INCOME DISTRIBUTION AND ECONOMIC GROWTH IN SOUTH AFRICA

VOLUME I THEORY AND ANALYSIS
VOLUME II STATISTICAL FOUNDATIONS

by

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TO STEFFI, MICHAEL AND ULRICH

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SUMMARY

It is the purpose of this study to examine the interplay of supply and demand factors for the South African economy, and to relate this to the functional, personal, and racial distribution of incomes. On the one hand, it appears that a concentration of incomes in the hands of those who possess both the ability and willingness to save, and to utilize the savings for productive investments, is a crucial determinant for the enhancement of economic growth. On the other hand, an excessive income concentration may severely limit the purchasing power of the major part of the population, thus inhibiting domestic investment.

The study is developed, partly in terms of a theory of economic development, and partly in terms of a theory of economic growth.

The analysis covers the period from 1918 to the present time. Periods during which the actual economic growth would have been faster had the distribution of incomes favoured work income receivers at the expense of other income receivers, are identified by employing a short-term post-Keynesian model of functional income distribution. Periods during which an acceleration of economic growth would have been achieved had the opposite condition prevailed, are also shown.

An analysis is made both of the division by race of aggregate income, and of racial wage differentials in particular economic sectors. A noticeable identity between the economic growth performance and racial wage differentials is evidenced both for the mining and manufacturing sectors.

It appears that in the long-term, there is regularity in respect of correlations between measures of the inequality in the size distribution of income on the one hand, and the rates of investment and economic growth on the other. From this observation it becomes evident that inequality in the distribution of personal income has been a necessary condition for the attainment of economic growth in South Africa.

It is obvious that a study of this sort necessitates the use of much statistical data. In order to avoid major disturbances in the flow of the theoretical and analytical arguments through the discussion of the statistical material, the work is submitted in two volumes, viz., Volume I dealing with the Theory and Analysis, and Volume II with the Statistical Foundations.

VOLUME I THEORY AND ANALYSIS

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LIST OF GRAPHS, VOLUME I

INTRODUCTION

The evolution of economic theory is closely connected with the search for an answer to the question of how the distribution of incomes develops during the process of economic growth. In the view of classical theorists, economic growth was associated with the overproportionate increase of one single factor share - rent in Ricardo's, and profit in Marx's system. An immediate verification or falsification was impossible, however, because economic theory ran ahead of national income accounting for almost a century. But even when the necessary national accounting statistics were produced some fifty years ago, [1] the discussion remained dormant at first, mainly because the neo-classical distribution theory had by then put forward new solutions to the question of factor shares - solutions, which seemed to be beyond empirical doubt. [2] But what was not then seen was that under the leadership of the neo-classical school, distribution theory had degenerated into a system which was relevant only in a micro-economic and static setting. The long-term, dynamic concepts of the classical school had been abandoned.

It was only after the Second World War that an active interest arose in constructing verifiable growth and distribution theories, and in empirically examining them. At the same time, the interest in the study of underdeveloped countries produced as a side-product: new knowledge about the relationship between distribution and growth processes over long periods of time. This knowledge was gained mainly by the use of cross-section studies of socio-economic settings of both underdeveloped and developed countries. The inadequacy of reliable statistical information about 19th century economies could therefore be largely overcome.

A prominent modern contribution to the understanding of income distribution and growth over long periods of time, is Simon Kuznet's Presidential Address to the American Economic Association in 1954, entitled "Economic Growth and Income Inequality". [3] It is Kuznet's finding that there was a long-term

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1. Paul Studenski, The Income of Nations, Part One: History (with corrections and emendations), New York University Press, New York, London, mainly p. 142 ff.
2. The climax of the neo-classical distribution theory was reached by George J. Stigler, Production and Distribution Theories, The Formative Periods, MacMillan, New York, 1941.
3. Simon Kuznets, "Economic Growth and Income Inequality", American Economic Review, Vol. XLV, 1955, pp. 1-28.

swing in the inequality characterizing the secular income structure, "widening in the early phases of economic growth when the transition from the pre-industrial to the industrial civilization was most rapid; becoming stabilized for a while; and then narrowing in the later phases".[1] Kuznets puts forward a large variety of arguments to substantiate his thesis. Factors such as savings and investment propensities, the drift from rural to urban employment, increase in legislative and political interferences, inflation, demographic observations, are employed for the explanation of his hypothesis.

The present study aims at investigating the possibility of a similar trend for South Africa, without, however, using the wide variety of arguments employed by Kuznets and others.[2] Instead, an attempt will be made to see the distribution and growth process as being mainly determined by the nation's allocation of expenditure between the consumer and the investment goods sector. To the extent that expenditures flow to the consumer goods sector, the domestic market gains in size and henceforth induces investments to be undertaken. When this happens, it has to be borne in mind, however, that investments and consumption are competitive, rather than complementary, under conditions of full employment, resulting in the rate of investment being lower than would have been possible, had consumer expenditure grown at a slower rate. The beneficiary effect which an expansion of the markets would have had under conditions when adequate productive capacity was already existent, is likely to dwindle, resulting in inflationary price increases, or deficits on the balance of payments account, or both.

The present study examines the relation between the growth of the rates of consumption and investment on the one hand, and the distribution of incomes, on the other, as it applies to South Africa. Whereas a widely spread command over purchasing power will stimulate consumption and thus induce the growth of markets,

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1. Kuznets, "Economic Growth and Income Inequality", American Economic Review, ibid., p. 18.

2. Compare also:
I. B. Kravis, "International Differences in the Distribution of Income", The Review of Economics and Statistics, Vol. XLII, 1960, pp. 408-416.

Maria Negreponti-Delivanis, Influence du Développement Economique sur la Répartition du Revenu National, Ecole Pratique des Hautes Etudes, Développement Economique, Collection publiée sous la direction de André Piatier, Sedes, Paris, 1959.

the concentration of incomes in the hands of those who are least likely to consume and who possess both the willingness and the ability to transfer savings into productive investments, can be regarded as a condition for a high rate of investment. This relation will be examined for the functional, personal, and racial distribution of incomes.

The study is developed partly in terms of a theory of economic development, and partly in terms of a theory of economic growth. Whereas the theory of development considers as variable factors things such as quantity and quality of the population, the availability of resources, propensities to consume and to invest, technical and commercial knowledge, and legal, social, fiscal, and monetary orders, the theory of growth assumes that the process of economic advance can be explained purely by economic concepts. Development theory is therefore more comprehensive: it involves the transformation of orientations and probably even cultures. Growth theory, on the other hand, assumes that sophisticated economic institutions and real and financial markets are existent already, and its concern is therefore confined to the rate of advance of the free market economy.

It is obvious that a study of this sort necessitates the use of much statistical data. In order to avoid major disturbances in the flow of the theoretical and analytical arguments through the discussion of the statistical material, the present work is submitted in two volumes, viz., Volume I dealing with the Theory and Analysis, and Volume II with the Statistical Foundations.[1]

During the statistical studies, care is devoted at all times to assess the error margin and error direction for individual time series. Moreover, an attempt is made to pinpoint deviations between statistical and theoretical income concepts, and to assess the relevance thereof.

Since the present study aims at discussing long-term developments, it is desirable to cover the longest possible historical period. This objective, however, is closely limited by the

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1. Since the reference sources for the two volumes differ widely it was decided to append a separate bibliography to each volume.

   In future quotations, reference to Volume II will appear in footnotes as "Compare Volume II, p. ____".

available data supply. Whereas statistical information on the gross domestic product by type of industry, is available from 1910 onwards, [1] certain other important time series are available only since about 1918. Examples are the industrial census data, [2] income tax statistics, [3] and data on the racial distribution of incomes. [4] However desirable it may be to extend the time coverage, it turned out that the systematic assessment of the relation between income distribution and growth is possible only for the 50 year period 1918 to 1968.

The availability of data also determines the periodization of the analysis. Whereas investigations concerning the functional distribution of incomes, are submitted on a year to year basis, the underlying relation between investment and economic growth is discussed for 5 year periods. With the exception of inter-racial wage differentials in mining and manufacturing, the racial distribution of incomes is investigated for unequal time intervals. Finally, the personal distribution of incomes is analysed on an annual basis for years before 1951, but only on an incidental basis for later years.

The plan of this dissertation is as follows:-

In chapter 1, [5] stages of economic development of the South African economy are discussed, with particular emphasis being put on exogenous factors which determine the historical growth pattern of the country. Chapter 2 defines concepts of income distribution and growth. This is succeeded by a discussion of the hypothetical and empirical relation between income distribution and growth in chapters 3 and 4. Chapters 5 and 6 investigate the types of models that can be used for the present study, and, as a key issue, the relation between the rates of investment and economic growth.

Three main types of functional distribution theory are analysed, viz., the post-Keynesian theory (chapters 7 and 8), the degree of monopoly theory (chapter 9), and the marginal productivity theory

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1. Compare Volume II, pp. 1 ff, pp. 181 ff, and Tables 1-10.
2. ibid., pp. 178 ff.
3. ibid., pp. 54 ff.
4. ibid., pp. 131 ff.
5. Since the decimal classification is used throughout, a chapter is indicated by an integer number.

(chapters 10 and 11). In all cases, the outline of the discussion is to investigate the significance and present-day assessment of these theories, and then to apply them to South African data. But in spite of the voluminous data which are reported upon in Volume II, difficulties are encountered time and again with the uneven quantity and quality of the available statistical information.

The relation between the racial distribution of incomes and economic growth is discussed in chapter 12, and that between the personal distribution of incomes and economic growth in chapter 13. Final conclusions are reported in chapter 14.

1. Development Stages of the South African Economy

At the outset it is appropriate to consider certain stages of the development of the South African economy in greater detail.

During the 50 year period 1918 to 1968, there has been a sustained increase in the rate of economic advance in South Africa. Whereas the average growth rate of the real gross domestic product during the pre-war years 1918 to 1938, was 3.5 per cent p. a., the corresponding rate for the years 1948 to 1968, was 5.2 per cent (compound rate of growth).[1]

Table 1 illustrates the compound rates of annual growth of the real gross domestic product for the four main sectors agriculture, mining, manufacturing, and services.[2]

TABLE 1 Compound Rates of Annual Growth, 1918-1968, 5 Year Intervals.[3]

Period	Agriculture	Mining	Manufacturing	Services	Total
1918-23	2.2	0.9	5.3	3.3	2.7
1923-28	-0.5	4.6	7.8	5.0	3.9
1928-33	-4.4	-3.2	1.7	-0.5	-1.5
1933-38	10.7	4.0	14.6	9.0	9.3
1938-43	5.9	0.4	3.5	5.7	4.7
1943-48	-1.3	0.9	9.9	4.1	3.7
1948-53	3.7	4.0	7.1	3.6	4.4
1953-58	1.1	9.7	5.5	4.5	4.8
1958-63	4.8	7.7	6.3	4.4	5.4
1963-68	1.4	4.2	7.1	6.3	5.7

1. Sources see footnote 3
2. For definitions of sectors, compare Volume II, pp. 188, 9.
3. Sources:
   1918-1963: Volume II, Table 48.
   1963-1968: South African Reserve Bank, Quarterly Bulletin, No. 98, December 1970, S-65, for gross domestic product by kind of economic activity, and S-64 for the deflator.

That there was in fact a sustained increase in the rates of growth during subsequent periods, can be examined when ten-year periods are compared, as is illustrated in Table 2.

TABLE 2 Compound Rates of Annual Growth, 1918-1968, 10-Year Intervals

Period	Growth in G.D.P., 1958 prices, per cent
1918-1928	3.3
1928-1938	3.7
1938-1948	4.2
1948-1958	4.6
1958-1968	5.6

The long-term acceleration of the rate of increase of real product values, constitutes an outstanding feature of South Africa's economic history during the past 50 years. This was, however, not achieved in a balanced fashion, in the sense that all economic sectors expanded their activities at equal rates. Although the mining industry can be regarded as the ultimate stimulant to the development of the South African economy,[1] its growth performance - together with that of the agricultural sector - lagged behind that of the manufacturing and services sectors. When seen over the whole fifty-year period, manufacturing grew with an average annual rate of 6.9 per cent, followed by services with 4.6, mining with 3.1, and agriculture with 2.3 per cent, respectively, giving an average growth rate of 4.3 per cent p.a. for all sectors.

One of the reasons which caused growth rates of the post-war years to exceed those experienced during pre-war years, was the fact that the overall impact of depressions was less during the latter than during the former decades. In this sense, the common distinction between 'prosperity' and 'depression', which was applicable for the South African pre-war economy, lost part of its relevance after 1945, when periods of inflationary full employment were followed by times when mild recessions together with relative price stability were experienced. The shortening of the downward amplitudes of the business cycle after 1945, has manifestly contributed to the acceleration of the overall growth rate experienced during the past 25 years.

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1. Compare D. Hobart Houghton, The South African Economy, Second Edition, Oxford University Press, Cape Town, 1969, p. 13, p. 104.

1.1 Exogenous Events which Influenced the Growth of the South African Economy

Economic growth cannot be fully explained by considering merely those factors which are endogenous to the system, such as the productive capacity which results from certain investments, the internal price system, or the volume of supplies forthcoming at certain prices.[1] It is necessary to refer also to certain exogenous factors, which have influence on the economy.[2] Examples are the two World Wars, or a shift in the external terms of trade brought about by, say, the devaluation of the currency of an important trading partner. In this sense, it is true to say that "economic growth of the country can only be interpreted in a historical context".[3]

1.1.1 The Period from Union to 1933

The first 23 years after Union have been classified by D. Hobart Houghton as a portion of the period during which the country laid her "Pre-Conditions for Take-Off", a growth stage which began as early as 1820.[4] Criteria of this period are the

1. A typical example of an endogenous model is given by Paul A. Samuelson, "Interactions between the Multiplier and the Principle of Acceleration", The Review of Economic Statistics, Vol. XXI, 1939, pp. 75-78.
2. These exogenous factors are called data by Walter Eucken, who writes: "Data, from the point of view of the economy as a whole, are those facts which determine the nature of the economic world without themselves being economic facts.* Data... constitute the frontier line up to which theoretical analysis is to be pursued and at which it has to break off."**
   Walter Eucken, The Foundations of Economics, History and Theory in the Analysis of Economic Reality, Hodge, London, 1950, * p. 213; ** p. 216.
3. D. G. Franzsen and J. J. D. Willers, "Capital Accumulation and Economic Growth", Income and Wealth, Series VIII, The Measurement of National Wealth, Ed. by R. Goldsmith and C. Saunders, Bowes and Bowes, London, 1959, p. 293.
4. D. Hobart Houghton, The South African Economy, ibid., p. 10. Houghton bases his classification on Rostow's well-known Stages of Economic Growth. For a critical discussion compare: Bruno Knall, "Wirtschaftserschließung und Entwicklungsstufen, Rostows Wirtschaftsstufentheorie und die Typologie von Entwicklungsländern", Zeitschrift des Instituts für Weltwirtschaft, Bd. 88, 1962, Heft 2, p. 210 ff.

weakening of traditional society, the advent of men of enterprise, the widening of market transactions, the development of an infra-structure, and, in the political field, the emergence of a centralised government.

Far-reaching repercussions for the South African economy arose with the Act of Union in 1910, which created the foundations for a Common Market for an area of 472,000 square miles. This was of vital importance for the newly emerging agricultural, pastoral, and manufacturing industries, which started to fill the growth-vacuum which had come about by the gold mines having reached an intermediate height of production by 1910.[1] Interestingly, the importance of the establishment of manufacturing activities was already acknowledged by the creation in 1910 of a Department of Commerce and Industries.[2]

Whereas the gold mining activities prior to Union had hardly exhibited any noticeable spread-effect as far as the introduction of secondary industries was concerned,[3] this condition changed significantly when, in the course of the First World War, imports were restricted and prices rose sharply owing to pent-up demand.[4] Further factors in aid of the developing industry were a substantial reduction in internal railway fares,[5] and the institution of preferential tariffs for some locally produced products.[6] The insufficient size of the market, however, together with the limitations set by lack of industrial experience and insufficiently forthcoming technical and financial resources, limited the new industrial activities to the production of final consumer goods,[7] whereas the provision of certain raw materials and semi-finished products was mainly forthcoming through imports.[8] The clothing industry, for example, processed imported textiles for many years, although South Africa was a major producer of wool.

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1. The so-called 'Gold Era' had ended in 1910. Compare: M. H. de Kock, Selected Subjects in the Economic History of South Africa, Juta, Cape Town, 1924, p. 127.
2. ibid., p. 129.
3. Compare Tjaart Andries du Plessis, The Industrial Growth Pattern and the Real Forces of Economic Expansion in South Africa, 1916/17-1956/57, unpublished D-Com Thesis, University of South Africa, 1965, p. 47.
4. The weighted average retail price index rose from 81.4 in 1914 to 145.8 in 1920. Union Statistics for Fifty Years, Jubilee Issue, H-23, col. 261.
5. After Union, the railways were no longer used for purposes of taxation, but charged economically orientated tariffs. de Kock, Selected Subjects ... ibid., p. 252.
6. Customs Tariff and Excise Duties Amendment Act, No. 36 of 1925. No protection was granted to industries supplying mining and agricultural requirements.
7. Final food processing was one of the main activities of the young industries.
8. Compare D. H. Houghton, The South African Economy, ibid., p. 115.

Although generally prosperous, the period under review also experienced great teething troubles. Significant downward swings in business cycles were experienced in South Africa (i) prior to and in the early years of the First World War (that is from 1912 to 1915),[1] (ii) during the Rand Mining Revolt (1920-1922), and (iii) during the Great Depression (1929-1932).[2]

The second and third of these three downward swings were so severe, that the experience then gained has moulded much of the South African political and economic thinking during later decades.

The Rand Mining Revolt was initiated by over-production and over-expansion, accompanied by a rapid rate of inflation (between 1919 and 1920 alone, retail prices rose by some 24 per cent),[3] unhampered speculation, and the absence of an appropriate fiscal and monetary control by the Government. Moreover, the premium which had been paid to an increasing extent for gold during the years 1919 and 1920, began to disappear.[4] This led to the most serious labour disturbance ever experienced in South Africa. Through the fall in the price of their final product, the gold mines were compelled to seek ways and means of reducing operating costs, which had risen in conjunction with the premium earned on gold. The employers attempted in particular to implement the recommendations of the Low Grade Mines Commission, 1920,[5] which were, inter alia,

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1. The South African Rebellion and the German South West Africa campaign (1912-1914), preceded the outbreak of the First World War.
2. The timing of the downswing is given by J. C. du Plessis, Economic Fluctuations in South Africa, 1910-1949, Bureau of Economic Research, Publication No. 2, Stellenbosch, (no date), Table 11, pp. 50, 1.
3. Union Statistics for Fifty Years, ibid., H-23.
4. The Index for the price of gold, was as follows:

1910-1918	100.0
1919	111.0
1920	131.6
1921	125.8
1922	100.6
1925-1931	100.0

S. Herbert Frankel, Investment and the Return to Equity Capital in the South African Gold Mining Industry, 1887-1965, An International Comparison, Blackwell, Oxford, 1967, p. 90.

5. Compare U. G. No. 34-1920, Low Grade Mines Commission, para. 178 ff.

to increase native employment and to remove the legal colour bar which had been introduced by the Mines and Works Act, 1911. Beginning in 1920, the number of White employees was reduced,[1] the employment ratio of Bantu to Whites increased,[2] wages were lowered, and the cost-of-living allowance rescinded. This resulted in a drop of wages and salaries paid out by the mining sector from R45, 150 million in 1920, to R28, 150 million in 1922, constituting a fall of some 38 per cent in labour costs.[3]

The economy measures, and the curtailment of statutory rights, were resisted by White miners who fought what they thought was "an unholy alliance between foreign capitalists and a corrupt government". (See footnotes 4 and 5.) In March, 1922, the Rand Mining Revolt broke out, resulting in street fights and the breakdown of law and order in Johannesburg. But this severe disturbance of labour relations was won by capital. The mining companies succeeded in implementing their demands and a vast body of low grade ore became profitable as a result of the various measures introduced.

After consolidation was reached, the economy experienced a significant boost during the good times, 1924-1930. To quote Walker: "Year after year the proceeds of the customs outran the sanguine estimates. The last of the good years yielded substantial surpluses both to the Treasury and the Railways, and ...to-morrow shall be as this day, and much more abundant".[6]

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1. The number of White employees dropped from 38, 032 in 1920 to 23, 712 in 1922. Compare Volume II, Table 43.
2. Compare Volume II, Table 44.
3. ibid., Table 43.
4. C. W. de Kiewiet, A History of South Africa, Social and Economic, Oxford University Press, London, 1957, p. 170.
5. The Profits Report of the Cost of Living Commission, 1919, clearly reflects signs of the beginning class struggle: "Society's quarrel ... is not with capital but with the power its possession gives to its owners - the private capitalists - over the lives of others. While it is true that Society cannot do without Capital it is becoming apparent that it cannot do with the capitalist.* Just as the 19th Century solved the problem of production, so the 20th Century will have to solve the problem of distribution".**
   U. G. 1-1919, * p. 80; ** p. 86
6. Eric A. Walker, A History of Southern Africa, Longmans, London, New York, Toronto, 1957, p. 609.

During the years of prosperity, the policy of protecting the 'Poor Whites' against the competition from cheap Bantu and Coloured labour, started a development which disturbed the forces of the free labour market by artificially protecting both the employment and wage rates of a section of the White population. [1] The 'Poor Whites' found themselves unable to compete after their urbanization, since they did not command the necessary industrial skills. The inauguration of the Department of Labour in 1925 and the passing of the Wage Act, were used for their protection. [2]

This 'paternalistic system', as Frankel has named it, [3] is likely to have retarded the organic development of the twenties to a certain extent. Although seemingly prosperous, there was in fact some under-utilization of resources (mainly labour) during this period, which prevented progressive non-Europeans to acquire living standards comparable with those of Whites.

The decade ended with the onset of the Great Depression which lasted from 1929 to 1932, and which was characterized, inter alia, by the collapse of the diamond trade, and a drop in the price of wool. A severe drought exacerbated the economic downturn. The country did not immediately follow Britain's devaluation in September, 1931, but devalued only in late 1932. [4] The abandonment of the gold standard which resulted in a drastic increase in the price of gold [5] and a tremendous boost in employment, brought the depression to an end.

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1. Grosskopf estimated that the number of 'Poor Whites' in 1931, was at least 220,000 persons. J. F. W. Grosskopf, The Poor White Problem in South Africa, Report of the Carnegie Commission, Vol. 1, p. vii.
2. The intention of the Wage Act was revealed during its Second Reading Debate by the Minister of Labour: "In South Africa, the lower civilization will gradually drive out the higher civilization. I believe there is room in South Africa for all of us, but I cannot understand ... that it can be in the long run good ... that the civilized population of South Africa should fail to keep their end up". The Wage Bill was said to protect "men who require a rate of wages upon which they can live according to decent civilized standards of life". House of Assembly Debates, Hansard, 1925, p. 1589 and 1590.
3. S. Herbert Frankel, "The Tyranny of Economic Paternalism in Africa, A Study in Frontier Mentality, 1860-1960", Supplement to Optima, Vol. 10, December 1960.
4. Interestingly, the Chamber of Mines at first supported the country's determination to stay on gold, because it knew that it would be difficult to lower wages if the old parity were re-introduced.
5. The index in the price of gold rose from 100.0 in 1931 to 167.2 in 1935.
   S. H. Frankel, Investment ..., ibid., p. 90.

1.1.2 The Period from 1933 to 1945

The period 1933 to 1945 has been classified by Houghton as the "South African Take-off into Self-sustained Growth". [1]

The era was characterized by a rapid increase in the rates of saving and capital formation, the diversification of industrial activities, and the commercialization of wide sections of hitherto unused resources. The 1930's saw a rapid expansion of gold mining, together with the introduction of deep level mining and the extension of mining activities to the West Rand. The revival of mining spread to manufacturing, where the labour force almost doubled between 1933 and 1939, [2] with the increase in the Bantu labour force being significantly faster than that in White labour. [3] The spread-effect of the revival was so fast that as from June, 1933, overtime was being worked by the full complement of workers in a number of factories, particularly in the engineering field. On the Witwatersrand, double shifts began to be run as from the same year. [4]

Together with the improvement of internal economic conditions went the expansion of export income, which increased rapidly owing to the uplift in the terms of trade.

By the outbreak of the Second World War, South Africa appears to have touched the full employment ceiling for her White manpower, [5] and in 1941 it became necessary to publish regulations for the control of the labour force. [6]

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1. D. H. Houghton, The South African Economy, ibid., p. 15.
2. From 164,790 employees to 307,069 employees. See Volume II, Table 45.
3. Bantu labour rose by 114 per cent, and White labour by 70 per cent, during the years 1933 to 1939. See Volume II, Table 45.
4. U. G. No. 43-1934, Report of the Department of Labour for the Year Ended December, 1933, pp. 24, 30.
5. U. G. No. 45-1941, Report of the Department of Labour for the Year Ended December, 1940, p. 7, reports:
"Owing to the international situation, industrial activity in the Union expanded in a remarkable way during the year under review and the effect in the labour market of this rapid development created difficulties of a kind not previously experienced in South Africa".
Partial production ceilings were reached long before the war. South African engineering firms found it impossible, for instance, to execute all orders the money for which had been voted under the 5-Year Defence Plan of 1934.
6. U. G. 45-1941, ibid., p. 4.

Of the period 1933 to 1945, the years 1940 to 1945 can be classified as the "liberal era" - as far as the extension of employment opportunities for Non-Whites is concerned. The sustained economic upswing allowed the removal of restrictive labour policies to a considerable extent, and Bantu in particular advanced in their occupational status. At the end of the War, the Native Laws Commission of Enquiry suggested that the urban Native be regarded as permanently settled, and described the idea of segregation as "utterly impracticable". [1]

1.1.3 The Period 1945 to 1968

The post-war era has been described by Houghton as belonging to the "Drive to Maturity". During this period, the expansion of economic activities gained further impetus, and the growing economy progressively diversified into new fields of production, such as textile manufacture, metal and engineering, liquid fuels and chemicals, inter alia.

Apart from the considerable pent-up demand which had been built up during the war years owing to supply restrictions, [2] certain exogenous factors accelerated the post-war boom, namely the devaluation of the South African pound in 1949, [3] the outbreak of the Korean War in 1950, and the discovery of the Orange Free State gold fields. A noteable exogenous effect which affected the economy in an adverse manner, was the Sharpville riot in 1960 and the confidence crisis which followed it. [4]

Apart from exogenous forces, endogenous factors contributed to the development of business cycles, the major impact originating from stock-piling cycles. [5]

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1. U.G. No. 28-1948, para. 23, p. 19.
2. On the magnitude of the pent-up demand, compare: C. van H. du Plessis, "Inflation - Its Effect on the South African Economy", Finance and Trade Review, Vol. 1, No. 2, January 1953, pp. 17-28.
3. The price of gold increased from 203.0 in 1948 to 292.2 in 1950. S.H. Frankel, Investment ..., ibid., p. 90.
4. Compare J. J. Human, South Africa 1960, Tafelberg Uitgewers, Cape Town, 1961.
5. Inventory cycles gain in impact when countries become more mature. Compare: Gerhard Colm, "Comments on the President's Economic Report of January 1954", The Review of Economics and Statistics, Vol. 36, 1954, pp. 254-266, here p. 256.

Most of the upswings experienced after the Second World War, were accompanied by supply shortages, increasing unavailability of skilled labour, and sustained price inflation. The Government applied a wide range of fiscal, monetary, and other select control measures from time to time, in order to induce the economy to develop on the envisaged 'full employment - stable money' path.[1] Several times, the initial depreciation allowances for new capital equipment were increased, in order to encourage greater investment outlays.

One of the major problems calling for government intervention was the persistent increase in demand for consumer goods. During most of the post-war years, the expansion of the consumer goods sector was achieved in direct competition with the expansion of the investment goods sector, resulting in the development of serious physical supply shortages. These were particularly severe in respect of the provision of infrastructural services, such as power-, transport-, communicational-, educational and hospital facilities.

The long-term economic development of the country has certainly been influenced significantly by the promulgation of the Physical Planning and Utilisation of Resources Act, 1967 which limits the number of Bantu labourers in certain metropolitan areas for ideological reasons.[2] This Act is likely to accelerate mechanization and, to a certain extent, even automation, although the supply of unskilled labour can still be regarded as practically unlimited. In this sense, this legislation constitutes a serious interference with the optimum allocation of productive resources.[3]

Mainly after 1967, the economy has experienced rates of inflation which were unduly high, when seen against the demands of the gold mines.[4] The main strength of demand stemmed from the

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1. The policy measures applied by the Government were, inter alia, import and foreign exchange restrictions and price and bank credit controls.
2. Compare Arnt Spandau, "Problemas de Direccion de Empresas en una Sociedad Pluralista - El Caso de Sudáfrica", Boletin de Estudios Económicos, Madrid, Vol. XXV, Diciembre 1970, Num. 31, pp. 759-787.
3. In the short-run, the Physical Planning Act has presumably had a disinflationary effect, because the level of private investment is likely to have been lower than would otherwise have been the case.
   Compare South African Reserve Bank, Quarterly Bulletin, No. 92, June 1969, p. 7.
4. Compare: "The Outlook for Gold Mining", A Memorandum Prepared by the Gold Producers' Committee of the Transvaal and Orange Free State Chamber of Mines, Swan Press, Johannesburg, 1967, p. 17. This document gives a good insight into the effects of inflation on South Africa's gold mines.

fast increase in government expenditures, resulting in demand-pull elements adding to the existing cost-push inflation.

At present, the South African economy can be regarded as semi-industrialized.[1] The manufacturing sector is well advanced, although its productivity is probably significantly lower compared with that of fully industrialized nations.

2. Definition of Concepts

2.1 Income Distribution

When used in the widest sense, the term 'income distribution' denotes any division of aggregate income.[2] Strictly speaking, the variety of possible disaggregations is unlimited.[3]

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1. T. A. du Plessis, "The South African Economy", Finance and Trade Review, Vol. VII, Nos 5 and 6, March, June 1967, p. 156.
2. Frank Münnich states categorically: "Eine Anordnung der Einkommen nach einem beliebigen Merkmal bezeichnen wir als eine Einkommensverteilung".
   Frank Münnich, Die langfristige Entwicklung der funktionalen Einkommensverteilung, Schriften zur wirtschaftswissenschaftlichen Forschung, Band 16, Hain, Meisenheim am Glan, 1966, p. 2. In the Anglo-Saxon literature the term 'income distribution' is mostly employed in the narrower sense where only the functional and personal categories of distribution are considered.
   Compare for instance Michael J. Brennan, Theory of Economic Statics, Prentice-Hall, Englewood Cliffs, 1965, p. 353 f.
   Kenneth E. Boulding, Economic Analysis, 3rd Edition, Hamish Hamilton, London, 1955, p. 197 ff.
3. Alfred Stobbe attempts an overall classification of the theory of income distribution. His main distinction is one between a real income distribution (measured in terms of the physical result of production), and a nominal distribution (measured in terms of the distribution of claims against the product). For these two cases, Stobbe suggests a structural, a personal, and a functional subdivision. The structural distribution asks how much income a particular industry will earn. The personal distribution asks for the income of groups of persons and the functional distribution examines the "Verteilung der Güter und Dienste nach Funktionen, die sie im Wirtschaftsprozess ausüben", * i. e. the relation between consumption and investment goods (in a closed economy). Stobbe's terminology is not in accord with the common usage of terms, as will be seen below.
   Alfred Stobbe, Untersuchungen zur makroökonomischen Theorie der Einkommensverteilung, Kieler Studien, Forschungsberichte des Institutes für Weltwirtschaft an der Universität Kiel, Herausgeber Erich Schneider, Tübingen 1962, p. 4 ff.

   * ibid., p. 8.

In the discussion of the term 'income distribution', a distinction will be made between the funtional, personal, and racial distributions of aggregate income. Some peripheral use will be made of sociological and structural criteria, but this will be done only insofar as they underline the statements made in connection with the three main classifications.

2. 1. 1 The Functional Distribution of Income

We owe the term 'functional distribution' to John Bates Clark, who wrote: "What we call functional distribution decides how much is secured in a particular way. It makes the pay for a certain grade of labor $ 1. 50 a day, regardless of who performs the labor. It makes the rate of interest five per cent, regardless of who gets it". [1] That there exists a close relation between the 'functional' classification of income receipt and the process of production, is shown by Wilhelm Krelle: "Die funktionelle Verteilungstheorie hat es mit dem Einkommen zu tun, wie es der Produktionsprozeß den 'Produktionsfaktoren' zufließen läßt". [2]

As economic theory developed, the functions performed by productive agents were defined differently. David Ricardo, the originator of the income distribution theory, distinguished three classes, namely, the proprietors of land, the owners of capital, and the labourers, who receive rent, profit, and wages, respectively. [3] Jean Baptiste Say separated the entrepreneur from the owner of capital: the former receives profits and the latter interest. [4] The coordinating process which is performed by the entrepreneur has been described by John Bates Clark as a function which "in itself includes no working and no owning of capital: it consists entirely in the establishing and maintaining of efficient relations between the agents of production". [5]

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1. John Bates Clark, The Distribution of Wealth, A Theory of Wages, Interest, and Profits, Macmillan, New York, London, 1927, p. 6.
2. Wilhelm Krelle, Verteilungstheorie, J. C. B. Mohr (Paul Siebeck), Tübingen, 1962, p. 4.
3. David Ricardo, The Principles of Political Economy and Taxation, with an Introduction by F. W. Kolthammer, Everyman's Library, No. 590, Edited by Ernerst Rhys, J. M. Dent and Sons, London, 1943, Original Preface, p. 1.
4. Alfed Amonn, "Say, Jean Baptiste", in: Handwörterbuch der Sozialwissenschaften, Band 9, Gustav Fischer, Stuttgart, J. C. B. Mohr (Paul Siebeck), Tübingen, Vandenhoeck and Ruprecht, Göttingen, 1956, p. 94, left column.
5. John Bates Clark, The Distribution . . . , ibid., p. 3.

F. van den Bogaerde has recently pointed out that from Clark's profit concept has originated an interesting inconsistency. Thus, under conditions of perfect competition, the entrepreneurial task is not needed, since in a stationary state nothing ever changes. Hence the entrepreneur cannot claim an income, and the firm, which is following a policy of profit maximization, can only achieve zero profit as an optimum. Van den Bogaerde concludes: "If there is perfect competition profits are a non-contractual residual payment to the entrepreneur which marginal analysis shows only to be possible in the short run; in the long run profits do not exist for they will then be annihilated by competition". [1]

In Western countries, the share of rents in total income has declined substantially during the process of industrial development. [2] Because of this, the provision of land is now often no longer regarded as a separate economic function but grouped together with the provision of capital. [3]

A new approach to the grouping of income receipts has recently been suggested by the French economists Jean Marchal and Jacques Lecaillon. They maintain that an incessant re-definition of income groups is necessary if one wants to describe the

1. F. van den Bogaerde, "Constant Returns to Scale: Applications and Implications", The South African Journal of Economics, Vol. 38, No. 3, September 1970, p. 236.
   Compare also : F. van den Bogaerde, "Makro-Ekonomie en die Verdelingsleer", The South African Journal of Economics, Vol. 38, No. 4, December 1970, p. 353 ff.
2. D. Gale Johnson estimated the return to land in the United States between the years 1910 and 1946 by multiplying the annual average rate of interest on farm mortgages by the estimated value of farm real estate on January 1 of the current years. He found that rent on land, as a percentage of the agricultural income, decreased from 39. 8 to 13. 3 per cent between the years 1910 and 1946. *
   In a different article, Johnson has shown that there occurred a secular decrease in the share of rents in income in the United States, even when urban land was taken into account as well. Suffice it to say that he estimates, that the share of rent in the national income decreased from 7. 2 per cent during 1925 to 1929, to 3. 4 per cent from 1947 to 1952. **
   * D. Gale Johnson, "Allocation of Agricultural Income", Journal of Farm Economics, November 1948, Tables I and II, pp. 728, 9.
   ** D. Gale Johnson, "The Functional Distribution of Income in the United States, 1850-1952", The Review of Economics and Statistics, Vol. XXXVI, 1954, Table I, p. 179.
3. Compare Wilhelm Krelle, Verteilungstheorie, ibid., p. 3.

real world. "Lentement ou brutalement l'organisme social se transforme sans arrêt. ... Une étude doit être faite pour chaque pays ou chaque groupe de pays et renouvelée périodiquement. Des catégories peuvent se fragmenter ou se réunir, des compartements évoluer. Les types de participants ne sont pas identiques dans tous les cas."[1] The authors suggest that the peoples' ways of life (manières de vivre) and their value judgments (des valeurs identiques) should be made the principal criteria for the grouping of income recipients.[2]

In this connection they suggest that five income groups be distinguished:-[3]

i. employees (le group des salariés);
ii. entrepreneurs in industry and commerce (le groupe des titulaires de profit);
iii. farmers (le groupe des exploitants agricoles);
iv. lenders of money and goods (le groupe des prêteurs);
v. receivers of transfer payments (le group des bénéficiaires de transferts.)

Of these, only groups i and iv receive pure functional incomes. Groups ii and iii receive mixed labour, capital, and profit incomes to the extent to which the respective functions are performed by individual income recipients. Since group v commands a legal and not an economic income claim it cannot be regarded as a functional category at all. The inclusion of group v into the system of income recipients would require that the disposable (or personal) rather than the national income concept be applied for the analysis.

At the present stage of theoretical development, the desire to classify groups of income recipients, has distinctly outrun the supply of suitable theories for the suggested classifications. Frank H. Knight goes so far as to suggest: "I would like to make every individual agent a separate factor", and he envisages a "continuous gradation between every factor and every other factor".[4] How

1. Jean Marchal, Jacques Lecaillon, La Répartition du Revenue National, Paris 1958, Tom. I, p. 35, 6.
2. ibid., Tom. I., p. 48.
3. ibid., Tom. I., p. 66.
4. Frank H. Knight, Discussion of Boulding's Paper on "Wages as a Share in the National Income", in: The Impact of the Union, Edited by David McCord Wright, Harcourt, New York, 1951, p. 164.

this ambitious desire will be fulfilled theoretically remains, however, to be seen.

2. 1. 1. 1 Theoretical Versus Accounting Income Concepts

To conceive pure functional categories of income receipts requires that a portion of traditional national accounting definitions be abandoned.

Labour income, in the traditional accounting sense, cannot be regarded as a pure functional category, because it consists of a mixture of wages and profits, insofar as specialized for-the-job training is required for the attainment of a particular income. To quote Robert M. Solow: "An unknown fraction of society's capital takes the form of the improvement of human abilities and skills. ... If it were possible to separate out the part of nominal wages and salaries which is really a return on investment, the share of property income in the total might be found to be steadily increasing". [1]

Being a mixture of wages, interest, and profits, the income received by non-corporate businesses (i. e., by private business proprietors) constitutes probably the greatest problem for national income statisticians, and has been referred to as the "crux of the functional income distribution". [2] Here, one and the same person, the individual proprietor, performs different economic functions, which are inseparably interwoven one with the other.

Krelle suggests that the income of non-corporate businesses should be regarded as a case 'sui generis' and that the functional income distribution theory should not deal with non-corporate income at all. [3] The error caused by this suggestion is dependent on the relative size of this type of income and on its relative change over a period of time. In view of the fact that the contribution to national income by non-corporate businesses has sharply declined during recent decades in Western countries, Krelle's suggestion

1. Robert M. Solow, "A Skeptical Note on the Constancy of Relative Shares", The American Economic Review, Vol. XLVIII, June 1958, Number 3, p. 616.
2. Wilhelm Krelle, Verteilungstheorie, ibid., p. 3.
3. ibid., p. 3.

does not appear to be operational for long-term analyses.[1]

An alternative solution would be to regard the total of non-corporate business income as one unity, say, property income, as is done in South Africa's income statistics.[2] As far as this method is concerned, a warning has been expressed by Edward C. Budd who writes that "...it should be observed that the difference between a market price imputation and actual entrepreneurial income is considerably less than the error introduced by attributing all of it to one or the other of the agents".[3] Budd consequently suggests that imputed prices, wage rates, and rental rates should be used to separate income parts of joint economic functions.[4] Apart from pragmatic arguments, theoretical considerations also postulate that the income of working proprietors should be split up into its components. The type of income here under discussion is a legal, not an economic entity. Legal concepts, however, should not be allowed to halt economic analysis.[5]

Like labour income, profits do not constitute a pure functional category. At least three major types of profits can be distinguished

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1. The relative decline of non-corporate income produces a certain statistical distortion which would not occur had the share of non-corporate business income in total income stayed constant. Evidence on the decline of non-corporate income is given by Irving B. Kravis who reports for the United States of America, that the assets of non-corporate enterprises "form a substantial, albeit declining, share of total private wealth. In 1956, unincorporated businesses and farms accounted for 23 per cent of the total tangible assets of the private sector (excluding durable consumer goods); in 1900, they accounted for 41 per cent".
   Irving B. Kravis, "Relative Income Shares in Fact and Theory", The American Economic Review, Vol. XLIX, December 1959, Number 5, p. 923.
2. Compare Volume II, p. 5.
3. Edward C. Budd, Comment on a Paper delivered by S. A. Goldberg, "Long-Run Changes in the Distribution of Income by Factor Shares in Canada", in: The Behaviour of Income Shares, Selected Theoretical and Empirical Issues, Studies in Income and Wealth, Vol. 27, By the Conference on Research in Income and Wealth, A Report of the National Bureau of Economic Research, Princeton, 1964, p. 280.
4. D. Gale Johnson, alternatively imputed wages to farmers and treated rents as a residual, and imputed rents and treated wages as a residual. Over a number of years he got about the same results.
   Compare D. G. Johnson, The Allocation of Agricultural Income, ibid.
5. It is noteworthy, however, that a prominent scholar like Erich Gutenberg maintains that profits have to be regarded as one unity which cannot be broken into parts. Erich Gutenberg, Grundlagen der Betriebswirtschaftslehre, Erster Band, Die Produktion, 5. Auflage, Springer, Berlin, 1960, pp. 6-8 and pp. 106 ff.

and the division of total profit into these different components has entirely different theoretical repercussions.

In the first instance, profit constitutes a reward for innovation and enterprise. Profit in this sense is a reward that accrues to the successful innovator of new processes of production. Through his innovations the entrepreneur creates for himself a quasi-monopoly the lifetime of which depends on the reactions of his rivals and on the prevailing legal and economic order. This type of profit has been described by Joseph A. Schumpeter as the "prime mover" of the capitalist society. He considers profits as "the premium put upon successful innovation in capitalist society" which is "temporary by nature: it will vanish in the subsequent process of competition and adaptation". [1]

A second theory regards profits as a remuneration for uncertainty and risk. According to Frank H. Knight for instance, the total value of residual incomes is attributable to the existence of risk and uncertainty in the real economic world. (See footnotes 2 and 3)

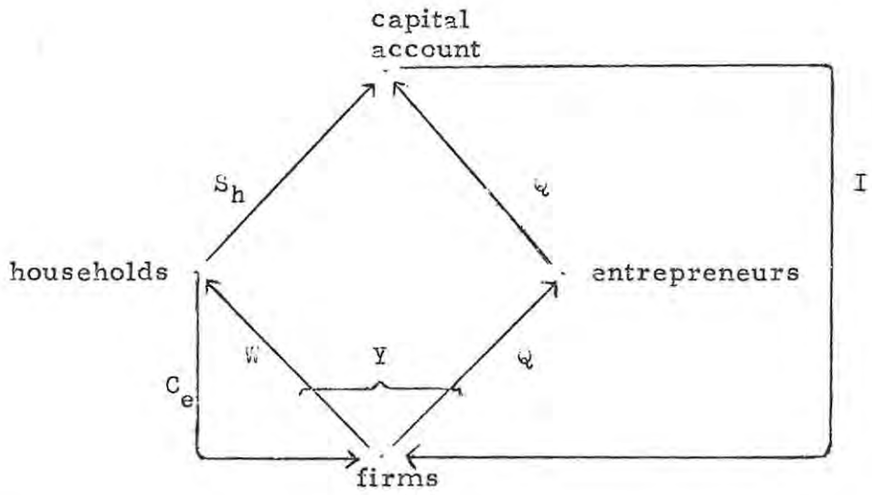
The eclecticisms of both Schumpeter and Knight suffer from the fact that a statistical approach to their definitions is impossible.

So far we have discussed profits as factor rewards. It should be noted, however, that there is a third case in which profits accrue whenever a demand curve slopes downward. Frank Münnich refers to the "Lehnstuhlmonopolisten, ... (dessen) einzige Leistung darin besteht, den Cournotschen Punkt zu finden". [4] Erich Preiser defines the dynamic version of this kind of profit as Q-Profit: "Er (i. e., the Q-Profit), entsteht unter der Konstellation I> S. Aber er ist nicht der Gewinn aus der Investition, er mißt nicht der Erfolg der Investition. Der Q-Gewinn ist lediglich ein Nebenprodukt

1. Joseph A. Schumpeter, Business Cycles, A Theoretical, Historical, and Statistical Analysis of the Capitalist Process, Volume I, 1st Edition, 4th Impression, McGraw-Hill Book Company, New York and London, 1939, p. 105 and 106.
2. Frank H. Knight, Risk, Uncertainty and Profit, No. 16 in Series of Reprints of Scarce Tracts in Economic and Political Science, The Riverside Press, Boston and New York, 1921, p. 46, pp. 264 ff.
3. Schumpeter criticizes this view by his claim that risk-bearing cannot be regarded as an entrepreneurial function but must be seen as a function of the capitalist. J. A. Schumpeter, Business Cycles, ibid., p. 104.
4. F. Münnich, Die Langfristige Entwicklung, ibid., p. 6.

der Investitionstätigkeit".[1] In the Anglo-Saxon literature this kind of profit is known as 'windfall-profit'.

The macro-economic generation of a Q-Profit can be shown by means of a four-sector-model consisting of the poles 'firms', 'households', 'entrepreneurs', and 'capital account'. The firms pay wages (W) to the households and profits (Q) to the entrepreneurs. Wages and profits together form income (Y) in this two-class model. The households dispose of their income by spending part of it on consumption (C) and by saving the residual (S_h). For the entrepreneurs it is assumed that all profits are credited to the capital account. S_h and Q together form the balance value for net investments (I). The respective situation is shown in graph 1.



GRAPH 1

It can be seen that the balance equation of the capital account is

$$I = S_h + Q, \text{ or}$$

$$Q = I - S_h, \text{ with } Q \gtrless 0 \text{ if } I \gtrless S_h.$$

In the present model, profits are defined as a non-factor income, i. e., profit net of interest payments allocated to capital (which is provided by the household sector). In this sense, profits

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1. Erich Preiser, "Multiplikatorprozeß und dynamischer Unternehmergewinn", in: Bildung und Verteilung des Volkseinkommens, Gesammelte Aufsätze zur Wirtschaftstheorie und Wirtschaftspokitik, 2., durchgesehene und erweiterte Auflage, Göttingen, Vandenhoeck & Ruprecht, 1961, p. 160.

constitute a residual income which can accrue in the short-run only.[1] If profits were not residual by nature, they could not possibly be maximized, since productive (i. e. non-residual) factors have to be used as sparingly as possible.

The empirical investigation requires that the functional factor contributions be separated as far as is required by the object of the research. For South Africa, we are faced with the dilemma that the actual supply of data is deficient in both type and quantity.[2] But even income statisticians of the United States who have at their disposal the world's most sophisticated system of national accounts, are modest when it comes to the border line of what is wanted and what is available. Simon Kuznets, probably the world's best known expert on national income statistics, puts forward a rather comforting view in this respect:- "As in all economic statistics, the institutionally available categories do reflect real distinctions, and their failure to resolve some major underlying problems in the definition and measurement of purer analytical concepts ... are not reason enough ... to dismiss them as worthless. The fault may lie with our desire to push analysis to clearly defined distinctions far removed from those recognized in the institutional patterns of our society. ... Under the circumstances it is perhaps best to accept the institutional accounting conventions of the available estimates for the half-loaf that they are ..."[3]

2.1.2 The Personal Distribution of Income

John Bates Clark, who first suggested the term, defined personal income distribution as "the income of particular men. It gives to A $ 500 a year, to B $ 50,000, to C $ 500,000 etc., regardless of the way in which any income is obtained".[4]

Krupp criticizes Clark's definition, pointing out that it is the household, and not the individual person, which must be regarded as

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1. These are profits generated by the capitalistic system as such and do not form part of the entrepreneur's cost calculations.
2. Compare Volume II, pp. 5 ff.
3. Simon Kuznets, "Quantitative Aspects of the Economic Growth of Nations, IV, Distribution of National Income by Factor Shares", Economic Development and Cultural Change, Vol. VII, No. 3, Part II, April 1959, p. 7.
4. J. B. Clark, The Distribution ..., ibid., p. 6.

the income receiver.[1] Three arguments can be put forward to substantiate this thesis, (i) the income receiver must be defined in terms of the social responsibility of the household head which is a function of the marital status and the number of dependants; (ii) different members of the household may earn incomes in their own rights which is then normally pooled by the household; (iii) economic decisions about income earned and income spent are taken by the community which the household forms and not by its individual members.

Other authoritative scholars of national accounting concepts such as Kuznets,[2] Ruggles,[3] and Brady,[4] suggest that the analysis of the personal distribution of income should consider incomes received by individuals. They argue that it is the individual (and not the household) who comes into direct contact with the machinery of production.

Moreover, personal income distribution statistics are occasionally grouped according to families. This concept is somewhat narrower than that of a household, since persons who live together with common housekeeping arrangements, but who are not related by kinship, are separately enumerated by family income censuses.

It would appear that one should give preference to the use of the family or household concepts, when welfare statements are to be made, whereas the personal concept appears to be superior from the point of view of theoretical accuracy. Unfortunately, the

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1. Hans-Jürgen Krupp, Theorie der personellen Einkommensverteilung, Allgemeine Grundzüge und verteilungspolitische Simulationen, Volkswirtschaftliche Schriften, Heft 127, Duncker & Humblot, Berlin, 1968, p. 13.
   For similar views compare Wilhelm Krelle, Verteilungstheorie, ibid., p. 4, and Irving B. Kravis, "Income Distribution: I, Functional Share", International Encyclopaedia of the Social Sciences, Vol. 7, Ed. by David L. Sills, Macmillan, Free Press, 1968, p. 137, left column.
2. Simon Kuznets, "National Income", Encyclopaedia of the Social Sciences, Edited by R. A. Seligman, Vol. 11, MacMillan, New York, 1933, p. 219, right column.
3. Richard Ruggles, "Economic Data", International Encyclopaedia of the Social Sciences, ibid., Vol. 4, p. 366, right column.
4. Dorothy S. Brady, Measurement and Interpretation of the Income Distribution in the United States, International Association for Research in Income and Wealth, Series VI, Ed. by Milton Gilbert and Richard Stone, Bowes and Bowes, London 1956, pp. 82, 3.

availability of data does not allow for much choice.[1] In a similar connection, Friedman once said: "We seek to measure what we want to measure; we often end by measuring what we can and producing a convincing rationalization that this is what we 'really' want to measure".[2]

Less effort has been spent on the development of the personal income distribution theory, compared with that of functional income distributions. Krelle argues that this is attributable to the fact, that the personal income determination does not stand in direct correlation to the working of the markets: "Die personelle Verteilung hängt ... von Zufälligkeiten der Besitzverteilung, von der Steuergesetzgebung und dem Sozialversicherungsschema ab. Es sind bei ihr sehr viel mehr Effekte überlagert, so daß sie sich für eine theoretische Analyse weniger anbietet". (See footnotes 3 and 4.)

In respect of the personal income distribution the distinction can be made between primary and secondary distributions.[5] The

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1. Compare Volume II, pp. 7 ff.
2. Milton Friedman, "Comment on a Paper delivered by Dorothy S. Brady", Research on the Size Distribution of Income, Studies in Income and Wealth, Vol. 13, National Bureau of Economic Research, Riverside Press, New York, 1951, p. 57.
3. Wilhelm Krelle, Verteilungstheorie, ibid., p. 4.
4. Eugen von Böhm-Bawerk, in his classical essay "Macht oder ökonomisches Gesetz?", maintained that the functional distribution of income could not be materially changed through power, whereas the personal distribution could:-
"Und noch eines kann, wie ich genügend anschaulich gemacht zu haben hoffe, auch das gebieterischste Machtdiktat nicht: es kann nicht gegen, sondern nur innerhalb der ökonomischen Wert-, Preis, und Verteilungsgesetze wirken, sie nicht aufhebend, sondern bestätigend und erfüllend". * ... "Indem durch Macht auch die Daten bleibend verschoben werden können, in die die funktionellen Verteilungsregeln einspielen, sind auf dem Felde der personellen Verteilung Eingriffe möglich, deren Wirkung keinerlei zeitliche Grenzen gesteckt sind". **
   * Eugen von Böhm-Bawerk, "Macht oder ökonomisches Gesetz?" Gesammelte Schriften von Eugen von Böhm-Bawerk, herausgegeben von F. X. Weiss, Wien 1924, p. 295.
   ** ibid., p. 299.
5. Simon Kuznets, Quantitative Aspects..., ibid., p. 6.

primary personal distribution refers to the distribution of income by size as it emerges in the productive process. The secondary distribution, on the other hand, refers to the distribution after the impact of redistribution through public finance has made its effect.

The distinction between the primary and secondary distributions of personal income can be made in a narrow or in a wider sense, respectively. In the narrow sense, the analysis is confined to the effects of public finance on the redistribution of income (fiscal policies, taxes, and transfer payments). In the wider sense, other impacts of government actions on the distribution of income are also taken into account, such as minimum wage legislation, price legislation (including retail price legislation), anti-monopoly legislation, and other measures of economic policies.

From the statistical point of view, an analysis of the effect of secondary distribution in the narrower sense, is possible when recourse is had to statistics supplied by the Department of Inland Revenue. The effect of secondary distribution in a wider sense is, however, to a large extent not quantifiable, with the exception of wage, and minimum and maximum price legislation.

2.1.3 Unification of the Functional and Personal Income Distributions

That there exists the possibility of a unification of the two main branches of distribution theory has been maintained time and again. A provoking thesis was put forward by Erich Preiser:- "Man muß sich indessen darüber klar sein, daß die Frage nach der Verteilung immer auf das Einkommen von Personen abzielt. Der Begriff der funktionellen Verteilung entstammt der Produktionstheorie, die den dinglichen Produktionsfaktoren ... ihren Anteil am Ertrag zurechnet. Unter bestimmten Umständen fließt dann den Besitzern dieser dinglichen Faktoren ein entsprechendes Einkommen zu. Insofern aber ist die Einkommensverteilung aber immer 'personell' ".[1]

1. Erich Preiser, "Distribution (I)", Handwörterbuch der Sozialwissenschaften, 2. Band, 1959, p. 622, left column. Compare by the same author: "Besitz und Macht in der Distributionstheorie", in: Bildung und Verteilung des Volkseinkommens, ibid., pp. 229 ff.

That the two theories can be unified can be shown as follows: assume that all income is factor income (i. e., transfer income is nought). In this case the functional and personal income distributions can be combined in a matrix whose columns show the number of households and whose lines the number of productive factors.

Assume: - $i = 1, 2, \ldots, m$ number of m households in an economy;

$j = 1, 2, \ldots, n$ number of n functional factor contributions;

Y_{ij} income received by the i'th household for the supply of the j'th service.

The income matrix ($\overline{Y}$) can now be written as: -

$$\overline{Y} = \begin{bmatrix} Y_{11} & Y_{12} & \cdots & Y_{1n} \\ Y_{21} & Y_{22} & \cdots & Y_{2n} \\ \cdots & \cdots & \cdots & \cdots \\ Y_{m1} & Y_{m2} & \cdots & Y_{mn} \end{bmatrix}$$

The sum of any line is $\sum_{j=1}^{n} Y_{\overline{i}j}$ (for $i = \overline{i}$) and indicates the total income earned by any household from one or more than one functional contribution. Cross-distributions[1] occur when incomes of households stem from different functional sources, i. e. when at least two elements of a line are unequal to zero.

The sum of a column is $\sum_{i=1}^{m} Y_{i\overline{j}}$ ($j = \overline{j}$) and shows the total income earned in the economy by a particular functional factor.

The total sum of all lines is identical with the total sum of all columns and indicates the income of the economy (excluding transfer income). The equation can be written as

$$Y^* = \sum_{i=1}^{m} \sum_{j=1}^{n} Y_{ij}, \text{ where } Y^* \text{ represents the total income.}$$

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1. Hans-Jürgen Krupp, "Personelle und funktionelle Einkommensverteilung", in: The German Economic Review, An English-language Quarterly on German Economic Research and Current Development, Vol. 5, 1967, Number 3, p. 219.

2.1.4 The Racial Distribution of Income

The concept of race is defined by Lundberg, Schrag, and Larsen as follows: "... Race disignates a system for classifying people according to certain physical characteristics. Members of racial groups differ with respect to pigmentation, hair form, physique, and other observable traits". [1]

In South Africa, four main races are officially distinguished, viz., Whites, Coloureds, Asiatics, and Bantu. The characteristics which distinguish members of these races, are far more embracing than those mentioned in the biologically determined definition above. In contrast, it is also differences in culture, language, social organisation, and education, which are associated with race in South Africa.

In regard to the racial classification of individual persons, Muriel Horrell maintains that "scientists would probably say that the task is impossible". [2]

Horrell's assertion may be valid for particular individual persons, but the present writer doubts whether it can be regarded as representative for the majority of the South African population. Here there would seem to exist a classification according to race which, in respect of most individual persons, rarely changes. [3]

The following definition of races is given by the 1951 Population Census:- (See footnotes 4 and 5.)

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1. George A. Lundberg, Clarence C. Schrag, Otto N. Larsen, Sociology, revised edition, Harper, New York, 1958, p. 230.
2. Muriel Horrell, A Survey of Race Relations in South Africa, 1954-55, South African Institute of Race Relations, Johannesburg, 1955, p. 33.
3. Horrell does not make it clear whether she refers her statement to a particular, individual person (which is correct), or to the majority of the population (which is wrong).
4. U.G. 42-1955, Population Census, 8th May, 1951, Geographical Distribution of the Population of the Union of South Africa, p. V.
5. It is not clear on which Act this definition is in fact based. It seems that the definition constitutes a mixture of legal and pragmatic rulings.
   The definition does not agree, for instance, with the Population Registration Act (Act No. 30 of 1950, as amended), which distinguishes only between three races, viz., Whites, Bantu, and Coloureds.

(i) WHITES - Persons who in appearance obviously are, or who are generally accepted as white persons, but excluding persons who, although in appearance obviously white, are generally accepted as Coloured persons.

(ii) NATIVES - Persons who in fact are, or who are generally accepted as members of any aboriginal race or tribe of Africa.

(iii) ASIATICS - Natives of Asia and their descendants, mainly Indians and Pakistani, with a few thousand Chinese, and small numbers of various other Asiatic nationalities.

(iv) COLOUREDS - All persons not included in any of the three groups referred to above. The great majority of the persons in this group are the persons known as the Cape Coloureds, but persons of mixed White and non-white blood are also included. The Cape Malays, when not shown separately, are also included in this group.

For the majority of the population, the classification or the race membership certainly stays unaltered during their lifetime, although it is a known fact that individual cases of re-classifications occur in South Africa, and are fought in the courts. For the statistical picture as a whole, it can be assumed that these cases are irrelevant.

The terminology concerning different races in South Africa has been discussed by D. Hobart Houghton.[1] According to him the term 'European' for instance is misleading because "the vast majority (of the white settlers) have been living in Africa for several generations". The term Native is likewise unsuitable, because White South Africans (if born in South Africa) are also natives. Also, the term is derogatory.

In respect of the terminology that will actually be used in the present study, it is not always possible to keep to a pre-defined pattern, because different terms come in through quotations. In principal, however, white South Africans will be referred to as Whites, people of mixed racial descent as Coloureds, people of

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1. D. Hobart Houghton, Economic Development in a Plural Society, Studies in the Border Region of the Cape Province, Published on behalf of the Institute of Social and Economic Research, Rhodes University, Oxford University Press, Cape Town, 1960, p. v ff.

Asiatic descent as Asiatics, and the indigenous Bantu-speaking population as Bantu. Occasionally, the term "Europeans" may be substituted for the term "Whites","Indians" for "Asiatics", and "Natives" for "Bantu".

2.1.4.1 Racial Pluralism in South Africa

South Africa is a plural economy, since her inhabitants are persons of different race groups, whose ways of life are to a large extent determined by their separate culture and by numerous legal enactments, planned in accordance with an all-embracing apartheid ideology.[1] In 1970, the number of Whites was 3.8 million, that of Coloureds, 2 million, of Asiatics, 0.6 million, and of Bantu, 14.9 million.[2] The Whites, who constitute the ruling group in the spheres of political and economic life, thus comprise 17.8 per cent of the total population.[3]

Theoretically, race as such need not necessarily sectionalize a population into a plural stratification, since prevailing scientific opinion suggests that the characteristics of different races are a cultural, not a hereditary phenomenon.[4]

What, then, are the causes of the racial polarisation found in South Africa? According to a recent study submitted by C. Orpen, it would be wrong to assume that White South Africans as such are more prejudice-prone than other people. Orpen writes:

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1. For a good outline of the apartheid ideology compare N.H. Rhoodie and H.J. Venter, Apartheid. A Socio-Historical Exposition of the Origin and Development of the Apartheid Idea, Cape Town, Pretoria, 1959.
2. House of Assembly Debates, Hansard, 25th September, 1970, col. 5132.
3. The corresponding percentage at the 1960 census was 19.3. The relative decline of the White population is due both to genuine changes in the population structure and to under-estimation of the number of non-Whites at the earlier census date.
4. For South African conditions, this aspect has been examined by S. Biesheuvel, the Director of the National Institute for Personnel Research, on numerous occasions. Compare by this author: "Work and its Effect on Personality Development in Africans", in: Problems of Transition, Proceedings of the Social Sciences Research Conference, 1962, Edited by J.F. Holleman et alia, Pietermaritzburg, Natal University Press, 1964, pp. 81-102.
"Mind, Manners and Morals, Some Problems in Cultural Readjustment", Race Relations Journal, Vol. XXII, No. 3, 1955, pp. 10-30.

"What evidence is available suggests that the accusation that we South Africans are 'cruel' or 'evil' and that it is this fact which has led us to set up a system of segregation is not only a gross over-generalisation but is also incorrect".[1] Using research results stemming from a psychological investigation into the prejudice of White South Africans, Orpen submits that the cultural milieu, and the fact that the highly developed in-group (i. e. the Whites) have casual and superficial contact[2] with the Bantu, are responsible for the shaping of attitudes of White South Africans toward the Bantu. The strong feelings of rejection between different race groups, which have been observed for a long time,[3] must therefore be regarded as a result of a political policy which deliberately limits the opportunity for interracial social contact.

The existence and institutionally perpetuated stratification between Whites and Bantu is likely to have accentuated the discrepancy between the economic development of the highly industrialized exchange economy, on the one hand, and the agriculturally orientated subsistence economy of the Bantu homelands, on the other. These areas, which are characterized by great poverty,[4] have frequently been described as overpopulated in relation to their resources.[5] It is nevertheless a fact that, partly by virtue of the re-settlement policy of the National Party Government, and partly through natural population increase, the number of Bantu in their 'homelands' has increased from 4. 1 million in 1960 to 6. 9 million in 1970, an increase of 68. 7 per cent, as against an increase of 16. 8 per cent of Bantu in White areas.[6] This achievement, which has been described as a "proof ... that the

1. Christopher Orpen, "Just how Prejudiced are White South Africans", New Nation, Vol. 4, No. 7, February 1971, pp. 10-12, here p. 12.
2. Casual and superficial contact is most likely to produce prejudice amongst persons. In contrast, intimate as well as infrequent contacts are conducive to the formation of non-prejudiced attitudes.
3. I. D. MacCrone, "A Comparative Study of European and Non-European Differences in Race Preferences", South African Journal of Science, Vol. XXXV, December 1938, pp. 412-6.
4. A good description of the Bantu homelands, is: D. Hobart Houghton and Edith M. Walton, The Economy of a Native Reserve, Keiskammahoek Rural Survey, Vol. II, Pietermaritzburg, Shuter and Shooter, 1952.
5. For instance U. G. 61-1955, Summary of the Report of the Commission for the Socio-Economic Development of the Bantu Areas Within the Union of South Africa, p. 49 ff.
6. House of Assembly Debates, Hansard, 25th September 1970, col. 5132.

policy of separate development is succeeding in regard to the Bantu people", [1] has far-reaching repercussions on the rest of the economy, one of the most important being the perpetuation of the migratory labour system between the homelands and the developed White areas. [2]

2.2 Economic Growth

The real gross domestic product at factor costs serves as a criterion for the economic growth of the South African economy. [3] Real product means the value of the product in terms of 1958 prices. [4] By choosing the real, rather than the monetary, product concept, the effects of both inflation and deflation are neutralized and separated from the physical growth performance.

Economic growth is measured in terms of domestic product time series, rather than in terms of product per head of the population. The growth of the population is regarded as an exogenous factor which cannot be explained by the economist. [5] Besides, the calculations remain easier and more reliable this way. [6]

1. House of Assembly Debates, Hansard, 25th September 1970, col. 5132.
2. An account of the migratory labour system is given by Friedrich Mühlenberg, Wanderarbeit in Südafrika, Ursachen eines Arbeitsmarktphänomens dualistischer Wirtschaftsgesellschaften, Gustav Fischer, Stuttgart, 1967.
3. For descriptive detail about the sources used and other conceptional concepts, see Volume II, Section IV, pp. 181-189.
4. Compare Volume II, Section IV, 2., p. 181.
5. Erich Preiser writes in this regard: "Wenn die Produktion im gleichen Tempo zunimmt wie die Bevölkerung, so bleibt allerdings das Einkommen je Kopf gleich, und manche Forscher wollen in diesem Fall überhaupt nicht von Wachstum sprechen. Wir machen diese Einengung nicht mit. Volkswirtschaftliches Wachstum heißt Wachstum des Sozialprodukts, gleichgültig ob das Einkommen je Kopf steigt oder nicht".
   Erich Preiser, Nationalökonomie Heute, Eine Einführung in die Volkswirtschaftslehre, Beck, München, 1959, p. 114.
   Similarly:
   George J. Stigler, "Policies for Growth", in: Proceedings of a Symposium on Economic Growth, The American Bankers Association, New York, 1963, p. 104.
   Winfried Vogt, Makroökonomische Bestimmungsgründe des wirtschaftlichen Wachstums der Bundesrepublik Deutschland von 1950 bis 1960, Ein Beitrag zur Theorie des wirtschaftlichen Wachstums, Kieler Studien, 66, J. C. B. Mohr (Paul Siebeck), Tübingen, 1964, p. 23.
6. In South Africa, data on the size of the population of Non-Whites are unreliable for certain censuses. Compare:-
   J. L. Sadie, "An Evaluation of Demographic Data Pertaining to the Non-White Population of South Africa",
   Parts I and II: Asiatics and Coloureds.
   Part III: The Bantu Population.
   South African Journal of Economics, Vol. 38, 1970, pp. 1-34 and 171-191.

If one is occasionally interested in the growth of income per head, one need merely deduct the growth rate of the population from the growth rate of real income.

It is furthermore necessary to define the general type of curve which is to represent the rate of growth, such as a straight line, a parabola, or an exponential curve (compound rate of growth). It is the latter type of curve which is used throughout in the present study. Assume that the domestic product grows from x_1 to x_2 during n years. In this case, the percentage rate of growth, G, is given by

$$G = (A-1)\,100,$$

$$\text{where } \log A = \frac{\log x_2 - \log x_1}{n}$$

Finally, a decision has to be taken about the reference periods which are to be considered. As Oskar Morgenstern warns: "If a year with a high (low) gross national product is chosen as base year, this will depress (raise) the growth rate of subsequent years. Since there is no such thing as a 'normal' year, the investigator has a great amount of freedom in determining a base year". [1]

Morgenstern produces the following calculations of the United States growth rates, computed for different base years (gross national product in 1954 dollars):- [2]

growth from	growth rate (per cent)
1949 to 1960	3.7 p. a.
1950 to 1960	3.3 p. a.
1954 to 1960	3.2 p. a.
1955 to 1960	2.3 p. a.

The differences are attributable to the fact that 1949 and 1954 were recession years, and 1955 a boom year.

In order to avoid the sort of difficulties mentioned by Morgenstern, economic growth rates could be measured for periods which cover the whole of the business cycle. For South Africa, reference turning point dates, and phases of business cycles, are

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1. Oskar Morgenstern, On the Accuracy of Economic Observations, Second, completely revised edition, University Press Princeton, 1963, p. 296.
   Compare also: Gottfried Bombach, "Wirtschaftswachstum" Handwörterbuch der Sozialwissenschaften, Vol. 12, p. 767.
2. Oskar Morgenstern, ibid., p. 297.

available since 1910, with date indications on a monthly basis.[1] For two reasons, however, it was found unsuitable to employ this method. Firstly, while final reference turning points are available on monthly definitions, real domestic product data are not, with the result that unreliable averages would have to be employed if one wished to use business cycle data as reference periods. Secondly, it is disturbing that the duration of the business cycles has varied widely, a fact which would not have allowed a strict comparative analysis to be carried out in respect of equally long time intervals.

For the reasons explained above, it was decided to analyse economic growth over the period from 1918 to 1968 in respect of 10 sub-periods, each of these of 5 years duration. 1918 was chosen as the first base year, since it is only as from 1918 that economic data are available on a more comprehensive scale.[2]

3. Alternative Hypotheses about the Relation of Income Distribution and Economic Growth

3.1 The Interaction of Supply and Demand

The process of economic growth can be analysed in relation to the total demand and total supply of goods and services in an economy. On the one hand, effective monetary demand is a condition for an exchange economy. Without it, entrepreneurs would have no

1. For 1910 to 1948, see:
   J. C. du Plessis, Economic Fluctuations in South Africa, 1910-1949, ibid., pp. 50, 1.
   For 1948 to 1969:
   D. J. Smit and B. E. van der Walt, "Business Cycles in South Africa during the Post-War Period, 1946-1968", South African Reserve Bank, Quarterly Bulletin, No. 97, September 1970, p. 40.
   Generally, compare: J. C. du Plessis, "Die Dinamika van die Ekonomiese Stelsel" (beskrywend), Ch. 30 in G. G. W. Schumann, D. G. Franzsen and G. de Kock: Ekonomie: 'n Inleidende Studie, Universiteitsuitgewers, 1964, p. 569 ff.
2. Compare Volume II, pp. 178 ff, and Tables 48 and 49.

inducement to create productive capacity, other than that which is required for the satisfaction of their own and their family's wants. On the other hand, it is important that the effective monetary demand can be productively satisfied through the existing supply capacity of the economy. If, for any reason, the physical supply potential is greater than the effective monetary demand, then the economy is - to a greater or lesser extent - underemployed. Depending on the size of this underemployment, the economy is in a recession or in a depression.[1] In order to restore equilibrium, productive capacities can either be reduced, or effective demand can be increased.

If, however, the opposite case prevails, i. e., effective monetary demand exceeds the physical supply capacity of the economy (measured in prices of the previous period), then the economy is over-employed. The remedy can again be twofold, i. e., either the supply potential of the economy should be increased through new investments (which constitutes a long-term measure), or the level of monetary demand should be cut down (which is a short-term measure). Insofar as neither of these remedies may not be successful, inflationary conditions will prevail.

A growing economy is characterized by the continuous extension of both the effective monetary demand and the productive supply. Real economies, however, are unlikely to expand their activities at an equilibrium growth rate where the increase in new physical supply precisely matches the increase in monetary demand.[2]

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1. Gottfried Haberler defines a recession when the decrease in industrial production is not more than 20 per cent, and the decrease in the gross national product not more than 6 per cent. Otherwise, Haberler refers to a depression.
Gottfried Haberler, "Gibt es noch einen Konjunkturzyklus?", Der Volkswirt, Dezember 1960, page unknown.

2. Roy F. Harrod defines the equilibrium condition of steady advance with the concept of the warranted rate of growth:- "The warranted rate of growth is taken to be that rate of growth which, if it occurs, will leave all parties satisfied that they have produced neither more nor less than the right amount. Or ... it will put them into a frame of mind which will cause them to give such orders as will maintain the same rate of growth".
Roy F. Harrod, "An Essay in Dynamic Theory", Economic Journal, Vol. 49, 1939, pp. 14-33, here p. 16.
Compare also by the same author: Towards a Dynamic Economics, Some Recent Developments of Economic Theory and Their Application to Policy, Lecture 3: Fundamental Dynamic Theorems, MacMillan, London, 1948, p. 81.

It is far more likely that, owing to factors such as the uncertainty about and the indivisibility of future investment projects, and the unavoidable period of gestation of new investments, investments grow at rates which are unbalanced, compared with the growth of effective monetary demand. This imbalance can be looked at in two different ways, viz., firstly, from the point of view of the economy as a whole, and, secondly, from the point of view of an individual industry.[1]

When looked at from the first aspect, it appears that the allocation of the country's resources between the consumption and investment goods sectors, has repercussions on the potential growth rate of the economy:

To quote F. van den Bogaerde:

"Terwyl investering van die hoofbestedingselemente die mees direkte en gunstigste uitwerking op groei het, is private verbruiksbesteding die element wat groei die minste, indien hoegenaamd, bevorder."[2]

In regard to the second aspect mentioned above, an imbalance in the process of growth is likely to confront the individual industry. For an industry, balance depends on the strength of consumer demand in relation to its supply capacity, but insufficiently forthcoming demand cannot be individually created via higher income payments. As Stephen Enke somewhat emphatically put it: "A manufacturer of laxativescannot count on his workers spending all their wages on his products; it would hardly be to their advantage".[3] An individual

1. Compare:
   Paul Streeten, "Unbalanced Growth", Oxford Economic Papers, NS, Vol. 11, 1959, pp. 167 ff.
   Paul N. Rosenstein-Rodan, "Problems of Industrialisation of Eastern and South Eastern Europe", The Economic Journal, Vol. 53, 1943, pp. 204 ff.
   Albert O. Hirschman, The Strategy of Economic Development, Yale University Press, New Haven and London, 1958.
   Ragnar Nurkse, Problems of Capital Formation in Underdeveloped Countries, Blackwell, Oxford, 1952.
   W. Arthur Lewis, "Economic Development with Unlimited Supplies of Labour", in: The Economics of Underdevelopment, edited by A. N. Agarwala and S. P. Singh, Oxford University Press, New York, 1963, pp. 400-449.
2. F. van den Bogaerde, "Ekonomiese Groei: Die Groei van Produksiekapasiteit of Aanbod", unpublished Paper, Pretoria 1970, p. 7. I am indebted to Professor van den Bogaerde for a copy of this manuscript.
3. Stephen Enke, Economicsfor Development, Dobson, London 1963, p. 299.

firm normally has to rely on markets which go far beyond the sales to those persons whom it employs. An economy, according to this way of looking at things, is balanced when the range of supply of consumer goods corresponds to the pattern of consumers' preferences(given a certain price system), and when the pattern of the investment goods industry corresponds to the actual demand for its products.

In this regard, the demand for a 'big-push' development has been put forward, according to which many firms, producing a large variety of different products, are being established at the same time.[1] To a certain extent, the protagonists of this development pattern seem to neglect the influence that foreign markets might have on the development of countries.[2]

3.2 Investment and Economic Growth

Investment creates supply capacities, which are a necessary condition for economic growth. The relation between investment and growth can be analysed according to two different approaches. On the one hand, it is possible to analyse the actual relation between the investment and growth performance in a given country during a certain period of time. On the other hand, one can go further than this and formulate an optimal investment budget - optimal in the sense that, if accepted, it should maximise the respective long-term future growth rate of that country.[3] In the present study, only the actual investment and consumption values will be analysed in relation to the growth performance.

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1. Ragnar Nurkse frequently contributed to this theme. Compare for instance his "Some International Aspects of the Problem of Economic Development", American Economic Review, May 1952, p. 572: "People working with more and better tools in a number of complementary projects become each other's customers. Most industries catering for mass consumption are complementary in the sense that they provide a market for, and thus support, each other. This basic complementarity stems ... from the diversity of human wants. The case for 'balanced growth' rests ultimately on the need for a 'balanced diet'."
2. Compare J. Jewkes, "Are the Economies of Scale Unlimited?", in: Economic Consequences of the Size of Nations, Proceedings of a Conference held by the International Economic Association, Edited by E. A.G. Robinson, London, 1963, p. 113.
3. Compare: Wilhelm Krelle, "Investition und Wachstum", Jahrbücher für Nationalökonomie und Statistik, Band 176, 1964, pp. 1-22.
   Wilhelm Krelle, "Beeinflußbarkeit und Grenzen des Wirtschaftswachstums", Jahrbücher für Nationalökonomie und Statistik, Band 178, 1965, pp. 3-27.

It is now necessary to have a closer look at the relation between supply and demand flows in an economy.

Consider the effective demand function of an open economy with government activity as

$$D = C_{pr} + C_{st} + I_{pr} + I_{st} + X - (Z_C + Z_I),$$

where

D	=	total monetary demand
C_{pr}	=	private consumption expenditure
C_{st}	=	State consumption expenditure
I_{pr}	=	private investment expenditure
I_{st}	=	State investment expenditure
X	=	exports
Z_C	=	imports of consumer goods
Z_I	=	imports of investment goods.

The distribution of the total monetary demand (D) between the different components of D, is of great importance for economic growth. Whereas the terms C_{pr}, C_{st}, and Z_C, and X serve partly the satisfaction of present economic desires, and partly the supply of foreign exchange, the terms I_{pr}, I_{st}, and Z_I supply the country with future productive capacities. Income, which is in a present period spent on the creation of productive capacities, will, in future periods (under the assumption of a correct assessment of the market) be instrumental for the creation of new income.

To the extent that investments are successful - in the sense that entrepreneurs invest their money in avenues where market capacities can be satisfied at given prices - the division of income between consumption (C_{pr}, C_{st}, and Z_C) and investment (I_{pr}, I_{st}, Z_I), determines the potential growth performance of the economy. The allocation of productive factors in an economy between different uses (here, consumption and investment), is a choice process. If physical productive factors are used for the production of consumer goods, they cannot - at the same time - be also employed for the production of investment goods.

Economic growth is based inter alia on investments, the growth of the labour force, and the rate of technical progress. A

country which wishes to maximise its economic growth, must consequently favour the development of the abovementioned crucial factors as much as possible. In relation to the accumulation of capital, this requires that economic and political power is concentrated in the hands of those who are likely to take growth promoting decisions. To quote Keynes: "Europe was so organised socially and economically as to secure the maximum accumulation of capital. While there was some continuous improvement in the daily conditions of life of the mass of the population, society was so framed as to throw a great part of the increased income into the control of the class least likely to consume it. The new rich of the nineteenth century were not brought up to large expenditures, and preferred the power which investment gave them to the pleasures of immediate consumption. In fact, it was precisely the inequality of the distribution of wealth which made possible those vast accumulations of fixed wealth and of capital improvements which distinguished that age from all others". [1]

This fundamental idea, described by Keynes in 1920, has frequently been repeated in the voluminous literature on underdeveloped countries, particularly after the Second World War. [2]

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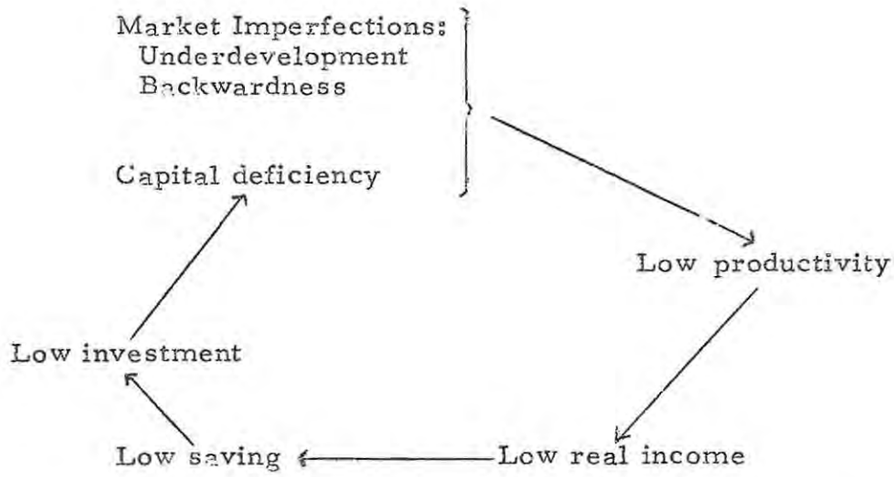
1. John Maynard Keynes, The Economic Consequences of the Peace, London 1920, p. 16.
   Compare also Keynes, Essays in Persuasion, Economic Possibilities for our Grandchildren, (1930), MacMillan, London, 1931, p. 373. Among other things, Keynes suggests, the future rate of economic growth will be dependent on "the rate of accumulation as fixed by the margin between our production and our consumption".
2. Marius Nikolinakos, Einkommensverteilung und Entwicklungsprozeß, Dissertation, Universität Köln, 1967, p. 1, and the literature cited there.
   Kenneth K. Kurihara, The Keynesian Theory of Economic Development, George Allen & Unwin, London, 1959, p. 32.
   H. G. Aubrey, "Mexico-Rapid Growth", in: H. F. Williamson and J. A. Buttrick (Editors), Economic Development, Principles and Patterns, Prentice Hall, New York, 1954, pp. 506-550, mainly pp. 547-550.
   V. K. R. V. Rao, "Redistribution of Income and Economic Growth in Underdeveloped Countries", in: Income Redistribution and the Statistical Foundations of Economic Policy, Edited by Colin Clark and Geer Stuvel, International Association for Research in Income and Wealth, Series X, London 1964, particularly pp. 314 ff, 318, 333.

3.2.1 Insufficient Capital Accumulation in Underdeveloped Countries, Vicious Circles, and the Policy of Belt-Tightening.

Insufficient capital accumulation is regarded as one of the characteristic features of an underdeveloped country. The stock of capital, at any point of time, is believed to be too small in relation to the growth targets of such communities. Different factors are responsible for this state of affairs, such as low incomes - and thus a low propensity to save together with poorly organized saving and capital markets - conspicuous consumption of the well-to-do and the lack of a middle class.[1] All these obstacles which interfere with economic development have been referred to under the general heading of 'vicious circles'. Because total physical output is low in underdeveloped countries, little is left for the accumulation of capital, after the basic consumption needs are fulfilled. Gerald M. Meier and Robert E. Baldwin once demonstrated this 'vicious' relationship by means of the following scheme:-[2]



1. The term "middle class" is defined as follows: "Es sind die Schichten, die nicht Kapitalisten und nicht Proletarier sind, in den oberen Grenzstufen sich keinen Luxus leisten können, bei proletarischem Einkommen doch noch einer bürgerlichen Lebenshaltung zuneigen, einen besonderen Lebensstil wirklich wahren, die Notwendigkeit des Klassenkampfes nicht anerkennen." The main groups are: handicraft, retail trade, innkeeping, salary receivers, civil servants, professional persons, and rentiers. Otto Heinrich von der Gablentz, "Mittelstand", Handwörterbuch der Sozial-Wissenschaften, Vol. 7, 1961, pp. 392, 395.
2. Gerald M. Meier and Robert E. Baldwin, Economic Development, Theory, History, Policy, Wiley, New York, 1963, p. 319.

The breakthrough of this vicious circle requires a process which is widely referred to as 'belt-tightening'. [1]

Some countries, such as Russia and Mainland China, have entrusted their governments with the accumulation of capital, often at the cost of complete isolation. [2] To many underdeveloped countries this seems to be the preferred growth model, by virtue of the prevention of wealth accumulation in the hands of

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1. R. M. Hartwell's study of the Industrial Revolution in England suggests, however, that care is required in the assessment of what is referred to as 'belt-tightening'. Whilst older English historians such as A. Toynbee, J. L. and B. Hammond, and Hobsbawn, gave the "worst possible interpretation of early industrialization" *, research done by G. H. Wood and A. L. Bowley suggests that the standard of living of workers improved between 1300 and 1950.** Since J. H. Clapham's approval of the Wood-Bowley thesis, the prevailing view in England about the Industrial Revolution is that it did in fact benefit the workers. But "for every firm judgment about the industrial revolution in England, there has been an equally firm contrary judgment".*** "Too often", Hartwell writes, "the historian has found evidence only ... of the abnormal, of the worst, of the most dramatic aspects of society and the economy. Again, without discounting the strong element of compassion in the motives of those who stress the ills of society, the historian has too often been attracted by the sad spectacle of man's inhumanity to man ... Misery, vice, and cruelty invariably fascinate, while virtue often bores".**** It is precisely the sympathy for the achievement of economic growth which leads modern historians to the approval of the Industrial Revolution.

   R. M. Hartwell, "Interpretations of the Industrial Revolution in England: A Methodological Inquiry", The Journal of Economic History, Vol. XIX, No. 2, 1959, pp. 229-249.
   * ibid., p. 230.
   ** ibid., p. 233.
   *** ibid., p. 239.
   **** ibid., p. 244.

2. FranklinD. Holzman remarks in this respect: "... Soviet industrial growth was as rapid as it was because of, rather than despite, the existence of central planning and authoritarian control. It seems doubtful that the amount and pattern of Soviet investment would ever be duplicated in an essentially consumer-orientated market economy. ... Resources must be directed, despite the needs and desires of households, predominantly into machines which produce machines (and weapons) rather than into machines which produce consumers' goods and services including housing". Franklin D. Holzman, Soviet Economic Growth, World Politics, VII, No. 1, October 1954, p. 144.
   Compare also:
   E. H. Carr, "Some Random Reflections of Soviet Industrialisation", in: C. H. Feinstein (Editor), Socialism, Capitalism and Economic Growth, Essays Presented to Maurice Dobb, At the University Press, Cambridge, 1967, pp. 271-284, here p. 279.

'exploitative entrepreneurs'. [1]

Whenever the process of economic development is entrusted to take place under the mechanism of a capitalistic market economy, then the formation of a powerful entrepreneurial class becomes an imperative. This class, assisted by the legal and economic system under which the capitalistic society functions, will then be responsible for curtailing the consumption goals of the many, thus favouring the pursuance of the growth goals of the few. An historical example of this is Japan. As William B. Lockwood reports, Japan denied her peasants and urban workers the fruits of economic progress for decades. [2] Prewar Japan presented a picture of extreme wealth and extreme poverty. The capitalistic system, to which the country subscribed, proved to be most effective. "... It is evident that the stock of productive wealth grew rapidly; that returns on property, relative to labor, remained high; and that a large share of property income tended to be concentrated in the upper tail of the income distribution curve". [3] Instead of exercising direct and centralised control, Japan organized her system of public finance and her market forces in such manner that the process of investment was highly rewarded. The great bulk of savings was accumulated voluntarily, assisted by regressive tax policies and the opportunities for large speculative gains.

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1. Many underdeveloped countries regard the appeal of confiscation as a means to solve their problems ofeconomic development. M. Bronfenbrenner defines 'confiscation' as "the shifting of income to developmental investment from capitalists' consumption, from transfer abroad, and from unproductive 'investment' like luxury housing".* He suggests that the Russian-style 'Confiscation-Model' is the most efficient one for fast development.** In the developed countries, confiscation was of little appeal because the responsibility for economic development lay in the hands of private persons. With the responsibility for economic growth having been taken over by the governments of underdeveloped countries, Bronfenbrenner predicts that "confiscation will probably increase with time".***
   * M. Bronfenbrenner, "The Appeal of Confiscation in Economic Development", Economic Development and Cultural Change, Vol. 3, April 1955, pp. 201-218, here p. 201.
   ** ibid., pp. 202-209.
   *** ibid., pp. 213, 218.
2. William W. Lockwood, The Economic Development of Japan, Growth and Structural Change, 1868-1938, Oxford University Press, London, 1955, pp. 140 ff.
3. ibid., p. 141.

The allocation of demand into avenues of productive investments, rather than into the consumer goods sector, was done mainly through the achievement and even tolerance of an extremely unequal distribution of personal incomes. This pattern of income distribution prevented the country from importing Western type consumer goods, instead of productive capital equipment; and it allowed Japan's entrepreneurs to provide financial resources for investment programmes, instead of letting such resources be paid out in the wage bill. Lockwood admits that the "grossly unequal distribution of wealth and power" ... "was wholly opposed to human and democratic values" ... and "failed lamentably to solve the problem of distributive justice".[1]

The enormous sacrifices which were carried by the Japanese nation during the process of industrial development, are now paying good dividends. In 1970, Japan's gross domestic product was the third highest of the world, and the fruits of progress have long started to be enjoyed by all classes of her population.[2]

3.2.2 de Schweinitz's Theory of the Interdependency between the Process of Economic Growth and the Political System

The policy of belt-tightening, which is required during the early stages of industrial development, can be seen in relation to a 'representative' political system in developing countries. In this connection, Karl de Schweinitz has put forward the hypothesis that the stage of economic growth in any country is linked with a certain political order.[3]

Economic growth requires that investments be increased. This goal, according to de Schweinitz, is pursued only by a small minority of the population. The majority would prefer to see immediate consumption increased at the expense of investments.[4] If government leaders are concerned with facilitating the growth process of the economy, then they "cannot try to solve the political problem by

1. W. W. Lockwood, The Economic Development, ibid., p. 303.
2. "Far East", Supplement to Financial Mail, October 27, 1967, pp. 105-109.
3. Karl de Schweinitz, Industrialization and Democracy, Economic Necessities and Political Possibilities, Glencoe, Collier-Macmillan, London 1964.
   de Schweinitz, "Industrialization, Labor Controls, and Democracy", Economic Development and Cultural Change, Vol. VII, No. 4, July 1959.
4. de Schweinitz, Industrialization and Democracy..., ibid., p. 56, 276.

acceeding to the demands of the masses of workers and granting them rights commensurate with the rights of the privileged members of the society". [1]

Democracy, with its institution of regular elections and its acceptance of majority votes, is prevented from being a free political system which can be adopted by any society. [2] A subsistence economy for instance is full of potential conflict because of the scarcity of land, the lack of capital, and because no person can improve his economic position save at the expense of another person. Economic life, under these circumstances, must be interpreted as a fight of each against everyone, where one person's gain constitutes another person's loss. The advantages of labour division are as yet non-existent.

Subsistence economies are therefore governed best by feudal systems, which rigidly ascribe status to various members of the community, thus mobilizing "the full force of custom, tradition, and class in the containment of economic conflict potentially capable of debilitating society". [3]

During the process of economic growth, the political system has to be of such a nature that members of the society who are willing to sacrifice present gain for future welfare, do obtain the command over resources. Communistic ideology, based on one-party rule, was responsible for this process in Russia. [4] In England, it was the Protestant Ethic. [5]

Once a high income society has been established, the co-operative elements of trade and exchange will grow to such an extent that potential conflicts over the distribution of incomes will decrease. Only then is it possible to grant freedom and democracy to members of the society. [6]

Typically, a hostile legal framework delays the growth of labour organizations during the early stages of industrial development - as was the case in Germany and the U.S.A. - and, although

1. de Schweinitz, Industrialization and Democracy . . . , ibid., p. 56.
2. ibid., pp. 14-23.
3. ibid., p. 23, compare also pp. 32, 3.
4. In 1970, Soviet Russia allocated 73 per cent of her expenditure on the total product into the investment goods sector including military expenditure and only 27 per cent into the consumer goods sector. Carl Gustaf Ströhm, "Breschnew zwischen den Extremen", Deutsche Zeitung/Christ und Welt, 12. 3. 1971, Nr. 11, p. 3.
5. de Schweinitz, Industrialization and Democracy . . . , ibid., p. 43.
6. ibid., p. 277.

to a lesser extent, in Great Britain (See footnotes 1 and 2).

3.2.3 Conclusions

The one factor which emerges with clarity is that the main problem with which underdeveloped countries are faced, i.e., the increase in their investment performance, permeates their total social and economic orders. Only the combined force of the political system, the legal and economic orders, the public finance, and, as far as is possible, the consensus of people directed by propaganda, is likely to lead to the attainment of a high rate of economic growth.

The lesson dictated by dire economic necessity is being learnt inevitably by each individual developing country, and individual accounts would easily be multiplied. In South Africa for instance, C.S.Richards denied in his Presidential Address to the Economic Society in 1945, the "frequently stated" hypothesis that "the problem of production has been solved and that what now awaits solution is the problem of distribution".[3] This assertion by Richards has proved lasting and was taken up again for instance, in the 1953-54 Budget Speech: "It is not possible to bring about an immediate rise in the standard of living of all sections of the community and at the same time to find large sums of capital which are necessary for the development of our resources. Just as in the case of an individual, the country must choose whether it wishes to use its entire income or whether it wants to have a portion for investment in capital works which will eventually

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1. de Schweinitz, Industrialization, Labor Controls ..., ibid., p. 390, 1.
2. V.K.R.V.Rao, the Director of the Institute for Economic Growth at the University of Delhi, observes for India that "welfare state and socialist leanings have come in the way of speeding up economic growth in India", * and "restriction on the consumption of the poor has been playing an important role in the financing of the social and economic overheads created by the State during the ten years of planning". **
   * V.K.R.V.Rao, Redistribution of Income and Economic Growth, ibid., p. 333.
   ** ibid., p. 318.
3. C.S.Richards, "Economic Incentives in the Post-War World", The South African Journal of Economics, Vol. 13, No. 3, September 1945, p. 148.

increase its production and give it much greater prosperity". (See footnotes 1, 2 and 3.)

3.3 The Size of the Market and Economic Growth

Next to the aspect of competition between the growth of the consumer goods sector and the investment goods sector, there exists also an element of complementarity, in the sense that the creation of supply capacities is without use unless there exists a demand for their services. Investment is not an asset in itself, but makes sense only when in fact used in conjunction with productive employment. In this sense it is clear that the final purpose of investments can only be the supply of consumer goods and services.

Given a certain income-consumption relation, productive resources in an economy will be fully utilized, only if expenditures on investment are forthcoming at such a rate, that they balance the income which the community is willing to refrain from consuming at the full employment equilibrium level of income. If the level of aggregate demand in the economy is insufficient for this full employment income to be attained, any component of aggregate demand can, in principle, be increased with the aim of restoring or instituting a level of demand, commensurate with the full employment of the economy. Thus, an increase in consumption or investment expenditure, either by private persons or by the government, as well as an increase in the balance of exports over imports, will have the same result of increasing the level of aggregate demand in an economy.

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1. Budget Speech, 1953-54.
2. In agreement with this statement compare M. van den Berg who observes that "in the case of the Union the objective of maximizing the national product received precedence during the period considered (i. e., the Post-War II years). When economic policy in the Union is compared with that in more mature economies it seems to have been mainly at the expense of a more equal distribution of national income between individuals". M. van den Berg, "The Objectives of Post-War Economic Policy in the Union", Finance and Trade Review, Vol. 1, No. 8, January 1956, p. 19.
3. Some commentators of the economic scene go so far as to even nowadays recommend the introduction of a poll tax as a means of economic development for Africa South of the Sahara. Stephen Enke, "Creating Incentives for Economic Development", in: Economic Development for Africa South of the Sahara, Edited by E. A. G. Robinson, ibid., pp. 370, 1.

The problem which has now to be analysed is that demand for investment goods is derived, to a large extent, from demand for consumer goods. Although it is possible that investments are undertaken ahead of consumer demand - as has in fact been occasionally reported for the United States[1] - the investors will normally rely on consumer demand which is existent at the stage of investment planning. For Japan for instance, Lockwood reports that consumer demand has been the main stimulus for this country's development:- "The secular growth of the Japanese economy required the growth of consumption no less than that of investment. ... Foreign markets offered Japan no escape from this necessity. ... In fact the bulk of increasing national output was consumed at home. ..."[2] It appears in particular that Japan solved the problem of underemployment in 1931 with remarkable skill. Rearmament and the development of strategic industries at home and on the Continent served her to employ formerly idle resources. By 1937, her economy was virtually fully employed, and with the beginning of the war, Japan drastically curtailed the civilian and export production and diverted resources into armament industries.[3]

It is typical for Japan that depression and stagnation were neither severe nor frequent during her economic development. This has correctly been attributed to some sort of equilibrium expansion of supply and demand which was attained during the pre-war era.[4]

Lack in demand is an obstacle to economic development that even centrally directed economies do not seem able to overcome. Thus the small size of the Soviet market was at one stage the greatest impediment to Soviet investment policy. This was particularly felt in the case of electricity, where the low consumption meant that power had to be transmitted over long distances, thus incurring additional capital costs, as well as power losses on the transmission lines.[5] The Dniepr and Nizhny Tagil railway waggon

1. "... American enterprisers extended railroads ahead of their traffic and built factories beyond the market capacity for their outputs, relying on the next decade or generation ... to justify their rashness." M. Bronfenbrenner, The Appeal to Confiscation ..., ibid., p. 210.
2. William W. Lockwood, The Economic Development..., ibid., p. 232.
3. G. C. Allen, A Short Economic History of Modern Japan, 1867-1937, George Allen and Unwin, London, 1945, p. 136.
4. William W. Lockwood, The Economic Development..., ibid., p. 292.
5. R. W. Davies, "Aspects of Soviet Investment Policy in the 1920s", in C. H. Feinstein, Editor, Socialism, Capitalism and Economic Growth, Essays Presented to Maurice Dobb, At the University Press, Cambridge, 1967, pp. 285-307, here p. 290.

works, which were built during the twenties, were planned for an annual output of 5 - 6000 which was far smaller than what was then usual in the United States. But even for this size it was doubted whether the Soviet railways would be in a position to purchase all the output. "The problem of sales also worried the planners in the new tractor and motor industries, in engineering generally, and in such consumer industries as footwear". [1]

The enormous efficiency of the American economy, on the other hand, must inter alia, be attributed to the size of the market of this country. [2]

A large buying power, i.e., a large capacity to absorb output, has repercussions both of a technical and of a commercial nature. In both these spheres, internal and external economies of large-scale production will grow when the density of markets and the size of plants increase. [3]

3.3.1 Say's Theorem of the Growth of Markets

Jean Baptiste Say, in his "Traité d'Economie Politique" (1803), put forward the view that the supply of economic goods creates its own demand. If one considers - as the classical school of economics did - an economy without money as a medium of exchange, i.e., a barter economy, then it is clear that anyone who offers goods on the market does this only in order to demand other things in return for the goods he has to offer. In an economy where producers are predominantly self-employed proprietors, such as peasant farmers or master craftsmen, Say's theorem must necessarily be regarded as valid. This leads to the conclusion that a barter economy tends always to be fully employed, because any increase in supply will always find its complementary increase in demand. In this sense,

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1. R. W. Davies, "Aspects of Soviet Investment Policy in the 1920s", ibid., p. 291.
2. Allyn Young, "Increasing Returns and Economic Progress", The Economic Journal, Vol. 38, 1928, pp. 527-542.
3. George J. Stigler, The Theory of Price, 3rd Edition, MacMillan, New York, London, 1966, p. 308.
   Jacob Viner, "Cost Curves and Supply Curves", in: Readings in Price Theory, American Economic Association, Allen and Unwin, London, 1964, pp. 198-232.
   Erich Gutenberg, Grundlagen der Bestriebswirtschaftslehre, Die Produktion, ibid., pp. 308 ff.

neither a general over-, nor a general underproduction is theoretically conceivable. [1]

Naturally, the economic classicists were aware of the fact that crises occurred from time to time. These were reconciled with Say's Law of Markets, through the notion of 'temporary derangements of markets'. To quote John Stuart Mill: "Every increase of production, if distributed without miscalculation among all kinds of produce in the proportion which private interest would dictate, creates, or rather constitutes, its own demand". [2] It is thus admitted that wrong assessments by entrepreneurs of market chances may give cause to temporary crises. To the extent that human predictions can be improved, such crises will, however, be avoided.

Interestingly, the discussion of Say's Law has again been taken up in the literature on underdeveloped countries. Ragnar Nurkse maintains, for instance, that the demand and supply sides of a market cannot be convincingly separated under conditions of underdevelopment: In an all-inclusive view, the size of the market is not only determined, but actually defined, by the volume of production. [3] Nurkse sees the problem of purchasing power in an underdeveloped country not as a monetary, but as a real phenomenon. In this view, stagnation, over-investment, and under-consumption theories are irrelevant for countries which are in early stages of their economic development. [4]

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1. A comprehensive discussion of Say's Law can be found in Schumpeter's History of Economic Analysis. Schumpeter writes: "... it is production itself ('supply') which creates the 'fund' from which flows the demand for its products: products are 'ultimately' paid for by products in domestic as well as in foreign trade". Joseph A. Schumpeter, History of Economic Analysis, Edited from Manuscript by Elizabeth Boody Schumpeter, George Allen & Unwin, London, 1954, p. 616.
2. John Stuart Mill, Essays on Some Unsettled Questions of Political Economy, School of Economics reprint, London, 1948, p. 73.
3. Ragnar Nurkse, Problems of Capital Formation in Underdeveloped Countries, Basil Blackwell, Oxford, 1966, p. 8.
4. Compare on the stagnation thesis: J. A. Schumpeter, History ..., ibid., p. 1171.
   A. H. Hansen, Economic Policy and Full Employment, McGraw Hill, New York, 1947, pp. 177-8.
   P. M. Sweezy, The Theory of Capitalist Development, Dobson, New York, 1942, pp. 190-9.
   Simon Kuznets, Six Lectures in Economic Growth, New York, 1959, Lecture II, The Necessary Conditions of Economic Growth, p. 30.

On close consideration it does not appear that Nurkse's suggestion can be accepted as valid. There appears to be little reason why one should deny the possibility of a sectoral over-production for an underdeveloped country altogether. After all, it appears that the creation of demand can always be influenced, (also in underdeveloped countries) by short-term fiscal and monetary policy measures, whereas the increase in supply is a task far more difficult, requiring long-term efforts to be exhibited. From this point of view alone, it would appear that there is little justification in denying the demand forces completely. But even then, it is typical for countries to grow in an unbalanced fashion, as was shown above. This may well make it necessary to exert influence on the supply and demand forces from time to time, in order to guide the development of an economy in a particular direction, and in order to prevent maladjustments from becoming cumulatively worse.

4. Empirical Findings and Hypotheses About the Relation of Income Distribution and Economic Growth.

Various attempts have been made to establish the relation between income distribution and economic growth for the long-term development of different countries.

In this chapter four different contributions will be discussed, i. e., those by (i) Simon Kuznets, (ii) Maria Negreponti Delivanis, (iii) the London School of Economics, and (iv) Marius Nikolinakos.

4. 1 Simon Kuznets

In his article "Economic Growth and Income Inequality", [1] Kuznets assumes that the inequality of income distribution increases during the early stages of industrial development of a country. Two reasons are mainly responsible for this, viz., -

i. the fact that only upper income groups save and thus concentrate income yielding assets in their

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1. Simon Kuznets, Economic Growth ..., ibid.,

hands;[1]

ii. the fact that the agricultural contribution to the total product decreases generally during the process of industrial development, resulting in the more even distribution of agricultural incomes giving way to the more uneven distribution of urban incomes.

Various factors are on the other hand responsible for the restoration of a greater degree of income equality, once a certain standard of economic development has been attained. These facts are:-

i. legislative interference (death duties, capital levies, and interest rate controls);

ii. demographic factors (the poorer people reduce the number of children relative to the more well-to-do people after the introduction of birth control);

iii. lack of adaptability to changing circumstances by those who hold command over income yielding assets;

iv. importance of service incomes. These start outstripping property incomes after a certain point of development has been reached.[2]

Kuznets cites empirical research which substantiates his thesis. For example he quotes Colin Clark's "Conditions of Economic Progress" which as early as 1940, suggested that the inequality of the distribution of personal income was greatest in

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1. It appears, however, from saving studies that this concentration of savings in the hands of upper income groups does not significantly disappear during the process of growth. To quote Brady and Friedman: "In all studies of family expenditure in relation to current income the pattern of savings exhibits the same general characteristics. From average dissavings in the lowest income brackets there is a progression to rapidly increasing average net savings in the highest income brackets".
Dorothy S. Brady and Rose D. Friedman, "Savings and the Income Distribution", National Bureau for Economic Research, Studies in Income and Wealth, Vol. 10, Riverside Press, New York, 1947, p. 250.

2. Compare also: Simon Kuznets, "Quantitative Aspects of the Economic Growth of Nations, VIII, Distribution of Income by Size", Economic Development and Cultural Change, Vol. XI, January 1963, No. 2, Second Part, pp. 69 ff.

1913 for Great Britain and Germany, and in 1929 for the United States.[1]

A critical examination of Kuznet's arguments raises doubt about his assertion that certain demographic factors, and the lack of adaptability to changing circumstances by those who hold command over income yielding assets, should promote a greater degree of income equality. It appears that what Kuznets describes refers to an acceleration of the circulation of economic elites, i.e., as growth becomes firmly instituted the command over income yielding assets - both old and new - is likely to change more frequently between persons than before. It is difficult to see, however, why this faster exchange of economic elites should be conducive to the realization of a more equal distribution of personal incomes. The mere fact that income yielding assets exist, and that somebody must possess them, will always produce income inequalities. Only the widespread acceptance of disciplined saving could counteract this tendency. Keynesian economics has taught us that the income receipt structure is fundamentally determined by the actual disposition of earnings. Economic growth will continue to be associated with increasing personal income inequalities, unless either the propensity to save becomes more widespread, or a compulsory system of profit sharing is instituted.[2]

4.2 Maria Negreponti Delivanis

The thesis of the long-term swing in the inequality of income distribution, found further treatment by Maria Negreponti Delivanis in her Influence de Développement Economique sur la

1. Colin Clark, The Conditions of Economic Progress, MacMillan, London, 1940, p. 430.
2. For a more detailed analysis of this problem, compare: Arnt Spandau, "Rate of Return, Profit Sharing, and the Distribution of Incomes", The South African Journal of Economics, Vol. 37, No. 2, June, 1969, pp. 105-116.

Répartition du Revenu National.[1] According to this authoress, changes in the market structure, which in turn are responsible for changes in the distribution of incomes, are typical during the process of economic development.

Interestingly, Negreponti Delivanis maintains that markets in underdeveloped countries are mainly competitive owing to the great importance of primary industries and to the absence of collusion, which is explained through the isolation of producers, the greater prevalence of homogeneous products, easy market entry, and great factor mobility.[2] Workers, in turn, are unable to take advantage of the lack of entrepreneurial market power, since they offer their labour individually.

During the period of take-off (accéleration du progrès), the inequality in the distribution of incomes increases, labelled by Negreponti Delivanis as "charges du progrès".[3] With the development of secondary industries which falls within this period, markets become more monopolistic and the workers' position deteriorates owing to the change in market forms, the relative abundance of qualified workers, and government intervention, which favours the rich classes, and not the poor.[4]

Finally, oligopolistic market structures are believed to be typical of developed countries. The number of competitors increases and profit margins are small.[5] The distribution of incomes turns to greater equality, owing to the decreased market power of entrepreneurs, together with the rise in trade-union power and the advent of public intervention supporting the working classes.[6]

In this model, the change in the market structure which is associated with the process of growth, is seen as being of vital importance for the distribution of incomes: "La forme du marché se trouve au centre du problème de la croissance et du mode de répartition du revenu national et toute évolution a des conséquences

1. Maria Negreponti Delivanis, Influence ..., ibid. Compare also: "La Formation des Prix Sous-Developpée", Revue Economique, No. 2, 1963, pp. 321-344, and: "The Distribution of National Income in Underdeveloped Countries", in: The Distribution of National Income, Ed. by Jean Marchal and Bernard Ducros, International Economic Association, MacMillan, London, 1968, pp. 297-325 (with discussion).
2. M. Negreponti Delivanis, Influence ..., ibid., p. 96 f.
3. ibid., p. 209.
4. ibid., pp. 208-230.
5. ibid., p. 253 ff.
6. ibid., pp. 241 ff and 340 ff.

sur le niveau de vie des différentes classes sociales".[1]

Unfortunately, Negreponti Delivanis' theses lack empirical support. As Nikolinakos points out, monopolies are existent in developed as well as in underdeveloped countries,[2] and recent research suggests that the level of industrial concentration has increased in industrial countries, and not decreased, as Negreponti Delivanis maintains.[3]

Apart from the question of empirical verification it would also appear that the authoress has neglected the discussion of important macroeconomic determinants of the distribution of incomes, viz., the rates of savings and investment, together with the savings propensities of different social classes.

4.3 London School of Economics

Under the leadership of E.H. Phelps Brown, the London School of Economics has illustrated the effect of the long-term development of the share of wages in income.[4] In the consideration of long-term wage statistics, Phelps Brown and his collaborators discovered that there have been long periods during which changes in real wages owing to distributive shifts have been small compared with those associated with movements in productivity.[5]

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1. Negreponti Delivanis, Influence ..., ibid., p. 459.
2. Marius Nikolinakos, Einkommensverteilung ..., ibid., Footnote 2, pp. 94, 5.
3. Helmut Arndt (Herausgeber), Die Konzentration in der Wirtschaft, Band I, Stand der Konzentration, Schriften des Vereins für Sozialpolitik, Gesellschaft für Wirtschafts- und Sozialwissenschaften, NF, Band 20 I., Duncker & Humblot, Berlin 1960.
   E.S. Mason, Economic Concentration and the Monopoly Problem, Cambridge Mass., 1957.
4. E.H. Phelps Brown and E.P. Hart, "The Share of Wages in National Income", The Economic Journal, Vol. LXII, London, 1952.
   E.H. Phelps Brown and Bernhard Weber, "Accumulation, Productivity and Distribution in the British Economy, 1870-1938", Economic Journal, 1953.
   E.H. Phelps Brown, "The Long-Term Movement of Real Wages", in: The Theory of Wage Determination, International Economic Association, Ed. by John T. Dunlop, Macmillan, London, New York, 1957, pp. 48-65.
   E.H. Phelps Brown, The Economics of Labor, Yale, New Haven and London, 1964.
   E.H. Phelps Brown, Pay and Profit, Manchester University Press, Manchester, 1968.
5. E.H. Phelps Brown, Long-Term Movements ..., ibid., p. 53.

British national accounting data for the period 1870 to 1938, reveal furthermore that the capital coefficient had remained more or less constant, with the result that a negative correlation between the rate of return on capital and the share of labour in income was existent,[1] viz., a rise in the first term causes a fall in the second, and vice versa.

The Phelps Brown School now distinguishes between a rigid sector (consisting of rent and salary receivers), and a flexible sector (made up of wage and profit recipients). Whilst general movements in the rigid sector occur only with resistance and lags, changes in the flexible sector are frequently observed even in the short-run.

The distribution theory put forward by the Phelps Brown School centres around the idea that long-term periods of inertia, may from time to time be disrupted by sudden displacements in the distribution of incomes. As an example of a period of inertia serves the period 1870-1914 of the British economy, when the rate of average return was between 10 and 13 per cent. Some time between 1913 and 1924, however, a "geological fault" occurred, which resulted in an unusually big distributive shift. Whilst rents and profits were squeezed, earned income rose from about 55 to over 65 per cent of home-produced national income, resulting in a drop of the average rate of return to about 7 per cent. Profits as a source of savings were significantly curtailed, and the incentive to abstain from consumption thus lowered. Total accumulation fell from about 14 per cent before 1914 to about 8 per cent during the inter-war years.[2]

In this theory, the objective by entrepreneurs to make a 'normal' rate of profit is of great importance. This 'normal' profit rate comes about through some sort of mechanism guiding the day-to-day decisions of entrepreneurs, which is universally accepted and which is described as a "convention of the kind which grows up

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1. If Y = income, L = labour income, r = rate of return, C = capital, k = capital coefficient, then:-

   (a) $Y = L + r\,C$
   (b) $C = k\,Y$
   (c) $Y = L + rkY$ or
   (d) $\frac{L}{Y} = 1 - rk$

   The same equation appeared also in the German literature in 1957. Compare Wilhelm Krelle, "Bestimmungsgründe der Einkommensverteilung in der modernen Wirtschaft", Schriften des Vereins für Socialpolitik, N.F., Band 13, Edited by W. G. Hoffmann, Duncker & Humblot, Berlin, 1957, p. 55 ff.

2. Compare Phelps Brown and Weber, Accumulation ..., ibid., p. 280 ff.

whenever the outcome of one man's decision depends on the similar decisions of other men". [1] There is a certain range in within which the profit margin will settle. On the upper side, this range is determined by the competition which is likely to arise if prices are too high, and on the lower side, by the protests of shareholders.

The actual outcome of the distributive juggle depends on the structure of the market, which can be either hard or soft. Under conditions of hard markets, firms are prevented from raising prices following increases in wages, and higher unit costs cannot therefore be easily passed onto customers. [2] Conversely, if the market environment is soft, firms will be able to maintain their profit margins even when wages are being increased. Inflationary conditions and buoyant demand are the concomitants of this market situation. It is possible, however, that the rigid sectors (salary and rent receivers) lose in the process of adjustment at the expense of gains materialized by the flexible sector (wage earners and profit receivers). In Britain, a period of hard markets was experienced during the deflations following World War I, and a period of soft markets during times of inflation after World War II.

Although market power (and, in particular, the degree of monopoly), cannot be measured in objective terms, it appears that the concepts of hard and soft markets are nevertheless useful tools for the description of particular historical situations of countries. Moreover, the theory of the 'normal' rate of profits, lends itself to the examination of the investment behaviour of firms. [3]

4.4 Marius Nikolinakos

The hypothesis of a long-term swing in the inequality of income distribution, has been made subject to empirical research by

1. Phelps Brown, Long-Term Movements ..., ibid., p. 59. In his Economics of Labour, Phelps Brown writes: "Just what level of profits is normal, adequate, and reasonable no one can say but everybody knows: a consensus prevails which no group of experts could formulate in agreed terms but which practical men apply to particular cases. Very likely the concensus shifts from time to time. (p. 187.) After an old bench mark is lost, a new concensus may form, often at a new level". (p. 236.)
2. Phelps Brown and Hart, Share of Wages, ibid., p. 271 ff. Phelps Brown, Long-Term Movements, ibid., p. 59 ff.
3. Arnt Spandau, Rate of Return..., ibid., p. 113 ff.

Marius Nikolinakos. In regard to the functional distribution of incomes, he compares wage and other income data for 51 countries which are grouped according to their stage of development.[1] Although this study is based on cross-section, rather than on time series data, it is nevertheless interesting to note the following main results;[2]

(i) for 16 developed countries (which are highly industrialized, show a high income per head, and are within the period of high mass consumption), the share of wages in income varies between 54 and 72 per cent.

(ii) For 11 underdeveloped countries (none of which has as yet reached the stage of high mass consumption), the wage share varies between 55 and 73 per cent.

Moreover, 24 additional countries are grouped according to further criteria, without, however, adding significantly to the argument.

Nikolinakos concludes: "Für die Ableitung einer Beziehung zwischen der Höhe der Arbeitseinkommensquote und dem Entwicklungsgrad sind die Ergebnisse nicht einleuchtend. Der höchste Entwicklungsgrad ist mit einer hohen Arbeitseinkommensquote verbunden, wärend der niedrigste Entwicklungsgrad sowohl sine hohe Arbeitseinkommensquote ... als auch niedrigere Arbeitseinkommensquoten ... aufweist. Der mittlere Entwicklungsgrad verzeichnet sowohl eine hohe Arbeitseinkommensquote ... als auch eine niedrige Arbeitseinkommensquote".[3]

Critically, it appears that a cross-section study of the nature here presented can hardly be regarded as satisfactory. The structural conditions prevailing in different economies will probably exhibit an important influence on the wage share, and it is unlikely that the relatively unsophisticated development criterion will portray the argument in a satisfactory manner.

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1. Marius Nikolinakos, Einkommensverteilung ..., ibid., On the problems of determining the stage of development, compare ibid., p. 112 ff.
2. ibid., p. 176 ff.
3. ibid., p. 193.

As to the personal distribution of incomes, Nikolinakos finds that the inequality of distribution correlates negatively with the share of wages in income. Except for countries with a very high stage of economic development, little correlation is found, however, between the degree of equality and the stage of development. Nikolinakos is consequently not able to verify Kuznet's hypothesis of a long swing in the distribution of incomes.[1]

The above findings suggest that the relationship between income distribution and economic growth is unpredictable when based on cross-section analyses. It remains to be seen whether more acceptable results can be obtained from the use of time series data.

5. Alternative Approaches to the Problem of Income Distribution and Economic Growth

5.1 Historical versus Mathematical Models

The discussion of the relation between income distribution and economic growth allows at least three different approaches.

First and foremost, the process of economic growth can be described by exact mathematical growth models. Depending on the ability of the theorist, such models will be constructed with greater or lesser relevance to real economic life. Karlheinz Oppenländer describes the requirements for economic growth models as follows: "Die Forderung, die an eine exakte Modelltheorie zur Erfassung wirtschaftlicher Wachstumsvorgänge gestellt wird, ist ... so zu formulieren: Ohne die Fähigkeit einzubüßen, Bedingungen für gedankliche Konstruktionen theoretisch zu analysieren, muß der tatsächliche wirtschaftliche Ablauf so erfaßt werden, daß eine realistische Analyse der Wachstumsvorgänge möglich ist".[2]

1. Nikolinakos, Einkommensverteilung..., ibid., pp. 106 ff.
2. Karlheinz Oppenländer, Die Moderne Wachstumstheorie, Eine kritische Untersuchung der Bausteine der Gleichgewichtskonzeption und der Wirklichkeitsnähe, 2. Auflage, IFO-Institut für Wirtschaftsforschung, Duncker & Humblot, Berlin, München, 1963, 1963, p. 18.

Mathematical growth models - like other economic models - should be open to both verification and falsification. The likelihood of a falsification will be great when the number of economic poles[1] is small[2] (i.e., when the extent of aggregation is substantial), whilst mathematical models which try to take a large number of variables and relations into account, are likely to become unmanageable.[3] The optimal size of a mathematical growth model is therefore dependent on the question under consideration and on the ambition and skill of the theorist.[4]

A second approach to the problem of economic growth and income distribution has come from the side of statistical-historical analysis. A good example of this type of research is Simon Kuznet's essay on "Economic Growth and Income Inequality".[5] Basically, Kuznet's approach is one of intelligent data collection, grouping, and interpretation. From this he derives a historical-hypothetical assessment of the forces which determine the relationship between economic growth and income distribution in general, based on the observations made in different countries during different periods.

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1. A pole is a sender or receiver of income flows.
2. Harrod's and Domar's growth models are examples of a high degree of aggregation.
3. A representative of the second category is Wilhelm Krelle's distribution model,* of which one commentator remarked: "Allein der Gebrauch von zweihundert bis dreihundert mathematischen Symbolen, die durch stufenweise Substitution vielfach ineinander verschachtelt sind, macht ein Nachvollziehen von Krelles Gedankengängen praktisch unmöglich".**
   * Wilhelm Krelle, Verteilungstheorie, ibid., pp. 107 ff.
   ** Jürg Niehans, "Ein Beitrag zum Verständnis von Krelles Makromodell", Weltwirtschaftliches Archiv, Vol. 92 (1964 I), p. 239, Footnote 1.
4. Many theorists obviously do not find this optimum and Erik Lundberg remarks: "It is perhaps characteristic in this field of research and certainly unfortunate that there has so far been a lack of harmony between highly developed but extremely abstract theories and very defective empirical knowledge. As a result, there has been plenty of scope for unscientific but imaginative speculation".
   Erik Lundberg, "The Stability of Economic Growth, A Critique of Statistical and Theoretical Investigations", translated from Swedish by Thomas L. Johnston, International Economic Papers, No. 8, Editors Alan T. Peacock, Wolfgang F. Stolper, Ralph Turvey, E. Henderson, MacMillan, New York, 1958, p. 45.
5. Simon Kuznets, Economic Growth ..., ibid.,

A third approach has been described by W. Arthur Lewis as consisting not of the making of a theory, but of a map.[1] His book on the "Theory of Economic Growth" is an example of an approach which, in its broad perspective, follows John Stuart Mill's "Principles of Political Economy".[2] One commentator remarked about Lewis' book that "it is indeed hard to think of any significant factor in economic development, or issue in development policy, which is not at least touched on in this book".[3]

At first sight it might appear as if the broad approach suggested by Mill and Lewis is the most suitable method of approaching the subject.[4] It has long since been established that economic,[5] sociological and psychological,[6] political,[7] natural,[8]

1. W. Arthur Lewis, Theory of Economic Growth, 1955, 8th Impression, 1965, George Allen & Unwin Ltd., London, preface. On the epistemological side of this approach, compare: Karl Brandt, "Zur Theorie des wirtschaftlichen Wachstums", Zeitschrift für Nationalökonomie, Bd. 17, 1957, pp. 341-348. Brandt explains the process of economic development in terms of "Feldstrukturen und Felkräften".
2. John Stuart Mill, Principles of Political Economy with some of their Applications to Social Philosophy, Longmans, Green and Co., New York and Bombay, 1904.
3. P. T. Bauer, "Lewis' Theory of Economic Growth" (Review), The American Economic Review, Vol. XLVI, 1956, (Sept.), No. 4, pp. 632-641, here p. 632.
4. Even E. Domar appears to be in agreement with this assertion when he introduces his "Essays in the Theory of Economic Growth" with the remark: "... one can study this and similar books backwards and forwards and still find no answer to that question why some societies have developed and grown faster than others, and why some large areas hardly developed at all". E. D. Domar, Essays in the Theory of Economic Growth, Oxford University Press, New York, 1957, p. 11.
5. Rigorous economic rationality was, for instance, the backbone of North America's unprecedented economic development.
6. Compare Leopold von Wiese, "Wirtschaftssoziologie", in: Handwörterbuch der Sozialwissenschaften, Vol. XII, pp. 247-254. George Katona, Psychological Analysis of Economic Behaviour, London, New York, Toronto, 1951.
7. Compare Michael Gamarnikow, Economic Reforms in Eastern Europe, Wayne State University Press, Detroit, 1968, reviewed by Arnt Spandau, The South African Journal of Economics, Vol. 38, No. 2, June 1970, pp. 202, 3.
8. Natural resources were the backbone on which South Africa's development was based. D. Hobart Houghton remarks in this respect: "Gold and diamonds between them brought about an economic revolution in the sub-continent which, both for the speed with which it was accomplished and for its far-reaching consequences upon the whole character of the country, is without parallel elsewhere in the world except perhaps where a backward country has struck oil". D. Hobart Houghton, The South African Economy, ibid., p. 13.

and structural factors are determinants of economic growth.[1] For South Africa the "Report of the Commission of Enquiry into Policy Relating to the Protection of Industries" states for example: "Economic development is determined by a combination of factors that are not only of an economic nature but also of a general social, cultural and political character ...".[2] The same Report mentions the following factors which exert an influence on the development of a country:

i. promotional activity;
ii. labour resources;
iii. capital resources;
iv. natural resources;
v. productivity of the economic system;
vi. public policy;
vii. autonomous factors.[3]

The question which has to be answered, however, is whether a universality of this kind is satisfactory from a theoretical point of view. Moreover, are we in a position after all to separate main from secondary determinants of the economic growth process? An economist of great competence, Gottfried Bombach, suggests that this is not possible: "Welche Kräfte die Wachstumsrate in unserer heutigen Wirtschaft letztlich bestimmen, wissen wir ohnehin nicht".[4]

It seems as if the 'universal approach' is sound for a general description of the development of a country.[5] It is doubtful, however, whether this method is commendable for the analysis of a specific, limited relationship between economic variables, such as that between income distribution and economic growth. In order to escape the mass of causal factors (which, to a certain extent, is also characteristic for the statistical-historical analysis), it is therefore necessary

1. On the relationship of structural determinants and economic growth, compare: Nicholas Kaldor, Causes of the Slow Rate of Economic Growth of the United Kingdom, Cambridge University Press, Cambridge, 1966. The relationship between structural factors and income distribution is thoroughly discussed by Jürgen Kromphardt, Strukturwandel und Einkommensverteilung, Die Entwicklung in der Nachkriegszeit, J. C. B. Mohr (Paul Siebeck), Tübingen, 1969.
2. U. G. 36-1958, Para. 216.
3. ibid., Paras. 217-224, and Para. 227 ff.
4. Gottfried Bombach, Die Verschiedenen Ansätze der Verteilungstheorie, in: Einkommensverteilung und technischer Fortschritt, Schriften des Vereins für Socialpolitik, N. F., Band 17, Berlin 1959, pp. 95-154, here p. 136.
5. For an excellent research study which uses this method, see: William W. Lockwood, The Economic Development of Japan, ibid.

to have recourse to abstract growth models which analyse the relevance of different hypotheses only in respect of a few number of well chosen determinants. [1]

In the use of abstract economic models, one must of course be aware from the very beginning, that the gap between the model and reality is unbridgeable. When Kurt W. Rothschild blames growth models for "the neglect of historical, sociological and institutional factors", [2] he reveals a false appreciation of their characteristic features. Growth models cannot close the gap between themselves and reality, neither are they expected to do this. A model always confines itself to showing what is regarded as an important relation between independent and dependent variables, and it is the task of the theorist to concentrate on relationships which

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1. A rigorous argument in favour of this is presented by Max Weber:-

   "... nur durch die Voraussetzung, daß ein endlicher Teil der unendlichen Fülle der Erscheinungen allein bedeutungsvoll sei, ... ist ... der Gedanke einer Erkenntnis ... überhaupt logisch sinnvoll ... Ein Chaos von Existenzialursachen über unzählige einzelne Wahrnehmungen wäre das einzige, was der Versuch eines ernstlich 'voraussetzungslosen' Erkennens der Wirklichkeit erzielen würde. ... Eine methodisch korrekte Beweisführung auf dem Gebiete der Sozialwissenschaften ... muß auch von einem Chinesen als richtig anerkannt werden".

   Max Weber, Die Objektivität sozialwissenschaftlicher und sozialpolitischer Erkenntnisse, aus: Gesammelte Aufsätze zur Wissenschaftslehre, 2. Aufl., Tübingen 1951, p. 168, besorgt von Johannes Winckelmann.

2. Kurt W. Rothschild, "The Limitations of Economic Growth Models, Critical Remarks on Some Aspects of Mr Kaldor's Model", in: Kyklos, International Review for Social Sciences, Vol. XII, 1959, pp. 567-587, here p. 568.

are economically relevant.[1]

After this general consideration of the character of economic models, an attempt will now be made to investigate and use different kinds of models in order to shed some empirical light on the following questions:-

(i) What has been the relation between the rates of investment and consumption on the one hand, and economic growth, on the other, for the South African economy since 1913? (Chapter 6 below.)

(ii) In what manner have different rates of investment and consumption affected the functional, racial, and personal distribution of incomes? (Chapters 7 to 14 below.)

6. The Rate of Investment in Relation to Economic Growth

6.1 Growth Models of the Harrod - Domar Type

Domar's and Harrod's growth models are today regarded as the early precursors to the theory of economic growth.[2]

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1. Nicholas Kaldor suggests that the statistical-historical approach should be combined with the theoretical approach as follows: "... The theorist ... ought to start off with a summary of the facts which he regards as relevant to his problem. Since facts, as recorded by the statisticians, are always subject to numerous snags and qualifications, and for that reason are incapable of being accurately summarized, the theorist, in my view, should be free to start off with a 'stylized' view of the facts - i.e., concentrate on broad tendencies, ignoring individual detail, and proceed on the 'as if' method, i.e. construct a hypothesis that could account for these 'stylized' facts. ..."
Nicholas Kaldor, "Capital Accumulation and Economic Growth", in F.A. Lutz and D.C. Hague (Editors), The Theory of Capital, Proceedings of a Conference held by the International Economic Association, MacMillan & Co., London, New York, 1961, p.178.

2. E.D. Domar, "Capital Expansion, Rate of Growth and Employment", Econometrica, Vol. 14, April 1946, reprinted in: Essays in the Theory of Economic Growth, ibid., pp. 70-82. E.D. Domar, "Expansion and Employment", The American Economic Review, Vol. 37, March 1947, reprinted in: Essays in the Theory of Economic Growth, ibid., pp. 83-108. In pages in future quotations will refer to the cited reprints.
Roy F. Harrod, "An Essay in Dynamic Theory", The Economic Journal, Vol. XLIX, March 1939, pp. 14-33. Roy F. Harrod, Towards a Dynamic Economics, MacMillan, London, 1948.
Roy F. Harrod, "Second Essay in Dynamic Theory", The Economic Journal, Vol. LXX, 1960, pp. 277 ff.

A main feature of both models is that they operate with one single productive factor only, viz., capital. Labour is regarded as complementary to capital, and the possibility of substitution between labour and capital is denied (i.e., coefficients of production are fixed). It is this particular assumption which is responsible for the instability of Harrod's growth path.

Both Harrod's and Domar's growth models belong to the category of "Golden Age" models, where the rate of growth of all main variables remains constant over a period of time.[1] Their models can therefore be regarded as counterparts of the long-term equilibrium solution of static theory.

The character of the new approach is clearly indicated in the following quotation from Domar:

"If investment increases productive capacity and also creates income, what should be the magnitude of investment, or at what rate should it grow, in order to make the increase in income equal to that of productive capacity?"[2]

Harrod and Domar succeeded in formulating the rate of full employment-equilibrium growth by using one behaviour equation in the form of a savings function, viz.,

(1) $S = sY$, (where s is the propensity to save for the total economy),

a production function, viz.,

(2) $I = k \Delta Y$, (where k is the marginal capital-output-ratio), and

the equilibrium condition

(3) $I \equiv S$.

It follows that

(4) $sY \equiv k \Delta Y$, or

(4a) $\frac{\Delta Y}{Y} = \frac{s}{k} = Gw.$

The rate of growth of income $\frac{\Delta Y}{Y}$ or Gw (i.e., Harrod's warranted rate of growth), is equal to the ratio of the savings coefficient (s), and the marginal capital-output ratio (k).

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1. Joan Robinson, The Accumulation of Capital, MacMillan, London, 1956, p. 99.
2. Domar, Expansion and Employment, ibid., p. 89.

The factors determining growth in this model are:-

(i) the initial level of income;

(ii) the rate of savings (which, because of (3), is identical with the rate of investment),

(iii) the capital-output-ratio (Harrod) or its reciprocal value, i.e., the productivity of investments (Domar).

Equation (4a) is a tautological explanation of the potential growth path of a capitalistic economy. Bombach comments as follows: "Das Domar-Modell erlaubt keine Aussagen über kausale Abhängigkeiten. Es soll lediglich zeigen, daß eine Entwicklung bei ständig voller Auslastung der Kapazitäten und gleichzeitiger Aufrechterhaltung des keynesianischen Gleichgewichts logisch möglich ist".[1]

The important conclusion to be drawn from Domar's model is the relation between the levels of saving, consumption, and economic growth. Under the condition of an economy growing along the Domar-equilibrium path, the rate of growth of income will, ceteris paribus, be the higher, the greater the propensity to save. The same is true in respect of the level of consumption, provided that a sufficiently long period of time has passed. According to Domar's growth model then, abstention from consumption at the present time will be rewarded by a higher future income.[2] There is no upward limitation to the process, and if a country has unlimited future-preference, it will have to depress present consumption to the lowest tolerable subsistence level, in order to maximize the income of future generations. Domar himself reflected on the appropriate development policy for underdeveloped countries as follows: "To secure the full employment of the Indian labor force in the near future on the American technological level would require a most fantastic growth of capital. There is really no particular purpose in computing any such rate, and all that need be said about these areas[3] in this connection is that the faster they manage to accumulate capital the better ...".[4] This phrase clearly shows that Domar does not envisage a limitation of the process of capital accumulation other than that given by the subsistence needs of a population.[5]

1. G. Bombach, Wirtschaftwachstum, ibid., p. 777, left column.
2. For a similar model, see: K. E. Boulding, "The Fruits of Economic Progress, and the Dynamics of Distribution," in: The American Economic Review, Proceedings, 1953, p. 473 ff.
3. Apart from India Domar refers also "particularly to Southeast Asia".
4. Evsey D. Domar, "Further Comment", The Quarterly Journal of Economics, Vol. LXVII, 1953, pp. 559-563, here p. 562.
5. In respect of developed countries, compare Domar's rejection of Hansen's stagnation thesis, ibid., p. 560.

6.2 Growth and Capital Formation in South Africa

Graph 2 (p. 67) illustrates the growth of South African capital stock and the G. D. P. at 1958 prices at logarithmic values, and the magnitude of the average capital coefficient in its absolute size.[1] Except for the period 1928-1933, the rate of growth of the G. D. P. is positive, and closely associated with the value of the capital stock.

By contrast, the value of the capital coefficient fluctuates more markedly. Noticeable heights occur during periods of under-utilization of capital, such as from 1930 to 1933, and from 1958 to 1962. Troughs are experienced when demand is high and the investment activity delayed, which is the case mainly during the World War II years.

In order to assess the relationship between investment and growth analytically for the whole period under consideration, a regression model is used which considers investments (X) as the independent, and the growth of the G. D. P. at real prices (Y), as the dependent variable. Measuring investment and growth over ten 5-year intervals,[2] the following results are found:[3]

TABLE 3 : Correlation Between Net Investment and Growth

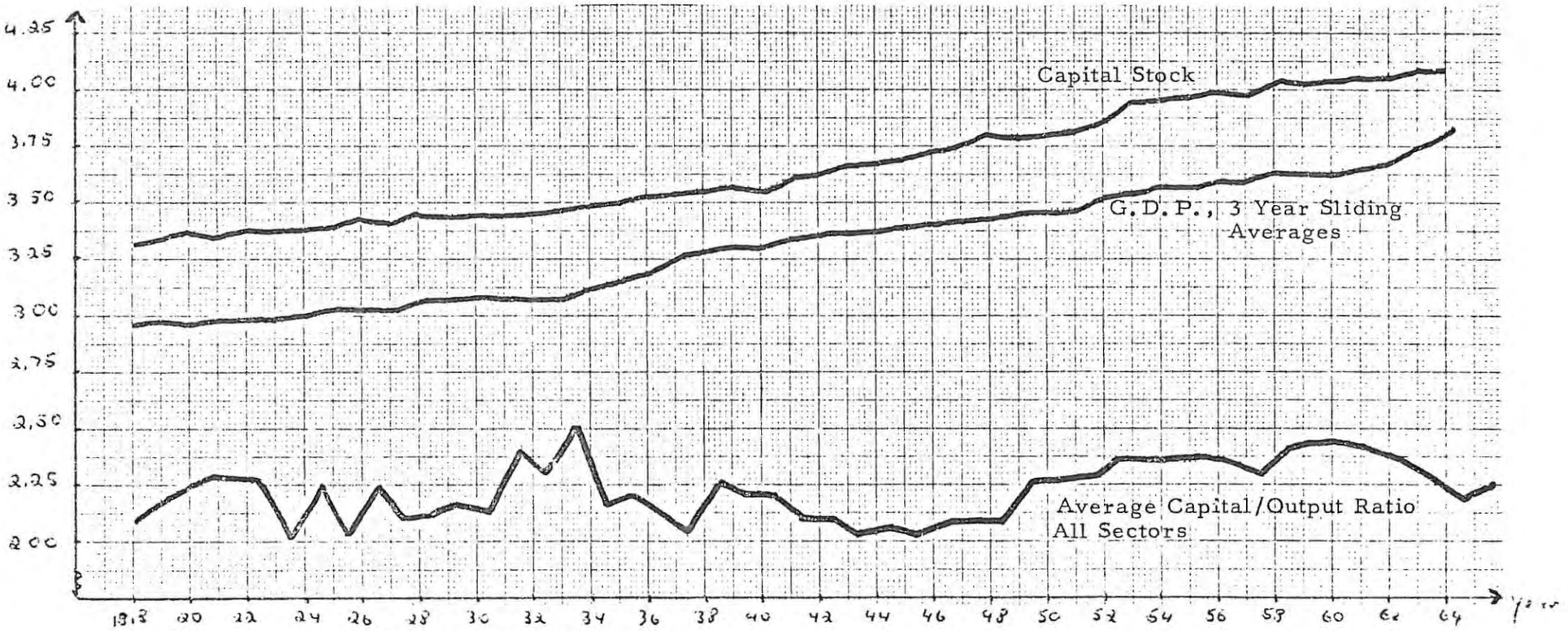
Sector	Best Slope	r	r^2	T
Agriculture	5.84	0.6279	0.3943	6.4544
Mining	5.53	0.6504	0.4231	6.8505
Manufacturing	10.27	0.9453	0.8934	23.1647
Services	5.93	0.9843	0.9689	44.6641
Total	7.43	0.9616	0.9246	28.0232

TABLE 4 : Correlation Between Gross Investment and Growth

Sector	Best Slope	r	r^2	T
Agriculture	4.11	0.8744	0.7650	14.4176
Mining	4.33	0.8059	0.6495	10.8906
Manufacturing	5.03	0.9727	0.9461	33.5088
Services	3.31	0.9817	0.9637	41.2387
Total	4.10	0.9878	0.9758	50.7490

1. Sources: Volume II, Tables 48, 49, 54
2. Compare p. 25 ff above.
3. Sources: Volume II, Tables 48 and 49.

Log R1,000 for Capital Stock and G.D.P.
Absolute Values for Capital/Output Ratio.



Graph 2 : Capital/Output Ratio, Capital Stock and G.D.P.,
S.A. Economy,
1958 Prices.

Both Tables 3 and 4 exhibit a strong positive correlation between the rates of investment and growth. It is interesting to note, that, with the exception of the service sector, the correlation coefficient r is greater when gross investments are being considered, (Table 4) compared with the same calculation when depreciations are excluded (Table 3). The better correlation of gross investments may be attributable to the fact that cash proceeds equivalent to depreciation allowances are periodically invested by firms, thus having a positive effect on the long-term growth of the firms' productive capacities.[1]

The r^2 columns of Tables 3 and 4, indicate the portion of the total variance of Y (i.e., G.D.P. at constant prices), which is explained by the regression model. For the sectors manufacturing and services (both in respect of gross and net investments), more than 89 per cent of the total Y-variance is explained by the regression model. It is not surprising to see, that the explanation is significantly less for the sectors agriculture and mining, since exogenous factors (rather than investments) can be regarded to be responsible for the growth performance of these sectors to a significant extent. Thus in the case of agriculture (where only 39 per cent of the growth of G.D.P. is explained through net investments), weather conditions determine the size and value of output considerably, and in the case of mining, the price for gold, which cannot be influenced by South African gold mines. Nevertheless, the T - test is significant for all cases, with $t_{.95}$ being equal to 1.86 for (10-2) = 8 degrees of freedom. Naturally, the T values are lower for agriculture and mining, compared with the sectors manufacturing and services.[2]

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1. Compare Robert Buchner, "The Increase in Production Capacity by Periodic Reinvestments Equivalent to Depreciation Allowances", The German Economic Review, Volume 8, Number 4, 1970, pp. 295-308.
2. The statistical formulae are based on William C. Merrill and Karl A. Fox, Introduction to Economic Statistics, John Wiley, New York, 1970, Chapter 9.5, pp. 346-364 (Correlation Analysis).

The positive result of the test of the Harrod-Domar formula (which has also been confirmed by research done in other countries[1]), underlines the validity of the hypothesis that investments (and thus savings) are necessary for the attainment of a high rate of economic growth.[2]

So far the general correlation between the rate of investment and the rate of growth has been examined for the South African economy. It is now necessary to work out the relation between the rates of investments and growth on the one hand, and the distribution of functional incomes, on the other.

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1. Compare for instance: Walther G. Hoffmann, "Long-Term Growth and Capital Formation in Germany", in: The Theory of Capital, International Economic Association, F. A. Lutz and D. C. Hague, (Editors), MacMillan, London, 1961, pp. 118-140.
2. For South Africa, an interesting use has been made of the Harrod-Domar model by T. A. du Plessis, who tried to evaluate the growth contribution made to the economy by capital imports. He uses the equation

$$r = ks\,(1-t^d) + ks'g + k\frac{B}{Y},$$

where

r	=	rate of growth
k	=	marginal product capital ratio
s	=	average propensity to save in the private sector
t^d	=	ratio of direct tax to income
s'	=	average propensity to save in the government sector
g	=	ratio of government income to total income
B	=	net foreign capital movements
Y	=	national income at factor costs.

For the years 1948-60, du Plessis assumed the following values:-

s	=	.12
s'	=	.22
g	=	.17
t^d	=	.07
k	=	.28 (excluding changes in inventories)
$\frac{B}{Y}$	=	.035

This formula, when used with the above values, produces a growth rate of r = 5.1 per cent (including the contribution made by foreign capital), or 4.1 per cent (excluding the contribution by foreign capital).

T. A. du Plessis, "Savings and the Role of Financial Intermediaries in South Africa", Finance and Trade Review, Vol. IV, No. 8, December 1961, pp. 445-51, here pp. 448, 9.

Three basic theories will be examined in this context, viz., (i) the post-Keynesian (widow's cruse) theory, (ii) the degree of monopoly (mark-up) theory, and (iii) the marginal productivity theory of income distribution.

Although the results of the different approaches will be found to link up generally one with the other, it is agreed that an excessive compartmentalization exists and cannot be overcome. Ernst Helmstädter remarks as follows on this question: "Die Verteilungstheorie zeichnet sich bekanntlich durch eine Fülle verschiedener Erklärungsansätze aus. In diesem Punkte ist ihr kaum ein anderer Zweig der theoretischen Nationalökonomie ebenbürtig. ... Vollständigkeit in der Berücksichtigung der die Verteilung beeinflussenden Grö ßen werden wir nie erreichen können. Die Aufgabe besteht vielmehr darin, daß wir uns auf die wesentlichen Gesichtspunkte konzentrieren".[1]

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1. Ernst Helmstädter, "Die Entwicklung der Einkommensverteilung in der Bundesrepublik Deutschland unter verteilungstheoretischem Aspekt, 1950-1965", No. 29 der Schriftenreihe des Instituts für Gesellschafts- und Wirtschaftswissenschaften der Universität Bonn, p. 394.

   Compare also: Melvin W. Reder, "Alternative Theories of Labor's Share", in: The Allocation of Economic Resources, Essays in Honor of Bernard Francis Haley, Edited by Moses Abramovitz et alia, Stanford University Press, Stanford, 1959, pp. 180-206.

7. Post-Keynesian Theories of Income Distribution and Economic Growth

7.1 Comparison of the Post-Keynesian Theories with Degree of Monopoly Theories

The post-Keynesian (widow's cruse) theories of income distribution and economic growth, which will be discussed in this chapter, and the degree of monopoly (mark-up) theories, which will be discussed in chapter 9 below, have a common basis in the following equations (5) to (13):-

Income is defined as the sum of consumption and investment, viz.

(5) $Y = C + I.$

In a two class society, income is the sum of wages (W) and profits (Q), viz.,

(6) $Y = W + Q.$

Writing c_w and c_q for the propensities to consume out of wages and profits, respectively, (5) and (6) become

(7) $Y = c_w W + c_q Q + I.$

W is the product of the wage rate (w) and the number of hours worked (h),

(8) $W = wh.$

Taking the productivity of labour as π, the physical output Y^{real} becomes

(9) $Y^{real} = \pi h.$

Equations (5) to (9) constitute the common basis for a comparison of the Keynesian with the degree of monopoly theories.

The crucial difference between the two theories is that the post-Keynesian theory assumes that full employment is secured through a flexible price system and that the state of full employment is the 'normal' situation for an economy. In contrast, the degree of monopoly theory is based on the assumption that price rigidities prevail on the supply side of the market, thus allowing for a potential unemployment equilibrium to persist.

The post-Keynesian argument furthermore, is based on the assumption of a rigid, technically determined relation

between capital and output, which is expressed by

(10) $Y^{real} = \sigma K$

where σ is the average productivity of capital.
Full employment is secured through the assumption of a flexible price level (P), i.e.,

(11) $P = \frac{Y}{Y^{real}}$,

The degree of monopoly theory, on the other hand, uses equation (11) to determine the real output as

(12) $Y^{real} = \frac{Y}{P}$, but the level of prices is now given by the degree of monopoly, m, as

(13) $P = (1+m)\ \pi\ h, \quad m > 0,$

Monopolists, according to the degree of monopoly theory, behave as price setters, and, consequently, take the position of quantity adjusters.[1] Therefore it follows that according to this interpretation, the size of real income will be small when the degree of monopoly is high, and vice versa. The monopolistic elements may restrict supply to such an extent that a permanent state of underemployment becomes inevitable.[2]

This supply restriction is denied by the post-Keynesian version of distribution and growth theories. These post-Keynesian theories are based on the vital assumption that the economy is always fully employed, and that the level of profits is determined by the size of monetary demand, given a certain level of supply. Profits accrue as windfall gains, and the precise level of profits cannot be anticipated by entrepreneurs, just as they do not attempt to plan a certain rate of profit. In comparison, the degree of monopoly theories regard profits as an entrepreneurial action parameter. Scheele observes in this regard :- "Eine Zunahme der Investitionsausgaben führt also in der Monopolgrad-Theorie zu einer Erhöhung des Outputs bei konstantem

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1. Erich Schneider, Pricing and Equilibrium, An Introduction to Static and Dynamic Analysis, Unwin, London, Third Impression, 1966, p. 48 ff.
2. Erwin Scheele convincingly suggests that Kalecki's work, in which the degree of monopoly theory was first put forward, was written in the immediate aftermath of the Great Depression.
Erwin Scheele, Einkommensverteilung und Wirtschaftswachstum, J.C.B. Mohr (Paul Siebeck), Tübingen, 1965, p. 5, Ft. 3.

Preisniveau und konstanter Einkommensverteilung; nach der keynesianischen Theorie bewirkt sie eine Abnahme der Lohnquote bei steigendem Preisniveau und konstantem Output." [1]

It is clear from the above that in relation to income and employment, the distribution of incomes is variable in the post-Keynesian type of theories, but constant in the degree of monopoly type.

It is a matter of both academic and practical interest to examine the validity of the two theories. When price flexibility exists during the business cycle, the 'Keynesian' factors operating on the demand side of the market dominate the factors which operate on the supply side. The supposition on which this argument is based is particularly valid during periods of over-employment, when general price increases can easily be realized, whereas the evidence for a downward price flexibility, during the periods of temporary recessions is at variance. [2] One cannot, however, ignore the degree of monopoly theories completely. The post-Keynesian version of growth and distribution theories do not take into account human behaviour, expressed in terms such as lust for power, boycotts, strikes, exploitation of favourable economic positions, economic warfare, rivalry, and retaliations against competitors. [3] It is exactly this influence of different objectives, modes of behaviour, and forms of markets which can be traced with the help of the degree of monopoly theory. [4]

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1. Erwin Scheele, Einkommensverteilung, ibid., pp. 3, 4.
2. Compare the critical discussion by Fritz Machlup, "Monopol", in : Handwörterbuch der Sozialwissenschaften, Band 7, pp. 448, 9.
3. Compare Wilhelm Krelle, Preistheorie, J. C. B. Mohr (Paul Siebeck), Tügingen, 1963, pp. 80-87. and Krelle, Präferenz- und Entscheidungstheorie, J. C. B. Mohr (Paul Siebeck), Tübingen, 1968.
4. Compare Erich Preiser, Wachstum und Einkommens-verteilung, Sitzungsberichte der Heidelberger Akademie der Wissenschaften, Jahrgang 1961, 5. Abhandlung, Heidelberg 1961, Footnote 1, p. 13, and p. 16.
   In Preiser's interpretation the degree of monopoly is seen as an action parameter which decisively influences the distribution of incomes, against which must be placed the passive role of the post-Keynesian theories as far as human behaviour assumptions are concerned.

7.2. General Features of Post-Keynesian Models on Income Distribution and Economic Growth.

In what follows, the post-Keynesian models (See footnotes 1 and 2) presented by K.E. Boulding, N. Kaldor, G. Bombach, and J. Robinson, will be discussed. These theories analyse the level of income and employment in relation to the distribution of incomes, thereby clarifying a relationship which formerly had been neglected under the rule of the marginal productivity theory.[3]

The main features of the post-Keynesian growth and distribution theories are as follows :-

i. the introduction of refined consumption and investment functions;

ii. the analysis of income and expenditures in circular flow models;[4]

iii. the assumption of dynamic relationships which help overcome the static formulation of Keynesian employment theory;

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1. In the literature, one finds the terms "Keynesian School"* "post-Keynesian School"** and "Neo-Keynesian School"*** side by side. The present writer prefers to use the term "post-Keynesian School".
   * Nicholas Kaldor, "Alternative Theories of Distribution", The Review of Economic Studies, Vol. XXIII, No. 2 1955-6.
   ** L. L. Pasinetti, "Rate of Profit and Income Distribution in Relation to the Rate of Economic Growth, "The Review of Economic Studies, Vol. XXIX, 1961/2, p. 267 ff.
   *** A.K. Sen, "Neo-Classical and Neo-Keynesian Theories of Distribution", The Economic Record, March 1963, p. 53.
2. Keynes made various remarks on the problems connected with the distribution of incomes, although he never attempted to build up a comprehensive system in this respect. In this connection, a positive contribution by him is the famous 'widow's cruse' theorem, which will be discussed below.*
   Normatively, Keynes frequently expressed his view that he attached more importance to the question of production, compared with that of distribution: "The evil of not creating wealth would be greater than the evil that the wealth, when created, should not accrue to those who have made the sacrifice namely, to the consumers whose consumption has been curtailed by the higher prices consequent on the Profit Inflation." **
   * John Maynard Keynes, Treatise on Money, Vol. I., Macmillan, London, 1931, p. 139.
   ** ibid., Vol. II, p. 126.
3. The marginal productivity theory never really developed an independent income and employment theory.
4. Circular flow models operate with economic poles which are connected by money and credit flows. The system is always closed and the number of poles and streams can be limited through appropriate aggregation.
   Compare Wilhelm Krelle, Volkswirtschaftliche Gesamtrechnung, Duncker & Humblot, Berlin, 1959.

iv. the assumption of a flexible distribution of incomes by means of which the instability of the Harrodian economic growth path is avoided.[1]

7.3 K. E. Boulding's Model of Income Distribution.[2]

Boulding modifies the 'basic system' by introducing certain business behaviour functions into a macroeconomic model of income distribution. He regards the dividend policy of businesses as the prime mover of his system, stating : "By far the most important conclusion which can be drawn from the model ... is that the ultimate long-run tendency (of the distribution of incomes) depends on the nature of the 'dividends function'."[3]

For his 'distributional equilibrium model'[4], Boulding assumes a two-class society consisting of businesses and households.[5] Income is received in the form of wages (W) and profits (Q) as

(14) $Y = W + Q$, and the income disposition is described by

(15) $Y = C + I$.

Consumption is a function of the size and distribution of incomes, viz.,

(16) $C = C(W, Q)$,

whereas investments are a function of profits,

(17) $I = I(Q)$.[6]

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1. Compare F. H. Hahn and R. C. O. Matthews, The Theory of Economic Growth : A Survey, in: Surveys of Economic Theory, Growth and Development, American Economic Association and Royal Economic Society, Vol. II, MacMillan, St' Martin's Press, London, 1967, p. 7.
2. Kenneth E. Boulding, A Reconstruction of Economics, Wiley, New York, Chapman & Hall, London, 1950, Chapter 14, pp. 243-269.
   K. E. Boulding, "The Fruits of Progress and the Dynamics of Distribution", American Economic Review, Vol. 43, Proceedings, 1953, pp. 473-483.
   K. E. Boulding, "Wages as a Share in the National Income", in The Impact of the Union, Edited by David McCord Wright, Hartcourt, New York, 1951, pp. 123-167 (with discussion).
   M. Turvey, "A Reconstruction of Economics", Review Article, Economica, May 1951, pp. 203 ff.
3. K. E. Boulding, The Fruits ...., ibid., p. 480.
4. K. E. Boulding, A Reconstruction, ibid., p. 264.
5. ibid., p. 246.
6. ibid., p. 265, Fig. 76.

The financial relations between businesses and households are described by the following terms :-

D = business distributions, consisting of dividends and interest;
I_n = internally financed investments or business savings;
I_e = externally financed investments or savings by households;
dM_b = increase in the money holdings by businesses;
dK_b = increase in credit granted by businesses to consumers.

Non-wage income is defined as

(18) $Q = I_n + D + dM_b + dK_b$, and wages as

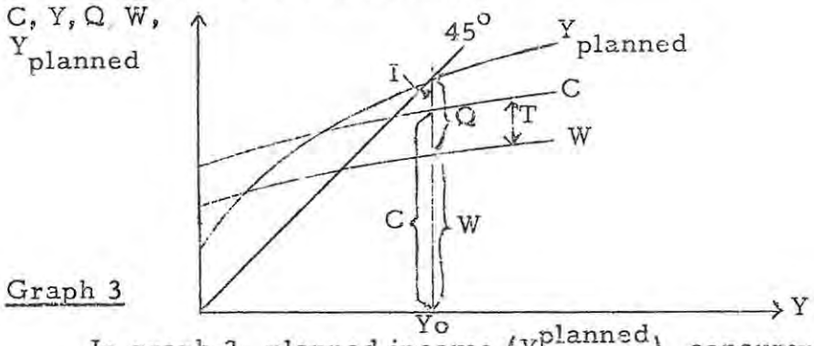
(19) $W = Y - Q = C + I - I_n - (D + dM_b + dK_b)$, or

(19a) $W = C + I_e - (D + dM_b + dK_b)$, since $I_e = I - I_n$.

The bracket term is defined as a tranfer item (T) :-

(20) $T = D + dM_b + dK_b$.

The size of T has a decisive influence on the distribution of incomes, as is illustrated below. [1]



Graph 3

In graph 3, planned income ($Y^{planned}$), consumption, investment, wages, and profits, are measured on the vertical, and nominal income on the horizontal axis. Investments are a function of profits and are superimposed on the consumption function. At the equilibrium level of income (Y_o), planned income ($C + I$) is equal to nominal income ($W + Q$). In Y_o, the size, disposition, and distribution of income are positively determined.

The size of the transfer factor T is crucial for the distribution of incomes. In the case of graph 3, T represents the difference between C and W, i. e., T constitutes a net increase in debts to businesses from households.

The one fact which emerges with clarity from Boulding's model is that the distribution of incomes is measured (during any period), not in terms of the actual, additional command over goods and services (called household absorption), but in terms of financial claims (i. e., in terms of W and T).

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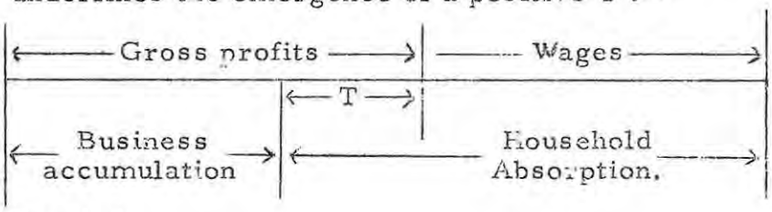
1. Compare Wilhelm Krelle, Verteilungstheorie, ibid., p. 73.

Graph 4 illustrates the distributive situation which underlines the emergence of a positive T : -[1]



Graph 4

The share of wages in total income can be described by

$$\frac{\text{Wages}}{\text{Total Income}} = \frac{\text{Household Absorption minus T}}{\text{Total Income}}$$

During a long period of time, the value of T may increase if there occurs a net increase in the indebtedness of households to businesses, as expressed, for instance, by an increase in hire purchase transactions. This tendency may be counteracted, however, if equity stock is increasingly held by households, since this favours the income share of the household sector.

The interesting feature of Boulding's model is that it sees the distributive juggle determined by the financial flows between businesses and households. In contrast, Kaldor (as will be seen in Section 7.4 below) puts the rate of investment and the propensities to save out of wages and profits in the centre of his deliberations. Basically, it appears that the two approaches are closely related one to the other, because saving and expenditure decisions by households will invariably be reflected in the financial flows of firms.

In the view of the writer, the relative usefulness of the two approaches (viz., Boulding's versus Kaldor's models) must be assessed in accordance with pragmatic considerations, i.e., preference must be given to that model-type which fits in best with the available statistical data.

The basic shortcoming of Boulding's model is the paucity of its behaviour functions. No provision is, for instance, made for circular behaviour relations which emerge when oligopolistic market forms are being considered. Factors such as trade union action, the propensity to retaliate, or hard or soft market structures, do not appear in Boulding's model at all, thus leaving important economic events unexplained.

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1. K.E. Boulding, A Reconstruction, ibid., p. 252.

7.4 Kaldor's Models of Income Distribution and Economic Growth.

By combining the Keynesian ideas of income generation with the dynamic Harrod-Domar approach, Kaldor contributes a number of models which deal with the relation of income distribution and economic growth.[1]

Kaldor attempts to base his models on the following typical characteristics to be found in capitalistic countries :[2]

i. Sustained growth in aggregate production and labour productivity;

ii. Sustained increase in the amount of capital per worker;

iii. A steady rate of profit on capital;

iv. Near-identity in the percentage growth rates of production and capital stock, associated with almost constant capital-output ratios over long periods, if different degrees of capital utilization are allowed for ;

v. A high correlation between the share of profits in income and the share of investments in output;[3]

vi. The existence of appreciable differences in the rate of growth of labour productivity and output in different societies, associated with corresponding variations in the investment coefficient and the profit share.

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1. N. Kaldor, "Alternative Theories of Distribution", The Review of Economic Studies, Vol. XXIII, 1955-56, p. 83 ff, reprinted in : N. Kaldor, Essays on Value and Distribution, Duckworth, London, 1960, p. 209 ff. (Ensuing quotations will refer to the reprint).
   N. Kaldor, "A Model of Economic Growth", The Economic Journal, Vol. LXVII, 1957, p. 591 ff.
   N. Kaldor and J.A. Mirrlees, "A New Model of Economic Growth", The Review of Economic Studies, Vol. XXIX, 1961/2, p. 174 ff.
2. N. Kaldor, "Capital Accumulation and Economic Growth", in : The Theory of Capital, Proceedings of a Conference held by the International Economic Association, Edited by F.A. Lutz and D.C. Hague, MacMillan, London, 1961, p. 178, 9.
   Compare also : N. Kaldor, A Model of Economic Growth, ibid., p. 592.
3. This statement is based on empirical research done by Phelps Brown and Weber, Accumulation ....., ibid., pp. 263-88.

According to Kaldor, none of these "stylized facts" can be "plausibly 'explained' by the theoretical constructions of neo-classical theory"[1], which assumes a steady fall in the rate of profit when the capital accumulation increases.[2]

In Kaldor's system, the distribution of incomes is directed by macroeconomic income flows, but not by the relative scarcities of productive factors, as had been maintained by the neo-classical distribution theory. The slope of the iso-product curve, which had occupied so central a position in the explanation of income shares before Kaldor, is regarded as an irrelevant criterion,[3] and is replaced by an analysis of the vigour and enthusiasm of entrepreneurs who are responsible for the maintenance of a high rate of investments.

In what follows, Kaldor's static version of the laws of distribution, as incorporated in his essay on the "Alternative Theories of Distribution", and the dynamic version from his "Model of Economic Growth", will be discussed. Later publications on the subject are dominated almost completely by the analysis of the growth aspect, and the distributive concerns are relegated to the background.

7.4.1 Kaldor's Static Model of Income Distribution

Kaldor assumes a full employment economy, the level of activity of which is limited by the availability of physical resources. Say's Law is assumed to be valid. The formal analysis is closely based on Keynes' multiplier, but whereas Keynes developed his multiplier theory in order to trace the effect of a change in investments on the level of income, (thus regarding employment as variable and the distribution of incomes as constant), Kaldor argues the other way round, and assumes full employment of physical resources, with a variable rate of investment and a variable

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1. N. Kaldor, Capital Accumulation, ibid., p. 179.
2. N. Kaldor, "Economic Growth and the Problem of Inflation", Economica, N.S., Vol. XXVI, 1959, pp. 212-26, and pp. 287-98. Here p. 224.
3. For a detailed account of Kaldor's objections to the marginal productivity theory, compare :-
   N. Kaldor, Alternative Theories, ibid., pp. 89-91.
   N. Kaldor, A Model of Economic Growth, ibid., pp. 602-3.
   N. Kaldor, Economic Growth and the Problem of Inflation, ibid., p. 224.

distribution of incomes.[1] The full employment assumption makes supply inelastic in relation to changes in aggregate demand, and the model therefore assumes complete price flexibility, both in the downward and upward directions.

Kaldor defines a two class society, consisting of wage (W) earners and profit (Q) receivers. Wage earners may be either labourers or salary earners, whereas profit receivers consist of entrepreneurs and property owners.[2] Undistributed profits of corporate businesses are included in the profit category. No provision is made for the possibility of a cross distribution, where one and the same income receiver receives income from both sources. Moreover, profit is not a homogeneous entity, since there is little relation between the paid out income of an independent proprietor (whose earnings might be less than that of a skilled labourer), and that of the undistributed profits of large industrial concerns (whose profits are depersonalized).[3]

Kaldor's balance and behaviour equations are as follows :-

(21) $I = S$ [4]

(22) $Y = W + Q$ and

(23) $S = S_w + S_q$, with (23a) $S_w = s_w W$ and (23b) $S_q = s_q Q$,

where S_w = savings of wage earners,

S_q = savings of profit receivers,

s_w = propensity to save out of wages,

s_q = propensity to save out of profits.

By combining the above equations, Kaldor obtains :

(24) $I = s_q Q + s_w W = s_q Q + s_w (Y-Q) = (s_q - s_w) Q + s_w Y.$

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1. N. Kaldor, Alternative Theories, ibid., p. 228.
2. N. Kaldor, Alternative Theories, ibid., p. 229.
3. Compare Gottfried Bombach, Die Verschiedenen Ansätze der Verteilungstheorie, Schriften des Vereins für Socialpolitik, NF, Band 17, Duncker & Humblot, Berlin 1959, p. 136.
4. Kaldor writes $I \equiv S$, since the relation between investment and savings must be interpreted as an ex post identity. (Alternative Theories, ibid., p. 229)
Hans Jürgen Schmitt suggests that $I = S$ be interpreted as an ex ante relation : "... ein Festhalten an KALDORs Auslegung (würde) zu einer Ablehnung des gesamten Models führen, da es in diesem Falle tautologisch wäre und somit keinen Aussagewert besässe."
Hans-Jürgen Schmitt, Die Verteilungstheorie Kaldors, Inaugural-Dissertation, Tübingen, 1966, (Bamberger Fotodruck), p. 7.

Dividing by Y gives

$$(25)\quad \frac{I}{Y} = (s_q - s_w)\frac{Q}{Y} + s_w, \text{ or}$$

$$(26)\quad \frac{Q}{Y} = \frac{1}{s_q - s_w}\frac{I}{Y} - \frac{s_w}{s_q - s_w} \qquad \text{(Footnote 1)}$$

The share of profits Q/Y (which is regarded as the dependent variable), is determined (i) by the share of investments in income (I/Y), and (ii) by the propensities to save out of wages and profits. The crucial independent variable is I/Y. For the case of a rise in the ratio of I/Y, Kaldor assumes that this will "raise prices and profit margins, and thus reduce real consumption, whilst a fall in investment, and thus in total demand, causes a fall in prices (relatively to the wage level), and thereby generates a compensating rise in real consumption." [2] Although the model is argued in static terms [3], one can assume that an increase in investments will not immediately produce a corresponding fall in consumption. There will rather ensue a dynamic process of adaptations, at the beginning of which prices in the investments good sector will increase, thus inducing a shift of productive resources from the consumer goods sector to the more profitable investment goods sector. With the value of monetary demand for consumer goods remaining unchanged, the price level of the consumer goods sector will subsequently increase. If the workers are not in a position to secure increases in their wages, a process of forced savings will commence during which the standard of real consumption will drop. Thus the workers finance the higher rate of investment by a drop in their real

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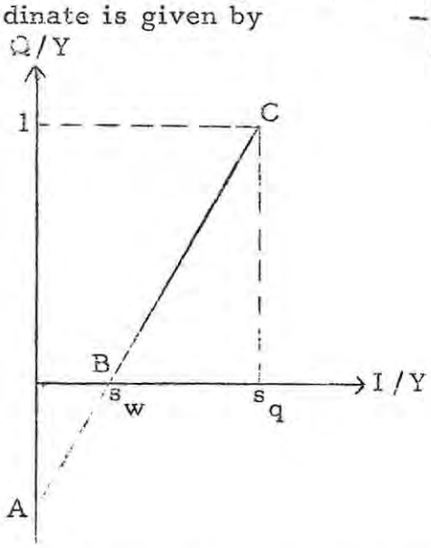
1. N. Kaldor, Alternative Theories, ibid., p. 229.
   K. W. Rothschild adequately compares the impact of this formula with the quantity equation in monetary theory.
   K. W. Rothschild, "Theme and Variations - Remarks on the Kaldorian Distribution Formula", Kyklos, Vol. XVIII, 1965, p. 653.
2. N. Kaldor, Alternative Theories, ibid., pp. 229, 230.
3. In static economic theory, all functional relations are related to the same time period.
   R. Frisch, "On the Notion of Equilibrium and Disequilibrium", Review of Economic Studies, Vol. III, 1937, pp. 100-6.
   J.A. Schumpeter, History of Economic Analysis, ibid., p. 963.

standard of consumption.[1]

A graphical representation of Kaldor's static distribution formula shows a straight line in a diagram which measures Q/Y on the vertical and I/Y on the horizontal axis. The slope of the distribution function is $\frac{1}{s_q - s_w}$, and the intersection with the ordinate is given by $-\left(\frac{s_w}{s_q - s_w}\right)$



Graph 5

Line AC in graph 5 is the distribution function, as determined by equation (26). Only the section BC is relevant because $\frac{Q}{Y} > 0$. For given values of s_q and s_w, the slope of the distribution function is determined, resulting in the rate of profit being directly dependent on the rate of investments.

From equation (26) and graph 5 it can be seen that $\frac{I}{Y} = s_w$ when $\frac{Q}{Y} = 0$, and $\frac{I}{Y} = s_q$ when $\frac{Q}{Y} = 1$. This relation can be proved by substituting into equation (26) the marginal values 0 and 1 for $\frac{Q}{Y}$, and solving for $\frac{I}{Y}$: -

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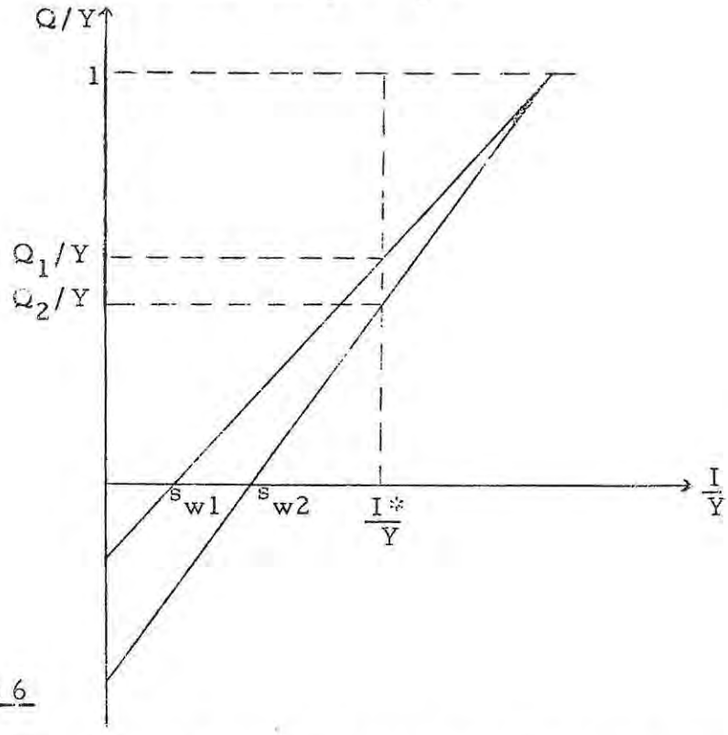
1. The writer disagrees with the assertion by D.D. Nuti that Kaldor's system is a "necessary relation that must always hold for macroeconomic equilibrium among ex-post magnitudes", and that Kaldor does not provide "a theory of the determination ... of income shares."
This assertion completely ignores the dynamic built-in processes of adjustment.
D.M. Nuti, "'Vulgar Economy' in the Theory of Income Distribution", De Economist, Jaargang 118, Nummer 4, Juli/August 1970, pp. 363-369.
In Contrast to Nuti's assertion, it appears that Kaldor describes a process of adaptation which is widely known as the "Wicksellian process". Compare Knut Wicksell, Lectures on Political Economic, Vol. 2, Money, Routledge, London, 1935, p. 195.

(27a) $\frac{Q}{Y} = 0 = \frac{1}{s_q - s_w} \frac{I}{Y} - \frac{s_w}{s_q - s_w}$ or $I/Y = s_w$

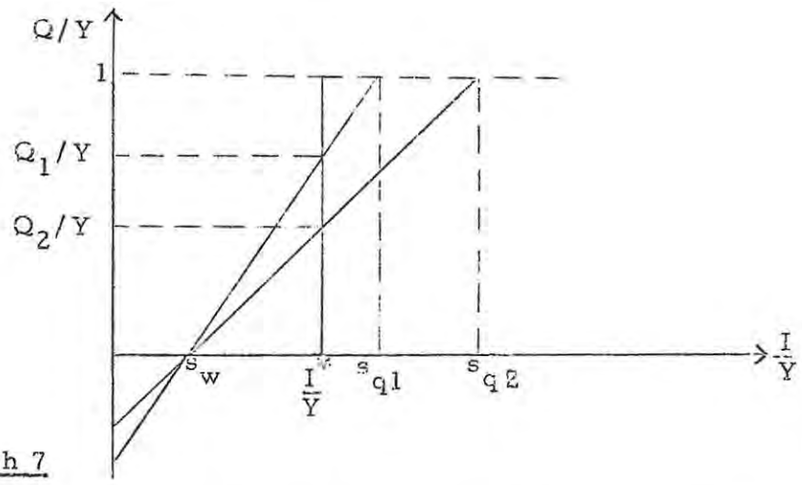
(27b) $\frac{Q}{Y} = 1 = \frac{1}{s_q - s_w} \frac{I}{Y} - \frac{s_w}{s_q - s_w}$ or $I/Y = s_q$

Given the values of I/Y and s_q, wage earners can lower Q/Y by increasing their marginal propensity to save, s_w. The resulting shift in the distribution of income is shown in graph 6, where an increase in s_w from s_{w1} to s_{w2} lowers Q/Y from $\frac{Q_1}{Y}$ to $\frac{Q_2}{Y}$, under the assumption that $\frac{I}{Y} = \frac{I^*}{Y}$.



Graph 6

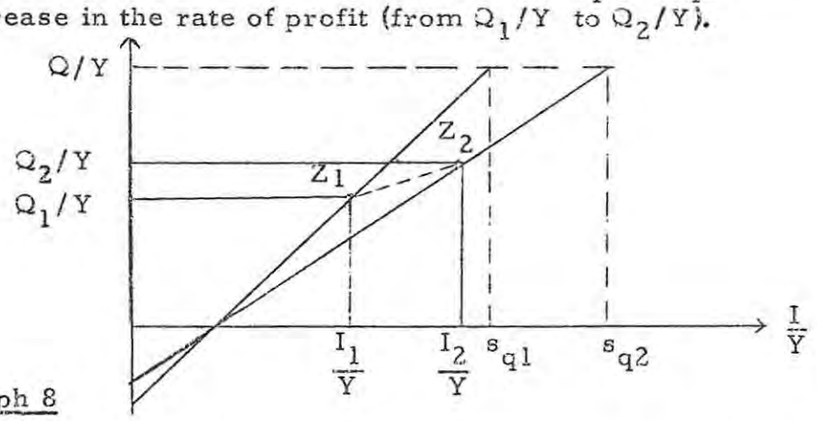
Whereas workers can improve their distributive position by increasing their marginal propensity to save, the opposite is true for entrepreneurs. Given the rate of investment, any increase in the propensity to save out of profits will deteriorate the relative share of entrepreneurs, and vice versa. Graph 7 illustrates the result of an increase of s_q from s_{q1} to s_{q2} under the assumption that the rate of investment is constant and equal to $\frac{I^*}{Y}$. As an outcome of this situation, the rate of profit drops from $\frac{Q_1}{Y}$ to $\frac{Q_2}{Y}$.



Graph 7

The effect demonstrated in Graph 7 is surprising and contrary to what one might have expected. The outcome is evident, however, when one considers that an increase in the propensity to save out of profits, must be accompanied by a compensating decrease in the propensity to consume out of profits. Hence the level of demand is less than would otherwise be the case, since the rate of investment is given. Consequently, price rises are also less, or prices might even fall. This results in the process of enforced savings not becoming necessary to the same extent as would have been the case had the propensity to save out of profits not increased.

The 'pure' case which is illustrated in graph 7, is unlikely, however, to be representative of real-world situations. It appears to be more likely that an increase in the rate of investment (say, from I_1/Y to I_2/Y in graph 8), is associated with both an increase in the rate of self-finance (from s_{q1} to s_{q2}) and an increase in the rate of profit (from Q_1/Y to Q_2/Y).



Graph 8

In graph 8, a situation is visualized where both the rate of profit and the rate of investment increase. The respective initial and final situations are indicated by points Z_1 and Z_2.

The "stability-condition" in Kaldor's system is given by the relation $s_w < \frac{I}{Y} < s_q$, a condition which is closely related with the "coefficient of sensitivity of income distribution", and defined as [1]

$$\frac{d\left(\frac{\Omega}{Y}\right)}{d\left(\frac{I}{Y}\right)} = \frac{1}{s_q - s_w}$$

The greater the relative difference between the two propensities to save, (i.e., the smaller the coefficient of sensitivity and the flatter the distribution curve) the smaller will be the relative redistribution of income between wage earners and profit receivers, which is required to bring about a given change in the investment ratio.

In Kaldor's static system, the ratio I/Y is the "prime mover in the distribution puzzle". (See footnotes 2 and 3). If, say, the rate of investment increases owing to an autonomous decision by entrepreneurs, workers could retain their former share in total income by immediately increasing their rate of saving to such an extent that Ω/Y remains constant (compare equation 26).

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1. N. Kaldor, Alternative Theories, ibid., p. 230.
2. K. W. Rothschild, Theme and Variations, ibid., p. 654.
3. The lack of an independent investment function has been described as a shortcoming of Kaldor's static distribution theory by C.E. Ferguson : - "In Kaldor's theory, investment is a completely exogenous variable whose behaviour is not determined by the model. In fact, the Kaldor model simply determines the profit share that is consistent with full employment, given an exogenous level of investment and the unequal propensities to save. This is a far cry from a theory of distribution ..."

   C.E. Ferguson, "Theories of Distribution and Relative Shares", Jahrbücher für Nationalökonomie und Statistik, February 1964, p. 34.

   The writer does not agree with the implications of Ferguson's criticism. It is hard to see why the coherence between the investment function and the distribution theory should be a 'conditio sine qua non' for a useful distribution theory.

   For a more balanced account, compare : J. Niehans, "Die Wirkung von Lohnerhöhungen, technischen Fortschritten, Steuern und Spargewohnheiten auf Preise, Produktion und Einkommensverteilung", in : Einkommensverteilung und technischer Fortschritt, herausgegeben von Erich Schneider, Schriften des Vereins für Socialpolitik, N.F., Band 17, Duncker & Humblot, Berlin, 1959, pp. 83-6.

However, workers are unlikely to behave in this way.[1]

On the contrary, it can be assumed that they will decrease their propensity to save, in order to hedge against the increase in prices, which results from the increase in the rate of investments. This behaviour causes the rate of profit to rise, until the point is reached where total savings are equal to total investments.[2]

7.4.2 Kaldor's 'Model of Economic Growth'

In his "Model of Economic Growth", Kaldor considers three critical factors, which in his opinion, are mainly responsible for the growth performance of capitalistic economies, viz.,

(i) the flow of inventions and innovations (technical progress),
(ii) the saving propensities of wage earners and profit receivers,
(iii) the growth of the population.

Although the distributive considerations lose the central importance which was attached to them in the static model, they are still taken into account through the assumption of different propensities to save out of wages and profits.

As in his static model, Kaldor assumes that Say's Law is valid, i.e., output is limited by available resources, not by effective demand.[3]

The growth model is put forward in two different versions, i.e., in a short-run and in a long-run interpretation. The difference between the two is that in the short-run model, investments are dependent on the rate of growth of real income, whereas in the long-run, no investment function sui generis is proposed.

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1. Kaldor remarks correspondingly : - "The re-investment of the profits of business enterprise always has been ... the main source of finance of industrial capital accumulation; we are now aware that the rate of accumulation is at the same time one of the main determinants of the amount of profits that is thus available for financing."
   N. Kaldor, "The Relation of Economic Growth and Cyclical Fluctuations", The Economic Journal, March 1954, here quoted from : Essay on Economic Stability and Growth, Duckworth, London, 1960, p. 228.
   Note that the above citation clearly testifies the close relation between Boulding's and Kaldor's distribution theories.
2. Compare graph 6 above. A decrease of s_w from s_{w2} to s_{w1} causes an increase in Q/Y from Q_2/Y to Q_1/Y.
3. N. Kaldor, A Model of Economic Growth, ibid., p. 593.

Both versions operate with the assumption of a constant capital-output ratio.[1] All economic flows are interpreted in real terms.[2]

7.4.2.1. The Short-Run Version of Kaldor's Growth Model

Combining equations (22), (23), (23a) and (23b), Kaldor defines the share of savings in income as

$$(28)\quad \frac{S}{Y} = s_w + (s_q - s_w)\frac{Q}{Y} \quad \text{with} \quad 1 > s_q > s_w > 0 .$$

Investments are directed by the desire to keep the capital-output ratio constant, modified by the change in the rate of profit on capital, viz.,

$$(29)\quad K_t = a\ Y_{t-1} + b\frac{Q_{t-1}}{K_{t-1}}\ Y_{t-1}$$

where K_t stands for the value of capital (K) in period t, and a and b are positive parameters.

By definition, $I_t = K_{t+1} - K_t$, hence

$$(30)\quad I_t = K_{t+1} - K_t = (Y_t - Y_{t-1})\left(a + b\frac{Q_{t-1}}{K_{t-1}}\right) + b\left(\frac{Q_t}{K_t} - \frac{Q_{t-1}}{K_{t-1}}\right) Y_t$$

From equation (29) the value of a is given as

$$(31)\quad a = \frac{K_t - b\frac{Q_{t-1}}{K_{t-1}}\ Y_{t-1}}{Y_{t-1}}$$

and from (31) and (30) the rate of investment can be derived as

$$(32)\quad \frac{I_t}{Y_t} = \frac{Y_t - Y_{t-1}}{Y_{t-1}}\ \frac{K_t}{Y_t} - b\frac{Q_{t-1}}{K_{t-1}} + b\ \frac{Y_t}{K_t}\ \frac{Q_t}{Y_t}$$

In equilibrium, $\frac{S_t}{Y_t} = \frac{I_t}{Y_t}$, hence, by combining (28) with (32),

$$(33)\quad \frac{Q_t}{Y_t} = \frac{\frac{Y_t - Y_{t-1}}{Y_{t-1}} \cdot \frac{K_t}{Y_t} - b\ \frac{Q_{t-1}}{K_{t-1}} - s_w}{(s_q - s_w) - b\ \frac{Y_t}{K_t}}$$

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1. Kaldor quotes empirical research which substantiates the thesis of the constancy of the capital-output ratio in "A Model of Economic Growth", ibid., p. 592, Ft. 2.
   For a critical assessment of this hypothesis, compare H.J. Schmitt, Die Verteilungstheorie, ibid., pp. 53-6.
2. N. Kaldor, A Model of Economic Growth, ibid., p. 598.

Given the propensities to save, the rate of profit (Q_t/Y_t) will be adjusted so as to bring about the equality between the rate of saving and the rate of investment.

The distribution of income in the short-run dynamic model is dependent on

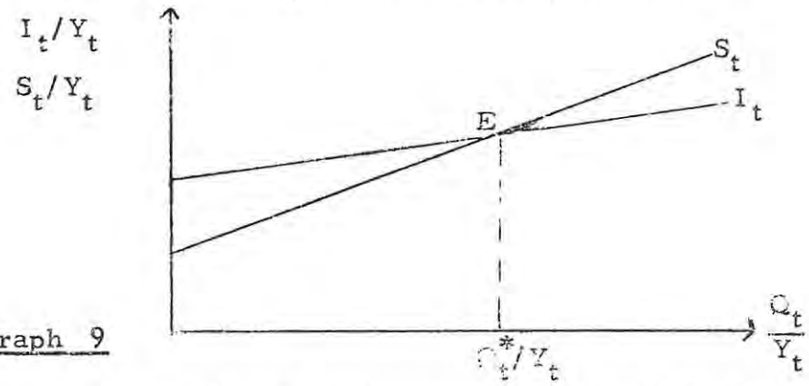
(i) the rate of growth of income $\frac{Y_t - Y_{t-1}}{Y_{t-1}}$,

(ii) the capital coefficient $\frac{K_t}{Y_t}$,

(iii) the rate of profit of the past period $\frac{Q_{t-1}}{K_{t-1}}$ and

(iv) the investment and savings coefficients b, s_w, and s_q.

The situation may be explained with the help of a diagram. In graph 9, I_t/Y_t and S_t/Y_t are measured on the vertical, and Q_t/Y_t on the horizontal axis. The distribution of functional incomes is determined by the intersection of the savings function S_t with the investment function I_t. The share of profits in income is Q_t^*/Y_t.



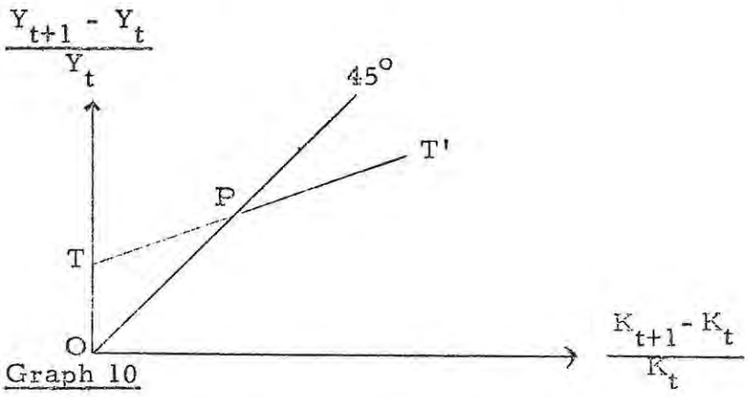
Graph 9

The equilibrium mechanism is similar to that of the static model. Assume for instance, that the rate of profit in income is less than Q_t^* / Y_t, in which case investments exceed savings. As a result of this situation, prices will rise and entrepreneurial profits will increase, until the equilibrium point E is reached. A similar adjustment occurs in the opposite direction if S_t exceeds I_t.

7.4.2.2 The Long-Run Version of Kaldor's Growth Model

For his long-run model, Kaldor assumes a technical progress function which unites the effects of the introduction of new knowledge and changes in the supply of capital, relative to labour.

The technical progress function (line TT' in graph 10), shows the growth of real income $\frac{Y_{t+1} - Y_t}{Y_t}$ in relation to the growth of capital $\frac{K_{t+1} - K_t}{K_t}$. (Footnote 1)



Graph 10

The growth of income is positive even when net capital investments are zero (distance OT), which means that some growth can be achieved without any capital investment at all. To the left of P, investments are dominantly capital saving, and to the right of P, they are dominantly labour saving.

In the long-run, a tendency exists for the rate of growth of income to match the rate of growth of real capital (Harrod's natural rate of growth), i.e.,

$$(34) \quad \frac{I_t}{K_t} = \frac{Y_{t+1} - Y_t}{Y_t}. \quad \text{(Footnote 2)}$$

Equation (34) shows that all equilibrium points will be found on the 45° line of graph 10.

The TT' function is given by

$$(35) \quad \frac{Y_{t+1} - Y_t}{Y_t} = c + d \frac{I_t}{K_t} = \gamma_1$$

Combining (34) with (35), Harrod's natural rate of growth becomes

$$(36) \quad \gamma_1 = \frac{c}{1 - d}$$

The long-run rate of growth, γ_1, is independent of savings and investments, and is determined only by the parameters of the technical progress function.

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1. The TT' curve which Kaldor draws is convex to the origin (marginal returns are decreasing).
   It seems to be preferable though to draw the TT' curve as a straight line, because Kaldor's algebraical notation is linear of the first degree. Compare A Model of Economic Growth, ibid., p. 597 and equation (3), p. 604.
2. Assume for instance that the growth of capital is smaller than the growth of income. In this case the capacity utilization will exceed what is regarded as normal, and capitalists will be induced to raise the level of investments.

In the long-run, the rate of capital return will remain constant, since the rates of investment (and saving) in income, as well as the propensities to save out of wages and profits, are constant (compare equation (28)). From equation (32), the warranted rate of growth γ_2 is then determined by

$$(37)\quad \frac{I}{Y} = \gamma_2 \frac{K}{Y}$$

Tha natural and warranted rates of growth become identical through the adjustment of the propensities to save. [1]

By combining (37) with (28), the long-term rate of profit is defined as

$$(38)\quad \frac{Q}{Y} = \frac{\gamma_2 \frac{K}{Y} - s_w}{s_q - s_w}$$

Equation (38) illustrates the determinants of the distribution of incomes in the long run. The rate of profit in income is a function of (i) the rate of economic growth, (ii) the capital coefficient and, (iii) the propensities to save out of wages and profits.

7.4.3 Limitations to Kaldor's Models

Kaldor limits the distributive range of his models by the three following conditions : [2]

(i) the minimum wage condition;

(ii) the minimum capital-return condition;

(iii) the minimum turnover-profit relation.

7.4.3.1 The Minimum Wage Condition

This condition can be expressed by

$$(39)\quad \frac{Q}{Y} \leqslant \frac{Y - W_{min}}{Y}, \text{ where } W_{min} = w_{min} h_w.$$

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1. N. Kaldor, A Model of Economic Growth, ibid. , p. 611, 12.
2. N. Kaldor, Alternative Theories, ibid., pp. 232 ff.
   A fourth condition, i. e., that the capital coefficient be independent of the rate of profit, is immaterial in the present context.

W_{min} is the minimum wage bill [1], w_{min} the minimum wage rate, and h_w the number of hours worked.

According to Kaldor's minimum wage condition, workers will attempt to maintain a constant real subsistence level of consumption even if wages fall below a certain minimum level w_{min}. This can be done by (i) decreasing s_w or (ii) increasing the indebtedness to entrepreneurs.

The discussion of the minimum wage condition is confined by Kaldor to certain technical remarks.[2] The issue, however, is of such central importance to the theory of income distribution and its relation to economic growth, that it is worth while to enlarge on the subject and in addition to analyse the social limits to which wages can be dropped.

The violation of the minimum wage condition is described by Kaldor as a state of affairs where investments will no longer create their own savings : "I/Y will suffer a shrinkage .... The system will not produce full employment ... the classical, and not the Keynesian, reaction-mechanism will be in operation : the size of the 'surplus' available for investment determining investment, not investment savings .... We are back at the Ricardian (or Marxian) model." [3]

In order to explain this reversal of Keynesian into classical conditions, assume that

$Y = 100; \; s_q = 0.8; \; w_{min} = 40.$

$s_w = 0.2$ is the saving-target by workers, which they are willing to give up, however, as soon as the minimum subsistence standard ($w_{min} = 40$) is endangered.

According to equation (28), the savings function is

$S/Y = (s_q - s_w) \, Q/Y + s_w.$

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1. The concept of a minimum wage bill is highly unsatisfactory, unless some assumption is made about the personal distribution of income. Kaldor seems to assume that the total wage bill is equally distributed between workers.
2. Rothschild points out that this is rather unsatisfactory, without, however, adding new points to the question under review.
   K. W. Rothschild, "Some Recent Contributions to a Macro-Economic Theory of Income Distribution", Scottish Journal of Political Economy, October 1961, p. 185.
3. N. Kaldor, Alternative Theories, ibid., p. 234.

s_w in this equation assumes different values according to whether

(40a) $(W_{eff} - s_w W_{eff}) \geq W_{min}$, or

(40b) $(W_{eff} - s_w W_{eff}) < W_{min}$.

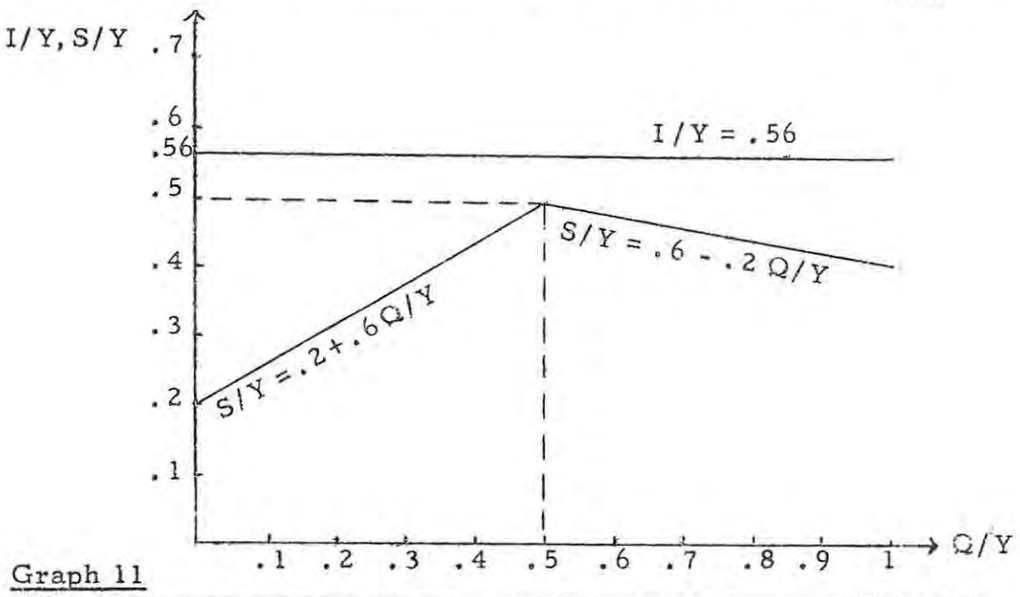
W_{eff} is the effective wage bill of workers. According to condition (40a), workers can save 0.2 parts of their incomes without endangering the subsistence level of consumption, W_{min}. For this case, the savings function becomes

(41a) $\frac{S}{Y} = 0.6 \frac{Q}{Y} + 0.2 \qquad [W \geq 40]$

In case (40b), the subsistence level W_{min} can be maintained only by cutting down on the target propensity to save. The savings function is therefore given by [1]

(41b) $\frac{S}{Y} = -0.2 \frac{Q}{Y} + 0.6 \qquad [W < 40]$

Equations (41a) and (41b) form the savings function in graph 11, where I/Y and S/Y are measured on the vertical, and Q/Y on the horizontal axes. The savings function shows a peak at Q/Y = 0.5, that is, the point where wage earners start successively to decrease their target rate of saving, in order to secure the subsistence level of consumption W_{min}.



Graph 11

1. It is $\frac{S}{Y} = \frac{S_q}{Y} + \frac{S_w}{Y}$, which can be written as

$$\frac{S}{Y} = \frac{S_q Q}{Y} \quad \frac{W_{eff} - W_{min}}{Y}, \text{ or, since } Q = Y - W_{eff},$$

$$\frac{S}{Y} = \frac{S_q Q}{Y} + \frac{Y - Q - W_{min}}{Y}, \text{ hence } \frac{S}{Y} = (S_q - 1)\frac{Q}{Y} + \frac{Y - W_{min}}{Y}$$

Inserting the values of the parameters gives

$$\frac{S}{Y} = -\frac{1}{5}\frac{Q}{Y} + \frac{6}{10}.$$

It is clear from graph 11 that the system does not tolerate a rate of investment higher than 0.5. Suppose that the rate of investment is higher than this, say, $\frac{I}{Y} = 0.56$. In this case, no intersection of the $\frac{S}{Y}$ and $\frac{I}{Y}$ functions will be reached, and the system will plunge into unemployment. This is what Kaldor has in mind when he refers to the reversal of Keynesian into classical reactions, once workers' income is pressed down to the physical subsistence level. Through the workers' reduced marginal propensity to save, the overall savings propensity decreases to such an extent that, from a certain point on, the necessary total savings cannot be secured.[1]

Up till now the technical repercussions of the minimum wage conditions have been discussed, but it is necessary also to examine the social implications of the issue.[2] The social subsistence minimum, which Kaldor has in mind, can be either a physical or a cultural standard of living. If the physical subsistence

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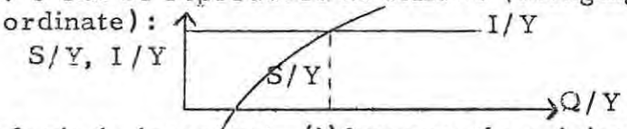
1. Charles Kennedy completely ignores these relations when he writes : "The S/Y curve ... will slope upwards from left to right, since the savings-ratio can be expected to be greater, the greater the share of income going to profits." His figure No. 3 can be reproduced as follows (changing abscissa and ordinate) :



Kennedy's analysis is incorrect, (i) because the minimum wage condition is not taken into account, and (ii) because Kaldor does not make any provision for an increasing savings-ratio of entrepreneurs.
Charles Kennedy, "A Static Interpretation of Some Recent Theories of Growth and Distribution", Oxford Economic Papers, NS, Vol. 12, 1960, pp. 193-201, here p. 197.

2. It has to be borne in mind, however, that the determination of the socially acceptable minimum wage level probably belongs to the responsibility of sociologists and political philosophers, and to a lesser extent to that of the economist. Compare Maurice Dobb, Wages, At the University Press, Cambridge, 1960, p. 136.
Wilhelm Krelle, Bestimmungsgründe der Einkommensverteilung in der modernen Wirtschaft, Schriften des Vereins für Socialpolitik, NF, Band 13, 1957, Duncker & Humblot, Berlin, p. 67.

standard is not secured, starvation will ensue.[1] In the event of the cultural subsistence standard being violated, different hypotheses have been put forward. Wilhelm Krelle suggests for instance that workers will become revolutionists : " ... der Unwille der arbeitenden Bevölkerung (wird) das ganze System früher oder später in die Luft sprengen."[2] Joan Robinson is less radical and suggests that "either the system explodes in a hyper-inflation, or some check operates to curtail investment."[3]

It seems that the question of the social minimum wage can be linked with (i) the stage of economic development, and (ii) the composition of the working force.

For a developed country with a homogeneous working force and powerful trade unions, it may be regarded as likely that a high standard of living can be permanently maintained. Quite apart from the fact that workers in such societies organize the conditions of their labour supply, there exists a market wage rate, caused by the scarcity of workers in relation to the number of jobs offered. In addition, many groups of workers possess supply monopolies based on technical or commercial training. Homogeneous and developed countries therefore show a trend for (i) wage levels to stay well above the physical subsistence level and to increase from time to time,[4] and (ii) for interpersonal wage differentials to narrow.[5]

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1. This is the classical implication.
   David Ricardo, Principles of Political Economy and Taxation, ibid., p. 53.
2. Wilhelm Krelle, Bestimmungsgründe, ibid., p. 67.
3. Joan Robinson, The Accumulation of Capital, Macmillan, London 1956, p. 48.
   Kaldor admits that inflation is a means "to reduce the proportion of real income consumed. But past experience has repeatedly shown that the extent to which an inflationary process succeeds in augmenting the real rate of savings of the community is very limited."
   N. Kaldor, Economic Stability and Growth, ibid., p. 216, Ft. 1.
   Compare also K. W. Rothschild, "The Limitations of Economic Growth Models, Critical Remarks on Some Aspects of Mr. Kaldor's Model", Kyklos, Vol. XII, 1959, p. 567 ff.
4. Compare Karl Heinz Katsch, "Lohnstatistik", Handwörterbuch der Sozialwissenschaften, Band 7, pp. 31-37, here Fig. 2, p. 36.
5. ibid., p. 35.

Kaldor's "minimum wage condition" requires qualification, however, when (i) a society is split into plural groups, and (ii) such a society is as yet economically relatively underdeveloped, thus exhibiting a high incidence of unemployment.[1] In plural societies, the income orientations of a ruling and a ruled class may widely differ. In colonial countries, for instance, the income expectations of the ruling class is usually orientated in accordance with the alternative income earning potential available in the colonizing country. Conversely, the ruled class has to content itself with an income expectation which is closely determined by what has always been 'traditional' and 'customary'. If, for instance, the 'customary' income level is determined by the (mostly small) yields of an agriculturally orientated subsistence economy, then wage employment will usually only just grant a small premium on this traditional income standard, i.e., a premium just high enough to induce workers to leave their subsistence activities and to join the industrial labour force. But as long as labour supply continues to be forthcoming at wages which are just above the subsistence level of living, no sustained improvement in the living standard of the ruled class can be expected, the more so, the more mobile the labour force is.[2]

In the view of the writer, a plural society therefore gives an economy a remarkable possibility to raise the rate of investment.

7.4.3.2 The Minimum Capital Return and Minimum Turnover-Profit Relation Conditions.

The minimum capital return condition is expressed as

(42) $Q/K \geqslant r$,

where r stands for the minimum capital premium and K for the value of capital investment.

The minimum rate of profit on turnover is

(43) $Q/Y \geqslant m$,

with m being the degree of monopoly.

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1. Compare W.A. Lewis, Economic Development ..., ibid., pp. 400 ff.
2. On the question of the mobility of the South African Bantu, compare D. Hobart Houghton, "Men of Two Worlds : Some Aspects of Migratory Labour", Presidential Address, Economic Society of South Africa, The South African Journal of Economics, Vol. 28, 1960, pp. 177-190.

The minimum capital return condition is related by Kaldor to the inducement to invest : "... the indicated share of profits cannot be below the level which yields the minimum rate of profit necessary to induce capitalists to invest their capital."[1]

The minimum turnover-profit relation, on the other hand, is imperative for downward price flexibility to be maintained. If prices were not flexible in a downward direction, the system would plunge into unemployment, following a drop in investments. It is assumed however, that entrepreneurs are prepared to decrease their prices only if a certain rate m of profit on turnover is maintained.

It is difficult - if not impossible - to define the rate of minimum capital or turnover with any degree of accuracy, for real economic situations. It may be that during short time periods, determined views exist among entrepreneurs as to what is regarded as a satisfactory level of profits. Over long periods of time, however, the consensus as to what is regarded a normal level of return may shift, thus leaving flexible what has been put forward by Kaldor in rigid terms.

7.4.4 Assessment of Kaldor's Models

Kaldor's models have attracted great attention in the economic literature by virtue of their easy and intelligible formulation of macroeconomic flows.[2] An important feature is that the relationships which Kaldor uses can be empirically tested, at least for countries which possess refined national accounting data.[3] The use of macroeconomic flow models of the Keynesian type give "a neat and modern content to the deep-rooted

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1. N. Kaldor, Alternative Theories, ibid., p. 233.
2. For an appraisal of Kaldor's contribution, see Fritz Schebeck, "Die Erklärung der Einkommensverteilung aus dem Einkommenskreislauf", in Beiträge zur Wirtschaftstheorie, herausgegeben von Helmut Frisch, Duncker & Humblot, Berlin, 1967, pp. 49-80, here pp. 70 ff.
3. For instance : Helmut Frisch, "Zwei Konzepte der Wachstumstheorie und das Wirtschaftswachstum der 50er Jahre", Zeitschrift für Nationalökonomie, Heft 3-4, 1965, p. 350 ff.

old Classical idea of a certain connection between distribution of income and capital accumulation." [1]

In what follows, two assumptions made by Kaldor will be critically considered, viz. (i) the assumption of price flexibility, both in the upward and downward directions, and (ii) the assumption that workers do not earn profit incomes.

7.4.4.1 Kaldor's Assumption of Price Flexibility

In Kaldor's system, full employment equilibrium is being maintained through the assumption of flexible prices, both in the upward and downward directions. It is questionable, however, whether this belief in the 'invisible' hands of the market is justified by modern experience.

Assume, for instance, that monetary demand presses beyond the physical full employment ceiling. On perfect and on monopolistic markets, this situation is likely to cause compensatory price increases. Whether it will have the same effect on oligopolistic markets, is a matter of debate.[2] The theoretical models put forward by Paul M. Sweezy and Wilhelm Krelle suggest that price rigidity is the most likely oligopolistic behaviour : "Im übrigen haben wir ... bei friedlichen Verhalten der Dyopolisten eine Preisstarrheit über lange Zeiträume zu erwarten, kein gleichgewichtsloses Schwanken des Preises in irgendwelchen Grenzen. Heftige Preisbewegungen sind nur bei Kampfsituationen zu erwarten ..." [3] The proviso is made by Sweezy, however, that prices "go up easily and openly in time of upswing" (Footnotes 4 and 5.) Nevertheless, cases are known

1. Luigi L. Pasinetti, "Rate of Profit and Income Distribution in relation to the Rate of Economic Growth", Review of Economic Studies, Vol. XXIX, 1961/62, p. 267.
2. Compare the excellent study by Fritz Machlup, "Oligopol", Handwörterbuch der Sozialwissenschaften, Band 8, pp. 82-94.
3. Wilhelm Krelle, Preistheorie, ibid., p. 265. This statement is based on Krelle's dyopoly theory, ibid., pp. 247 ff.
4. Paul M. Sweezy, "Demand under Conditions of Oligopoly", The Journal of Political Economy, 1939, reprinted in : American Economic Association, Readings in Price Theory, George Allen and Unwin, London, 1964, pp. 404-409, here p. 408.
5. For an empirical assessment of Sweezy's statement, compare George J. Stigler, "The Kinky Oligopoly Demand Curve and Rigid Prices", The Journal of Political Economy, Vol. LV, 1947, reprinted in : Readings in Price Theory, ibid., pp. 410-439.

where entrepreneurs have been reluctant to increase prices during boom periods. They might rather prefer to lengthen the delivery periods or run down stocks before considering an increase in prices. Variations in delivery periods and changes in stocks, however, are phenomena which do not fit into Kaldor's models.[1]

On the other hand, if the level of monetary demand is lower than the physical supply capacity of the economy, price rigidity will often be typical for oligopolistic markets, since, if a competitor cuts his price, he has "no reason to believe that he will succeed in taking business away from his rivals." (Footnotes 2 and 3.)

The general uncertainty about the relation between prices and money wage rates is expressed by H. Atsumi as follows : "There is no reason in general for expecting that prices must be raised relatively at some definite rate, say 10% to wages, when total demand increases at a definite rate. Hence, there is no reason to suppose that the distribution of income is determined."[4]

7.4.4.2 Kaldor's Classification of Income Recipients

L. Pasinetti made an important observation when he pointed out that there is a 'logical slip' in Kaldor's theory, in that it makes no provision for workers to earn income from their savings.[5]

1. Alternatively, firms may decide to deteriorate the quality of the commodities they produce. This case would not be incompatible with Kaldor's analysis.
   Compare Lawrence Abbott, Quality and Competition, Columbia University Press, New York, 1955.
   On the interchangeability of price and quality competition, compare : Erich Gutenberg, "Grundlagen der Betriebswirtschaftslehre", Zweiter Band, Der Absatz, 3.Auflage, Springer-Verlag, Berlin, Göttingen, Heidelberg, 1959, p. 425ff.
2. Paul Sweezy, Demand ..., ibid., p. 405.
   Compare also : S.H. Slichter, Wages and Prices, Proceedings of the Academy of Political Science, Columbia University, April 1948, p. 50.
3. J.G. Witte assumes that the price adjustment will only come about after a certain time lag.
   J.G. Witte, "Productivity, Relative Prices, and Income Distribution", The Southern Economic Journal, Vol. XXV, 1958, p. 149 ff.
4. Hiroshi Atsumi, "Mr. Kaldor's Theory of Income Distribution", The Review of Economic Studies, Vol. XXVII, 1959-60, pp. 109-118, here p. 117.
5. L. Pasinetti, Rate of Profit, ibid., p. 270.

Profits, according to Pasinetti, should therefore be divided into profits that accrue to capitalists and those that accrue to workers : "By attributing all profits to the capitalists it (i. e., Kaldor's theory) has inadvertently but necessarily implied that workers' savings are always totally transferred as a gift to capitalists. Clearly this is an absurdity." (Footnotes 1 and 2.) Kaldor's model, it is therefore suggested, is valid only for the case when $s_w = 0$.

The shortcoming has been rectified by the assumption that profits are divided into profits earned by entrepreneurs (Q_q) and by wage earners (Q_w), respectively, viz.,

(44) $Q = Q_q + Q_w$.

The savings function for workers becomes

(45) $S_w = s_w (W + Q_w)$,

whereas that of profit receivers remains unchanged as

(46) $S_q = s_q Q_q$.

The equilibrium condition is given by

(47) $I = S_w + S_q = s_w (Y - Q_q) + s_q Q_q$

$= s_w Y + (s_q - s_w) Q_q$,

and therefore

(48) $$\frac{Q_q}{Y} = \frac{1}{s_q - s_w} \frac{I}{Y} - \frac{s_w}{s_q - s_w}$$

The right hand side of equation (48) coincides with Kaldor's static distribution formula, whereas the left hand side shows that this relation is representative for the share of capitalists' profits in income, rather than for the share of total profits in income, as Kaldor maintained. Kaldor's formula therefore must

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1. L. Pasinetti, Rate of Profit, ibid., p. 270
2. Kaldor defines the two classes of income receivers which he considers, i. e., workers and profit receivers, neither in accordance with the social reality, nor in accordance with production aspects, but simply according to the formal criterion of differences in the marginal propensities to save. This is unsatisfactory and Pasinetti's and Bombach's contributions in particular aim at taking a broader view at the question of income groupings.

be interpreted to be representative for the incomes received by capitalists and workers, respectively, and not for the income received in the form of wages and profits. For the latter category, Pasinetti gets [1]

$$(49)\quad \frac{Q}{Y} = \frac{1}{s_q - s_w}\,\frac{I}{Y} - \frac{s_w}{s_q - s_w} + r\left(\frac{s_w - s_q}{s_q - s_w}\,\frac{K}{I} - \frac{s_w}{s_q - s_w}\,\frac{K}{Y}\right)$$

with (49a) $r = \frac{Q}{K}$

On the assumption that the long-run rate of interest is equal to the rate of profit, [2] Pasinetti is furthermore able to prove that

$$(50)\quad \frac{Q}{K} = \frac{1}{s_q}\,\frac{I}{K}\ .$$

This produces the startling conclusion that, in the long run, the workers' propensity to save, s_w, does neither have any influence on the rate of profit, nor on the distribution of income between wages and profits. It is only in respect of the distribution between capitalists and workers (equation (49)), that the rate of savings out of wages bears an influence. [3]

7.4.5 Summary

The dichotomy between growth and income distribution clearly emerges from Kaldor's growth and distribution models : A high rate of investment requires that a high rate of profits be tolerated. Although Kaldor mentions certain minimum wage and profit restrictions, nothing is said about the outcome of the actual choice process between investment and consumption.

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1. L. Pasinetti, Rate of Profit, ibid., p. 271.
2. The empirical evidence for this assumption is dubious. Compare :
   Gottfried Bombach, "Spekulation über die Entwicklung der Einkommens- und Vermögensverteilung auf sehr lange Sicht", in Wirtschaftskreislauf und Wirtschaftswachstum, Carl Föhl zum 65. Geburtstag, Herausgegeben von Erich Schneider, J.C.B. Mohr (Paul Siebeck), Tübingen, 1966, p. 54.
3. For a similar result, compare :
   P.P. Chang, "Rate of Profit and Income Distribution in Relation to the Rate of Economic Growth, A Comment", Review of Economic Studies, Vol. 31, 1964, pp. 103 ff.

One could also say that Kaldor's system is an open one : the growth rate is optimal when $s = s_q$ and $Q/Y = 1$, that is, when all income is invested and consumption is zero. Naturally, this 'ideal' growth target is unobtainable. But where precisely the distribution of incomes is likely to stabilize, Kaldor does not indicate.

7.5 Bombach's Theory of Income Distribution and Economic Growth [1]

Bombach modifies Kaldor's distribution model by taking account of two different types of profits :

(i) profit as income of independent proprietors;

(ii) retained profit, including windfall profits.

Income (Y) is defined as the sum of private disposable income (F) (consisting of wages, salaries, and paid-out income of independent proprietors), public revenue (R), and retained profits (U), viz.,

(51) $Y_t = F_t + R_t + U_t$.

Investment is equal to a portion g of the total income ($1 > g > 0$) and is financed by the portion s_f of private income, s_r of the public revenue [2], and the total of retained profits viz.,

(52) $gY_t = s_f F_t + s_r R_t + U_t$.

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1. G. Bombach, "Preisstabilität, Wirtschaftswachstum, und Einkommensverteilung", Schweizerische Zeitschrift für Volkswirtschaft und Statistik, Vol. 95, 1959, pp. 1-20. With a Comment by Alfred E. Ott," Bemerkungen zu Bombachs Aufsatz über Preisstabilität, wirtschaftliches Wachstum und Einkommensverteilung", Schweizerische Zeitschrift für Volkswirtschaft und Statistik, Vol, 97, 1961, pp. 76-79. G. Bombach, Die Verschiedenen Ansätze der Verteilungstheorie, ibid.
G. Bombach, Wirtschaftswachstum, ibid.

2. There is a household surplus, if $s_r > 0$, otherwise a deficit.

Bombach assumes that the income of employees and independent proprietors form a portion α, and the public revenues a portion τ of the income of the previous period. τ is largely determined by the tax structure and the budget. It follows that

(53a) $R_t = \tau Y_{t-1}$ and (53b) $F_t = \alpha Y_{t-1}$.

By combining (53a and b) with (52), it is

(54) $Y_t - Y_{t-1} = \underbrace{Y_{t-1}\left[\alpha(1-s_f) + \tau(1-s_r)\right]}_{\text{consumption by private persons and public bodies in period t}} + \underbrace{g\,Y_{t-1} + g(Y_t - Y_{t-1})}_{\text{investment in period (t-1) plus additional investment between the periods (t-1) and t.}} - Y_{t-1}$

hence

(55) $(Y_t - Y_{t-1}) - g(Y_t - Y_{t-1}) = Y_{t-1}[\alpha(1-s_f) + \tau(1-s_r)] - (1-g)\,Y_{t-1}$

Multiplying (55) by $\frac{1}{(1-g)\,Y_{t-1}}$ gives the rate of growth of nominal income as

(56) $\frac{Y_t - Y_{t-1}}{Y_{t-1}} = \frac{\alpha(1-s_f) + \tau(1-s_r)}{1-g} - 1$

The rate of growth of real income is determined according to the Harrod-Domar formula as

(57) $\frac{Y_t^{real} - Y_{t-1}^{real}}{Y_{t-1}^{real}} = \frac{g}{k}$, where k is the marginal coefficient of capital.

Combining (54) with (53b) gives the share of personal income as

(58) $\frac{F_t}{Y_t} = \frac{\alpha Y_{t-1}(1-g)}{Y_{t-1}\left[\alpha(1-s_f) + \tau(1-s_r)\right]} = \frac{1-g}{\alpha(1-s_f) + \frac{\tau}{\alpha}(1-s_r)}$.

The share of personal disposable income, F_t/Y_t, is an increasing function of the propensities to save, both by private and public households, and a falling function of the rate of investment (g) and the share of public households (r). Since g (according to (57)), is positively connected with the real rate of economic growth, the dichotomy between the growth and distribution targets is also apparent in Bombach's model. Small independent proprietors and wage income receivers will therefore be adversely affected by a rapid rate of economic advance.

Similarly, the share of undistributed profits can be expressed as

$$(59) \quad \frac{U_t}{Y_t} = \frac{\alpha (k - s_f) + \tau (k - s_r)}{\alpha (1 - s_f) + \tau (1 - s_r)}$$

Given the propensities to save (s_f and s_r) and the share of personal and public incomes, the rate of undistributed profits is a function only of the rate of investment, k.

7.6 Mrs. Robinson's Theory of Income Distribution and Economic Growth. [1]

Mrs Robinson's theory on the "Accumulation of Capital" is a forerunner to Kaldor's "Model of Economic Growth". [2] Her model, which is argued in verbal terms but which has been translated into mathematical categories by certain commentators, [3] can be taken as typical for underdeveloped countries. Technical forces, the rates of investment and wages, and the energy of entrepreneurs, are the central forces which influence both the distribution of incomes and economic growth.

Given sufficient entrepreneurial enterprise, the rate of investment in income (which is regarded as the decisive determinant for economic growth) is checked by what Robinson calls the 'inflation barrier'. [4] This barrier is reached once the physical resources in an economy tend towards full employment, resulting in expenditure on investments and on consumption becoming directly competitive one against the other. As a result of this situation, prices will rise and real consumption by workers correspondingly fall. Unlike Kaldor, who envisages a certain minimum wage bill below which wages are not allowed to fall, Mrs Robinson maintains that the inflation barrier is

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1. Joan Robinson, The Accumulation of Capital, MacMillan, London, 1956.
   J. Robinson, "The Real Wicksell Effect", The Economic Journal, Vol. LXVIII, 1958, pp. 600 - 605.
   J. Robinson, "Growth and the Theory of Distribution", Annals of Public and Co-operative Economy, Liège, Vol. XXXVIII, 1967, pp. 3-7.
   Paul Lambert, "Commentary on Mrs Robinson's Conclusions", Annals of Public and Co-operative Economy, Liège, Vol. XXXVIII, 1967, pp. 9-11.
2. Compare L. Pasinetti, Rate of Profit, ibid., p. 267, Ft. 2.
3. G.D.N. Worswick, "Mrs. Robinson on Simple Accumulation, A Comment with Algebra", Oxford Economic Papers, NS, Vol. 11, 1959, p. 125 ff.
   On aspects of the investment function, compare : Charles Kennedy, A Static Interpretation, ibid.
4. J. Robinson, The Accumulation, ibid., p. 48 ff.

established rigidly only in a developed country, whereas it may be shifted outward in underdeveloped economies. The argument is based on the assumption that wage constraints in developed countries often contain a cost-of-living clause, by means of which a 'ratchet' effect protects whatever standard of consumption has been reached during any period of time[1], whereas in underdeveloped countries, peasants may support their lives at a lower level of consumption than what is required for industrial workers.

Like her successors, Mrs Robinson does not offer a precise hypothesis for the level of capital accumulation.[2] Instead, she submits that the following factors have a certain influence on the potential accumulation of capital : -

(i) availability of investment finance and supply of money. This check becomes operative for the individual firm mainly through the limitation in its borrowing power, such as the lack of sites which can be mortgaged. This financial barrier is shifted outward through the thriftiness of the public and through conservatism in the dividend policy of firms;

(ii) the availability of physical factors of production, necessary to carry out planned investments;

(iii) the production of consumption goods, necessary to feed the population, and

(iv) the balance of payments.

It is of interest to note Mrs Robinson's opinion that a capitalistic order is inferior to a socialistic one in respect of extracting from an economy a surplus for the accumulation of capital : "... After a socialist revolution, the surplus going to the feudal class becomes available for investment, while in the ex-colonial and semi-colonial countries it is still being wasted on consumption, largely of imported luxuries, which makes it doubly wasteful."[3]

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1. Compare Harry C. Eastman, "The Economic Effects of the French Minimum Wage Law", The American Economic Review, Vol. XLIV, No. 3, June, 1954, pp. 369-376.
2. She suggests that a "comparative historical anthropology" is needed to solve this problem.
   J. Robinson, The Accumulation, ibid., p. 56.
3. J. Robinson, Growth and the Theory of Distribution, ibid., p. 6.

Among Western economictheorists,Mrs Robinson has found little consent in respect of the thesis propounded above.[1]

7. 7. Assessment of the Post-Keynesian Models of Income Distribution and Economic Growth

The post-Keynesian models of income distribution and economic growth are easily comprehensible and useful for econometric research. The popularity of these models among economists probably results from the fact that they are based on statistically verifiable circular flows. They have contributed the following perceptions on the relation of income distribution and economic growth :-

(i) the rate of economic growth is an increasing function of the rate of investment. There is no upper limit to the rate of investment, hence growth would be maximized if Y = I. Likewise, profits are low when the rate of investment is small : "If we look at the great depression", Boulding argues, "and we ask why did profits disappear in 1932 and 1933, the main answer is that investment disappeared. It was a shift in the composition of the national income which was responsible for the shift in its distribution." [2]

(ii) the property titles arising from the accumulation of investments flow to those who undertake the savings, and with the help of Boulding's T-term it can be seen that the accrual of property titles directly influences the distribution of incomes.[3]

In the classical case, where workers' incomes are limited to their subsistence levels, profits are equal to investments. Kaldor's significant contribution is that he relates the distribution of incomes to the propensities to

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1. Compare Paul Lambert, "Commentary on Mrs Robinson's Conclusions", Annals of Public and Co-operative Economy, Vol. XXXVIII, 1967, Liège. pp. 9-11.
   On the issue in general, compare the powerful account given by Walter Eucken in his Grundsätze der Wirtschaftspolitik, J.C.B. Mohr (Paul Siebeck), Tübingen, 1952.
2. Selections from the Discussion of Boulding's Paper, on "Wages as a Share in the National Income", ibid., Comment by Boulding, p. 153.
3. Compare graph 4 above.

save out of wages and profits. Bombach, Boulding and Pasinetti refine Kaldor's approach by taking into account also the rate of retained profits by companies, the indebtedness of workers to firms, and the value of income-yielding savings accumulated by workers.

(iii) From the above it follows that a high rate of growth is reconcileable with an equal distribution of personal income only if the workers' propensity to save is high. This leads to the conclusion that the distribution of functional income in countries which are in the early stages of their economic development will favour profit receivers, simply because sufficient accumulation has not as yet been undertaken to provide both for a high rate of investment and an above-subsistence standard of consumption (which would allow for personal savings to be accumulated on a large scale).

There are, however, a number of shortcomings attached to the post-Keynesian theories, of which the most important ones are as follows : (i) no provision is made for the consideration of cases where the monetary demand is insufficient for the full employment of the existing capital. In other words, the conditions laid down are correct only as long as the development is continuously pushing at the full employment ceiling ; (ii) the relative scarcities of productive factors, and their individual bargaining power, does not come into the post-Keynesian models at all. It follows from this that the post-Keynesian writers do not succeed in bringing about an ultimate unification of income distribution theories.

8. A Post-Keynesian Approach to the Problem of Income Distribution and Economic Growth in South Africa.

In the empirical examination of the post-Keynesian models of income distribution one is faced with the difficult problem of overcoming shortcomings in the available data. Kaldor's models, for instance, require knowledge about the savings propensities of wage earners and profit receivers, respectively, whereas the South African statistics tabulate only 'personal savings', which may have originated either from 'wages and salaries', or from 'income from property by households' (which include interest,

dividend, and rent receipts by households and the profits of non-corporate business entreprises).[1] Consequently, we have one equation with two unknowns, which makes it impossible to determine the values of the required parameters individually. If one wishes to operate with the theoretical propositions on an empirical basis, one therefore has to estimate the savings propensities for one particular year, and assume their constancy for other years.

Likewise, the empirical examination of Boulding's and Bombach's distribution models is faced with the difficulty that data on retained profits are available only for a certain sample of public companies.[2] These data, which exhibit information about the balance sheets and appropriation accounts of firms, are unfortunately not combined with cost and revenue figures, which again results in a comprehensive empirical analysis not being feasible.

In view of the difficulties mentioned above, the writer decided to test to empirical relevance of the post-Keynesian models for the South African economy in respect of a modified macroeconomic approach. A supplementary exposition of the argument will be put forward in non-mathematical terms. Although a rigorous analysis of the individual post-Keynesian models is not feasible because of the paucity of available data, the exposition of the argument remains closely linked with the discussion of the post-Keynesian models in the previous section. The failure to test in detail the different models outlined above, does not invalidate their discussion, since the main value of the model analysis has to be sought in the evaluation of tendencies, and not necessarily in the presentation of econometrical results.

In what follows, Kaldor's static distribution formula is used as the basis of the empirical examinations.

Re-writing equation (26) gives

(26a) $I/Y = (s_q - s_w) Q/Y + s_w = s_q Q/Y + s_w W/Y.$

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1. Compare : South African Reserve Bank, "Quarterly Bulletin of Statistics", No. 97, Spetember 1970, S-65 and S-69.
2. Bureau of Statistics, "Surveys of Accounts of Public Companies", National Accounts Series.

If one assumes that s_q and s_w are constant over time, then it follows that an increase in the ratio of I/Y must produce an increase in Q/Y, i.e., a shift of income from the work income sector (the propensity of which to save is relatively low), to the 'other income' sector (the propensity of which to save is relatively high). In other words, variations in the relative income shares explain variations in the savings ratios.

The empirical test of equation (26 a) is done by the use of this formula for the predicted value of I/Y ($I/Y_{predicted}$), and the subsequent comparison of the predicted with the actual I/Y (I/Y_{actual}). Equation (26b) defines $I/Y_{predicted}$, and equation (26c) the difference D between I/Y_{actual} and $I/Y_{predicted}$, i.e.,

(26b) $I/Y_{predicted} = s_w \; W/Y + s_q \; Q/Y,$

(26c) $D = I/Y_{actual} - I/Y_{predicted}.$

8.1 Estimation of the Savings Propensities.

8.1.1 The Propensity to Save out of Wages.

The propensity to save out of wages is estimated by considering separately the income and savings schedules of the four different races for the year 1966, as is illustrated in Table 3.

Table 3 Estimation of the Propensity to Save out of Work Income, 1966

Race Group	Total Work Income,[1] R million	Estimated Savings Ratio	Value of Income, R million	
			Consumed	Saved
	Col. 1	Col. 2	Col. 3	Col. 4
Whites	2,827	.040	2,714	113
Coloureds	292	.010	289	3
Asiatics	89	.016	88	1
Bantu	1,190	.010	1,178	12
Total	4,398	.030	4,269	129

1. Total Work Income from Vol. II, Table LIV, p. 149.

Column 1 of Table 3 gives the remuneration of employees (i.e., total wage and salary incomes) for the year 1966. Column 2 shows the savings propensities for the different race groups, viz., 4 per cent for Whites, 1 per cent for Coloureds and Bantu, and 1.6 per cent for Asiatics. The respective estimates are based on income and expenditure surveys of households for the different race groups. In the case of Whites, it is reported that aggregate income exceeds aggregate expenditure by some 3 per cent for a sample of White families in ten principal urban areas, and the urban areas of the Vaal Triangle and the Orange Free State gold fields (November 1966)[1]. This reported savings ratio is increased to 4 per cent on the grounds that an underestimation of income, and an overestimation of expenditure, is typically being established for surveys of this nature.[2] For Coloureds and Bantu, different surveys by the Bureau of Market Research of the University of South Africa, also report an excess of expenditure over income. The reliability of this finding is also questioned. For the case of Bantu, for instance, it is reported that "income is frequently understated in field investigations. ... The sale of native beer, 'fat cakes', magewu, and various other items without the required licenses seems to be common practice and it is extremely difficult to obtain reliable information on a person's income from such sources. Furthermore, respondents often do not take into account the income of all household earners from all sources."[3]

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1. Bureau of Statistics, Report 11-06-02, Survey of Family Expenditure, November 1966, Detailed Expenditure of Families, Ten Principal Urban Areas and the Urban Areas of the Vaal Triangle and the Orange Free State Gold Fields, p. 75 (Table 2).
2. ibid., p. xii.
3. Bureau of Market Research, University of South Africa (in future referred to as BMR), "Income and Expenditure Patterns of Urban Bantu Households (Pretoria Survey)", by C. de Coning et al., Research Report No. 3, Vol. I, 1961, p. 12.
   For a similar finding regarding Coloureds, compare : BMR, "Income and Expenditure Patterns of Coloureds Households (Cape Peninsula)", by G.R. Feldmann-Laschin et al., Research Report No. 9, 1965, p. 12.

In view of this evidence, it is assumed that the propensity to save by Coloureds and Bantu was 1 per cent in 1966.

For Asiatics, who are described as "careful (people) and thrifty buyers (who) did not enter into levels of expenditure higher than they could meet with their incomes", the reported savings rate of 1.6 per cent is taken from a survey of income and expenditure, without further adjustments.[1]

For the four races together, the average savings propensity is consequently assumed as 3 per cent.[2] This is considerably lower than values of s_w reported for Western Germany, which vary between 6 and 8 per cent,[3] but in near vicinity to an estimation submitted for the United States of America, where a value of $s_w = .04$ was assumed for the period 1909 to 1956.[4] It appears to be reasonable, however, to assume a somewhat lower value of s_w for South Africa, compared with Germany and the United States, firstly, because neither of these countries possesses such a large poor section in the population total, and secondly because South Africa relied during her economic development on large capital inflows for the provision of savings, rather than on internal accumulation.[5]

8.1.2 The Propensity to Save out of Other Income.

The estimation of the propensity to save out of other income, is based on the year 1963, since 1963 was a year of reasonably full employment (the upswing had begun in September, 1961, and continued to April, 1965)[6]. For 1963, the propensity to save out of other incomes is estimated under the assumption that D is very small. Assuming $s_q = .297$, D becomes -.002, which is regarded as sufficiently accurate. Subsequently, the value $s_q = .297$ is used for other years, in order to enable the comparison of I/Y_{actual} with $I/Y_{predicted}$.

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1. BMR, "Income and Expenditure Patterns of Urban Indian Households (Durban Survey)", by G.F. Feldmann-Laschin, Research Report No. 12, 1966, p. 8.
2. Compare Table 3 above.
3. Ernst Helmstädter, Die Entwicklung ..., ibid., p. 406 ff.
4. M.W. Reder, Alternative Theories ..., ibid., p. 188.
5. During 1922/23 to 1928/29, only 61.6 per cent of all investments were financed from home savings. This percentage increased to 85.5 during 1932/33 to 1937/38.
   Board of Trade and Industries, Report No. 282, Investigation into Manufacturing Industries in the Union of South Africa (First Interim Report), Cape Town, 1945, para. 169.
6. D.J. Smit and B.E. van der Walt, Business Cycles, ibid., p. 40.

Having defined the year 1963 as the overall base year, the value of D can be expected to be negligible for each year with a similar employment situation.

No distinction is made between the provision of investment funds from within and from outside the country. It therefore follows, that the ratio of net capital inflow to total investments, forms part of the ratio of the propensity to save out of other income.

8.2 Empirical Results.

The estimation of the parameters for equations (26b) and (26c) is submitted in Table 4 (p. 114) below. Column 1 gives the value of I/Y_{actual}, and columns 2, 3 and 4 show the computation of $I/Y_{predicted}$. For the base year 1963, for instance, the computation is as follows :[1]

$$\frac{I}{Y}_{predicted} = s_w \cdot \frac{W}{Y} + s_q \cdot \frac{Q}{Y} = S_w + S_q =$$

$$.03 \cdot .5343 + .297 \cdot .4657 = .016 + .138$$
$$= .154$$

For the years 1918 to 1968, the values of the following parameters are listed in Table 4 :-

column No. 1 $\quad \frac{I}{Y}_{actual}$

column No. 2 $\quad S_q \left(= s_q \frac{Q}{Y} \right)$

column No. 3 $\quad S_w \left(= s_w \frac{W}{Y} \right)$

column No. 4 $\quad \frac{I}{Y}_{predicted} = S_q + S_w$

column No. 5 $\quad D = \frac{I}{Y}_{actual} - \frac{I}{Y}_{predicted}$

The main finding of this test is as follows :-

(i) Years during which the actual investment was smaller than the predicted investment :-

(Decision Criterion : D is smaller than zero)

1918

1921 to 1934

1940 to 1945

1959 to 1963

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1. Sources : Compare footnotes to Table 4.

(ii) Years during which the predicted investment was smaller than the actual investment :-

(Decision Criterion : D is larger than zero)

1919 to 1920
1935 to 1939
1946 to 1958
1964 to 1968

Taking the sign of D as the criterion of decision, the following findings are submitted :-

Whenever the actual investment was smaller than the predicted investment (case (i) above), the growth of the economy would have been accelerated had the distribution of incomes favoured work income receivers at the expense of other income receivers. Assuming that the propensity to consume out of work income is greater than the propensity to consume out of other income, the above is equal to saying that the rate of economic growth would have been faster had the ratio of consumption to income been higher than it actually was.

Conversely, whenever the predicted investment was smaller than the actual investment (case (ii) above), the growth of the economy would have been faster had the distribution of incomes favoured other income receivers at the expense of work income receivers, in other words, had the rate of consumption been smaller than what it actually was.

As far as the war years are concerned, it appears unlikely that the economy would have exhibited a faster rate of growth during those years, had the distribution of incomes favoured work income receivers at the expense of other income receivers. The answer to this peculiar result probably lies in the fact that the partial central administration of resources during the war, distorts the econometrical findings.

In an attempt to throw further light on the growth and distributive pattern of the post-war years, the propensity to save out of other income, is regarded in such a manner that the savings of corporations are separated from the savings of other income receivers (net of corporate incomes). Equations (26b) and (26c) are consequently re-written as

$$(26d) \qquad I/Y^*_{predicted} = s_w\, W/Y + s^*_q\, Q^*/Y + s_{corp}\, Y_{corp} ,$$

and

(26e) $D^* = I/Y_{actual} - I/Y^*_{predicted}$

where

Y^* = income prediction with separated corporate savings;

s^*_q = propensity to save out of other income, net of corporate income;

Q^* = other income net of corporate income;

s_{corp} = propensity to save out of corporate income;

D^* = difference between actual and predicted investments, based on income predictions with separate corporate savings.

s_{corp} can also be interpreted as the ratio of total corporate income which is retained internally.

Equations (26d) and (26e), when compared with (26b) and (26c), have the advantage of taking into account the fact that corporate incomes and savings vary significantly from year to year. This is of particular importance for the post-World War II years, since it is since 1945 that the share of corporate income has grown considerably.

s_{corp} can be calculated by considering the profit allocation of public companies, which is known for a representative sample on an annual basis since 1945/46.[1] The value of s_{corp} is equal to the retained earnings ratio, which expresses the portion of the companies' profits (net of tax) allocated to the internal reserve fund.

Table 5 (p. 115 below) illustrates the calculation of $I/Y^*_{predicted}$ with variable retained saving ratios for corporations. The value of corporate income is calculated according to the formula :-

$$\text{Corporate Income} = \text{Corporate taxes} + \frac{(100 - \text{Corporate savings})}{\text{retained earnings ratio}}$$

In 1964, for example, corporate savings amounted to R335 million, and corporate taxes to R385 million. The ratio of retained earnings was 47.8 per cent, which gives the following computation of corporate income before tax :-

$$\text{Corporate income}_{1964} = 385 + \frac{100 \cdot 335}{47.8} = 1086$$

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1. Compare Table 7, p.122 below, and sources given there.

The constancy assumption in respect of the savings ratios is now held only in respect of the terms s_w and s_q^* (s_q^* represents the value of savings out of other income, net of corporate income).

Comparing Table 4 with Table 5, it becomes obvious that the absolute sizes of the D values are smaller when corporate savings are separately considered, particularly during periods of full-employment.

When comparing column 5 of Table 4 with column 6 of Table 5, it becomes obvious that the D values exhibit equal signs for all years, except for 1950 and 1968, when the signs are opposite. According to Table 4, it appears that both years 1950 and 1968, were periods when the predicted rate of investment was smaller than the actual rate of investment, whereas the opposite is suggested by Table 5. For 1953, this uncertainty is easily explained by the fact that a turning point was experienced in the course of the year (the downswing began in March [1]). No similar explanation can, however, be found for 1968, since the upswing started in January of this year. But in 1968, a sharp fall in the rate of investment had occurred (from .240 in 1967 to .164 in 1968), a change which is not adequately reflected in the shift in income from 'other' to 'work' income. It would therefore appear that the abnormal result for 1968, is attributable to some lag effect having been in operation during the period considered.

1. D.J. Smit and B.E. van der Walt, Business Cycles, ibid., p. 40.

Table 4 Real Investment and Estimated Savings Ratios, 1918 - 1968. Components of Savings : S_q , S_w

YEAR	I/Y actual	S_q	S_w	I/Y predicted	D
Col.	1	2	3	4	5
1918	.161	.148	.015	.163	-.002
1919	.174	.158	.014	.172	+.002
1920	.282	.146	.015	.161	+.121
1921	.057	.135	.016	.151	-.094
1922	.017	.140	.016	.156	-.139
1923	.151	.147	.015	.162	-.011
1924	.165	.150	.015	.165	-
1925	.142	.149	.015	.164	-.022
1926	.143	.147	.015	.162	-.019
1927	.123	.147	.015	.162	-.039
1928	.145	.149	.015	.164	-.019
1929	.129	.145	.015	.160	-.031
1930	.063	.138	.016	.154	-.091
1931	-.002	.136	.016	.152	-.154
1932	-.078	.137	.016	.153	-.231
1933	.086	.150	.015	.165	-.079
1934	.139	.147	.015	.162	-.023
1935	.189	.151	.015	.166	+.023
1936	.211	.151	.015	.166	+.045
1937	.213	.147	.015	.162	+.051
1938	.186	.143	.016	.159	+.027
1939	.174	.146	.015	.161	+.013
1940	.123	.145	.015	.160	-.037
1941	.110	.142	.016	.158	-.048
1942	.048	.138	.016	.154	-.106
1943	.048	.134	.016	.150	-.102
1944	.093	.128	.017	.145	-.052
1945	.118	.123	.018	.141	-.023
1946	.249	.124	.017	.141	+.108
1947	.273	.130	.017	.147	+.126
1948	.274	.130	.017	.147	+.127
1949	.198	.128	.017	.145	+.053
1950	.157	.140	.016	.156	+.001
1951	.287	.139	.016	.155	+.132
1952	.178	.128	.017	.145	+.033
1953	.205	.136	.016	.152	+.053
1954	.205	.138	.016	.154	+.051
1955	.192	.136	.016	.152	+.040
1956	.170	.124	.017	.141	+.029
1957	.173	.136	.016	.152	+.021
1958	.170	.131	.017	.148	+.022
1959	.119	.133	.016	.149	-.030
1960	.143	.134	.016	.150	-.007
1961	.125	.134	.016	.150	-.025
1962	.120	.135	.016	.151	-.031
1963	.152	.138	.016	.154	-.002
1964	.185	.139	.016	.155	+.030
1965	.244	.136	.016	.152	+.092
1966	.190	.134	.017	.151	+.039
1967	.240	.138	.016	.154	+.086
1968	.164	.132	.017	.149	+.015

Sources : See p. 115 below.

Table 5 Real Investment and Estimated Savings Ratios, 1947 - 1968. Components of Savings : S^*_q, S_w, S_{corp}.

YEAR	I/Y actual	S^*_q	S_w	S_{corp}	I/Y^* predicted	D^*
	Col. 1	Col. 2	Col. 3	Col. 4	Col. 5	Col. 6
1947	.273	.113	.017	.017	.147	+.126
1948	.274	.116	.017	.016	.149	+.125
1949	.198	.109	.017	.022	.148	+.050
1950	.157	.105	.016	.041	.162	-.005
1951	.287	.100	.016	.055	.171	+.116
1952	.178	.097	.017	.037	.151	+.027
1953	.205	.108	.016	.040	.164	+.041
1954	.205	.110	.016	.042	.168	+.037
1955	.192	.110	.016	.039	.165	+.027
1956	.170	.086	.017	.057	.160	+.010
1957	.173	.100	.016	.055	.171	+.002
1958	.170	.094	.017	.058	.169	+.001
1959	.119	.096	.016	.059	.171	-.052
1960	.143	.095	.016	.056	.167	-.024
1961	.125	.099	.016	.061	.176	-.051
1962	.120	.094	.016	.054	.166	-.046
1963	.152	.103	.016	.072	.191	-.039
1964	.185	.091	.016	.076	.183	+.002
1965	.244	.094	.016	.074	.184	+.060
1966	.190	.088	.017	.078	.183	+.007
1967	.240	.094	.016	.070	.180	+.060
1968	.164	.086	.017	.072	.175	-.011

Sources : Tables 4 and 5.

I/Y Investment is Gross Domestic Investment minus Depreciation.
1918-1945 : D.G. Franzsen and J.J.D. Willers, "Capital Accumulation and Economic Growth in South Africa", in : Income and Wealth, Series VIII, The Measurement of National Wealth, Ed. by R. Goldsmith and C. Saunders, Bowes and Bowes, London, 1959, p. 316.
1946-1951 : South African Reserve Bank (SABR) Quarterly Bulletin of Statistics, No. 35, March 1955, Table XXXVIII D, p. 36.
1952-1961 : ibid., No. 74, December 1964, Table XXXI D.
1962-1969 : ibid., No. 97, September 1970, S-69.

Income is National Income at Factor Cost.
1918-1945 : Franzsen and Willers, Capital Accumulation, ibid., pp. 316 and 317.
1946-1952 : SARB, ibid., No. 51, March 1959, Table XXXV, p. 35.
1953-1961 : SARB, ibid., No. 78. December 1965, Table XXXI, p. 35.
1962-1968 : SARB, ibid., No. 98, December 1970, S-65.

S_q .197 x Other Income as Percent of Total Income.

The savings ratio is explained in the text. 'Other Income as Per Cent of Total Income' from : Volume II, Table 9.

S^*_q .297 x (Other Income minus Corporate Income), as Per cent of Total Income.

The value of corporate income is calculated according to the formula :-

Sources continued

Corporate Income before tax = Corporate Taxes + 100 x Corp. Sav. / retained earnings ratio.

Sources for the retained earnings ratio :- see footnote 1 to Table 7, p. 122 below.

Corporate Savings : same source as for net investment, compare above.

Corporate taxes :

1946-48 : U.G. No. 10-1960, Report of the Commissioner of Inland Revenue for the Year 1957/8, Statement 28 (iv).

1949-58 : U.G. No. 71-1960, Report of the Commissioner of Inland Revenue for the Year 1958/9, Statement 21.

1958-61 : South African Reserve Bank, Quarterly Bulletin, No. 78, December 1965, p. 35.

1962-68 : South African Reserve Bank, Quarterly Bulletin, No. 98, December 1970, S-65.

V/Y Volume II, Table 7.

s_{corp} same source as for investments above. The figures for 1946 to 1952 are estimated on the basis of the year 1953.

8.3 Examination of the Empirical Results in the Light of South Africa's Economic History.

8.3.1 Pre-War Years

With the exception of the years 1919 and 1920, and 1935 to 1939, it appears that there was sufficient investment finance, whereas the level of demand was insufficient relative to the productive potential of the economy. The fact that during the years 1919 and 1920, and again 1935 to 1939, the availability of capital (compared with the desire to invest) was insufficient, suggests that the value of the accelerator must have been remarkably high during those periods.[1] This was all the more so because it was only after South Africa had abandoned the gold standard in 1931, that investment could proceed satisfactorily owing to the greater availability of capital, which followed the improvement in the terms of trade.[2] Although this may appear a paradox, capital became scarce immediately after the revaluation of gold because the desired rate of investment had increased faster than the availability of resources. During the periods of full employment (1919 and 1920 and 1935 to 1939), the ceiling of the business cycle was therefore determined by the inability of firms to acquire sufficient liquid funds for their investment projects.[3]

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1. The accelerator is a parameter which relates investments to the change in demand.
   Compare Rudolf Schilcher, "Multiplikator und Akzelerator", Handwörterbuch der Sozialwissenschaften, Band 7, pp. 469-478.
2. Compare Herbert Frankel, "Capital and Capital Supply in Relation to the Development of Africa", in : Economic Development for Africa South of the Sahara, International Economic Association, Macmillan, London, St. Martin's Press, New York, 1964, p. 424.
3. Even substantial inflows of foreign capital (which were associated with technical know-how and human manpower), did not remove the lack of investment finance during 1919 to 1920 and again 1935 to 1939.
   Compare :- Eric H. Louw, "The Rôle of Foreign Capital in the South African Economy", Finance and Trade Review, July/August 1956, Vol. II, No. 1, pp. 3-12.
   J.L. Sadie, "Foreign Capital, I., A Reappraisal of our Needs", Finance and Trade Review, Vol. III, No. 1, March 1958, pp. 3-15.

The inadequacy of investment capital during pre-war years was furthermore aggravated by the fact that organized capital and industrial share markets had not developed to any considerable extent. South African firms, in so far as they did not rely on foreign capital, were financed mainly through ploughed-back profits, which were accumulated through the thrift of the proprietor, through funds obtained from relatives, friends, legal firms, boards of executors and trust companies[1], and, to a lesser extent, through public subscription with the help of attorneys, stockbrokers, and others interested in the promotion of new ventures.[2]

Although South African manufacturing firms were able to rely on the provision of short-term credit from the banking system, by way of overdrafts and other forms of trade credit, it would appear that the provision of risk capital constituted a major problem for the South African industrialist before the war : "The financial needs of South Africa were those of a young, expanding and financially poor country. Logically it is therefore reasonable to expect a deficiency in the Union's financial system, especially with regard to the financing of manufacturing industry."[3]

8.3.2 Post-War Years.

All post-war years except for the short period 1959 to 1963, are characterized by an inadequate level of investment finance.[4] This empirical fact is in accord with known facts about the prevailing situation in the post-war consumer goods market, and capital markets.

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1. Compare A.J. Norval, A Quarter of a Century of Industrial Progress in South Africa, Juta, Cape Town, Wynberg, Johannesburg, 1962, pp. 96 ff. The South African sugar, clothing, footwear, and sawmilling industries, are reported for instance to have been financed mainly by friends and families on an unorganized basis.
2. Board of Trade and Industries, Report No. 282, ibid., para. 184.
3. ibid., para. 182.
4. See p. 113 above.

In considering the level of consumption first, it is apparent that the marginal propensity to consume dropped significantly during the years 1958 to 1963, compared with the prior period 1953 to 1958, and the following period 1963 to 1968. This can be seen by considering Table 6, which shows the comsumption functions for the three different periods mentioned above.

Table 6 Consumption Functions, Post-War Years.[1]

Years	Consumption Function	r	r^2	T	n-2
1953-58	C = .965Y - 216.5	.9903	.9808	28.57	4
1958-63	C = .746Y - 589.5	.9739	.9484	17.2	4
1963-68	C = .878Y - 91.9	.9915	.9832	30.6	4

where C = consumption expenditure,

Y = personal income,

r = correlation coefficient,

r^2 = portion of total variance explained by regression model,

T = T - test,

n-2 = degrees of freedom.

During the years 1958 to 1963, the marginal propensity to consume was only .746, compared with .965 during 1953 to 1958, and .878 for the period 1963 to 1968. The calculations submitted in Tables 4 and 5, suggest that it was the low propensity to consume during the period 1958 to 1963, which was mainly responsible for an inadequate level of consumption setting the growth ceiling during those years. Given the level of investment, it can be concluded, that a shift of income from 'other' income receivers to 'work' income receivers would have promoted economic growth, if one accepts that the marginal propensity to consume of the former group, is less than that of the latter.

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1. Sources : South African Reserve Bank, Quarterly Bulletins,
1953 to 1959, No. 71, March 1964, p. 36.
1960 to 1961, No. 79, March 1966, S-60.
1962 to 1968, No. 98, December 1970, S-70.

The above thesis implies that the level of investment finance was inadequate during all post-war years except for the period 1959 to 1963. This empirical finding is in accordance with the known facts about the situation on the post-war capital markets. Thus, the financing of heavy industrial investments after the war, evolved a series of problems for the manufacturing sector, (i) because the public sector was an important competitor with the private sector for for capital funds, and (ii) because of the chronic shortage of risk capital. The shortage of risk capital was in turn the outcome of the "Gründerkrach" in 1948, when industrial share prices on the Johannesburg stock exchange collapsed during midyear[1], which, for the ensuing years, discouraged investment in the new issues market, in spite of the restoration of satisfactory profit levels.[2] The reluctance by investors to provide risk capital, has prevailed ever since and was abandoned only during the stock market boom in 1968/9. For the 1950's and early 1960's, however, both the institutional and private investors preferred the low-yield investments in Building Society Shares and deposits, to the engagement in the industrial share market.[3] In the middle of the 1950's, South African Life Insurance Companies invested about 3.5 per cent of their funds in ordinary shares, and Pension Funds about 1 per cent. By international standards, commentators regarded this as a low and disappointing proportion.[4] This situation, however, improved considerably

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1. Overspeculation, and, in some instances, fraudulence were the causes of the 1948 "Gründerkrach".
   F.K. Lomas, "Some Aspects of Profit Re-Investment in the Union", The South African Journal of Economics, Vol. 23, 1955, p. 287.
2. ibid., p. 287 ff.
3. Compare M.D. Marais, "Recent Economic Tendencies in the Union with Special Reference to Savings and Investments", Finance and Trade Review, Vol. II, 1957, pp. 305 ff, here particularly p. 310.
   Sadie estimates that before 1956, only one-sixth of personal savings flowed into risk investment.
   Sadie, Foreign Capital I, ibid., p. 9.
4. M.S. Louw, "Risk Capital for Industry", Financial Mail, April 17, 1959, p. 134.
   In comparison, British Life Insurance Companies invested some 12 per cent of their assets in equities during the early 1950's.
   Sadie, Foreign Capital I., ibid., p. 10.

during the 1960's. [1]

The result of the prevailing scarcity of risk capital was that companies - even those of adequate standing - found it difficult to approach the new issues market and, in consequence, relied mainly on profit-reinvestments as a means of financing their growth. For years therefore, it was the policy of companies to hold constant the rates of ordinary dividends in each year, and to retain the bulk of increases in profits, for purposes of reinvestment. [2]

Table 7 illustrates the appropriation of profits after tax, to dividends and to re-investments, for the years 1945/46 to 1963/64. The calculations are based on the consolidated accounts of a sample of public companies, the shares of which are quoted on the Johannesburg Stock Exchange.

Unlike other Western countries [3], South African firms were able to rely to an increasing extent on the re-investment of retained profits for their expansion. This is particularly noticeable for the period 1945/46 to 1960/61. Since then, the retained profits ratio has fluctuated more widely, which seems to be indicative of an increasing concern about a stable dividend policy. [4]

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1. T.J. de Vos, "A Review of the Investment Policies of South African Life Insurance Companies", Finance and Trade Review, Vol. VI, Nos. 5 and 6, March, June, 1965, pp. 202, 3.
   T.A. du Plessis, "Savings and the Role of Financial Intermediaries in South Africa", ibid., Table IV, p. 452.
   A certain amount of information about the South African capital market is also given in R.P. 50-1964, Report of the Technical Committee on Banking and Building Society Legislation, para 28, p. 10.
2. P.K. Lomas, Profit Reinvestment, ibid., p. 294 ff.
3. Evidence is given by Lomas, ibid., Table IV, p. 291. From 1951 onwards the rate of reinvested profits has been significantly larger in South Africa than in the U.S.A. and Great Britain.
4. To the extent that dividends are held rigid, retained earnings will closely correlate with net profit and depreciation.
   For the United States of America, compare : John Lintner, "Distribution of Incomes of Corporations among Dividends, Retained Earnings, and Taxes", American Economic Review, Papers and Proceedings, Vol. XLVI, May 1956, No. 2, pp. 97-118.

Table 7 Appropriation of Profits after Tax, Public Companies, 1945/6 to 1967/8 [1]

	Increase in Profits per cent	Distribution of Profits, after tax	
		To Dividends per cent	To Re-Investments per cent
1945/46	..	67.4	32.6
1946/47	37.6	68.1	31.9
1947/48	22.0	66.7	33.3
1948/49	6.4	65.4	34.6
1949/50	7.7	65.4	34.6
1950/51	26.9	57.9	42.1
1951/52	6.0	61.9	38.1
1952/53	4.9	57.6	42.4
1953/54	-2.0	54.4	45.6
1954/55	8.2	57.2	42.8
1955/56	.7	55.0	45.0
1956/57	1.4	54.7	45.3
1957/58	..	52.6	47.4
1958/59	9.2	52.3	47.7
1959/60	5.5	57.7	42.3
1960/61	12.3	48.9	51.1
1961/62	4.6	61.2	38.8
1962/63	19.3	40.4	59.6
1963/64	24.4	52.2	47.8
1964/65	15.2	46.8	53.2
1965/66	.5	49.3	50.7
1966/67	7.8	52.5	47.5
1967/68	6.1	55.5	44.5

It can be conjectured that the reliance by firms to finance their investment through retained earnings (rather than through bank overdrafts or new issues), is likely to produce a shift in the distribution of incomes from dividend receivers to corporations. The paucity of statistical data does not allow us to quantitatively assess the impact of this effect, although the indications suggest that the distributive shift caused by it must have been considerable.

1. Sources : 1945/6 to 1953/4 : P.K. Lomas, Profit Re-Investment ..., ibid., Table I, p. 288.
1954/55 and subsequent years : Bureau of Census and Statistics, National Accounts Series, Survey of Accounts of Public Companies, Memorandum Nos.
17 (p. 33, for 1954/55 to 1956/57);
20 (p. 34, for 1957/58 to 1958/59);
27 (p. 35, for 1959/60 to 1960/61);
33 (p. 40, for 1961/62);
43 (p. 28, for 1962/63 and 1963/64);
and Reports Nos. 09-01-02; 09-01-04.

The high level of retained earnings is furthermore likely to have had certain repercussions on the personal distribution of incomes. Private shareholders of companies, whilst not being immediately credited with the payment of dividends, will nevertheless benefit from the growth of the companies in which they hold shares, if share prices rise subsequent to favourable profit statements. It is important to note, however, that unrealized capital gains are not regarded as income in the national accounting evaluations. Neither is the realized capital gain (in the event of the sale of the share) computed as income, since it is regarded as a personal transfer. In South Africa, capital gains do not come under the purview of the Income Tax Act at all.[1] If one places one's analysis of the personal distribution of income on income tax data (as is done in the present study), then it follows that an ever increasing proportion of realized or unrealized transfer incomes (paid out in form of capital gains), escapes the analysis. The personal distribution of incomes is therefore likely to appear more equal than would have been the case, had all retained earnings been distributed to shareholders and subsequently been reinvested by them.

A few remarks are necessary also in relation to the functional distribution of incomes. Firstly, the shift of economic activity from private entrepreneurs to public corporations can be expected to produce a shift in the distribution of incomes from 'other' to 'wage' income. This results from the fact that the total income of entrepreneurs (including that portion that could reasonably be imputed to their labour), is regarded as 'other income'[2], whereas the total income of an employed manager is computed as 'wage income'. Secondly, the relative increase in 'wage income' will also be promoted by the failure of the national accounting system to compute realized and unrealized transfer incomes resulting from retained earnings by companies, as 'other income'.

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1. Compare Volume II, pp. 75, 6.
2. Compare Volume II, p. 2

The shift in the functional distribution of incomes from 'wage' to 'other' income, is counteracted, however, by the evident policy followed by public companies to maximize the retained-earnings ratio.[1] As a result of this behaviour, personal savings have systematically been lower, and corporate savings higher, than would have been the case otherwise. Compared with other Western countries, the share of corporate income in South Africa is therefore relatively high, and that of paid-out dividends relatively low.

Moreover, it is conceivable that the level of investment actually chosen, was higher than it would have been had dividend payments been higher since an unknown portion of dividends would probably have been alienated from the capital market by dividend receivers and spent for purposes of consumption. Against this must be held the possibility, however, that the marginal profitability of investments is less when retained earnings are used for their finance, compared with the case when reliance is placed on the issue of new equity rights or on the increase of borrowed funds.[2]

To summarize : certain computational (and economically, rather artificial) forces are here at work, exhibiting an important potential influence on the functional distribution of incomes. To trace the quantitative relevance of this shift, is impossible, however, because of the paucity of available data.

8.4 Critical Assessment of Empirical Results.

The acceptance of the findings propounded above depends on a number of assumptions which should clearly be born in mind.

The first and foremost assumption is that the error in the calculation of the ratio of wage income to total income has to be taken as zero. The implications of this assumption have been

---

1. Retained earnings ratio = 100 $\frac{\text{Corporate Savings}}{\text{corporate income minus corporate taxes.}}$

2. Compare Erich Gutenberg, "Grundlagen der Betriebswirtschaftslehre", Dritter Band, Die Finanzen, 2 Auflage, Springer Verlag, Berlin, Heidelberg, New York, 1969, pp. 266 ff.

discussed elsewhere in greater detail. [1]

Three further assumptions are made in connection with the propensities to save, viz.,

(i) that the propensity to save out of work income is correctly estimated for the year 1965,

(ii) that the propensity to save out of other income for the year 1963, is based on correct assumptions, and

(iii) that the savings propensities remains constant through time.

It is evident that the estimation of the savings propensities lacks statistical support to a considerable extent. This is true for the propensity to save out of work income - where all available evidence was carefully consulted - but even more so for the propensity to save out of profit income, which was computed as a residual.

The assumption of constant savings propensities over time is necessary, simply because there is no better alternative hypothesis. Our failure to know anything positive about the saving propensities of past decades, does unfortunately not allow any refinements in regard to the statistical values of savings propensities.

This lack of knowledge also confines the analysis to the comparison of I/Y in relation to W/Y and Q/Y. Alternatively, had statistical data on the savings propensities been available, then it would have been suggestive to relate changes in I/Y also to s_w and s_q, thereby describing the Z_1 Z_2 - line which has been analysed in graph 8 above. [2]

In the foregoing analysis, crucial importance is attached to the sign of the difference between the actual and predicted investment as expressed by the term D. Although it is conceded that the absolute values of D, may not always be accurate, it appears that the sign of the numerical expression, which can either be plus or minus, illustrates, in fact, events of qualitative significance. By using the relation between the predicted and actual investments, it is possible to determine for any year (with the probable exception of the war years), whether or not the availability of financial funds curtailed investments.

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1. Compare Volume II, p. 3 ff. and footnote 2, p. 4.
2. Compare p. 83 above.

9. Degree of Monopoly Theory of Income Distribution

The degree of monopoly theory of income distribution explains the level of income and employment in an economy in relation to the price formation on different markets. Full employment is not a necessary condition for this model.

The main protagonist of the degree of monopoly theory is Michael Kalecki. (Footnotes 1 and 2) For Kalecki, monopolistic price formation is typical for capitalistic countries :- "Monopoly appears to be deeply rooted in the nature of the capitalist system : free competition, as an assumption, may be useful in the first stage of certain investigations, but as a description of the normal state of capitalist economy it is merely a myth".[3]

9.1 Kalecki's Theory of the Firm

Kalecki continues the classical tradition by regarding the conditions of production as the main determinant for the distribution of incomes. He modifies the classical assumption of U-shaped average cost functions, however, by assuming constant variable costs.[4]

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1. Michael Kalecki, "The Determinants of Distribution of National Income", Econometrica, Vol. 6, April, 1938, pp. 97-112.
   Michael Kalecki, "The Distribution of National Income", in : American Economic Association, Readings in the Theory of Income Distribution, Allen and Unwin, London, 1967, pp. 197-217.
   Michael Kalecki, Theory of Economic Dynamics, Allen and Unwin, London, 1954.
2. There is little unanimity about the classification of Kalecki's work. Rothschild suggests that he contributed a macroeconomic theory *, whilst Krelle groups his work under monopoly theories. ** Preiser maintains that Kalecki's contribution amalgamates the basic ideas of the class monopoly theory with the theory of national income analysis. *** Preiser's classification seems to be most preferable.
   * K.W. Rothschild, Some Recent Contributions, ibid., p. 18.
   ** W. Krelle, Verteilungstheorie, ibid., p. 41 ff.
   *** E. Preiser, Distribution I, ibid., p. 629.
3. Michael Kalecki, The Distribution ..., ibid., p. 217.
4. This assumption is in accord with the findings of empirical costs studies.
   Compare Erich Gutenberg, Grundlagen der Betriebswirtschaftslehre, Erster Band, Die Produktion, ibid., pp. 278 ff, and the literature quoted there.
   also : H.B. Malmgren, "What Conclusions are to be Drawn from Empirical Cost Data". Journal of Industrial Economics, March 1959, pp. 136-144.

Kalecki defines prime costs to include production wages and raw materials, whilst overheads are comprised of fixed costs consisting of salaries, interest, and depreciation.[1] The price formation is based on the assumptions that (i) the average prime costs, and (ii) the prices of competing firms which produce similar products, are taken into account.[2]

The price of a product is given by

(60) $p = mu + n\bar{p}$,

with p = price of the product;

$\bar{p}$ = weighted average price of all firms producing that product;

u = unit prime costs;

m, n = expectation parameters, with $m > 1$

$0 < n < 1$. (Footnote 3)

Kalecki's theory of price formation represents some sort of "full costing"[4], modified by the facts that (i) overhead costs are excluded as an influence on price formation and (ii) that competitors' pricings are taken into account.[5]

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1. The separation of wages and salaries into two different categories is unsatisfactory from the point of view of income distribution theory. It is noteworthy in this regard that British labour statistics have always made the distinction between wage and salary earners. This is probably the reason why Kalecki chose this income classification.
   Compare also : Alfred Stobbe, Untersuchungen zur makroökonomischen Theorie der Einkommensverteilung, Kieler Studien, J. C. B. Mohr (Paul Siebeck), Tübingen, 1962, p. 34.
2. Thus Kalecki also considers oligopolistic pricing elements. Michael Kalecki, Theory of Economic Dynamics, ibid., p. 12.
3. m must exceed unity. It is not true that $0 < m < 1$, as Krelle maintains. Wilhelm Krelle, Verteilungstheorie, ibid., p. 42, Footnote 2.
4. On the justification of this assumption, see : P. A. Tinsley, On the Flexibility of Cost-Plus Pricing, Research Memorandum No. 75, Princeton University, 1965.
5. The above is Kalecki's latest version which he published in his Theory of Economic Dynamics in 1952.
   In his earlier publications, Kalecki used Lerner's degree of monopoly μ, which was defined as the difference between price and marginal cost to price, or
   $\mu = \frac{(p-m)}{p}$, where m = marginal costs.
   Compare M. Kalecki, The Determinants of Distribution, ibid., p. 100, and
   A. Lerner, "The Concept of Monopoly and the Measurement of Monopoly Power", Review of Economic Studies, Vol. 1, June, 1934, pp. 157-175.
   For a critical assessment of the question under review, compare Johann Schulz, "Die Monopolgradtheorie der Einkommensverteilung", in : Beiträge zur Theorie der Einkommensverteilung, mit einem Vorwort von Oskar Morgenstern, herausgegeben von Helmut Frisch, Duncker & Humblot, Berlin, 1967, pp. 97 - 114, here p. 106 ff.

Dividing (69) by u gives

$$(61)\quad \frac{p}{u} = m + \frac{n\bar{p}}{u} \quad .$$

On the assumption that the firm in question charges the same price as its competitors, it is $p = \bar{p}$, hence

$$(62)\quad \frac{\bar{p}}{u} = \frac{m}{1-n} \quad .$$

The parametres m and n determine the degree of monopoly, as expressed in the relation of price to costs.

In Kalecki's model, the pricing process determines both the size and the distribution of incomes. The attention therefore focusses, not on the labour market (where nominal wages are being determined), but on the commodity market (where real wages are set): It is the entrepreneurs, and not the workers, who command the strategic weapon for the determination of the distribution of incomes.

9.2 Comparison of the Post-Keynesian with the Degree of Monopoly Theory.

The fundamental difference between the post-Keynesian and the degree of monopoly theories of income distribution becomes clear when one considers that increasing profits lead to a lower level of employment in Kalecki's model, whereas they are characteristic of a situation of over-employment, in the post-Keynesian model.

The dichotomy of these two findings is closely linked with the theory of economic growth. Post-Keynesian theories assume that Say's Law is valid, i.e., they do not separate the demand and supply sides of the market. Kalecki's theory, on the other hand, makes this distinction. Using Domar's growth model, the demand is determined by

$$(63a)\quad \frac{dY}{dt} = \frac{1}{s}\frac{dI}{dt} \quad ,$$

and supply by

(63b) $\frac{dY}{dt} = \frac{1}{k} I = \frac{1}{k} sY,$

since $S = sY$ and $I = S$. (Footnote 1)

Given the marginal capital-output ratio (k), an increase in the propensity to save (s), has a stimulating effect on the supply side of the economy through the creation of new capacities, whereas it has a slowing-down effect on the demand side because of the decrease in the value of the multiplier. An increase in the degree of monopoly will therefore induce supply to grow faster than demand, a case which had not been considered by the post-Keynesian theories.

The question whether the post-Keynesian or Kalecki-type model is more representative, appears to depend on the assumptions which one makes about the behaviour of entrepreneurs. Kalecki's model is valid when the representative entrepreneur is static and thinking in terms of implementing some historical rate of profit, even if this happens at the expense of potential sales. The post-Keynesian theories, on the other hand, can be regarded as relevant when entrepreneurs are dynamic and try to expand their businesses as fast as possible.

9.3 The Degree of Monopoly Model in Relation to the South African Economy.

As in case of the empirical examination of the post-Keynesian model, one is again confronted with the paucity of available statistical data when one attempts to relate the 'degree of monopoly' model to the South African economy. Sophisticated theories must therefore be reduced to their basic ingredients. In the case of the degree of monopoly model of income distribution, this means that the analysis remains limited to the consideration of the average wage rate, the price index, the productivity of labour, and the wage share. Helmstädter describes these four factors as the "strategic variables" of wage policies.[2]

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1. Compare p. 75 above.
2. Ernst Helmstädter, Die Entwicklung ..., ibid., p. 396 ff.

Consider the following relations :-

(64) $\lambda = \frac{\bar{w}}{p}$, where λ share of wages in income
$\bar{w}$ wage per 1 unit of output
p price

(65) $\bar{w} = \frac{w\,h}{Y}$, where w is the average wage rate of the economy,
h the number of hours worked and
Y value of real income

(66) $\pi = \frac{Y}{h}$, where π is the average productivity of labour.

From (64) to (66) it follows that

(67) $\lambda = \frac{w}{p\,\pi}$, i.e., the share of wages in net output is equal to the average wage rate divided by the product of the price index and the labour productivity.

Equation (67) illustrates the tautological relation between four strategic variables of wage policies : the share of wages, the average wage rate, the price index, and the productivity of labour.

In what follows, the relation between these four magnitudes will be analysed for the South African manufacturing industries for the years 1917 to 1965. The lack of reliable employment data does not allow the extension of this analysis to the total economy. [1]

Following the terminology suggested by Phelps Brown [2], changes in the price index will be discussed in terms of changes in the market environment : a general decrease in the price index indicates a hard, and a general increase, a soft market environment. In Kalecki's terminology (which, for the present discussion, appears to be somewhat restricted), a hard market environment would be indicative of a decrease in the degree of monopoly, and a soft market environment, of an increase.

The data which are relevant for the analysis are listed in Table 8, and their logarithms are illustrated in graph 12.

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1. Compare Volume II, Table 57, for the available data of the economically active population.
2. Compare p. 56 ff above.

TABLE 8 South African Manufacturing Industries : Average Wage, Wage Share, Price Index, and Labour Productivity, 1917 to 1965.

YEAR	Average Wage	Wage Share	Price Index	Labour Productivity
1917	168.54	61.53	99.6	27.49
1918	182.22	59.98	106.4	28.55
1919	202.32	61.15	117.7	28.11
1920	217.86	61.51	145.8	24.29
1921	243.66	68.62	132.9	26.90
1922	235.51	70.16	110.1	30.49
1923	223.03	65.64	106.8	31.82
1924	224.25	64.75	108.3	31.98
1925	205.14	59.33	108.3	31.93
1926	210.33	59.80	107.9	32.60
1927	213.47	59.43	106.3	33.79
1928	220.94	57.84	106.9	35.74
1929	222.66	57.40	106.9	36.28
1930	231.64	58.69	106.9	36.92
1933	211.82	55.02	94.5	40.74
1934	214.54	57.24	94.0	39.88
1935	222.80	58.04	94.3	40.71
1936	227.15	58.34	96.5	40.35
1937	235.66	57.98	100.0	40.65
1938	242.07	57.21	99.9	42.35
1939	245.46	55.47	103.4	42.80
1940	249.13	53.15	108.2	43.32
1941	255.50	51.60	117.3	42.21
1942	289.24	54.62	124.4	42.56
1943	316.66	57.12	128.8	43.04
1944	341.28	58.15	132.2	44.40
1945	372.37	59.80	134.1	46.43
1946	392.33	60.33	139.7	46.55
1947	418.85	59.92	147.8	47.29
1948	444.68	60.46	153.2	48.01
1949	471.59	61.70	159.3	47.98
1950	486.19	59.84	171.0	47.52
1951	530.00	54.70	185.9	52.12
1952	579.96	56.49	192.4	53.36
1953	624.28	56.67	195.9	56.24
1954	648.50	55.40	195.9	59.76
1955	675.37	61.65	202.1	54.21
1956	692.29	56.27	205.9	59.75
1957	720.05	58.64	212.0	57.92
1958	736.52	59.58	219.4	56.35
1959	717.20	58.00	222.0	55.70
1960	807.02	57.97	224.8	61.93
1961	847.99	57.71	230.7	63.70
1962	875.90	56.76	235.7	65.47
1963	867.31	56.78	238.9	63.94
1965	1018.77	58.90	247.8	69.80

Sources : see p. 132 below

Sources of Table 8

Average Wage :

Volume II, Table 45, Salaries and Wages in Rand, divided by number of employees, total of all races.

Wage Share :

ibid., salaries and wages divided by net output. In order to take overheads into account (which are included in net output but which do not constitute portion of the value added), 15 per cent of net output were deducted for the years 1917 to 195-, and 20 per cent for later years. The writer is indebted to Professor J.J. Stadler of the University of Pretoria for this recommendation (letter dated 10th November, 1970, Pretoria).

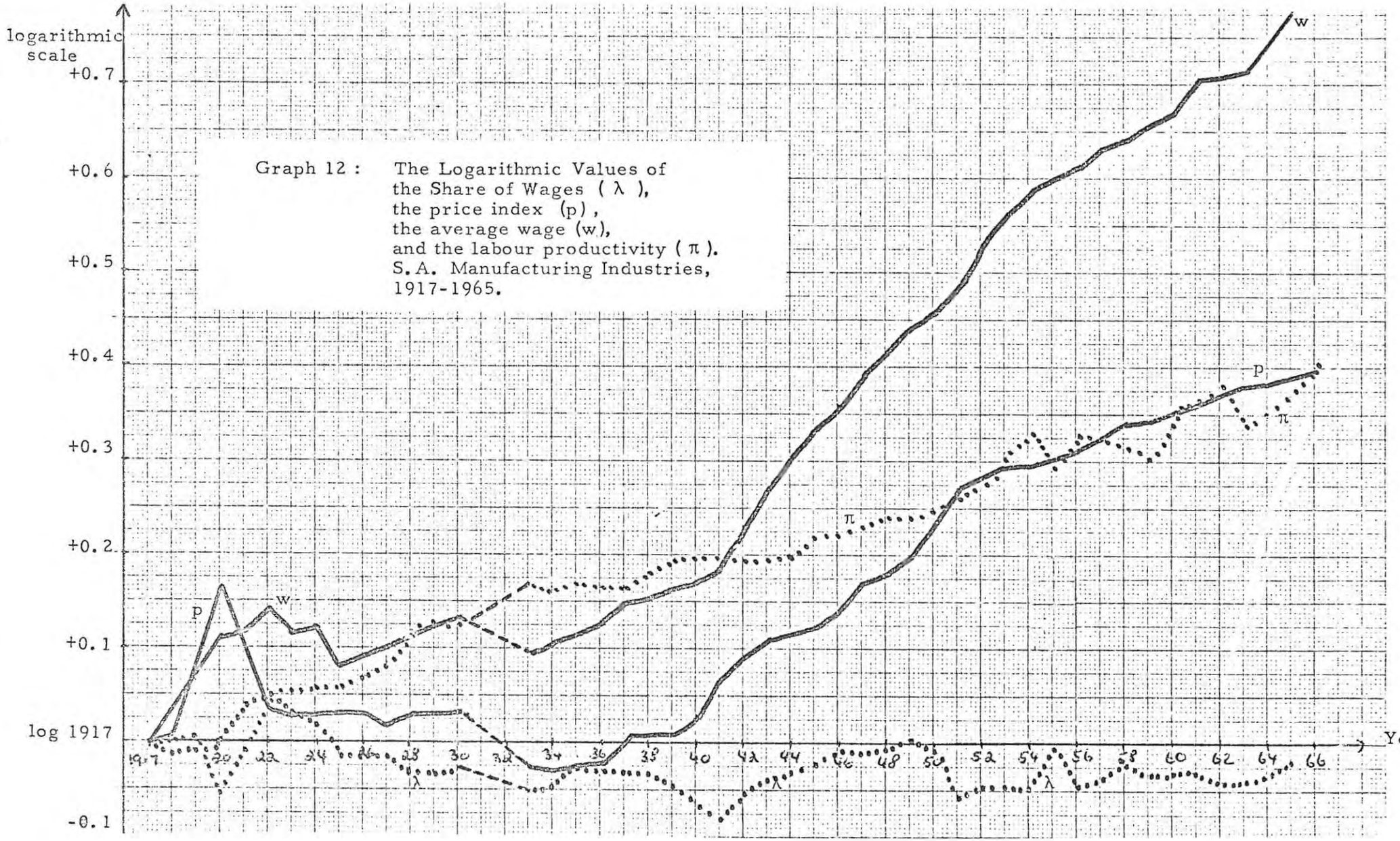
Price Index :

Union Statistics for Fifty Years, Jubilee Issue, ibid., H-23, col. 261 (retail price index, weighted average), and South African Reserve Bank, Quarterly Bulletin, No. 98, December 1970, S-73.

Labour Productivity :

Calculated according to the formula $\pi = \frac{w}{p\lambda}$

(compare p. 130 above).



Graph 12 : The Logarithmic Values of the Share of Wages (λ), the price index (p), the average wage (w), and the labour productivity (π). S.A. Manufacturing Industries, 1917-1965.

The analysis of Table 8 and graph 12 reveals the following relations :-

1917 to 1920 The post-World War I boom was characterized by steep increases in both the price index and the average wage rate. Between 1919 and 1920 the increase in the price index was significantly faster than that of the average wage rate, without, however, producing a deterioration in the wage share.[1] In contrast, there occurred a compensating fall in average labour productivity in 1920.

1920 to 1925 This period, which saw the post-war depression and subsequent revival, experienced an all-time peak in the value of the wage share. This temporary 'geological fault' in the distributive pattern was associated with (i) a drastic fall in the price index (which was far more pronounced than the relatively modest fall in the average wage rate index), and (ii) with a remarkable improvement in the labour productivity index.

1925 to 1930 During these years of virtual price stability, labour productivity increased slightly faster than the average wage rate index. Consequently, there was a slight drop in labour's income share.

1930 to 1933 During the Great Depression of the early 1930's the average wage rate, the share of wages, and the price index, dropped significantly. This was compensated for by an improvement in the index of labour productivity. As was the case in 1922, the the Great Depression clearly favoured profit income receivers at the expense of work income earners.

The reason for the increase in the index of labour productivity is the fact that the value of physical production at constant prices decreased by only some 2 per cent between 1930 and 1933,

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1. The wage share is the share of wages in net output, after deduction of overheads.

whereas the number of employees decreased by 11.1 per cent.[1] By virtue of this sharp improvement in labour productivity, entrepreneurs were able to increase their income share in spite of resisting market forces.

1933 to 1941 — After a temporary improvement in the wage share between 1933 and 1935, the share dropped to an all-time low in 1941. This development, which took place although the average wage rate increased faster than the labour productivity index, was caused by the fact that the formerly hard market environment had become soft by about 1935, allowing substantial price increases to be realized. In fact, the retail price index increased from 94.3 in 1935 to 117.3 in 1941, an increase of more than 24 per cent during 6 years. By comparison, the average wage rate at current values rose by only 12 per cent during the same 6-year period.

1941 to 1949 — The War and post-War years were a period of active wage policy. Between 1941 and 1949, average money wages rose by some 85 per cent, whereas the price index increased only by 35.8 per cent, resulting in a significant improvement of the wage share. The index of labour productivity rose only slowly during this period.

1949 to 1965 — Hardly any noticeable shift in the distributive pattern is observable for the period 1949 to 1965. Save for some short-term fluctuations, the share of wages in net output remained more or less constant. Average money wages rose steeply without, however, producing any remarkable effect on the distributive pattern. This neutralization of the improvement in average wages, was affected, almost equally by an increase in the price index and an increase in the index for the productivity of labour.

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1. Sources :
Table 8, p. 132 above, for the price index.
Volume II, Table 45, for number of employees (all races), and net output.

To summarize : The detailed analysis of wage, price, and productivity behaviour of the South African manufacturing industries after 1917, shows that there were two major fluctuations in the ratio of total wages to net output, viz., a peak in 1922, and a trough in 1941. When seen over the total period 1917 to 1965, however, the long-term stability of labour's income share is evident. The sustained growth benefitted the two classes of wage and other income receivers more or less equally.

At the same time, some significant changes occurred between hard market environments (when price increases were not possible), and soft market environments (when price increases could easily be realized). Basically, the total period from 1920 to 1935, can be classified as a hard market period, and that after 1935 as a soft market period.

Finally, the sustained improvement in the average wage index was neutralized from the distributive point of view, partly because of the price increases, and partly because of the simultaneous increase in the labour productivity index.

10 The Marginal Productivity Theory of Income Distribution

10.1 Introduction

Of all income distribution theories, the marginal productivity theory is most highly developed. Here is a theory which gives a final answer to the question of the distribution of incomes between input factors whose joint productive cooperation is required for the attainment of output. The theory allows mathematical treatment and yields determinate results for given parameters. The laws of distribution, according to the marginal productivity theory, produce stable equilibrium solutions. Through the claim that an income distribution which has come about according to the laws of the marginal productivity theory is 'just', the solution has occasionally been made subject to naive economic ethics.[1]

The marginal productivity theory of income distribution is closely linked with the theory of production. By basing the analysis on the law of diminishing marginal returns, mechanistic relationships are made responsible for the functional distribution of incomes. In this sense it is true to say that the edifice of economic theory is unified. Since the neo-classical theory (to whose efforts we owe the marginal productivity theory of distribution) also provides a theory of income disposition which is orientated in marginal terms (Gossen's First and Second Laws and their implications), the three main columns of economic theory, i.e., production theory (in German 'Einkommensentstehung'), distribution theory

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1. To quote John Bates Clark : "The welfare of the laboring classes depends on whether they get muchor little; but their attitude toward other classes - and, therefore, the stability of the social state, - depends chiefly on the question, whether the amount they get, be it large or small, is what they produce. If they create a small amount of wealth and get the whole of if, they may not seek to revolutionize society; but if it were to appear that they produce an ample amount and get only part of it, many of them would become revolutionists, and all would have the right to do so. * ... The right of society to exist ... (is) at stake. These facts lend to this problem of distribution its measureless importance." **

   John Bates Clark, The Distribution of Wealth, A Theory of Wages, Interest and Profits, Macmillan, New York, London, 1927. (first published 1889).
   * p. 4.
   ** p. 3.
   Compare also pp. 6, 7, 9, 49 f, 323-4.
   Clark used the marginal productivity theory of distribution in order to refute the Marxian assertion that private property induces exploitation. In Clark's system, the productive factors land and capital occupy as important positions as does labour.

('Einkommensverteilung') and income disposition theory ('Einkommensverwendung'), have been amalgamated into one. (footnotes 1 and 2)

Historically, the creation and development of the marginal productivity theory of distribution overlapped for a long time with the doctrines of the 'classical school'. The former was made known long before the latter was abandoned. Thus, Johann Heinrich von Thünen was an early precursor of this school, with his famous treatise "Der isolierte Staat in Beziehung auf Landwirtschaft und Nationalökonomie", published in 1826. (foo notes 3 and 4). Long after this, economists like John Stuart Mill, Nassau William Senior, Karl H. Rau, and others, still suggested the wage fund theory as an explanator of wage formation.[5] This classical advocacy was abandoned only when, round about 1870, university economists took over the field that formerly had been dominated by practioners and political and moral philosophers.[6] The ensuing triumphant progress of the newly discovered marginal productivity theory was led - often without knowledge of the work done by others in the same field - by W. St Jevons[7], L. Walras[8]

1. Compare Erich Preiser, Bildung und Verteilung des Volkseinkommens, ibid.
2. Also, there is not any longer a separate conception of a wage, interest, and rent theory. All of these are unified within the marginal productivity theory of distribution. Compare for instance Jean Marchal, "Wage Theory and Social Groups", in : The Theory of Wage Determination, Proceedings of a Conference held by the International Economic Association, Edited by John T. Dunlop, Macmillan, London, New York, 1957, p. 170.
3. On von Thünen's work, see : Edgar Salin and Asmus Petersen, "v. Thünen, Johann Heinrich", in : Handwörterbuch der Sozialwissenschaften, Band 10, pp. 386-392.
4. On Thünen's wage theory, see : Wilhelm Krelle, "Lohn (I), Theorie", Handwörterbuch der Sozialwissenschaften, Band 7, pp. 1-16, particularly pp. 7 and 14, 15.
5. ibid., p. 3.
6. In this connection see : John T. Dunlop, "The Task of Contemporary Wage Theory", in : The Theory of Wage Determination, ibid., p. 4
and John T. Dunlop, "The Task of Contemporary Wage Theory", in: New Concepts in Wage Determination, Edited by George W. Taylor, Frank C. Pierson, McGraw-Hill, New York, 1957, p. 120
7. W. St Jevons, The Theory of Political Economy, London and New York, 1871.
8. L. Walras, Eléments d'économie politique pure, ou théorie de la richesse sociale, Lausanne, 1874-77, and Théorie mathematique de la richess sociale, Lausanne 1883.

V. Pareto[1], C. Menger [2], Eugen von Böhm-Bawerk [3], and John Bates Clark[4]. Further refinement was given by J.R. Hicks [5] and Joan Robinson[6] who introduced the concept of elasticity of substitution. An important gap was filled when C.W. Cobb and P.H. Douglas[7] developed a production function which was based on the concepts of the marginal productivity theory and which was empirically testable.

This 'formative period' as George J. Stigler once called it[8], lasted at least until the Great Depression, when the then dominating belief, that employment could be raised through reduction in wages, was harmfully shaken. But even then, the new epoch of macroeconomic thinking and theorizing, which was commenced by John Maynard Keynes' publication of the "General Theory of Employment, Interest, and Money" [9], only slowly permeated to the side-road of income distribution theory. So much so, that William J. Fellner in 1953 still declared : "By contemporary distribution theory we presumably mean a qualified marginal productivity theory; that is to say, a combination of the marginal productivity theory with other analytical elements." (footnotes 10 and 11)

1. Vilfredo Pareto, Cours d'économie politique, Lausanne, 1896/7.
2. C. Menger, Grundsätze der Volkswirtschaftslehre, 1871, 2. Auflage, Wien-Leipzig, 1923.
3. Eugen von Böhm-Bawerk, Kapital und Kapitalzins, 3 Bände, Jena 1921, insbesondere Positive Theorie des Kapitals, and his famous article : "Macht oder ökonomisches Gesetz?", ibid.
4. John Bates Clark, The Distribution of Wealth, ibid.
5. J.R. Hicks, The Theory of Wages, First Edition, 1932, Second Edition, 1963, MacMillan, London, 1963.
6. Joan Robinson, The Economics of Imperfect Competition, MacMillan, First Edition 1933, 1959, London, New York, 1959.
7. Paul H. Douglas, The Theory of Wages, MacMillan, New York, 1934.
8. George J. Stigler, Production and Distribution Theories, The Formative Period, MacMillan, New York, 1949.
9. John Maynard Keynes, The General Theory of Employment, Interest and Money, MacMillan, London, 1936.
10. William J. Fellner, "Significance and Limitations of Contemporary Distribution Theory", American Economic Review, Papers and Proceedings, Vol. 43, 1953, p. 484.
11. For a similar suggestion, see : Sidney Weintraub, An Approach to the Theory of Distribution, Chilton Co. Philadelphia 1958, p. 1.
compare also :
Gottfried Bombach, Die Verschiedenen Ansätze ..., ibid.

This clearly testifies the inability - at that stage, - of combining the marginal productivity theory with macroeconomic concepts, as far as these are related to the distribution of incomes. Uncertainty, however, is also expressed from the opposite point of view, when Nicholas Kaldor attempts to combine different macroeconomic theories with their microeconomic counterparts : "We have seen how the various 'models' of distribution, the Ricardian-Marxian, the Keynesian and the Kaleckian are related to each other. I am not sure where 'marginal productivity' comes in, in all this ..." [1]

10.2 The Micro- and Macroeconomic Versions of the Marginal Productivity Theory of Distribution.

Whereas the classical school believed that a mixture of social and natural factors determined the distribution of income[2], the marginal productivity theory ignores the presence of social factors completely, and makes the distribution of income dependent on arguments of a technical, natural, and physical nature. This 'objectivity' is clearly expressed in the four major assumptions, viz., (i) the law of diminishing marginal returns is representative ; (ii) competition is perfect; (iii) profits are maximized; and (iv) the economy is stationary, i.e., non-growing.[3] At a first sight, condition (iii) seems to contain a certain element

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1. N. Kaldor, Alternative Theories, ibid., p. 100
2. Compare for instance Ricardo's theory of human propagation : "It is when the market price of labour exceeds its natural price that the condition of the labourer is flourishing and happy, that he has it in his power to command a greater proportion of the necessaries and enjoyments of life, and therefore to rear a healthy and numerous family. ... When the market price of labour is below its natural price, the condition of the labourers is most wretched ... It is only after their privations have reduced their number ... that the market price of labour will rise to its natural price. ..." *
   Ricardo here explains economic data in terms of a theory, with the result that an analysis of the size of the population is attempted in terms of natural and predictable laws.
   * David Ricardo, The Principles of Political Economy and Taxation, 1817, Everyman's Library, Edited by Ernest Rhys, Introduction by F.W. Kolthammer, 1943, p. 53.
   For a criticism see : Walter Eucken, The Foundations of Economics, History and Theory in the Analysis of Economic Reality, Translated from the German by T.W. Hutchison, William Hodge, London, 1950, p. 217.
3. An economy is stationary when all income is consumed and net investments are zero.

of human choice but on closer examination it becomes clear that there is only one alternative. The assumption of profit maximization constitutes a tautology in a stationary system with perfect competition, because there is no other objective available to the entrepreneur if he wishes to survive. He must maximize his profits in order to make neither a profit nor a loss, which is the optimal choice situation.

Apart from its neglect of social, behaviouristic factors, the marginal productivity theory of distribution is limited in that it considers only the demand for input factors, disregarding the conditions of supply. (Footnotes 1 and 2). In this respect it is weaker than the classical theory. The assumption that supply is completely elastic at given prices, is worlds apart from the real situation.

10.2.1 Properties of the Production Function

10.2.1.1 The Law of Diminishing Marginal Returns.

The technological assumption on which the marginal productivity theory of distribution is based is that production in an economy is undertaken subject to diminishing marginal returns. If fixed input is held constant and a variable factor input is increased, the marginal physical product of the variable factor will decline, at least after a certain point. This is founded upon the condition that the productive factors are interchangeable which means that the production function will have derivatives and that different factors are substitutable one for the other.

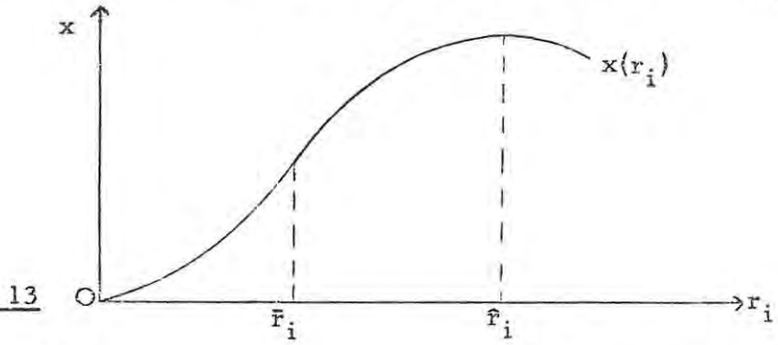
The classical production function can generally be expressed by the formula :

(68) $x = ar_i^3 + br_i^2 + cr_i + d,$

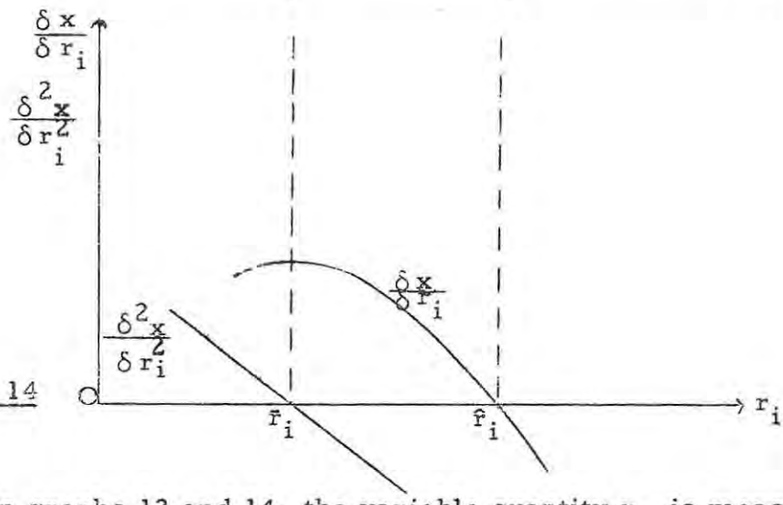
---

1. Paul A. Samuelson called this demand 'derived demand', i. e., demand for factors of production which is derived indirectly from the consumer demand for the final product. Paul A. Samuelson, Economics, An Introductory Analysis, 7th Edition, McGraw-Hill, New York and Tokyo, 1955, 1967, p. 510.
2. Erich Preiser, "Erkenntniswert und Grenzen der Grenzproduktivitätstheorie", in : Bildung und Verteilung des Volkseinkommens, ibid., pp. 271-3.

where x is the quantity of physical output, r_i ($i \in 1, 2, \ldots, m$) the variable factor and a, b, c and d are parameters. Graphs 13 and 14 show the total and marginal product curves, respectively.



Graph 13



Graph 14

In graphs 13 and 14, the variable quantity r_i is measured on the horizontal axis. The physical quantity of output (x) is measured on the vertical axis of graph 13, and the marginal physical product $\frac{\delta x}{\delta ri}$ and the derivative of it $\frac{\delta^2 x}{\delta ri^2}$ on the vertical axis of graph 14.

The total product curve $x(r_i)$ increases with increasing increments for $O < r_i < \bar{r}_i$. Correspondingly, the marginal product curve increases and the derivative of the marginal product curve is greater than zero.

For $\bar{r}_i < r_i < \hat{r}_i$, the total product curve increases with decreasing increments and beyond the point of saturation ($r_i \geq \hat{r}_i$), the total product curve starts falling. These formal relationships can be expressed as follows : A production function is classical, if

(69a) $$\frac{\delta x}{\delta ri} > O \quad \text{for} \quad r_i < \hat{r}_i$$

(69b) $$\frac{\delta^2 x}{\delta ri^2} > O \quad \text{for} \quad O < r_i < \bar{r}_i$$

(69c) $\frac{\delta^2 x}{\delta r_i^2} < 0$ for $r_i > \bar{r}_i$

with $x \gtrless 0$ and $r_i \gtrless 0$ (Footnote 1)

10.2.1.2 Assumption of Constant Returns to Scale

According to the assumption of constant returns to scale, output will increase by a factor λ if all input factors are increased by the same factor, i.e.,

(70) $\lambda x = x(\lambda r_1, \lambda r_2, \ldots, \lambda r_m)$

where λ is a constant. A production function which fulfulls condition (70) is linear and homogeneous of the first degree.

10.3 The Microeconomic Version of the Marginal Productivity Theory of Distribution.

The microeconomic version of the marginal productivity theory can be expressed by the following relations :-

Assume that Q = profits;
p = price of the final product;
r_i = quantity of the variable factor;
q_i = price of the variable factor;
x = quantity of the final product;

then

(71) $Q = px - \sum_{i=1}^{m} r_i q_i$ for $i = 1, 2, \ldots, m$.

(72) since $x = x(r_1, r_2, \ldots, r_m)$
profits are maximized when

(73) $\frac{\delta Q}{\delta r_i} = 0 = p\frac{\delta x}{\delta r_i} - q_i$ or

---

1. Compare : Wilhelm Krelle, Verteilungstheorie, ibid., pp. 51 ff.
Wilhelm Krelle, Preistheorie, ibid., pp. 61 ff.
Wilhelm Krelle (unter Mitarbeit von Wilhelm Scheper), Produktionstheorie, Teil I der Preistheorie, 2. Auflage, J.C.B. Mohr (Paul Siebeck), Tübingen, 1969, pp. 23 ff.

$$(74)\quad q_i = p\,\frac{\delta x}{\delta r_i}$$

According to equation (74), a firm will maximize its profits when the remuneration of a factor is equal to the marginal physical product of that factor, multiplied by the price for the final product.

The expression $p\frac{\delta x}{\delta r_i}$ is also referred to as the value of the marginal physical product (in the case of competition), or the marginal revenue product or marginal value product in cases both of competition or monopoly.[1] The value of this is equivalent to the physical product in money terms, or, in the case of a monopoly, the total revenue when the last output unit is produced, minus the total revenue when it is not produced.

The total remuneration of factor r_i is calculated by multiplying equation (74) with the available quantity of r_i, i.e.,

$$(75)\quad px = r_i q_i = p\sum_{i=1}^{m} r_i\,\frac{\delta x}{\delta r_i}\ .$$

Since Wicksteed's 'Co-ordination of the Laws of Distribution', 1894, the 'Exhaustion-of-product-problem' has been solved for the marginal productivity theory. To quote George J. Stigler : "The completion of the marginal productivity theory of distribution was achieved only with the development of the proof that if all productive agents are rewarded in accord with their marginal products, then the total product will be exactly exhausted."[2] According to Euler's theorem, a linear homogeneous production function will exactly exhaust the total product because a given percentage increase of all productive factors will result in the same percentage increase in the physical product. (footnotes 3 and 4)

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1. Compare Edward Hasting Chamberlin, The Theory of Monopolistic Competition, A Re-Orientation of the Theory of Value, 7th Edition, Cambridge, Mass, Harvard University Press, London, Oxford University Press, 1933, 1956, pp. 177-182.
2. George J. Stigler, "Euler's Theorem", in: Production and Distribution Theories, ibid., p. 320.
3. For the proof see : R.G.D. Allen, Mathematical Analysis for Economists, MacMillan, London, New York, p.326 f. and Wilhelm Krelle, Verteilungstheorie, ibid., p. 53, footnote 1.
4. For a critical discussion of Euler's theorem, see : F. van den Bogaerde, Constant Returns ..., ibid., pp. 223-239.

10.4 The Macroeconomic Version of the Marginal Productivity Theory of Distribution.

The formulation of the macroeconomic version of the marginal productivity theory of distribution was developed by John Bates Clark. [1]

Assume a macroeconomic production function $Y = f(L, C)$, where income (Y) is a function of labour (L) and capital (C).

According to (74), the wage rate (w) and the interest rate (v) can be expressed as

(76a) $w = \bar{p}\frac{\delta Y}{\delta L}$ and (76b) $w = \bar{p}\frac{\delta Y}{\delta C}$

$\bar{p}$ in equations (76a) and (76b) indicates the price level in the economy. $\frac{\delta Y}{\delta L}$ and $\frac{\delta Y}{\delta C}$ are the marginal products of labour and capital.

The product is fully used when

(77) $\bar{p}y = wL + vC$

which is the case because of (76a, b), i.e.,

(78) $\bar{p}y = \bar{p}\left[\frac{\delta Y}{\delta L} L + \frac{\delta Y}{\delta C} C\right]$.

The total real income $\bar{p}y$ is equal to the marginal contributions of labour and capital, multiplied by the respective input factor quantities and valued with the average price index of the economy.

According to the macroeconomic version of the theory, the competition among entrepreneurs is responsible for the fact that each labourer receives the value of the marginal contribution of labour. To quote Clark : "With an ideally complete and free competitive system, each unit of labor can get exactly what a final unit produces. With imperfect competition, it still tends to get that amount." [2]

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1. J.B. Clark, The Distribution of Wealth, ibid., mainly Chapters XII and XIII.
2. Clark, The Distribution of Wealth, ibid., p. 179.

Clark formulated this theory as a denial of the assertion that the capitalistic wage system is open to exploitation. At first sight it would seem that the opposite is true, because, if the wage rate is fixed in accordance with the marginal contribution of the last worker, it would seem as if all intramarginal workers are paid less than they are worth. But Clark explained this by pointing out that all labourers are assumed to constitute "a body of men ... of the average quality of ordinary labourers".[1] On this assumption, "any unit whatever ... is final in the economic sense; inasmuch as, by its presence, it brings the supply to its present actual magnitude".[2] Workers, (just as any other productive factors), are thus regarded as interchangeable, and each individual worker may be regarded as marginal.

Also, an increase in the labour force would result in the productive equipment of the economy becoming of inferior quality from which it follows that the greater marginal product of a smaller labour force must be attributed to capital, not to labour.[3]

10.5 Marginal Productivity Theories Reconsidered.

In the microeconomic version of the theory, the individual firm acts as a quantity adjuster (which follows immediately from the condition that competition is perfect).[4] With the price being given to the firm, the entrepreneur has to adjust the quantity in order to maximize profits.

Assume that the wage rate is given as $\bar{w}$. In this case, the entrepreneur will choose that employment $\bar{e}$ where the wage rate $\bar{w}$ is equal to the marginal product on labour, as is illustrated in graph 15.

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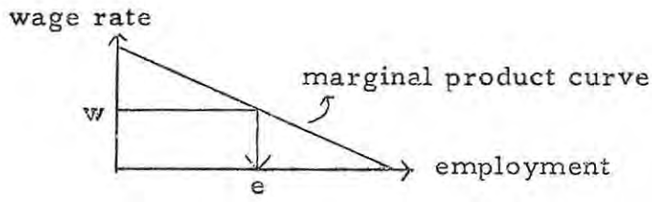
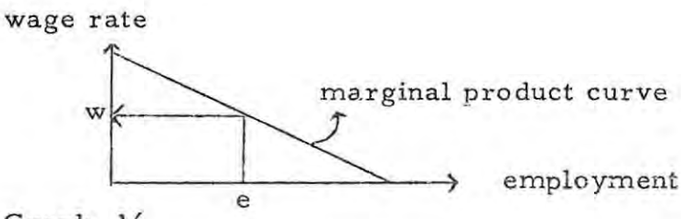
1. ibid., p. 181.
2. ibid., p. 180.
3. ibid., pp. 195, 202, 322 ff.
   Note that the labour force is here regarded as the variable factor, whilst the capital equipment is being held constant. Hence it follows that the capital intensity per worker will increase when the number of workers is reduced, and vice versa.
4. Erich Schneider, Pricing and Equilibrium, An Introduction to Static and Dynamic Analysis, English Version by Esra Bennathan, Unwin, London, 1962, p. 49.



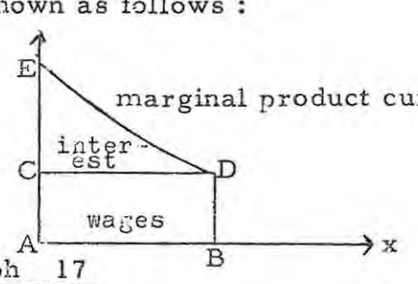
Graph 15

The macroeconomic version assumes that the quantities of labour and capital are constant. The marginal physical product $\frac{\delta x}{\delta r_i}$ is determined by the scarcities of the input factors and the rates of remuneration reflect these scarcities. The pay rates will be such that all factors will find employment if they seek it. Since, according to the law of diminishing marginal returns, the marginal contribution of a factor decreases when its quantity increases, the factor reward will also decrease with increasing factor supply, upto the point where the total factor quantity is employed. Graph 16 shows the macroeconomic relation where $\overline{e}$ is given and $\overline{w}$ is determined by the forces of the market.

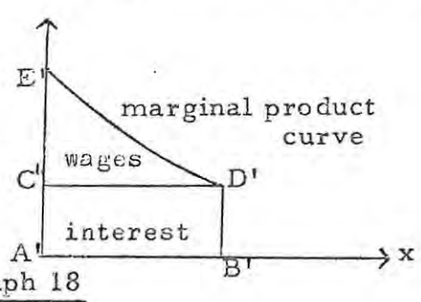


Graph 16

Since the area under the marginal product curve is equal to the total physical product, [1] the distribution of incomes can also be shown as follows : [2]



Graph 17



Graph 18

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1. Compare Paul A. Samuelson, Economics, ibid., Chapter 27, particularly p. 514.
2. J.B. Clark, The Distribution of Wealth, ibid., p. 201.

In graph 17, the distribution of incomes is shown with respect to labour, and in graph 18, with respect to capital. In either case the total product is fully exhausted through respective income payments. The rectangle ABCD (graph 17) is equal to the triangle C'D'E' (graph 18) and the triangle CDE (graph 17) is equal in size to the rectangle A'B'C'D' (graph 18). Since the analysis is based on the long-term equilibrium situation, profits are zero. The world here considered is that of a stationary economy, where nothing ever changes. This being so, there is no need for the co-operative function of the entrepreneur, who consequently cannot claim an income.

The microeconomic version of the theory has been criticised by Erich Preiser who points out that it is the relative factor scarcities, rather than the marginal contributions to the product, which determine the remuneration of productive factors.[1] As a positive contribution, Preiser only acknowledges the fact that, in equilibrium, the factors of production are remunerated in accordance with their relative scarcities.[2] This is of course correct, but the writer disagrees with Preiser's statement that the microeconomic formulation of the theory is nonsensical, because the individual entrepreneur must adjust the level of employment in accordance with the marginal productivity of the variable factor, if he wishes to exist. Hence it is true that the marginal productivity influences the size of the factor income.

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1. "Sie (die Grenzproduktivitätstheorie) behauptet : 'Jeder Produktionsfaktor wird nach seinem Grenzprodukt entlohnt'. Dieser Satz trifft die Sache nicht, worauf man ihn auch immer beziehe. Er trifft nicht die mikroökonomische Verhaltensregel. ... Denn der Unternehmer hat bei atomistischer Konkurrenz ja gar keine Wahl, den Produktionsfaktor so order so zu entlohnen, da q für ihn gegeben ist. Nur die Beschäftigung kann er variieren. ..." E. Freiser, Erkenntniswert und Grenzen ..., ibid., p. 273.

2. Consider two factors, r_1 and r_2, whose prices are q_1 and q_2. If B is an iso-cost line, then it is true that

$$(A1)\ B = r_1q_1 + r_2q_2 \quad \text{or} \quad (A2)\ r_1 = B/q_1 - (q_2/q_1)\, r_2$$

The iso-production curve can be expressed by the total differential of the production function, i.e.,

$$(B)\ dx = 0 = \frac{\delta x}{\delta r_1}\, dr_1 + \frac{\delta x}{\delta r_2}\, dr_2$$

By combining (A2) with (B), one gets in equilibrium :

$$(C)\ \frac{|q_1|}{|q_2|} = \frac{\left|\frac{\delta x}{\delta r_1}\right|}{\left|\frac{\delta x}{\delta r_2}\right|}$$

According to (C), the ratio of the absolute factor prices (i.e., the ratio of their relative scarcities)is equal in equilibrium to the ratio of the marginal productivities of the respective factors.

A more rigorous criticism can be put forward against the macroeconomic version of the theory in that the factor supply is assumed to be constant, an assumption which stands in obvious contradiction to the facts. An analysis of the supply of input factors is therefore the missing link of the marginal productivity theory of distribution.[1] The propensity to enjoy leisure and the need - determined both psychologically and sociologically - to seek work employment, are (amongst others) determinants of the supply of labour. Moreover, the willingness of entrepreneurs to take risks, influences the supply of capital in an economy. All these factors must be analysed in relation to economic development and cannot simply be taken as constant.

10.6. Marginal Productivity Theory of Distribution and Economic Power.

The microeconomic version of the marginal productivity theory of distribution makes it possible to take account of monopolistic market structures. On the selling markets, it is then not the value of the marginal physical product, but the value of the marginal revenue product, which is equated with the cost of the input factor. According to the Robinson-Amoroso formula, marginal revenue (R') can be expressed by $R' = p\left(1 - \frac{1}{E_{x,p}}\right)$ where $E_{x,p}$ stands for the price elasticity of demand (footnote 2). The value of the marginal revenue product (V) is

(79) $$V = \frac{\delta x}{\delta r_i} \cdot p \left[1 - \frac{1}{E_{x,p}}\right] \quad \text{with } E_{x,p} > 1.$$

---

1. Heinz A. Schleicher, "Kritische Bemerkungen zur Grenzproduktivitätstheorie", in : Beiträge zur Theorie der Einkommensverteilung, ibid., pp. 23-49.

2. It is

(A) $$E_{x,p} = -\frac{\frac{dx}{x}}{\frac{dp}{p}} = -\frac{dx}{dp} \cdot \frac{p}{x}$$

Since revenue are

(B) $$R_{(x)} = p(x)\, x \quad ,$$

marginal revenue can be expressed as

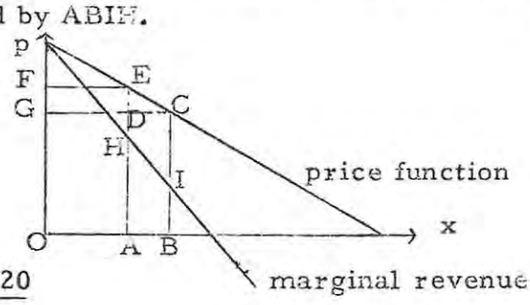
(C) $$\frac{d}{dx} R(x) = R' = x\frac{dp}{dx} + p = p\left[\frac{x}{p} \cdot \frac{dp}{dx} + 1\right]$$

(C) in (A) gives

(D) $$R' = p\left[1 - \frac{1}{E_{x,p}}\right]$$

Under monopolistic conditions therefore, the factors continue to be rewarded with their marginal products, except that the valuations are now different.

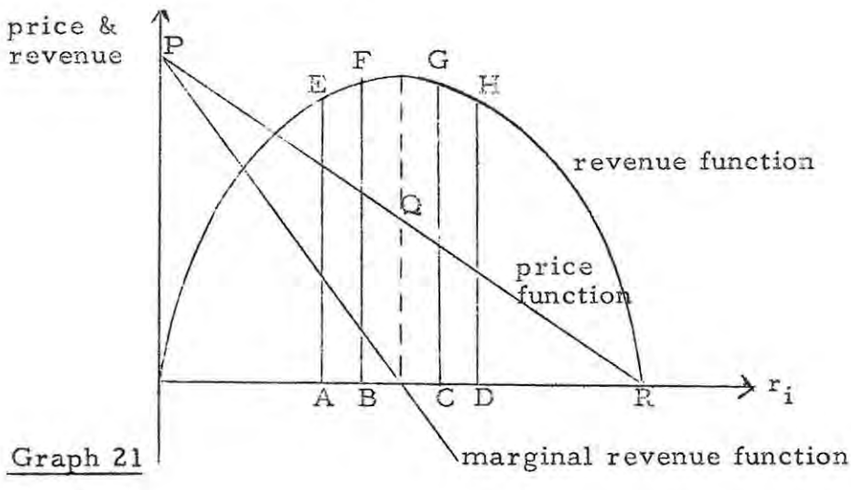
Graph 20 illustrates the situation under discussion. Consider a price (p) - quantity (x) diagram with p(x) as the monopolistic demand function and MR the corresponding marginal revenue function. Assume that through the sale of the marginal unit, x increases from A to B, and the price falls from F to G. The rectangle ABCD is the value of the marginal physical product, and [ABCD - DEFG] is the value of the marginal revenue product. This is identical with the integral under the marginal revenue curve between A and B, i.e., with the area formed by ABIH.



Graph 20

10.7 Factor Elasticity and Factor Incomes.

The question which has now to be answered is whether an increase in factor supply will increase or decrease the total income of that factor. The answer depends on the respective value of the elasticity of demand. In respect of an increase in factor supply, the total income of a factor will increase when the elasticity of demand is greater than unity, and decrease when it is smaller than unity.



Graph 21

In graph 21, q_i is the price of the variable factor, and r_i its quantity. The price function ($q_i(r_i)$) falls when r_i increases. The corresponding income function ($q_i(r_i) \cdot r_i$) is therefore a parabola. It is true that the elasticity of demand for the factor r_i is greater than unity between points P and Q on the $q_i(r_i)$ line, and smaller than unity between points Q and R. Correspondingly, when demand is elastic (i.e., greater than unity), an increase in factor quantity will result in an increase in factor income (compare an increase of r_i from A to B with the resultant increase in income from E to F). On the other hand, when demand is inelastic (i.e., smaller than unity), an increase in factor quantity will result in a drop in total income (compare an increase of r_i from C to D with the resultant drop in income from G to H).

It follows from the above that

$$(80) \quad \frac{d(q_i r_i)}{dr_i} > 0 \quad \text{if} \quad E_{r_i, q_i} = -\frac{\frac{dr_i}{r_i}}{\frac{dq_i}{q_i}} > 1$$

and

$$(81) \quad \frac{d(q_i r_i)}{dr_i} < 0 \quad \text{if} \quad E_{r_i, q_i} < 1.$$

The elasticity of demand for factor services is influenced by the law of diminishing marginal returns. The stronger the effectiveness of this law, the steeper (ceteris paribus) will be the downward slope of the factor demand curve, the lower also will be the value of the elasticity and the smaller the increase in income caused by a decrease in factor remuneration.

10.8 Elasticity of Substitution and Factor Income Shares.

The concept of the elasticity of demand for factor services is insufficient to make a statement about the distribution of incomes, because different values of the elasticity are combined with different quantities of the total product. Even if wage incomes increase, it may be that capital incomes increase at a faster rate, thus decreasing labour's relative share.

An answer to the problem under discussion can be given by using the concept of the elasticity of substitution, which was

independently developed by J. R. Hicks and J. Robinson. (Footnotes 1 and 2)

According to equation (78), the distribution D between labour L and capital C can be written as

$$(82) \qquad D = \frac{\frac{\delta Y}{\delta L}}{\frac{\delta Y}{\delta C}} \cdot \frac{L}{C}$$

If the labour/capital ratio changes, the distribution will change according to

$$(83) \qquad \frac{dD}{d\left(\frac{L}{C}\right)} = \frac{d\left[\frac{\frac{\delta Y}{\delta L}}{\frac{\delta Y}{\delta C}}\right]}{d\left[\frac{L}{C}\right]} \cdot \frac{L}{C} + \frac{\frac{\delta Y}{\delta L}}{\frac{\delta Y}{\delta C}}$$

The elasticity of substitution, $\nu_{L,C}$, which, according to Hicks, is a "measure of the ease with which the varying factor can be substituted for others", [3] can be expressed as

$$(84) \qquad \nu_{L,C} = - \frac{d\left[\frac{L}{C}\right]}{\frac{L}{C}} : \frac{d\left[\frac{\frac{\delta Y}{\delta L}}{\frac{\delta Y}{\delta C}}\right]}{\frac{\frac{\delta Y}{\delta L}}{\frac{\delta Y}{\delta C}}}$$

The elasticity of substitution, according to (84), indicates the percentage change in the ratio of labour in capital, when the ratio in the marginal productivity of labour to capital changes by a certain percentage.

Equation (84) can be re-written as

$$(85) \qquad \nu_{L,C} = - \frac{d\left(\frac{L}{C}\right)}{\frac{L}{C}} : \frac{d\left(\frac{w}{v}\right)}{\frac{w}{v}}$$

---

1. J. R. Hicks, The Theory of Wages, ibid., pp. 117, 245. Joan Robinson, The Economics of Imperfect Competition, ibid., pp. 256, 330.
2. For the analysis, compare : Wilhelm Krelle, Verteilungstheorie, ibid., pp. 63 ff.
3. J. R. Hicks, The Theory of Wages, ibid., p. 117.

which means that the elasticity of substitution measures the change in the labour/capital ratio when the wage rate/interest rate ratio changes by a certain percentage.

The value of the elasticity of substitution is nought when the input factors are completely limitational, and between nought and infinite when they are substitutable.

(85) can be changed into

$$(86) \qquad \frac{1}{\nu_{L,C}} = - \frac{\frac{L}{C} \cdot d\left(\frac{w}{v}\right)}{\frac{w}{v} \cdot d\left(\frac{L}{C}\right)}$$

since $\frac{\frac{\delta Y}{\delta L}}{\frac{\delta Y}{\delta C}} = \frac{w}{v}$, equation (86) can be combined with equation (83) which gives

$$(87) \qquad \frac{dD}{d\left(\frac{L}{C}\right)} = \frac{w}{v}\left[1 - \frac{1}{\nu_{L,C}}\right]$$

It follows that an increase in the supply of labour (relative to capital) will increase labour's share in income if the elasticity of substitution of labour for capital is greater than unity. Hence

$$(88) \qquad \frac{dD}{d\left(\frac{L}{C}\right)} > 0 \text{ if } \nu_{L,C} > 1, \text{ and } \frac{dD}{d\left(\frac{L}{C}\right)} < 0 \text{ if } \nu_{L,C} < 1$$

In the present model, technical relations determine the distribution of income. If the elasticity of substitution is nought, i.e., if a change in the factor price relation of labour to capital has no influence at all on the relative employment of labour and capital, then it is true that the factor that has become more expensive will increase its relative share in total income. If, on the other hand, the elasticity of substitution is greater than unity, a factor which becomes more expensive will experience a decrease in its share in total income. Factor income shares will be constant only when a relative increase in a factor's price causes a similar proportionate decrease in employment.

Since, in the short run, input factors of a firm can be taken to be rather limitational, a factor will be in a position to improve its relative income share through a factor price increase. In the long run, however, the degree of substitutability is likely to increase. After a firm has adjusted its plant to changes in relative input prices, the distributive effect of factor price increases may be nullified.

10.9 The Constancy of Relative Factor Shares.

In regard to the marginal productivity theory of income distribution, three factors work toward the constancy of factor shares, viz.,

i. a demand for input factors equal to 1;

ii. an elasticity of substitution equal to 1 ;,

iii. neutral technical progress.

Empirical evidence suggests that the observed constancy of relative shares, is associated with a value of the elasticity of substitution near to unity, with labour-saving technical progress [1], and consequently with an average demand elasticity smaller than unity. [2]

---

1. According to Hicks, a labour saving invention (which increases the marginal product of capital more than that of labour), will diminish labour's relative income share. Conversely, a capital saving invention (which increases the marginal product of labour more than that of capital) will improve labour's relative income share. Only neutral inventions would leave the relative income shares uneffected. *

   Robert M. Solow, in a study of the American private non-farm production function between 1909 and 1949, found that gross output doubled, with 87.5 per cent being attributable to technical change and the remaining 12.5 per cent to increased use of capital . **

   Recently, a classification of technical progresses has been put forward which is not linked with distributive shares. ***

   * J.R. Hicks, The Theory of Wages, ibid., pp. 121, 2.

   ** Robert M. Solow, "Technical Change and the Aggregate Production Function", The Review of Economics and Statistics, Vol. XXXIX, 1957, pp. 312-320, here p. 320.

   *** Alfred E. Ott, "Technischer Fortschritt", Handwörterbuch der Sozialwissenschaften, Band 10, pp. 302-316.

2. Compare K.W. Rothschild, "Der Lohnanteil am Gesamteinkommen", Weltwirtschaftliches Archiv, Band 78, 1957, pp. 157-200.

11. The Cobb-Douglas Production Function.

A neo-classical production function which allows empirical testing is the Cobb-Douglas production function. This function, the mathematical form of which was developed by Charles W. Cobb in 1927 [1], and which was first published in 1928 jointly by Cobb and Paul H. Douglas, [2] is of the form

(89) $x = aL^{\alpha}C^{\beta}$ $\quad 0<\alpha, \beta<1$, where

(90a) $x = f(L, C)$ and

(90b) $\lambda x = x(\lambda L, \lambda C)$.

Notations : x = physical output;
L = index of labour;
C = index of capital;
a, α, β = constants.

Equation (89) can be written in logarithms as

(91) $\log x = \log a + \alpha \log L + \beta \log C$.

It can be seen that the general form of the function is linear in logarithms.

11.1 Properties of the Cobb-Douglas Function. [3]

11.1.1 The Influence of the Elasticity of Output on the Shares in Income

The two exponents of the Cobb-Douglas production function, α and β, represent the elasticities of output with respect to labour and capital, respectively. The elasticity of output is defined as the percentage increase in physical output caused by a 1 per cent increase in physical input. To take

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1. On the history of the Cobb-Douglas function, compare : H. Douglas, The Theory of Wages, ibid., p. 132.
2. Charles W. Cobb and Paul H. Douglas, "A Theory of Production", American Economic Review, Vol. 18, 1928, Supplement, pp. 139-165.
3. Wilhelm Krelle, Preistheorie, ibid., pp. 64 ff.
Wilhelm Krelle, Produktionstheorie, ibid., pp. 142 ff and 156 ff.
Wilhelm Krelle, Verteilungstheorie, ibid., p. 65 ff.
Jacob Marschak and William H. Andrews, Jr., "Random Simultaneous Equations and the Theory of Production", Econometrica, Vol. 12, 1944, pp. 143-205.

labour as an example, it is :-

(92) $$E_{x,L} = \frac{\frac{\delta x}{x}}{\frac{\delta L}{L}}$$

$E_{x,L}$ is the elasticity of output with respect to labour.

The proof for the hypothesis is obtained by differentiating equation (89) with respect to labour (L) :-

(93) $$\frac{\delta x}{\delta L} = a \alpha L^{\alpha-1} C^{\beta} = \alpha \frac{a L^{\alpha} C^{\beta}}{L} = \alpha \frac{x}{L}$$

Dividing by $\frac{x}{L}$ gives

(94) $$\alpha = \frac{\delta x}{\delta L} \cdot \frac{L}{x}, \quad \text{q. e. d.}$$

For capital it is similarly

(95) $$\beta = \frac{\delta x}{\delta C} \cdot \frac{C}{x}$$

The elasticity of output with respect to the scale of operation, $E_{x,\lambda}$ can now be computed as the sum of the two exponents of the Cobb-Douglas production function. It is

(96) $$E_{x,\lambda} = \frac{dx}{d\lambda} \cdot \frac{\lambda}{x} = \alpha + \beta \quad \text{(Footnote 1)}$$

$E_{x,\lambda}$ indicates the percentage increase in production when all factors are increased by a certain percentage λ . Increasing, constant, or decreasing returns to scale are found according to whether $E_{x,\lambda} \gtreqless 1$.

Most empirical tests of the function found that the sum of the two exponents, i.e., $\alpha + \beta$, is equal to unity of nearly so. Equality with unity would indicate that the function is homogeneous of the first degree, i.e., a proportionate increase in all input factors would increase the total output by the same proportion.

At the same time, the two exponents indicate the relations according to which the different factors of production contribute to the total product. Douglas defines the term 'contribution' in this sense as "the amount added to the product by the last unit of a factor multiplied by the number of units of that factor". [2]

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1. Compare Jacob Marschak and William H. Andrews, Jr., Random Simultaneous Equations ..., ibid., pp. 152 & 182 ff.
2. Paul H. Douglas, The Theory of Wages, ibid., p. 145.

According to (94) and (95) and on the assumption that the factors are paid according to their marginal contributions, it is true that

(97a) $\frac{\delta x}{\delta L} L = \alpha x$ and (97b) $\frac{\delta x}{\delta C} C = \beta x.$

This shows the close relation between the Cobb-Douglas function and the marginal productivity theory of income distribution : The share of each factor in total income (αx and βx) is equal to the marginal productivity of that factor, multiplied by the factor quantity.

Since the two exponents, α and β , are equal to the respective elasticities of output, it can be concluded that technical, objective relationships determine the relative shares commanded by different factors of production.

11.1.2 The Influence of the Elasticity of Demand on Shares in Income.

The Cobb-Douglas production function is linked with the elasticity of demand for factor input. To take labour as an example,

(98) $E_{w,L} = - \frac{\delta L}{\delta w} \cdot \frac{w}{L}$

expresses the elasticity of demand for labour ($E_{w,1}$) as the ratio of a relative change in demand for labour, caused by a certain relative change in the wage rate.

According to (93), it is true that

(103) $\frac{\delta x}{\delta L} = a \alpha L^{\alpha-1} C^{\beta}$

which is equivalent to

(104) $\frac{\delta x}{\delta L} \bar{p} = w = \bar{p} a \alpha L^{\alpha-1} c^{\beta}.$

Differentiating (104) with respect to L gives

(105) $\frac{\delta w}{\delta L} = (\alpha - 1) \bar{p} a \alpha L^{\alpha-2} C^{\beta}.$

By combining (98) with (104) and (105), it follows that

(106) $E_{w,L} = - \frac{\delta L}{\delta w} \cdot \frac{w}{L} = - \frac{1}{(\alpha-1)\bar{p}a\alpha L^{\alpha-2} C^{\beta}} \cdot \frac{\bar{p} a \alpha L^{\alpha-1} C^{\beta}}{L}$

$= - \frac{1}{\alpha - 1} = \frac{1}{1 - \alpha}$

or

(107a) $\alpha = 1 - \frac{1}{E_{w,L}}$ and similarly (107b) $\beta = 1 - \frac{1}{E_{v,C}}$

Cobb and Douglas, in their study of the American manufacturing industry between 1899 and 1920, estimated that the coefficients α and β of their production function were 3/4 and 1/4, respectively. They correspondingly found that the elasticity of demand for labour was -4, and for capital, - 1.33 (see equations (107a) and (107b)). Douglas concluded : "This would mean that an increase of 1 per cent in wages would ... result in a decrease of 4 per cent in the quantity of labor demanded, and an increase of 1 per cent in the rate of interest would ... result in a decrease of 1.33 per cent in the quantity of capital demanded while decreases of 1 per cent in the respective rates of return would result in corresponding increases of 4.0 and 1.33 percents in the quantities of labour and capital demanded." [1]

11.1.3 Elasticity of Substitution and the Distribution of Incomes.

For a Cobb-Douglas production function, the elasticity of substitution is equal to unity. This means that if the ratio in the wage rate to the interest rate is changed by a certain percentage, the employment of labour relative to capital will change in the same relation. (Footnotes 2 and 3) From this Krelle concludes that the distribution of income is unlikely to change in the short run : "Die Verteilung ist (d. h., bei der Cobb-Douglas Produktionsfunction) unabhängig von Veränderungen des Verhältnisses der eingesetzten Arbeits- und Kapitalmengen. Sie wird ... ausschliesslich durch die Potenzexponenten ... bestimmt, die aber ... nur ein anderer Ausdruck für die Lohn- bzw. Zinselastizität der Nachfrage nach Arbeit bzw. nach Kapital sind. Nimmt man an, dass diese Elastizitäten sich jedenfalls kurzfristig nur wenig ändern, so ist von dieser Theorie aus eine ziemliche Stabilität der Verteilung zu erwarten, ganz wie sie statistisch bisher in Erscheinung getreten ist." [4]

(Footnotes See page 159)

Footnotes referring to page 158

1. Paul H. Douglas, The Theory of Wages, ibid., p. 152.
2. Proof : - The partial differentiation of the Cobb-Douglas function results in :

$$\frac{\delta x}{\delta L} \Big/ \frac{\delta x}{\delta c} = \frac{a\alpha L^{\alpha-1} C^{\beta}}{a\beta L^{\alpha} C^{\beta-1}} = \frac{\alpha}{\beta} \cdot \frac{C}{L}, \quad \text{and}$$

$$\frac{d\left(\frac{\delta x}{\delta L} \Big/ \frac{\delta x}{\delta C}\right)}{d(L/C)} = -\frac{\alpha}{\beta} \frac{C^2}{L^2}$$

according to (85),

$$\nu_L = - \frac{d\left(\frac{L}{C}\right) \quad \frac{\frac{\delta x}{\delta L}}{\frac{\delta x}{\delta C}}}{\frac{L}{C} \cdot d\left[\frac{\frac{\delta x}{\delta L}}{\frac{\delta x}{\delta C}}\right]} =$$

$$-\left(-\frac{\beta}{\alpha} \cdot \frac{L^2}{C^2} \cdot \frac{C}{L} \cdot \frac{\alpha}{\beta} \cdot \frac{C}{L}\right) = +1$$

3. The concept of the elasticity of substitution must clearly be distinguished from the concept of the elasticity of demand. The former measures the relative change in the price of one factor in terms of the price of another factor, whereas the latter measures changes with respect to the price level of one and the same factor.
4. Wilhelm Krelle, Verteilungstheorie, ibid., pp. 65, 66.

11.2 Econometrical Studies Undertaken with the Cobb-Douglas Production Function.

The beginnings of the Cobb-Douglas function were laid by Douglas who found that, when he computed the indices of labour, capital, and physical output on a logarithmic scale, the product curve lay regularly between the two curves for the factors of production and "tended to be approximately a quarter of the relative distance between the curve of the index for labour, which showed the least increase over the period, and that of the index of capital which showed the most". [1]

In the beginning, Cobb and Douglas tested the formula under the assumption of constant returns to scale with $1 = \alpha + \beta$, but following a proposal by David Durand[2], Douglas abandoned this restriction and henceforth determined α and β independently, so as to allow for decreasing and increasing returns, respectively. The work had reached a preliminary climax when Douglas reported in his Presidential Address to the American Economic Association in 1948 that "... over the last two decades, we have had the assistance of a devoted and ... competent group of associates, and in the aggregate many tens of thousand of hours (!) have been spent upon the work." [3]

Tests of the functions were undertaken as (i) time series studies; (ii) cross section studies and (iii) studies of plant averages.[4] The first function to be tested was a time series of the American manufacturing industry for the years 1899 to 1922, for which Douglas reports the solution

$$P = 1.01\ L^{3/4}\ C^{1/4}\ .$$ (Footnote 5)

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1. Paul H. Douglas, "Are There Laws of Production?" The American Economic Review, Vol. XXXVIII, March 1948, No. 1, pp. 1-41, here p. 6.
2. David Durand, "Some Thoughts on Marginal Productivity, With Special Reference to Professor Douglas' Analysis," The Journal of Political Economy, Vol. XLV, 1937, 740-758, here p. 748 ff.
3. P.H. Douglas, Are There Laws ..., ibid., p. 10.
4. These, however, mostly suffered from the lack of suitable data. See P.H. Douglas, Are There Laws ..., ibid., p. 22.
5. P.H. Douglas, The Theory of Wages, ibid., p. 133.

As an index of labour, Douglas computed the number of wage earners and clerical workers employed by industry. The index of capital comprised the value of buildings, plant, and equipment, expressed in constant prices of the year 1880 and based on data of plant valuations.[1]

The testability of the suggested production function led many economists, in particular during the thirties and forties, to calculate the parameters for different years and different countries. Table 9 summarizes the major results. (Table 9 See page 162).

Criticism against the Cobb-Douglas production function takes many forms. The major points are :-

(i) definitions of output and capital are different in different countries, thus inhibiting international comparisons;

(ii) it is difficult to adjust the index of capital for its relative intensity of use, and the index of employment for differing labour productivities ;

(iii) a material point of criticism has been put forward by Horst Mendershausen, who suggests that the time series constitute a "nearly perfectly multicollinear set".[2] In other words, two or more of the independent variables may be so highly correlated that their separate effects upon the independent variables cannot be distinguished.

Douglas replied that he found in three cross-section studies the values of α and β to be many times their respective standard errors.[3]

(iv) It is also evident that the Cobb-Douglas function produces different results, dependent upon the variable whose squared deviation is minimized, because the plane is unstable in the sense that most points of observation will be clustered around a straight line.

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1. ibid., pp. 113-127.
2. Horst Mendershausen, "On the Significance of Professor Douglas' Production Function", Econometrica, Vol. 6, 1938, pp. 143-53, here pp. 144 and 147.
3. P.H. Douglas, Are There Laws ..., ibid., p. 11. Compare also : P.H. Douglas and M. Bronfenbrenner, "Cross Section Studies in the Cobb-Douglas Function", Journal of Political Economy, Vol. 47, 1939, p. 761 ff.

Table 9 Empirical Parameters of the Cobb-Douglas Production Function.

Reference	Country	Type of study	Date	α	β	$\alpha + \beta$	w
1)	USA	T	1899-1922	0.75	a)	a)	.
2)	USA	C	1919	0.76	0.25	1.01	0.60 b)
3)	Canada	C	1937	0.43	0.58	1.01	0.52 b)
4)	New Zealand	T	1915-1935	0.483	a)	a)	.
5)	Australia	C	1922-1923	0.61	0.46	1.07	0.54 c)
6)	Australia	C	1936-1937	0.50	0.50	1.00	0.51 c)
7)	South Africa	C d)	1937-1938	0.66	0.32	0.98	
8)	South Africa	C e)	1937-1938	0.65	0.37	1.02	

Abbreviations, sources and symbols :

T = intertemporal study, based on time series;

C = cross-section (interindustrial) studies;

a) values are not independently calculated;

b) output includes depreciation, therefore the low value for w.

c) average per plant, unweighted;

d) based on 17 principal groups of manufacturing industry;

e) based on a more minute classification of industries;

w = share of wages in income, expressed in percentages.

References :

1. Charles W. Cobb and Paul H. Douglas, "A Theory of Production", American Economic Review, Vol. 18, Supplement, March 1928, pp. 139-65.
2. Paul H. Douglas and Grace T. Gunn, "The Production Function for American Manufacturing in 1919", American Economic Review, Vol. 31, March 1941, pp. 67-80.
3. Paul H. Douglas and Patricia Daly, "The Production Function for Canadian Manufactures", Journal of the American Statistical Association, Vol. 39, June 1943, pp. 178-186.
4. Colin Clark, The Conditions of Economic Progress, Macmillan, London, 1940, pp. 504 ff.

5&6. Paul H. Douglas with Grace T. Gunn, "The Production Function for Australian Manufacturing", Quarterly Journal of Economics, Vol. 56, November 1941, pp. 108-129.

7&8. G.W.G. Browne, "The Production Function for South African Manufacturing Industry", The South African Journal of Economics, Vol. 11, December 1943, No. 4, pp. 258-268.

A Survey of more recent research work in this field is given by Wilhelm Krelle, Produktionstheorie, ibid., pp. 156-9.

In spite of evident statistical shortcomings, it has been found that the Cobb-Douglas theory fits most cases, and in particular, that the income shares of labour and capital correspond rather well with the exponents α and β. For the years 1909 to 1918, Douglas computed the exponent for the American manufacturing industry. He found that the value of the exponent α was 0.75, against labour's share of 0.741 in the net value of manufacturing.[1] This agreement between α and W/Y is surprising for two reasons :-

(i) it is difficult to explain why the laws of distribution which are formulated for the ideal world of perfect competition should also be applicable under conditions of oligopolistic and monopolistic pricing ;

(ii) moreover, the marginal productivity theory of distribution is formulated for a stationary, non-growing economy. This makes the explanation of dynamic windfall profits difficult.

In reply to these reservations, Douglas suggested that quasi-monopolies and oligopolies "may have shared with their workers the excess gains which they have made at the expense of the consumers."[2] This is a very far-reaching assertion though, implying as it does that the strength of the labour market power changed during different periods of the business cycle in the same relation as the market power of firms. It means that in good business periods, firms improve their market power vis-à-vis the consumers and the workers theirs vis-à-vis the entrepreneurs, and vice versa in bad business periods.

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1. P.H. Douglas, Are there Laws ..., ibid., p. 7.
2. ibid., p. 38.

11.2.1 G.W.G. Browne's Study of the South African Production Function.

In 1943, G.W.G. Browne, then a member of the Social and Economic Planning Council, submitted an interesting study on the Cobb-Douglas function in South Africa.[1]

Browne based his calculations on the 21st Industrial Census (U.G. 21-1941) for the year 1937-8. In this Census,

P = the gross value of the output of each of the industries concerned, less the cost of the materials, fuel, light and power employed;

L = the average number of employees, including working proprietors, managers, accountants, salaried staff, wage-earners, and persons regularly employed in their homes, employed in each industry during the year ;

C = the value of land and buildings, machinery, plant and tools (i.e., fixed capital) employed.

Browne estimated the parameters of the function

$$P = bL^{k}C^{j}$$

by using a multiple correlation analysis, and minimizing in the P direction. For seventeen principal industrial groups, Browne found in a cross-section calculation that the values of the parameters of the function were :-

$k = 0.66$

$j = 0.32$

$a = 1.736$ $\quad (a = \log b)$

Browne also estimated the function

$$P = bE^{m}N^{n}C^{j} ,$$

where E = average number of European employees and

N = the average number of Non-European employees.

For the same data as before, Browne found the parameters

$m = 0.41$

$n = 0.27$

$j = 0.30$

$a = 2.025$ (Footnote 2)

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1. G.W.G. Browne, The Production Function, ibid.
2. G.W.G. Browne, The Production Function ..., ibid., p. 260.

Considering separately Europeans and Non-Europeans, Browne submits results also for 85 private manufacturing industries, 23 government and local government undertakings, and for the two groups combined. Table 10 shows the respective results :

Table 10 Parameters of the Cobb-Douglas Function, Browne Estimates

		m	n	j	a
1.	85 private man. industries	0.45	0.20	0.37	1.742
2.	23 gov. and local gov. "	0.65	0.16	0.22	2.017
3.	1. and 2. combined	0.50	0.25	0.29	1.872

For 85 private manufacturing industries, Browne observed that the share of wages in the value of net output did not agree with the exponents m and n of the production function :

	European Labour	Non-European labour
share of wages in net value added	0.297	0.163
exponents of the Cobb-Douglas Function	0.45	0.20 (Footnote 1)

Browne commented on this discrepancy by suggesting that "It is difficult to believe that the marginal product of European labour can be so much greater than what it actually receives, and the results derived above must therefore be regarded with suspicion". [2] Two commentators on Browne's article, Paul H. Douglas and Clark Kerr, suggested however different interpretations. To them the particular social organization of South Africa seems responsible for the finding : "While Professor Browne does not draw such a conclusion", Douglas writes, "perhaps this is the case where a highly monopolized set of industries which are largely run by foreign employers or by men whose cultural interests are elsewhere, do not give to the

1. G.W.G. Browne, The Production Function ..., ibid., pp. 261 and 267.
2. ibid., p. 268.

labourers that which in a competitive society they would obtain". [1] Clark Kerr relates this finding to what he calls a "class-share-determined-by-the-actions-of-capitalists approach to income distribution". He believes that this theory is representative where "one or very few large employers have effective control", as is the case in certain banana and oil countries, "or in the Belgian Congo or South Africa" .... "In all these instances there is substantial independence of action for the 'capitalists' in both the product and the labor markets, and thus quite a degree of 'free will' in what they do ". [2]

The writer regards neither of these arguments as valid.

Firstly, it is wrong to assert that "foreign employers or men whose cultural interests are elsewhere", are responsible for the running of the South African economy. Following a proposal by René Maunier, one can classify colonies into habitable colonies "whose temperate sky is favourable to a European population", and colonies for exploitation, "usually situated in the tropics, where the climate does not permit permanent European settlement." [3] South Africa has clearly to be classified under the first category, constituting one of the enduring examples of White settler societies in the British/ Dutch colonial world. [4] Whites have been in South Africa just as long as there have been immigrants in the United States of America. The assertion therefore, that the cultural interests of employers are elsewhere, must be regarded as absurd.

Secondly, it is simply not true that "one or very few large employers had effective control" in the South African manufacturing sector during the year 1937-38. [5] The 21st Industrial

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1. Paul H. Douglas, Are There Laws ..., ibid., p. 40
2. Clark Kerr, Labor's Income Share and the Labor Movement, in : George W. Taylor and Frank C. Pierson, New Concepts in Wage Determination, New York, Toronto, London, 1957, p. 263.
3. René Maunier, The Sociology of Colonies, An Introduction to the Study of Race Contact, Edited and Translated by E.O. Lorimer, Volume I, Routledge & Kegan Paul, London, 1949, p. 8.
4. Compare Leo Kuper, "Political Change in White Settler Societies : The Possibility of Peaceful Democratization", in: Pluralism in Africa, Ed. by Leo Kuper and M.G. Smith, University of California Press, Berkeley and Los Angeles, 1969, pp. 169-193.
5. Kerr's statement makes one assume that he might have had South Africa's gold mines in mind.

Census gives the number of working proprietors for 17 divisions of private industry as 7,606.[1] To this must be added a certain number of managers whose number is, however, not separately known.[2] Moreover, one wonders what sort of evidence Douglas had when he assumed that there exists in South Africa "a highly monopolized set of industries." The writer believes that it is very likely for monopsonistic elements to be prevalent on the market for Bantu labour. But whether and to what extent, monopolistic elements are existent on the sales markets, is a question which requires investigation, and cannot be answered a priori.

Another issue, however, seems to be of still greater importance. As found earlier, the exponent of the Cobb-Douglas function for Europeans was 0.45, as compared with their share of wages in net output of 0.297. By relating these two figures one finds that the exponent of the Cobb-Douglas function is 1.52 times higher than the respective share in net output. In contrast, the exponent of the Cobb-Douglas function for Non-Europeans is only 1.23 times higher than their share in income (0.20 against 0.163).[3] At a first glance this might appear to be an extraordinary result, since the bargaining power between the two groups rests principally with Europeans (trade unionism), which leads one to assume that the wage share of Europeans should be more in line with their marginal contribution, compared with Non-Europeans.

Assume, however, that the marginal productivity theory of distribution is valid. It is also known that the income differential between skilled workers (i.e., mainly Whites)

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1. U.G. 21-1941, Table 11, p. 35. Of this number, 7105 persons were Europenas.
2. The combined number of "managers, accountants, and salaried staff" for 17 industrial groups was 19,464 persons.
3. Compare p. 165 above.

and unskilled workers (i.e., mainly Bantu) in South Africa is already among the largest in the world.[1] Yet this income differential is still narrower than it would have been if the two race groups had been paid in accordance with their relative marginal contributions. Relative to the labour supply elasticities, therefore, the Whites are under-, and the Non-Europeans overpaid. Under conditions of perfect competition, the present wide wage differentials would consequently display even wider disparities.

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1. Report No. 282 of the Board of Trade and Industries gives the following results of its enquiry into the wage rates of skilled and unskilled workers in South Africa and various countries overseas :

Unskilled Wage as Percentage of Skilled Wage, 1938 :-

South Africa	16.7
Canada	52.9
Australia	75.4
New Zealand	81.3
Great Britain	66.0
Germany	79.0
Italy	68.4
France (Paris)	75.6
Sweden	82.0

Board of Trade and Industries, Report No. 282, ibid., Ann. F, p. 156.

11.2.2 Further Calculations of the South African Manufacturing Production Function

In an attempt to throw more light on the question under discussion, the following two programmes were used for the estimation of the South African production functions, viz.,

Programme No.	Function
1	$\log P = \log z + l \log L + k \log K$
2	$\log P = \log z + e \log E + b \log B + a \log A + c \log C + k \log K$

where

P = gross value of output of each of the industries concerned, less the costs of the materials, fuel, light, and power employed;
z = constant factor;
L = average number of employees;
l = marginal contribution to P by L;
E = total European labour force;
e = marginal contribution to P by E;
B = total Bantu labour force;
b = marginal contribution to P by B;
A = total Asiatic labour force;
a = marginal contribution to P by A;
C = total Coloured labour force;
c = marginal contribution to P by C;
K = value of capital, i.e., value of land and buildings plus value of machinery, plant, and tools;
k = marginal contribution to P by K.

For the years 1918-19 to 1960-61, the calculations covered the following 19 industry divisions :-

1 = Food
2 = Beverages
3 = Tobacco
4 = Textiles
5 = Wearing apparel, etc.
6 = Wood and wood products
7 = Furniture
8 = Paper and paper products
9 = Printing and publishing, etc.
10 = Leather and leather products
11 = Rubber products
12 = Chemicals and chemical products
13 = Products of petroleum and coal
14 = Non-metallic mineral products
15 = Basic metal industries
16 = Metal products
17 = Machinery
18 = Electrical machinery
19 = Transport equipment.

For the 1961-62 and 1963-64 censuses, the 13th industry division (products of petroleum and coal) was no longer tabulated separately. For these two years, therefore, only 18 industry divisions were used.

The functions were minimized in the log P direction (least square estimates), and the unknown parameters z, l, k (Programme 1), and z, e, b, a, c, k (Programme 2), were determined by means of a cross section calculation for the 19 industry divisions listed above (18 industry divisions in respect of the years 1961-62 and 1963-64).

Programme 1 required the solution of a 3-column, and programme 2 of a 6-column matrix. The solution was found by applying Cramer's rule.

After extensive calculations it was found that the results obtained with programme 2 were rather unsuccessful. Firstly, the parameters of some factors frequently fluctuated in a random manner, when compared over a number of consecutive years. Secondly, negative marginal products occurred from time to time, particularly in respect of the value of the marginal contribution rendered by Coloureds and Asiatics, who constitute only relatively small portions of the total labour force.[1] It appears that the problem of multicollinearity becomes insurmountable once the number of variables exceeds 3. For these reasons, only the results obtained from the use of programme 1 will be considered.[2]

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1. P.E. van der Dussen, who recently submitted extensive research results about the production functions for the South African manufacturing industries, reports about exactly the same difficulties.
   P.E. van der Dussen, Estimation of Production Functions for South African Manufacturing Industries, 1945-1963, Drukkeriy Bronder-Offset N.V., Rotterdam, 1970, p. 158.
2. Sources :
   1918-19 to 1943-44 : Union Statistics for Fifty Years, ibid., L-6 to L-19. All currency values were transferred from Pound to Rand.
   1944-45 to 1960-61 : Statistical Year Book, 1964, ibid., M-16 to M-25.
   1961-62 & 1963-64 : South African Statistics, 1968, M-9 to M-19.
   Capital consists of the value of land, buildings, and machinery. In order to take overheads into account (which are included in net output but which do not constitute portion of the value added), 15 per cent of net output were deducted for the years 1918-19 through 1954-55, and 20 per cent for later years. These values are recommended by Prof. J.J. Stadler, in a letter to the writer, Pretoria, dated 10th November, 1970.

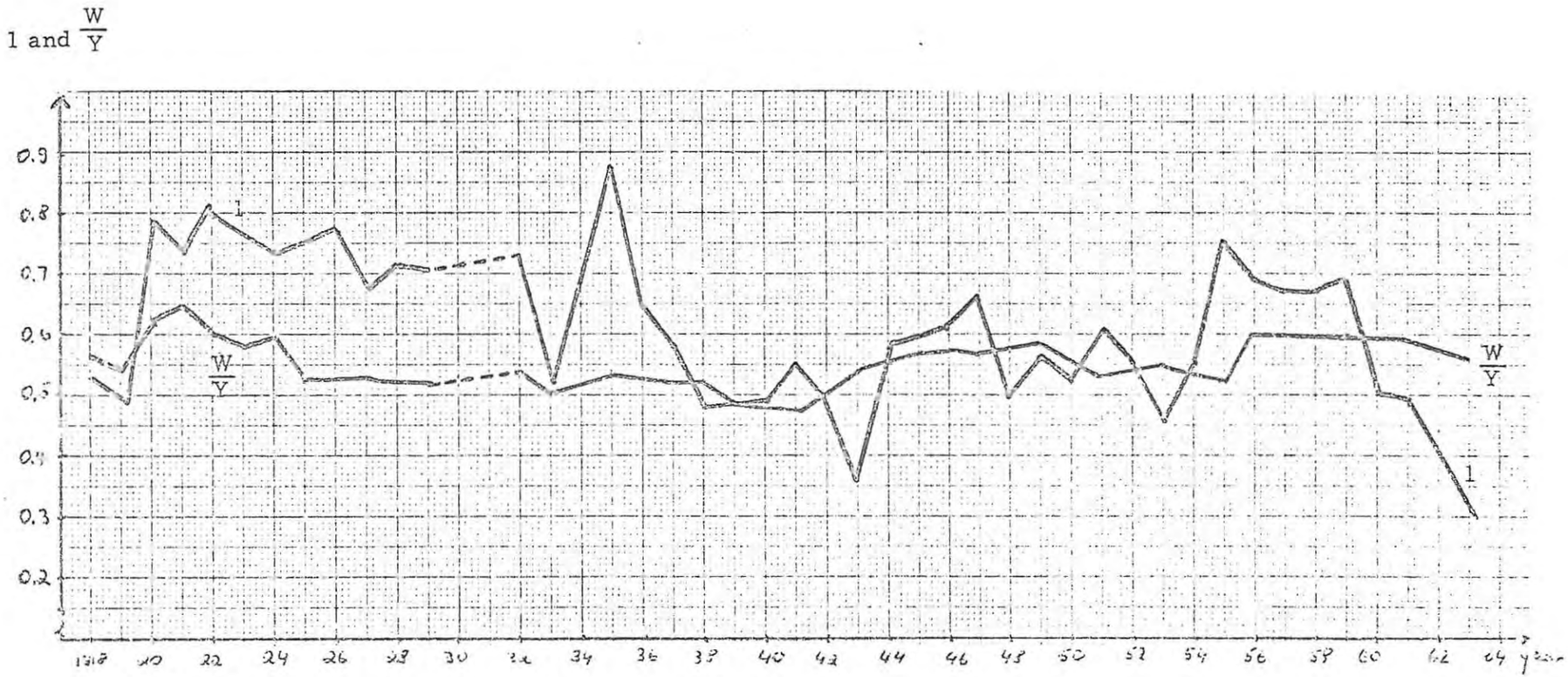
Table 11 Calculation of the Cobb-Douglas Production Function, South African Manufacturing Industries, 1918-19 to 1963-64, and Comparison with Actual Income Shares.

Year	z	l	k	(l+k)	W/Y	(1-W/Y)
1918-19	2.292	0.526	0.379	0.905	0.562	-0.036
1919-20	2.300	0.495	0.428	0.923	0.546	-0.051
1920-21	2.280	0.775	0.118	0.893	0.626	+0.149
1921-22	2.280	0.735	0.149	0.884	0.645	+0.090
1922-23	2.277	0.798	0.078	0.876	0.602	+0.196
1923-24	2.284	0.767	0.113	0.880	0.581	+0.186
1924-25	2.291	0.734	0.153	0.887	0.593	+0.141
1925-26	2.296	0.747	0.134	0.881	0.526	+0.221
1926-27	2.297	0.772	0.112	0.884	0.525	+0.247
1927-28	2.294	0.675	0.227	0.902	0.526	+0.149
1928-29	2.293	0.712	0.194	0.906	0.522	+0.190
1929-30	2.289	0.703	0.203	0.906	0.518	+0.185
1932-33	2.292	0.730	0.175	0.905	0.537	+0.193
1933-34	2.302	0.523	0.392	0.915	0.512	+0.011
1934-35	2.298	0.689	0.218	0.907	0.527	+0.162
1935-36	2.291	0.874	0.020	0.894	0.532	+0.342
1936-37	2.296	0.644	0.286	0.930	0.528	+0.116
1937-38	2.298	0.587	0.356	0.943	0.520	+0.067
1938-39	2.302	0.484	0.472	0.956	0.522	-0.038
1939-40	2.303	0.498	0.458	0.956	0.511	-0.013
1940-41	2.305	0.491	0.473	0.964	0.491	0.000
1941-42	2.302	0.553	0.413	0.966	0.479	+0.074
1942-43	2.307	0.492	0.489	0.981	0.507	-0.015
1943-44	2.300	0.366	0.647	1.013	0.542	-0.176
1944-45	2.210	0.580	0.403	0.983	0.557	+0.023
1945-46	2.308	0.597	0.391	0.988	0.575	+0.022
1946-47	2.310	0.615	0.376	0.991	0.577	+0.038
1947-48	2.314	0.664	0.320	0.985	0.570	+0.094
1948-49	2.309	0.492	0.508	0.999	0.573	-0.081
1949-50	2.309	0.566	0.431	0.998	0.582	-0.016
1950-51	2.312	0.533	0.468	1.001	0.563	-0.030
1951-52	2.311	0.613	0.386	0.999	0.535	+0.078
1952-53	2.309	0.551	0.456	1.007	0.551	0.000
1953-54	2.306	0.456	0.556	1.012	0.554	-0.098
1954-55	2.307	0.562	0.453	1.015	0.542	+0.020
1955-56	2.307	0.752	0.262	1.014	0.528	+0.224
1956-57	2.307	0.698	0.307	1.005	0.602	+0.096
1957-58	2.307	0.679	0.326	1.005	0.605	+0.074
1958-59	2.307	0.683	0.328	1.010	0.602	+0.081
1959-60	2.312	0.698	0.313	1.012	0.609	+0.089
1960-61	2.310	0.506	0.498	1.004	0.596	-0.090
1961-62	2.260	0.497	0.500	0.997	0.594	-0.097
1963-64	2.246	0.316	0.563	0.879	0.568	-0.252

1. The actual income share (W/Y) refers to the relation of total salaries and wages to total net output, after provision for overheads.
Sources : 1918-19 through 1943-44 : Union Statistics for Fifty Years, ibid., L-3.
later years : Statistical Year Book, 1964, ibid., M-7.

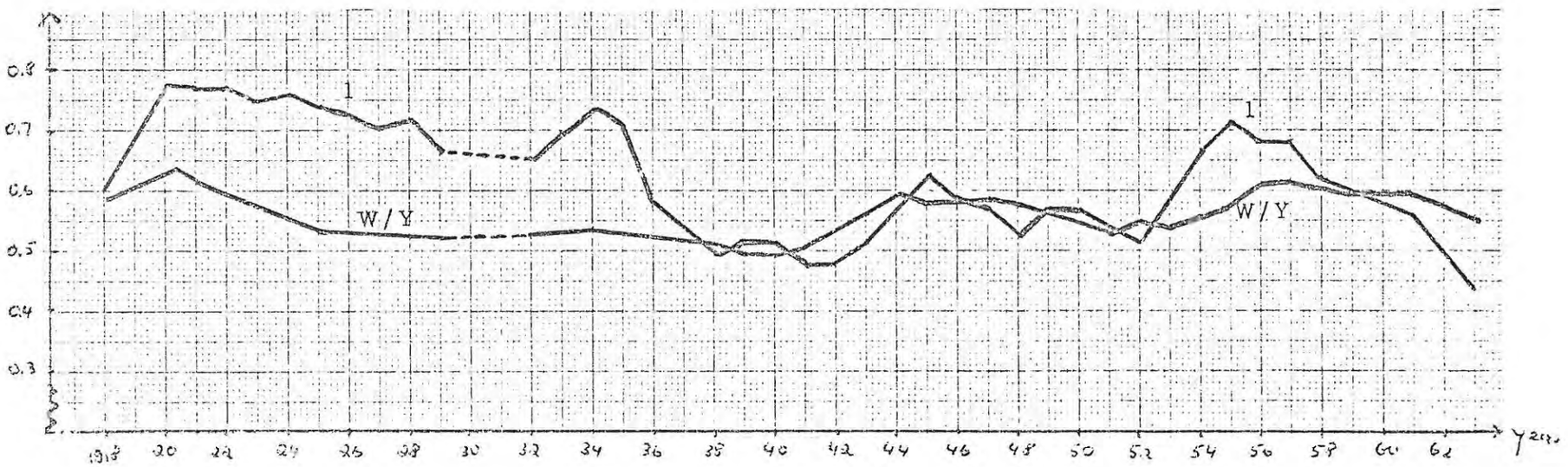
Table 12 South African Manufacturing Industries, 1919 / 1920 to 1961 / 62, Marginal Contribution of Labour (1) and Wage Share ($\frac{W}{Y}$), Three Years sliding Averages.

YEAR	1	W/Y
1919/20	0.599	0.578
1920/21	0.668	0.606
1921/22	0.769	0.624
1922/23	0.767	0.609
1923/24	0.766	0.592
1924/25	0.749	0.567
1925/26	0.751	0.548
1926/27	0.731	0.526
1927/28	0.720	0.524
1928/29	0.697	0.522
1929/30	0.715	0.526
1932/22	0.652	0.522
1933/34	0.647	0.525
1934/35	0.695	0.524
1935/36	0.736	0.529
1936/37	0.702	0.527
1937/38	0.572	0.523
1938/39	0.523	0.518
1939/40	0.491	0.508
1940/41	0.514	0.494
1941/42	0.512	0.492
1942/43	0.470	0.509
1943/44	0.479	0.535
1944/45	0.514	0.558
1945/46	0.597	0.570
1946/47	0.625	0.574
1947/48	0.590	0.573
1948/49	0.574	0.575
1949/50	0.530	0.573
1950/51	0.571	0.560
1951/52	0.566	0.550
1952/53	0.540	0.547
1953/54	0.523	0.549
1954/55	0.590	0.541
1955/56	0.671	0.557
1956/57	0.710	0.578
1957/58	0.687	0.603
1958/59	0.687	0.605
1959/60	0.629	0.602
1960/61	0.567	0.600
1961/62	0.440	0.586



Graph 22 : Marginal Contribution of Labour (1) and
Share of Labour in Net Output (Overheads excluded), (W/Y)
S.A. Manufacturing Industries.

1 and $\frac{W}{Y}$



Graph 23 : Three-Year Sliding Averages :
Marginal Contribution of Labour (1) and
Share of Labour in Net Output (Overheads excluded), (W/Y)
S. A. Manufacturing Industries.

Table 11 lists the relevant parameters of the Cobb-Douglas function, and the share of wages in income for the years 1918-19 to 1963-64. The value of z is a constant, and the values of l and k indicate the relative marginal contributions of labour and capital, respectively. According to the marginal productivity theory, l and k are the prediction values of the Cobb-Douglas function, i.e., they are relative factor rewards which correspond to the assumptions of the marginal productivity theory.

The actual wage share W/Y indicates the sum of wages and salaries in relation to the net value added (after deduction of overheads). During two years, viz., 1940-41 and 1952-53, the predicted value of the wage share is identical with the actual share.

An inspection of Graph 22 reveals that the predicted wage share (l) exhibits greater fluctuations than the actual wage share (W/Y). Nevertheless, it is obvious that a certain measure of congruence exists in between the two graphs. The three major peaks of the l-line, which occurred during the periods 1919-20 to 1927-28, 1933-34 to 1937-38, and 1955-56 to 1960-61, are clearly reflected in the behaviour of the W/Y line.

In order to gain a more long-term view of the relation between the wage share (W/Y), and the marginal contribution of labour (l), three-year sliding averages are listed in Table 12 and plotted in graph 23. In this way, peak and trough values are narrowed. The two curves display a close congruence in their slopes, although the marginal contribution (l) exceeded the wage share (W/Y) for the total period 1918-19 to 1937-38, and again for the period 1953-54 to 1959-60. It is apparant that the behaviour of the two functions displays the closest identity during the years 1937 to 1953, but showed comparatively greater divergencies before and after this period. In particular, it appears that there was a relative overpayment of labour (compared with its marginal contribution) during the years before the Second World War, an underpayment during the 1950's, and an overpayment during the 1960's. An attempt was made to relate the relation between the marginal labour's income share and its respective marginal contribution, to the growth performance of the manufacturing sector[1]. The result was negative, however, in that no correlation could be established.

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1. Compare Table 1, p. 4 above.

So far, the functional distribution of incomes has been discussed. In Section 12 below, an attempt will be made to relate the racial distribution of incomes to the history of economic growth. At the outset, a discussion of racial wage and income differentials will be given, both for the United States of America and for South Africa. This is followed by an analysis of the forces which determine racial wage differentials in South Africa. Finally, the racial wage structure will be related to the investment behaviour of firms, and some reflections will be given on the impact of pressures for wage increases.

12. The Distribution of Income by Race and its Relation to Economic Growth

12.1 Discrimination in an 'Egalitarian' Society

In recent years, the question of racial wage and income differentials has - to a considerable extent - become an emotional issue. Whilst some people may argue that the differences in the economic status of the races are attributable solely to economic factors (such as the marginal contribution rendered by persons of different races, their productivity, their work performance and work commitment), it is also held that differences in the racial income pattern are associated with discrimination in its purest form.

To gain as broad an insight into the question as possible, it appears useful to report firstly about income differentials between Whites and Negroes in the United States of America.[1] This country is a particularly interesting object of observation, because its egalitarian civilization and its ideals,[2] stand in close opposition to its inability to overcome racial prejudice.[3]

The amount of research undertaken in the United States on wage and income differences between Whites and Negroes is

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1. In future referred to as the "United States".
2. Compare the following account on the American society by Wladimir S. Woytinsky and Emma S. Woytinsky: "Da die junge Nation das Werk von Menschen ist, deren Ziel es war, frei und unabhängig zu sein, wurden der Individualismus und die Vielfalt freiwilliger Assoziationen statt einer strengen Scheidung in Klassen, Kasten und Gilden zur Grundlage der Amerikanischen Gesellschaft. ... So wurde eine dem tätigen Alltag zugewandte, in ihren Grundzügen egalitäre Zivilisation geboren." "VereinigteStaaten von Amerika", in: Handwörterbuch der Sozialwissenschaften , Band 11, pp. 16-63, here p. 60.
3. Compare the monumental work by Gunnar Myrdal, An American Dilemma, Written with the Assistance of Richard Sterner and Arnold Rose, Two Volumes, McGraw-Hill Book Company, New York, Toronto, London, 1944, 1964.

substantial.[1] One of the main findings of this research is that there occurred significant improvements in the median wage and salary incomes of Negroes, compared with Whites, during the War and post-War period 1940 to 1948. During the 1950's and early 1960's, however, the relative income position of the Negroes deteriorated again.

Table 13 illustrates changes in the median wage and salary incomes of Whites and Non-Whites in the United States.

TABLE 13 Median Wage and Salary Income of Males 14 Years of Age and Over with Wage and Salary Income, by Colour, 1939-57[2]

	White	Nonwhite	Nonwhite as a per cent of white
1939	$ 1,112	$ 460	41.4
1947	2,357	1,279	54.2
1948	2,711	1,615	59.6
1949	2,735	1,367	50.0
1950	2,982	1,878	61.3
1951	3,345	2,060	61.6
1952	3,507	2,038	58.1
1953	3,760	2,233	59.4
1954	3,754	2,131	56.8
1955	3,996	2,342	58.8
1956	4,260	2,396	56.2
1957	4,396	2,436	55.4

1. M. Zeman, A Quantitative Analysis of White- Non-White Income Differentials in the United States in 1939, unpublished Ph. D. Dissertation, Department of Economics, University of Chicago, 1955.
D. Gale Johnson, Some Effects of Region, Community Size, Color, and Occupation on Family and Individual Income, Studies in Income and Wealth, Vol. XV, National Bureau of Economic Research, New York, 1952.
D. Dewey, "Negro Employment in Southern Industry", Journal of Political Economy, Vol. LX, August 1952, pp. 285 ff.
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Alan B. Batchelder, "Poverty: The Special Case of the Negro", The American Economic Review, Papers and Proceedings, Vol. LV, May 1965, No. 2, pp. 530-540.
Elton Rayack, "Discrimination and the Occupational Progress of Negroes", The Review of Economics and Statistics, Vol. XLIII, 1961, pp. 209-214.

   The above does not constitute a comprehensive bibliography.

2. Source: U. S. Bureau of the Census, Current Population Reports: Consumer Income, Series P. - 60. Note that Negroes make up more than 95 per cent of the Non-White persons in the United States.

The evidence shows that a noticeable relative rise of Non-White as per cent of White income, occurred between the years 1939 and 1951. After 1951, the inter-racial income differences widened again.[1]

The reasons for the changes in the income disparity between Whites and Negroes are manifold and are classified below.

12. 1. 1 Factors Contributing to the Advancement of Negroes

The factors which have contributed to the advancement of Negroes are:-

i. Labour shortages caused by buoyant demand. This is the main reason put forward by Rayack for the income advancement of Negro workers between 1940 and 1948: "The labor shortages opened up a wider range of job opportunities for Negroes[2] ... The ability of the Negro to hold or advance his ... position is, substantially, a function of the tightness of the labor market".[3]

ii. Reduction in discrimination against Negroes which would make employers "pursue the same hiring policies with respect to race even after the labor shortages disappeared".[4]

iii. Reduction of poorly paid and corresponding increase of highly paid occupations. During the past 30 years, the decrease in poorly paid farm and service occupations (particularly in the South), and the increase in highly paid work such as clerical and sales positions have been made responsible for the advancement of Negroes.[5] It is reported that by 1962, Negroes were found in nearly every occupation.[6]

iv. Movement from the South to the North and from rural to urban areas.[7]

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1. For the five years after 1957, it is reported that the non-White to White income differential for men deteriorated slightly (from 0.50 to 0.49), whereas it improved for women (from 0.61 to 0.67). Alan B. Batchelder, Decline in the Relative Income, ibid., p. 547.
2. Elton Rayack, Discrimination, ibid., p. 211.
3. ibid., p. 214.
4. ibid., p. 212.
5. ibid.
6. Arnold Rose, "Postscript Twenty Years Later, Social Change and the Negro Problem", in: Gunnar Myrdal, An American Dilemma, ibid., p. xxxviii.
7. Herman P. Miller, Income of the American People, Census Monograph Series, 1955, p. 39.

Against these factors one must consider a number of elements which worked toward the deterioration of the Negroes' income position.

12. 1. 2 Factors Constributing to the Relative Deterioration of the Negroes' Income Position

The major factors which caused the deterioration of the Negroes' income position are:-

i. Disappearance of labour shortages. The disappearance of labour shortages is the most important single argument to be cited in respect of the relative deterioration of the Negroes' income postion after 1951. Technological unemployment during the 1950's has hit the Negroes much harder than it affected Whites. It is reported that "Negroes ... constitute a disproportionately large number of the 'permanently unemployed', and their rate of becoming unemployed was about double that of white workers during the several recessions that have occurred since 1955". [1]

ii. Widening of the 'educational' gap. In this connection, Batchelder observes that during the 1950's, the Negro gained relatively in the number of average years of school completed compared with those completed by Whites, but the average quality of a year of school deteriorated at the same time. [2]

iii. Widening of the age gap. Batchelder found that the median age of Negroes was 25. 8 years in 1950 and 22. 3 in 1960. For Whites it was 30. 1 in 1950 and 29. 3 in 1960, yielding a Negro-White age ratio of 0. 86 in 1950 and 0. 76 in 1960. This age structure constitutes a disadvantage for the Negro, since the peak income of both White and Negro men is obtained between the age of 35 to 44. [3]

12. 1. 3 Conclusion

With the probable exception of the 'age gap' argument, the

1. Arnold Rose, Postscript ..., ibid., p. xxx.
2. Alan B. Batchelder, Decline in the Relative Income, ibid., p. 538.
3. ibid., p. 539.

factors which contributed to the relative decline of the Negroes' income position are associated with actual discrimination. It may be, however, that the 'educational gap' and the resultant greater susceptibility of Negroes to technological unemployment, stem from past, and not necessarily from present-day discrimination. It is noteworthy that the relative income position of Negroes deteriorated during the 1950's, although statutory discrimination was virtually eradicated during this decade.[1] This leads one to conclude that the White - Negro income differentials in the United States are connected with practiced discrimination in its purest form. The validity of this statement is also underlined by a consideration of racially determined difficulties, faced by black capitalists. As TIME reports: "The aspiring black entrepreneur has even more trouble than the white in getting loans, insurance or contracts from large firms ... Two-thirds of small businesses fail in their first five years".[2]

The evidence presented by the United States, illustrates that racial discrimination is representative also in an 'egalitarian' society.

It is interesting now to contrast the inter-racial wage and income differentials of the United States with those prevalent in South Africa, since the latter country has completely different social and political objectives.

12.2 Evaluation of the South African Statistics on Income by Race

In South Africa, the statistical knowledge of the structure and composition of the income distribution by race is limited, and to a large extent inconsistent between different periods, since most of the research in this direction has been undertaken by private scholars. These generally made little attempt to fall into line with earlier research as far as the coverage and concept of income are concerned. The analysis of the aggregate income by race in South Africa is, therefore, severely hampered by the lack of adequate and consistent statistics.[3]

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1. Arnold Rose, Postscript, ibid., pp. xxxiii - xxxv.
2. Time, Special Issue, Black America 1970, April 6, 1970, p. 63 B.
3. Compare the discussion racial income distribution statistics in South Africa, Volume II, Section III.

The most striking feature of the racial income distribution is the wide disparity in the per capita contribution to the G. D. P. by the four different races. During 1960 for instance, the average per capita income of Whites was R1,217.5, as against R136.5 of Coloured persons, R168.0 of Asiatics, and R79.2 of Bantu.[1] The average per capita income earned by Whites was consequently 8.9 times higher than that earned by Coloured persons, 7.2 times higher than that earned by Asiatics, and 15.4 times larger when compared with the average income earned by Bantu.[2] Table 14 illustrates the percentage income earned by the four different races in relation to the relative size of the population of each section.

TABLE 14 : Racial Composition of the G. D. P., and the Population, 1960[3]

	Whites	Coloureds	Asiatics	Bantu
Percentage of Population	19.3	9.4	3.0	68.3
Percentage of G. D. P.	76.5	4.2	1.6	17.7

The disparity in the per capita income of the different races is less when one considers the disposable income rather than the G. D. P. During the year 1959/60, the share of Whites in the disposable income was 69.3 per cent, that of Coloured persons 5.7, of Asiatics 2.0, and of Bantu 23.0 per cent.[4] This result is attributable to the fact that the concept of the G. D. P., includes incomes earned by corporate businesses (mainly controlled by Whites), whereas the disposable income concept excludes this type of income.

In regard to the composition of the income receipt structure, Table 15 illustrates that the 'other income' earned by Whites constitutes more than 100 per cent of the work income earned by them. On account of their commercial activities, 'other income' constitutes also a substantial portion of the total income earned by Asiatics, whereas it is only of a negligible importance for Coloured persons and Bantu.

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1. Sources: South African Statistics, 1968, A-10, for the racial composition of the population. Volume II, Table LIII, for the distribution of the G. D. P. by race.
2. Inter-racial per capita income differentials are even wider in countries where non-Africans (mainly Whites and Indians) constitute very small minorities compared with the indigeneous African population. In 1946, the income differential between non-Africans and Africans in Northern Rhodesia was 1 to 58, and in Southern Rhodesia, 1 to 34. In 1949, it was 1 to 34 in Kenya. United Nations, Statistical Papers, Series E-., No. 3 National Income and its Distribution in Under-Developed Countries, New York, 1951, Table 12, p. 19.
3. As footnote 1 above.
4. Volume II, Tables XVII. and LIII.

TABLE 15 : Other Income as Per Cent of Work Income, Selected Years[1]

Year	Whites	Coloureds	Asiatics	Bantu	All Races
1946/7	104	7	83	15	71
1956/7	109	7	64	11	74
1960	119	12	67	19	83

The comparison of Tables 14 and 15 makes it clear that the racial per capita income disparity must be associated with an unequal distribution of income-yielding assets[2] and entrepreneurial efforts.[3]

Two significant facts distinguish the income structure of Bantu from that of the other three races. Firstly, about one-third of the income earned by Bantu is received 'in kind', as against only some 12 per cent on average for the other races.[4] This clearly testifies the backwardness of the Bantu as a consumer. Secondly (and more important), it is noteworthy that 31 per cent of the total income earned by Bantu in 1959/60, was earned in rural districts, as against only 15 per cent on average for the other three races. Since the per capita income earned by Bantu was R169.4 p.a. in urban as against only R36.1 in rural districts, it is the retarded urbanization of the Bantu (and a great number of factors associated with the process of urbanization) which must be linked with the low per capita income of this race.[5]

12. 2. 1 The Long-Term Evidence on Racial Income Data

The available long-term statistical evidence on racial income data refers partly to the distribution of aggregate, and partly to the

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1. Sources: Volume II, Tables XIIL, XIVL, and LIII.
2. It is regretted that the Department of Statistics does not collect statistics on the racial distribution of income-yielding assets.
3. Since 'other income' is usually distributed more unequally than work income, one can expect that the personal income distribution will be more unequal for Whites than for the other races.
4. Volume II, Table IL.
5. Volume II, Table LI. In 1960, only 31.8 per cent of the Bantu population lived in urban areas, as against 83.6 per cent in the case of Whites, 68.3 per cent in the case of Coloureds, and 83.2 per cent in the case of Asiatics. South African Statistics, 1968, A-24.

distribution of sectoral incomes.[1] Aggregate income studies, which are based on the domestic, national, personal, disposable, or work income concepts, are available for the years 1917/18, 1924/25, 1936, 1939/40, 1946/7, 1956/7, 1959/60, 1960, 1964 and 1966.[2] Because of differences in coverage and definition, formal identity exists only in respect of the following characteristics:-

i. the share of the income received by Non-Europeans (all calculations from 1917/18 to 1966);
ii. the share of the different race groups by type of economic activity (1924/25 and all subsequent calculations); and
iii. the share of work income by type of economic activity (1946/47 and all subsequent calculations).

Table 16 illustrates the distribution of aggregate income by race for all available studies which have been considered in Volume II (see p. 187 below).[3]

The analysis of the percentage distribution of income by race reveals that

i. the share of Whites in the domestic income varied between 71.9 per cent (1917/18) and 76.5 per cent (1960). Between 1924/25 and 1939/40, the share of White income dropped continuously and was least in 1939/40 when judged by Frankel's and Herzfeld's calculation of the net national income by race (72 per cent).[4] After World War II, however, the income share of Whites recovered steadily and reached a peak value of 76.5 per cent in 1960 (related to G.D.P.).

ii. the relative decrease in White income during the World War II years was reflected in the relative increase of Bantu earnings, which rose steadily between 1924/25 and 1946/47 (from 17.9 to 20 per cent), and fell off sharply during ensuing years (17.7 per cent in 1960).

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1. Volume II, Section III, Paras. 1-10, for the distribution of aggregate income, and Para. 11 for the distribution of sectoral income.
2. Volume II, Tables XIL, LVI, XIIL, XIVL, LII, LIII, LIV.
3. For a definition of the term 'aggregate income', compare Volume II, p. 131, footnote 1.
4. This does not necessarily mean that the share of White income in total income was in fact least precisely in 1939/40. Statistics on racial wage differentials suggest that income differentials between Whites and Bantu narrowed during the War, but widened again after 1945.

iii. As regards the income share of Asiatics and Coloureds, the calculations suggest that their relative income position improved slightly during 1946/47 to 1956/57, when the income share of Bantu deteriorated.

iv. The main distinguishable feature of the distribution of income by race is its relative constancy during the 35 year period 1924/25 to 1960. As far as the total income earned by the different races is concerned, it is difficult (if not impossible) to discover clear long-term changes in relative command over income. For recent years, this constancy is also reflected in the fact that there has been practically no change at all in the relative distribution of work income, during the period 1964 to 1966. [1]

Table 17 illustrates the aggregate income by race at current prices and the income per head at current and constant prices, for the years 1924/25, 1936, 1946/47, 1956/57, and 1960, and Table 18 shows the corresponding compound rates of increase in per capita income, valued at 1958 prices. During the four periods considered, it is only between 1936 and 1946/47, that the rate of the Non-European per capita income increase was larger than the corresponding increase in White income. For the period 1924/25 to 1960 as a whole, the rate of annual per capita increase of income earned by Whites was fastest with 2.3 per cent, against 1.9 per cent in the case of Bantu and 0.8 and 1.2 per cent in the case of Coloureds and Asiatics, respectively. As a result, the total per capita increase in income was 126 per cent for Whites, but only 81 per cent on average for the three Non-European races.

In the interpretation of the different growth rates of per capita income figures it must be kept in mind, however, that the population estimate for the year 1924/25 is likely to have underestimated the true number of Coloured, Asiatic, and Bantu persons, whereas it can be assumed to have been more correct for Whites. To the extent that this relative underestimation of the size of the Non-European population was eliminated in the 1960 Census, it would therefore appear that the per capita income of Coloureds, Asiatics, and Bantu has in fact grown faster than what is suggested by Table 18.

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1. See Table 16 below.

Apart from this, one could also argue that the total size of the population is probably not the best possible criterion on which to base a per capita income estimate, since the relative size of the economically active populations was significantly different for the four races at Census dates.[1] In 1960, for instance, 35.9 per cent of the White population was economically active, against only 30.9 per cent in the case of Coloureds, 21.4 per cent in the case of Asiatics, and 29.5 per cent in the case of Bantu (excluding Bantu peasants). Naturally, these data must be taken into account when welfare statements are made.[2]

1. See Volume II, Table 57.

2. In respect of a macroeconomic income study, these considerations can, however, be taken as irrelevant.

TABLE 16 : Percentage Distribution of Income by Race, 1917/18-1966

Year	Calculator	Income Concept	Whites	Coloureds	Asiatics	Bantu	Non-Europeans	Total
1917/8	Lehfeldt	net domestic income	71.9	-	-	-	28.1	100.0
1924/5	Spandau	gross domestic income	75.2	5.3	1.6	17.9	24.8	100.0
1936	Dpt of Economics	net national income	74.9	4.5	1.9	18.7	25.1	100.0
	"	net domestic income	74.5	4.2	1.7	19.6	25.5	100.0
1939/40	Frankel & Herzfeld	net national income	72.0	-	-	-	28.0	100.0
1946/7	Thirion	net national income	73.8	4.3	1.9	20.0	26.2	100.0
	"	net domestic income	74.3	3.9	1.8	20.0	25.7	100.0
1956/7	Retief	net national income	74.0	4.9	2.1	19.0	26.0	100.0
	"	net domestic income	75.9	4.4	1.9	17.8	24.1	100.0
1959/60	Nel	disposable income	69.3	5.7	2.0	23.0	30.7	100.0
1960	Stadler	gross domestic income	76.5	4.2	1.6	17.7	23.5	100.0
1964	Dpt of Statistics	work income	64.3	6.6	1.9	27.2	35.7	100.0
1966	"	work income	64.3	6.6	2.0	27.1	35.7	100.0

Table 17 Aggregate Income by Race and Per Head of Population, Current and Constant Prices (1958), GDP Values in R million, Income per Head in Rand, Population in 1000.

	Whites	Coloureds	Asiatics	Bantu	Total
1924/5					
GDP	403	28	9	96	536
Population	1,635	600	179	5,112	7,526
Income per head	246.5	47.5	49.5	18.7	71.2
Income per head, constant prices	506.8	97.7	101.8	38.4	146.4
1936					
NDP	520	29	12	137	698
Population	2,009	772	221	6,616	9,618
Income per head	258.6	37.5	55.0	20.7	72.6
Income per head, constant prices	566.7	82.2	120.5	45.4	159.1
1946/7					
NDP	1138	60	27	306	1531
Population	2,408	948	292	7,922	11,570
Income per head	472.5	63.3	92.5	38.6	132.3
Income per head, constant prices	683.8	91.6	133.9	55.9	191.5
1956/7					
NDP	2932	169.	73	688	3862
Population	2,909	1,322	435	9,927	14,603
Income per head	1,007.9	126.5	166.7	69.4	264.4
Income per head, constant prices	1,007.9	126.5	166.7	69.4	264.4
1960					
GDP	3737	205	80	861	4883
Population	3,069	1,500	476	10,880	15,925
Income per head	1,217.5	136.8	168.0	79.2	306.6
income per head, constant prices	1,147.5	128.9	158.3	74.6	288.8

TABLE 18 : Per Capita Income : Compound Rate of Increase p. a., 1953 Prices.

Period	Whites	Coloureds	Asiatics	Bantu	Non-Europeans
1924/25 to 1936	0.9	- 1.4	1.4	1.4	0.8
1936 to 1946/47	1.7	1.0	1.0	1.9	1.8
1946/47 to 1956/57	4.0	3.3	2.2	2.2	2.5
1956/57 to 1960	3.3	0.5	- 1.3	1.8	1.4
1924/25 to 1960, total increase in per cent	126	32	57	94	81
1924/25 to 1960 percentage increase, compound rate, p. a.	2.3	0.8	1.2	1.9	1.7

Sources for Tables 17 and 18

Income at current prices: Volume II, Tables XIIL, XIIIL, XIVL, LIII, LVI.
Population data: 1925 to 1936: Union Statistics for Fifty Years, ibid., A-8. 1946/7 to 1960: Statistical Year Book, 1966, A-11. The deflator was obtained by dividing the GDP values at current prices (Volume II, Table 3) by the GDP estimate at constant prices (Volume II, Table 51).

Abbreviations: GDP = Gross domestic product
NDP = Net Domestic Product

12.2.2. The Relation Between the Growth of Racial Income and Economic Growth

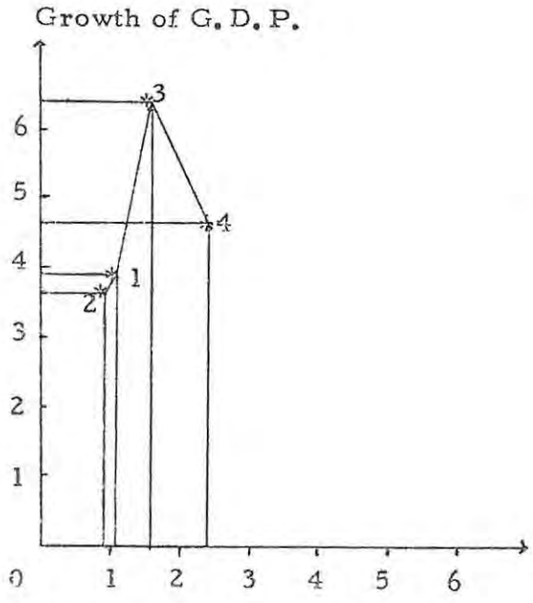
It is interesting to contrast the growth rate of the G.D.P. at constant prices with the growth rates of income increases of Whites in relation to Non-Whites, as shown in Table 19.

TABLE 19 : Growth Rates of the G.D.P. at Constant Prices and Growth of White Income in Relation to the Growth of Income of Other Races

Period	Growth Rate of G.D.P.	Growth of White income over growth of income of other races
1924/25 to 1936	3.9	1.1
1936 to 1946/7	3.7	0.9
1946/47 to 1956/7	6.4	1.6
1956/57 to 1960	4.7	2.4

Graph 24 illustrates the above relations geometrically.

Point 1 represents the period 1924/25 to 1936;
" 2 " " " 1936 to 1946/47;
" 3 " " " 1946/47 to 1956/57;
" 4 " " " 1956/57 to 1960



Graph 24

Graph 24 shows a single-peaked relation between the growth of the G. D. P. in real terms and the income differentials between the White and the Non-White races. During period 3 (1946/47 to 1956/57), the economic growth rate was fastest with 6.4 per cent p. a. At the same time, the income growth for White persons was 1.6 times faster than for Non-Whites. The growth performance of the economy was less rapid during periods when the growth of White in relation to Non-White income was either less or more. This suggests that there might exist an optimal relation between the racial income growth and economic growth.

In order to expound this hypothesis in more detail, the relation between racial income and total economic growth will be evaluated for the main economic sectors.

12. 2. 3 Racial Income Growth and Growth of G. D. P. by Economic Sectors

Table 20 lists the compound annual growth rates of the contribution to the G. D. P., made by the different races. The calculations are tabulated according to main economic sectors and valued at 1958 prices.[1]

Graphs 25 to 44 illustrate the relation between the growth rates of racial income (γ income), and the growth rates of the contribution to the G. D. P. made by different economic sectors (γ G. D. P.).[2] The growth of the G. D. P. is measured on the horizontal, and the growth of the racial income on the vertical axis. The observation points 1 to 4 refer to the four periods considered. These points have been combined by straight lines, so as to facilitate the assessment of the relation between the racial income growth and the total growth rate of the economy.

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1. Sources: See Table 17, p. 188 above.
2. The diagrams are ordered as follows:-

Nos.	25-28	Agriculture;
"	29-32	Mining;
"	33-36	Manufacturing;
"	37-40	Services;
"	41-44	Total.

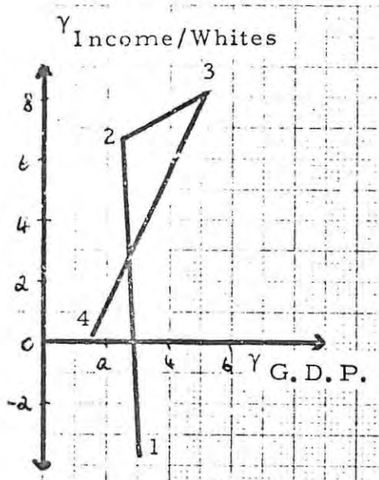
Source: Table 20 below.

TABLE 20 : Compound Rates of Annual Growth of G. D. P. at 1958 Prices, by Racial Divisions

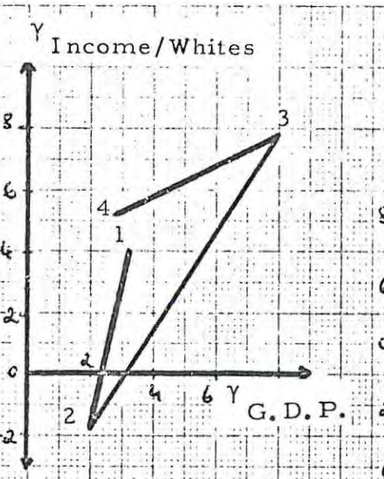
	AGR.*	MIN.*	MAN.*	SER.*	TOT.*
WHITES					
1924/25 to 1936	-3.5	4.0	5.5	2.8	2.7
1936 to 1946/47	6.8	-1.7	6.4	3.4	3.4
1946/47 to 1956/57	8.4	7.8	6.9	4.6	5.9
1956/57 to 1960	0.1	5.2	5.4	5.3	4.7
average, 1924/25 to 1960	3.1	3.5	6.3	3.8	4.1
COLOUREDS					
1924/25 to 1936	1.0	-8.0	3.8	0.1	0.7
1936 to 1946/47	1.4	-2.4	10.5	-0.2	2.9
1946/47 to 1956/57	3.5	6.9	6.7	8.2	6.9
1956/57 to 1960	6.8	21.5	2.8	2.7	3.5
average, 1924/25 to 1960	2.5	0.5	6.6	2.5	3.4
ASIATICS					
1924/25 to 1936	-1.3	-5.7	5.8	4.0	3.2
1936 to 1946/47	-3.3	-1.2	9.7	2.9	3.6
1946/47 to 1956/57	5.4	2.9	7.0	6.2	6.4
1956/57 to 1960	3.7	19.0	2.4	0.1	1.0
average, 1924/25 to 1960	0.4	0.4	7.1	4.0	4.0
BANTU					
1924/25 to 1936	0.4	5.1	5.5	6.2	3.6
1936 to 1946/47	0.6	0.0	12.9	5.0	3.6
1946/47 to 1956/57	2.7	1.4	6.4	5.7	4.5
1956/57 to 1960	2.1	7.7	3.7	4.3	4.2
average, 1924/25 to 1960	1.3	2.9	7.9	5.7	4.0
CONTRIBUTION to G. D. P.					
1924/25 to 1936	3.0	3.1	6.5	3.9	3.9
1936 to 1946/47	2.5	1.9	5.3	4.0	3.7
1946/47 to 1956/57	5.3	7.9	9.6	5.7	6.4
1956/57 to 1960	1.0	2.6	4.4	5.6	4.7
average, 1924/25 to 1960	2.5	3.4	6.5	4.0	4.1

* Abbreviations: AGR. = Agriculture; MIN. = Mining; MAN. = Manufacturing; SER. = Services; TOT. = Total.

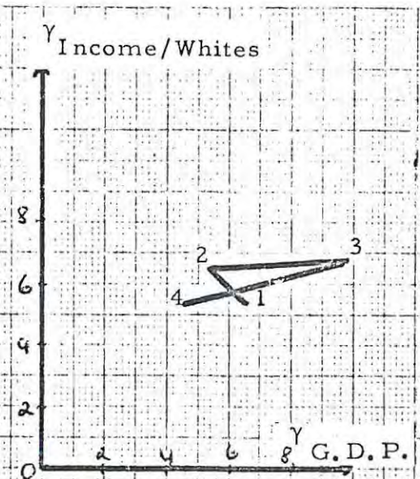
AGRICULTURE	MINING	MANUFACTURING	SERVICES	TOTAL



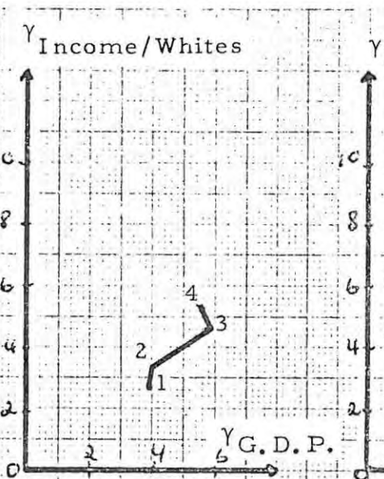
Graph25



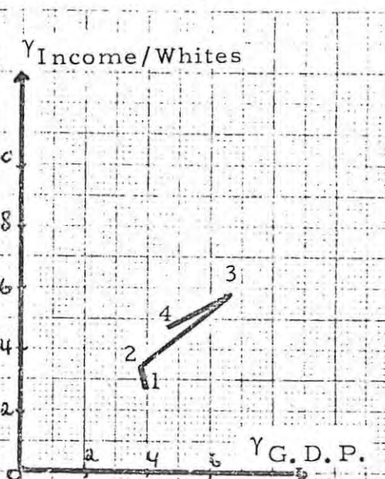
Graph 29



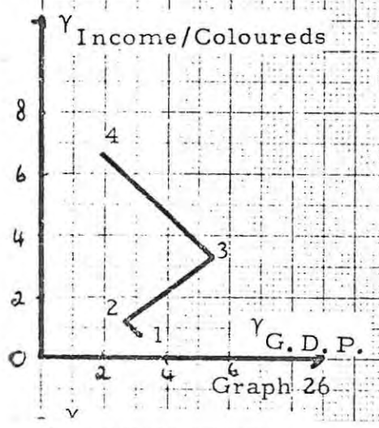
Graph 33



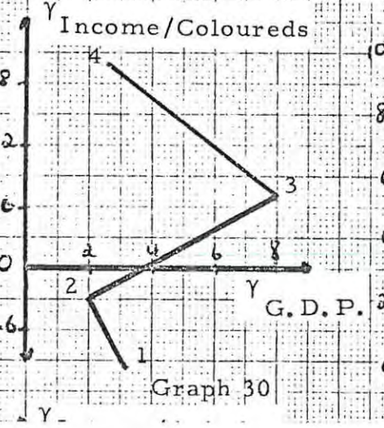
Graph 37



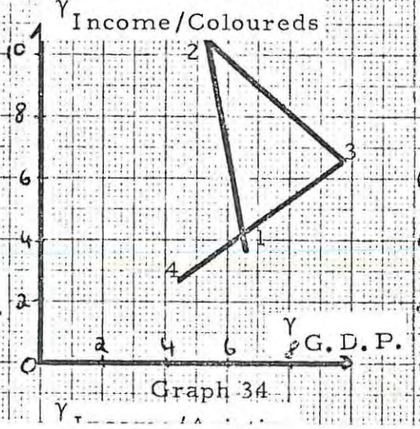
Graph 41



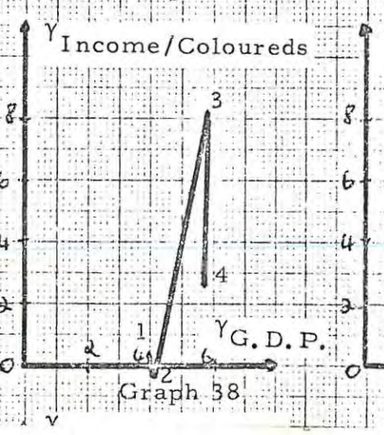
Graph 26



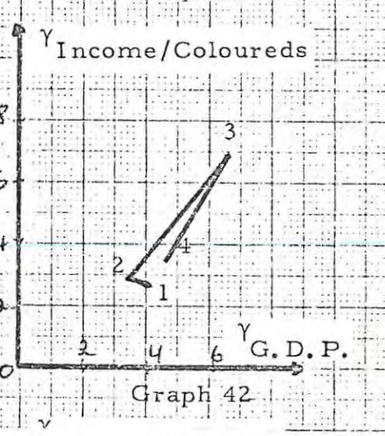
Graph 30



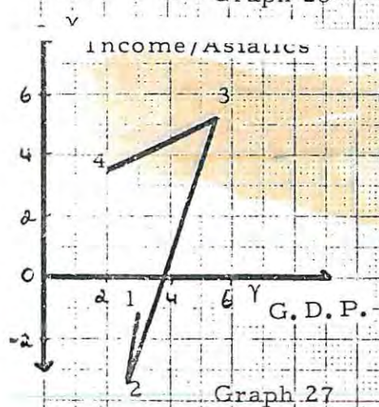
Graph 34



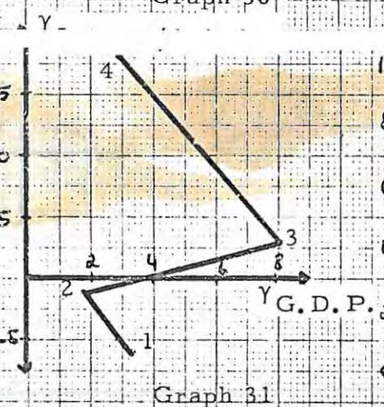
Graph 38



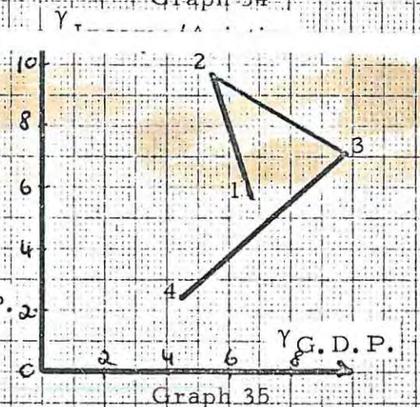
Graph 42



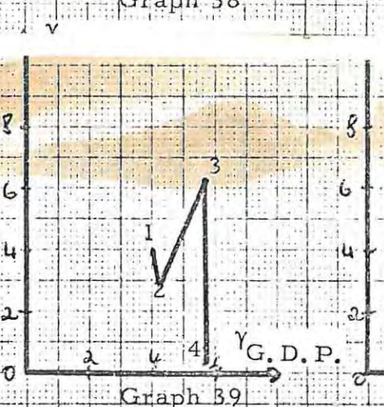
Graph 27



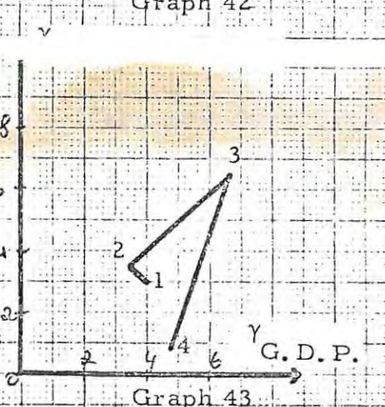
Graph 31



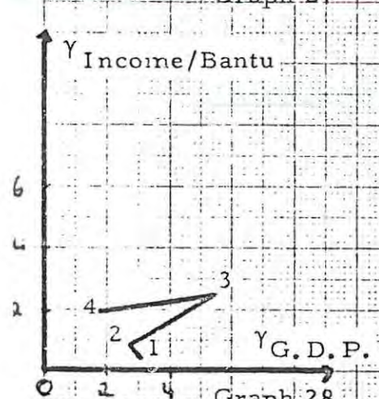
Graph 35



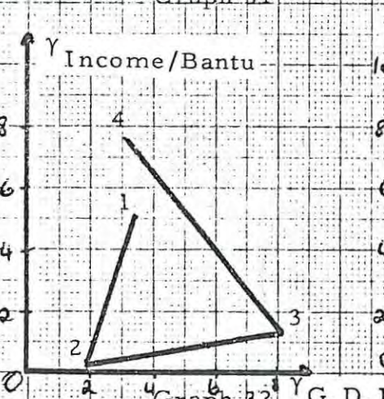
Graph 39



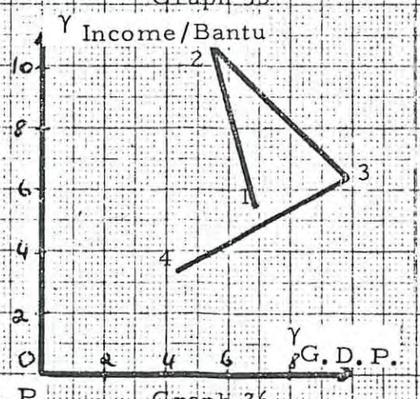
Graph 43



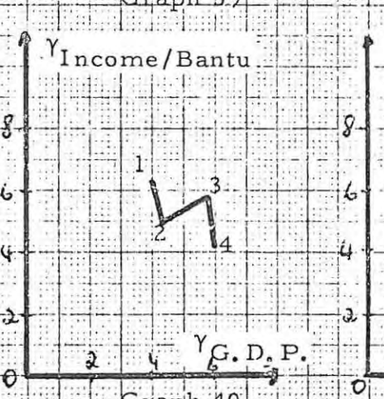
Graph 28



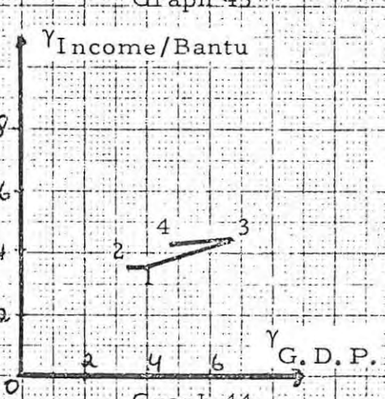
Graph 32



Graph 36



Graph 40



Graph 44

For the interpretations of the relation between the growth of income received by different races, and the growth of the G. D. P., the concepts of normal and abnormal relations will be defined. Normal relations are those where increases in the rate of growth of the G. D. P. during one particular period are associated with a positive growth rate of racial incomes. In other words, an observation point which is situated in the North-East sector of a diagram, indicates a normal relation between racial and aggregate income growth for the period presented by that point. In graph 25, for instance, points 2, 3, and 4 illustrate normal relations, whereas point 1 is indicative of an abnormal situation.

The concept of normal and abnormal relations can, however, conveniently be extended so as to cover the relation between racial and total income growth during two consecutive time periods. Geometrically, a normal relation is characterized by an upward sloping, straight line between any two consecutive time points. In graph 25, for instance, the relations between periods 2 and 3, and 3 and 4, are normal, but the relation between periods 1 and 2 is abnormal.

In the ensuing discussion, normal and abnormal relations will be considered both in respect of one particular time period, and in respect of two consecutive time periods.

Table 21 lists the number of normal and abnormal relations, both for a particular period and for two consecutive periods. [1]

TABLE 21 : Number of Normal and Abnormal Income Relations

	One Period		Two Consecutive Periods	
	Normal Relations	Abnormal Relations	Normal Relations	Abnormal Relations
Agriculture	13	3	8	4
Mining	11	5	7	5
Manufacturing	16	0	5	7
Services	15	1	8	4
Total	16	0	9	3

When one period is considered, the number of normal relations always exceeds the number of abnormal relations. When two consecutive time periods are considered, however, it is noticeable that in the manufacturing sector, the number of abnormal

1. Note that the number of normal plus abnormal relations is 16, when one period only is considered, and 12, when two consecutive periods are analysed.

relations is greater than the number of normal relations, whereas the opposite holds true for all other sectors.

In order to elucidate further effects of the issue under consideration, a detailed sectoral analysis of the relation between racial and aggregate income growth will be outlined below.

12. 2. 3. 1 Agriculture: Racial Income Growth and Growth of G. D. P. Contribution

In the agricultural sector, positive growth rates of aggregate income are associated with negative growth rates of racial income in three cases, i. e., once for Whites (period 1), and twice for Asiatics (periods 1 and 2). This abnormal relation between racial income growth and the growth of the total sector, must be seen in connection with changes in the structure of employment.

Between 1921 and 1936, the numbers of both Whites and Asiatics employed in agriculture was practically constant, whereas the corresponding figure for Coloured and Bantu persons increased significantly. [1]

During the period 1946/47 to 1956/57, the agricultural sector realized the highest rate of annual growth (5. 3 per cent) in relation to the four different periods here considered. This rapid growth was accompanied by an over-proportionate increase in the income earned by Whites (3. 4 per cent), compared with income increases of 3. 5 per cent for Coloureds, 5. 4 per cent for Asiatics, and 5. 3 per cent for Bantu. This pattern was subsequently reversed, however, when the agricultural growth rate fell to 1. 8 per cent during the period 1956/57 to 1960. The growth of White income fell then to almost zero, whereas the income drawn from agricultural activities by the other three races continued to increase. In the case of Coloureds, the growth rate of income earned in agriculture even exceeded the respective growth rate of the period 1946/47 to 1956/57.

The sensible reaction of the growth of White income to the overall sectoral growth suggests that the income receipt structure in agriculture is closely related to the growth of racial income. Whereas during 1960, Whites received only some 6 per cent of their agricultural earnings as work income, and some 94 per cent as other income, the proportion of work income was 81 per cent in the case of Coloureds, 30 per cent in the case of Asiatics, and 61

1. Volume II, Table 57.

per cent in the case of Bantu.[1] This income receipt structure, considered together with the different growth rates of racial income, suggests that 'other income' is significantly more sensible to fluctuations in the growth rate of agricultural income, than is work income.

12. 2. 3. 2 Mining: Racial Income Growth and Growth of G. D. P. Contribution

In the analysis of the mining sector, the attention can be confined to Whites and Bantu since Coloureds and Asiatics constitute but minor portions of the total working force.

The striking feature of this sector is that the relation between the total income growth experienced by Whites and Bantu, and the total sector's economic growth rate, is normal throughout (i. e., all straight lines between any two points are upward sloping). The only exception to this rule, is the increase in the growth rate of incomes earned by Bantu between periods 3 and 4, which is associated with an overall fall in the growth rate of the total mining sector. This phenomenon is explained by the fact that the number of Bantu employees increased significantly during period 4 (from 487, 196 to 551, 855 persons), whereas the number of Whites remained more or less constant.[2] It is therefore the change in the employment structure which can be made responsible for the observed abnormal relation.

Although nominal income and employment figures increased somewhat during period 2 (1936 to 1946/47)[3], real income earnings per head deteriorated by 1. 7 per cent p. a. for Whites, and remained constant for Bantu.[4] This is indicative of the fact that the gold mines were able to withhold increases in real income earnings per head, during a period when their growth performance was least.

1. Volume II, Table LIII.
2. Volume II, Table 43.
3. ibid.
4. Table 20 above.

12. 2. 3. 3 Manufacturing: Racial Income Growth and Growth of G. D. P. Contribution

The inspection of the graphs referring to the manufacturing sector reveals that the relation of income distribution and economic growth shows a similar shape for all races. The relations between periods 1 and 2, and between periods 2 and 3, are abnormal, except for Whites where it is normal during period 2. The relation between periods 3 and 4 is normal for all races.

An interesting feature of the manufacturing sector is that the distribution growth pattern is compressed for Whites (see graph 33), but expanded for the three Non-White races (see graphs 34 and 36).

During period 2 (i. e., during the years 1936 to 1946/47), the growth of income of the three Non-European races exceeded that of the White race substantially (the growth rates being 10.5 per cent for Coloureds, 9.7 per cent for Asiatics, and 12.9 per cent for Bantu, as against only 6.4 per cent for Whites).[1] A reverse trend appeared during the period 1956/57 to 1960, when, during a time of slow economic growth, the racial income increase was substantially less for the Non-White races, compared with Whites.

12. 2. 3. 4 Services: Racial Income Growth and Growth of G. D. P. Contribution

The service sector, which shows growth rates between 4 and 6 per cent during the 4 periods considered, reflects a somewhat similar income distribution pattern, when compared with the manufacturing sector, except that the three Non-European races did not benefit from income increases comparable to those experienced in the manufacturing sector during the war period. A substantial shift in the structure of racial income distribution took place in the period 1956 to 1960, compared with the period 1946/47 to 1956/57, when the income growth of the Non-White races declined sharply, whereas White income growth accelerated.

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1. Table 20 above.
2. Compare also Volume II, Table 46, and graph 48 below.

12. 2. 3. 5 Conclusion

The inspection of graphs 41 to 44 reveals that there was not a single abnormal relation in the distribution/growth pattern of the total economy in any of the 16 individual periods considered. It is only when one analyses the distribution/growth pattern between two consecutive periods that there appear three cases of abnormal relations, viz., in respect of Whites, Coloureds and Asiatics, where the racial income increased slightly between the first and second periods, whereas the overall growth rate declined. In all other cases, the distribution/growth relations sloped in the same directions: between periods 2 and 3, there was a rise in the growth rate of racial incomes and in the growth rate of the total economy. The opposite occurred when the growth rates of both racial and aggregate income, dropped between periods 3 and 4.

The inspection of graphs 18 to 21 reveals that the income growth which has been experienced by Whites, Coloureds, and Asiatics, is more or less in line with the growth rate of the total economy.[1] This is not the case, however, for income earned by Bantu, where the distribution/growth lines have an almost flat appearance.

This evidence suggests that the growth of Bantu real income seems to reach a ceiling much faster than the growth of income earned by Coloureds, Asiatics, and Whites. This is particularly noticeable in period 3 (1946/47 to 1956/57), when the income earned by Bantu increased only at an average rate of 4. 5 per cent p. a., whereas the income increases of Whites, Coloureds, and Asiatics, were 5. 9, 6. 9, and 6. 4 per cent p. a., respectively.[2]

The lack of abnormal relations in the aggregate distribution/growth pattern, suggests that total income payments increased more or less in line with the growth of different economic sectors and of the total economy. The shortcoming of the present analysis, however, is that the statistical data on which it is based are rather unrefined and not necessarily consistent over different periods. In the ensuing section therefore, the debate will be continued on the basis of racial wage data, which are available on an annual basis.

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1. In other words, the straight line between different income points form more or less a 45^{o} line.
2. Table 20 above, 'Total'-column.

12.3 Evaluation of Racial Wage Differentials in South Africa

For a number of reasons it is appropriate to examine wage differentials in addition to income differentials. Firstly, it can be said that the social orientations of members of a community are determined, not by the total income earned by their particular race, but rather by actual wage differentials. Thus, whereas it is difficult for any one individual to assess the impact of factors such as the size of the economically active population, the standards of education, and the willingness to perform entrepreneurial activities (all these being factors which influence the total income earned by a particular race), the same individual may well be aware of the wage differential between him and his immediate fellow workers.

Moreover, the use of racial wage differentials is pragmatic, since long-term racial wage statistics are available on an annual basis for the mining and manufacturing sectors.

The major portion of the ensuing discussion will be confined to the wage differential between Whites and Bantu, because these two groups constitute by far the majority of the economically active population.[1] Moreover, the racial polarization is sharpest when consideration is given to White versus Bantu wage patterns, since the average incomes per head of both Coloureds and Asiatics lie in between that earned by Whites and Bantu, respectively.

12.3.1 The Causes of Racial Wage Differentials in South Africa

Ever since the discovery of gold and diamonds during the last third of the 19th century, the South African economy has considered the Bantu as suppliers of low paid and unskilled labour. Whereas European wages had to be high in order to attract skilled workers from overseas, Bantu wages could be kept low by virtue of an almost elastic supply curve. Leistner suggests that the Bantu "was neither seriously viewed either as a consumer of the goods and services produced in the market economy, nor as a provider of savings".[2]

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1. In 1960 for instance, the total economically active population (excluding unemployed and unspecified persons) was 1,106,513 Whites, 466,792 Coloureds, 101,909 Asiatics, and 3,226,412 Bantu.
   Volume II, Table 57.
2. G.M.E. Leistner, "Economic and Demographic Aspects of the Bantu Market", Bulletin of the Bureau of Market Research, No. 16, March 1965, p. 4.

The high wage differentials between Whites and Bantu have now persisted for a century.[1] The economy has naturally adapted itself to this characteristic, and little evidence is available which would suggest a narrowing of differentials between White and Bantu wages.

The wide wage differentials which prevail in South Africa between the average White and Bantu worker, are determined by a multitude of legal, social, and economic factors. Although the individual impact of any of these factors, cannot be quantitatively assessed, an attempt will be made below to consider some of the major arguments which determine racial wage differentials in South Africa.

12. 3. 2 The Impact of Occupational Barriers on Inter-Racial Wage Differentials

One of the main reasons responsible for the wide racial wage differentials, is the congruence ofoccupational and racial hierarchies.

1. It has been suggested that 1960, the year of the Sharpville riots, can be regarded as a "landmark indicating a turning point in the current of our affairs for it was about then that the upsurge of social pressure coincided with the completion of the modern economy's framework ..." *
In this regard it is certainly true that the Bantu has now become accepted as a more valuable employee and consumer. Little evidence is available, however, which suggests that the relative income position of the Bantu has improved in his favour since 1960. **

* G. M. E. Leistner, ibid., p. 6.

** Compare Volume II, Table 47 b.
As regards household incomes, F. E. Rädel reports that "a ... recent indicator is available in a comparison of the average income rise of Bantu households with that of White households in Pretoria, based on statistics compiled by the Bureau of Market Research and Bureau of Statistics respectively. According to these two sources the average annual growth rate for Bantu households was 5.2%, while that for White households amounted to 4.9% only."

F. E. Rädel, "The South African Market - A Quantitative Analysis", Finance and Trade Review, Vol. VIII, No. 1, June 1960, p. 19.

Leistner estimates that the share of Bantu purchasing power will rise from 17.6 per cent in 1963 to 21 per cent in the year 2000.
ibid., p. 10.

Skilled labour, which requires "a period of generally 5 years training controlled either under an apprenticeship or a learnership scheme", [1] is mainly in the hands of Whites because the stipulations of the Apprenticeship Act of 1944, make it virtually impossible for non-Whites to become skilled. Although the Apprenticeship Act does not exclude Bantu from acquiring professional qualifications de jure, it does so de facto, because only few Bantu possess the necessary minimum educational qualifications for the entry of an apprenticeship. In addition, the necessary part-time technical classes are often not available for Bantu. The most serious factor, however, is that Whites are frequently not willing to train them.

A second reason which led to the establishment of large wage differentials between Whites and Bantu is that initially the South African industry was specialized mainly in maintenance and repair work. Then, there was in fact a distinct division of work between the skilled and the unskilled worker. As the development of the economy proceeded, mechanization was introduced, based on the employment of semi-skilled machine minders and of the skilled worker whose function it was to organize and to supervise. However, progress in the reclassification of work has been slow. Where workers undertake semi-skilled work operations, they often continue to be classified as unskilled workmen, with resulting adverse effects on their wages. [2]

Being almost completely barred from skilled and semi-skilled work, the performance of unskilled labour rests mainly with the Bantu. Unskilled work is considered as "those manual operations which by nature are very simple and require little, if any, previous training or experience. ... Sweeping a floor, carrying bags ... and performing other similar work can be accepted as unskilled work, which requires mainly, if not wholly, physical exertion only and can be undertaken by the average person off the street at a moment's notice". [3] This definition clearly

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1. U.G. No. 45-1941, Report of the Department of Labour for the Year Ended 31st December, 1940, p. 29.
2. Steenkamp reports that the oiling and greasing of machines, including motor vehicles, is classified as an unskilled occupation, although these jobs require "more knowledge and a far greater sense of responsibility than the handling of a pick or a shovel".
   W. F. J. Steenkamp, "The Impact of the Bantu on Personnel Administration and Wage Structures", Finance and Trade Review, Vol. IV, No. 3, September 1960, p. 162.
3. U.G. No. 9-1947, Report of the Department of Labour for the Year ended 31st December, 1945, para. 59, p. 44.

stresses the interchangeability of the unskilled worker, who can be taken off the street.[1] From this it follows that the bargaining power of unskilled workers must be minimal, as long as the supply of workers is, for practical purposes, unlimited.

In between the skilled and unskilled operations, there is defined a semi-skilled work grade. For the metal industry it is reported that "semi-skilled workers operate machines on a repetitive basis that have previously been set to measures by a journeyman ... Semi-skilled work is a generic term referring to many different jobs from almost-skilled to almost unskilled".[2]

Statistical information on the relation of race and occupational status, is not available in South Africa. Insight, albeit very weak, can only be gained by considering the random tabulation of the number and race of employees whose wages were regulated by wage determinations. It must be borne in mind, however, that the figures do not include determinations which apply only to unskilled workers, nor do they include wage determinations made under Industrial Council Agreements.

Table 22 below illustrates that 83.6 per cent of the skilled workers are Europeans, with the other three races each constituting between 5 to 6 per cent in this group, respectively. In contrast, only an extremely small proportion of Europeans (1.2 per cent), is found in the unskilled group. The great bulk of the Bantu (80.0 per cent) are unskilled workers, although some occupational progress can also be noted for this race group: 15.4 per cent of the total number of Bantu were found in the semi-skilled, and 4.6 per cent in the skilled group. Of Coloureds and Asiatics, some 31 per cent are in the semi-skilled group, but in the case of Asiatics, a larger proportion of workers is skilled, compared with Coloureds, where a larger proportion is unskilled.

The rigid congruence between the occupational and racial hierarchies has been maintained by what is known as the legal and

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1. W. F. J. Steenkamp maintains, however, that the attitude to regard the Native as "an undifferentiated mass" is now fast disappearing.
"In Quest of Aims and Norms for Minimum Wage Fixing in Terms of the Wage Act", The South African Journal of Economics, Vol. 31, 1963, p. 253.
2. F. van den Bogaerde, "Occupational Wage Differentials in the South African Metal Industry", The South African Journal of Economics, Vol. 30, 1962, p. 270.

customary colour bars.[1] The oldest of the legal colour bars is the Mines and Works Act of 1911, which excluded Bantu from "nearly all ostensibly responsible positions in mines and some allied concerns in the Transvaal and Orange Free State".[2] This was followed by the famous enactment of reserving even unskilled work in government service for Whites, but at 'civilized' rates of pay. This civilized labour policy was introduced to help overcome the 'Poor White' problem in South African cities.[3]

The statutory colour bar was carried into the manufacturing and construction sector when, with legislation introduced to Parliament in 1955, the Government hoped to check and even reverse the employment of African workers in posts previously held by Whites. In terms of Section 77 of the Industrial Conciliation Act, 1956, (as amended), the Minister of Labour was empowered to reserve certain occupations for certain races.[4]

It has been the impact of the colour bars to prevent any significant 'circulation of elites' (Pareto) beyond racial boundaries and to prune the equalitarian influence of competition. The forces of competition, which disregard private interest, have therefore been mobilized to a lesser extent than would have been the case had the country's labour market relied on inter-racial competition. S. Herbert Frankel once noted in a similar regard that the South African society is standing "half-way between a feudal, or patriarchal organisation of effort on the one hand, and a modern

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1. On the relationship of these, Steenkamp notes that "the colour bar, though buttressed here and there by legal enactment, is mainly a social and cultural phenomenon". W. F. J. Steenkamp, "Bantu Wages in South Africa", The South African Journal of Economics, Vol. 30, June 1962, Footnote 19, p. 101.
2. Social and Economic Planning Council, Report No. 13, The Economic and Social Conditions of the Racial Groups in South Africa, U. G. No. 53-1948, para. 50, p. 33.
3. Officially, the civilized labour policy was described by the Department of Labour as an ensurance that the European unskilled worker "is not denied entry into unskilled occupations by reason of the fact that the lower standard of living to which the Native is accustomed has ... kept the rates of pay ... at a level which will not enable such workers to live in accordance with a standard generally observed by civilised persons". U. G. 4-1937, Annual Report of the Department of Labour for the Year 1935, pp. 15, 6.
4. Compare: Muriel Horrell, South Africa's Workers, Their Organisations and Patterns of Employment, South African Institute of Race Relations, Johannesburg, 1969, pp. 38 ff.

open economic society on the other hand". [1]

TABLE 22 : Number of Employees in Industries, Trades or Undertakings in Respect of which Wage Determinations were made during the Period 1937-1955

Classification According to Skill and Race. [2]

	Skilled	Semi-Skilled	Unskilled	Total
	A. Number of Employees			
Europeans	94,802	14,033	1,334	110,169
Coloureds	5,973	10,159	16,795	32,926
Asiatics	6,194	5,106	5,245	16,545
Bantu	6,326	21,242	110,197	137,765
All Races	113,295	50,539	133,571	297,405
	B. Classification of Workers of each Race according to Skill			
Europeans	86.1	12.7	1.2	100.0
Coloureds	18.1	30.9	51.0	100.0
Asiatics	37.4	30.9	31.7	100.0
Bantu	4.6	15.4	80.0	100.0
Total	38.1	17.0	44.9	100.0
	C. Percentage which each Race Constitutes of Class of Skill			
Europeans	83.6	27.8	1.0	37.0
Coloureds	5.3	20.1	12.6	11.0
Asiatics	5.5	10.1	3.9	5.7
Bantu	5.6	42.0	82.5	46.3

1. S. Herbert Frankel, "Whither South Africa", The South African Journal of Economics, Vol. 15, March 1947, p. 35. Similarly: S. Herbert Frankel, The Tyranny of Economic Development, ibid.

2. U. G. No. 21-1957, Report of the Department of Labour for the Year ended 31st December, 1955, Table 20, pp. 29-30.

   For a critical examination of the reliability of the above statistics, compare: U. G. No. 62-1951, Report of the Industrial Legislation Commission of Enquiry, para. 133, p. 23 and H. J. J. Reynders, Nywerheidsontwikkeling in die Bantoegebiede van Suid-Afrika, Dissertation, unpublished, Pretoria 1955, 2 Vols., p. 35.

12. 3. 3 The Migratory Labour System and Inter-Racial Wage Differentials

Inter-racial wage differentials between Europeans and Bantu are, to a certain extent, attributable to the century-long perpetuation of South Africa's migratory labour system.[1] The migrant labourer forms the link between the two opposite poles of the country's economic structure, viz., between the modernized exchange economy on the one hand, and the backward, agriculturally orientated subsistence economy, on the other.[2]

The number of migrants is considerable. The Tomlinson Commission estimated that at any time in 1951, about 503,000 male South African Bantu were employed outside their Reserves as migrant labourers, and that these represented about 44 per cent of the male population of working age between 15 and 64 years of age.[3] To this must be added some 400,000 Bantu migrant labourers from extra-Union territories.[4] As far as women are concerned, the Commission found that "it was still traditional for women to remain at home, although the tradition is undergoing changes".[5] The total number of migrant females in 1951 is given as only 66,000.[6] The total pool from which migrant labourers are drawn is naturally much larger than the actual number of migrant labourers at any moment of time. For 1951, this total has been estimated as over two million men (including extra-Union migrants).[7]

1. The South African Government opted for the perpetuation of the migratory labour system with the acceptance of recommendations of the Tomlinson Commission. Compare Memorandum, Government Decisions on the Recommendations of the Commission for the Socio-Economic Development of the Bantu Areas within the Union of South Africa, W.P., F-'56 (no date, probably 1952), p. 2.
   Compare also: Friedrich Mühlenberg, Wanderarbeit in Südafrika, Ursachen eines Arbeitsmarktphänomens dualistischer Wirtschaftsgesellschaften, Ökonomische Studien, Band 14, Gustav Fischer Verlag, Stuttgart, 1967, pp. 181-200.
2. Friedrich Mühlenberg, Wanderarbeit ..., ibid., with bibliography.
3. U.G. 61-1955, Tomlinson Report, Summary, ibid., p. 53.
4. Tomlinson Report, Original, ibid., Hoofstuk 10 p. 9 ff. This figure is adjusted for the fact that not all exta-Union Bantu wish to re-settle in their home countries.
5. U.G. 61-1955, Tomlinson Report, Summary, ibid., p. 53.
6. ibid.
7. D.H. Houghton, Men of Two Worlds, ibid., p. 181.

The economic problems associated with migratory labour are usually discussed in the context of labour productivity: a stable labour force, it is argued, would bring about better production results, less loss in time, and an overall increase in aggregate income.[1]

It is questionable, however, whether this line of thought considers all implications of the issue. South Africa is still today a country with large numbers of unemployed Bantu who would be willing to join the working force if they could. By virtue of the migratory labour system, one can therefore argue that more Bantu participate in the production process than would be the case otherwise. In this sense, the migratory labour system operates as an institution which enables the economy to fall back on a semi-experienced work force which would otherwise not be available. In this manner, extreme income differences are also being eradicated, since many rural Bantu migrate from time to time. Moreover, it would be wrong to refer to a 'loss' of potential working time when the alternative is nothing but complete idleness in the homelands. In the opinion of the writer, therefore, the problem is not to eradicate the migratory labour system, but rather to create more employment opportunities. Until such time as all Bantu are productively employed, the perpetuation of the migratory labour system must be looked upon as being economically sensible.[2]

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1. The question of productivity losses through migratory habits of the tribal Bantu found examination by E. W. Stanton, "Native Labour on Repetition Work", in : The African Factory Worker, by the Department of Economics, University of Natal, Oxford University Press, Cape Town, London, New York, 1950, pp. 96-102.
2. It is precisely the eradication of Bantu unemployment which in the long run will be instrumental in the narrowing of wage and income differentials between races.
   A good historical example of the effects of economic growth on the labour market is provided by Japan. Up to about 1956, Japan had a dual labour market, where small firms paid wages significantly lower than large firms. Whereas the wage rates paid by small firms were related to the living standards of the peasant, large firms offered high wages which they were able to pay by virtue of their greater productivity. The principle of seniority shielded the workers of large firms from outside competition .
   But all this has changed since the scarcity of labour has become a common feature in Japan. Since then, the premium formerly paid for seniority has vanished, and the wage differentials between young and old, female and male, and manual and white-collar workers, have shrunk remarkably.
   Compare Kozo Yamamura, "Wage Structure and Economic Growth in Postwar Japan", Industrial and Labour Relations Review, Vol. 19, No. 1, October 1965, pp. 58-69.

12. 3. 4 Other Factors Determining Inter-Racial Wage Differentials

Scientific opinion suggests that differences in the wage earning ability of members of different races cannot be explained in terms of differences inhereditary or biological constitutions.[1] Nevertheless, unbiased observers like the International Labour Office, suggest that "the African's work performance is at present unsatisfactory in many respects by European standards; that in quantity and quality it is often inferior; that the African sometimes lacks pride in his work; that he is often unstable and restless and prone to absent himself apparently without valid reasons. ..."[2]

The difficulties with statements of this kind arise from the fact that cause-effect relations are often inseparably intertwined. Moreover, the fact that Native labour could always be secured at an extraordinary low price, gave cause for its extravagant use.[3]

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1. Compare the careful treatment given to this question by Simon Biesheuvel, "Mind, Manners and Morals, Some Problems in Cultural Readjustment", Race Relations Journal, Vol. XXII, No. 3, 1955, pp. 18-30, here particularly pp. 20 ff.
and by the same author: "The Abilities of Africans", The Listener, 19th April, 1956, pp. 448, 9.

   On the other hand, some scientists disagree. Cornelius J. Connolly, for instance, describes the fissural pattern of Negro and White brains as follows: "Different frequencies of the features do not enable us to tell the racial provenience of an individual specimen. There remains the possibility that combinations of morphological features produce a configuration of the fissural pattern typical of each race. There is some foundation for this view. The course of the sulci often differs somewhat in our two series, a fact which is correlated with the shape of the brain. But again many exceptions occur and this feature alone could not serve as a criterion of racial differences. It may be possible, however, by considering the more typical sulcal features in each race together with other morphological features such as the shape of the brain and its parts, form of the temporal pole, etc., to determine the race to which an individual specimen belongs, in a goodly percentage of cases". Cornelius J. Connolly, External Morphology of the Primate Brain, C. C. Thomas, Springfield, Ill., 1950, p. 258.
   Compare also: Donald A. Swan, "Juan Comas on 'Scientific' Racism Again?", The Mankind Quarterly, Vol. II, No. 4, April-June 1962, pp. 231-245.
2. International Labour Office, African Labour Survey, Studies and Reports, N.S., No. 48, Geneva, 1958, Imprimeries Réunies, p. 169.
3. Evidence given to the Economic Commission, 1914, stated that "Native labour in South Africa is so cheap that it has come to be looked upon as a thing which can be used extravagently". U.G. No. 12-1914, para. 55.

Consensus of opinion has also been established that no adequate return can be achieved from the use of Native labour unless close supervision is being exercised by Europeans.[1] This in turn is naturally costly, resulting in Native labour being regarded as expensive, not as cheap.[2]

Recent research invalidates a good deal of the accusations made and conclusions drawn above. Systematic labour research suggests that:-

i. absenteeism and high labour turnover are correlated with conditions of work and the wage level, the number of hours worked per day, and the importance of the worker in the process of production;[3]

ii. the African's potential of physical exertion surpasses that of the European by as much as 50 per cent when proper financial rewards are being granted;[4]

iii. the African is highly adaptable to simple, repetitive machine operations, "usually coupled with a high degree of manual dexterity";

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1. G. St. J. Orde Browne, The African Labourer, Cass, London, 1967, p. 31.
2. In respect of South African farming, compare Margaret Roberts, Labour in the Farm Economy, South African Institute of Race Relations, Johannesburg, 1959, pp. 93, 4.
3. The effect of proper work organisation on absenteeism can be judged upon by the following tabulation given in the Report of the Government Mining Engineer for the Year ended 31st December, 1951 (the data refer to a "typical Inspector's district"):-

	Percentage Rate of Absenteeism	
	Europeans	Non-Europeans
absent due to leave	6.9	-
absent due to sickness	2.9	0.9
absent due to accident	0.9	0.3
absent with permission	1.1	0.2
absent without "	1.0	0.2
at work	87.2	97.9
Total	100.0	100.0

Source: U.G. No. 50-1951, p. 26.

4. Peter Kilby, "African Labour Productivity Reconsidered", The Economic Journal, Vol. 71, 1961, pp. 273-291, here p. 279.
5. Report No. 282 of the Board of Trade and Industries suggests that "there can be no doubt that the Native is well suited to perform a good deal of work of a semi-automatic character. ... Since the outbreak of the war ... Natives have been employed on machine operations in a sufficiently wide range of industries, both heavy and light, to prove their competence in this kind of work, provided that the processes are suitably subdivided..". Board of Trade and Industries, Report No. 282, ibid, para 134. Simon Biesheuvel suggests that the disposition of the Native toward rhythm is responsible for his adaptability for repetitive operations. Simon Biesheuvel, "The Occupational Abilities of Africans", Optima, Vol. II, No. 1, 1952, pp. 18-22.

iv. his quality as a skilled worker is closely related to his level of training;[1]

v. his supply curve of labour is not backward sloping as has often been suggested by different observers;[2]

vi. adaptability and punctuality are widely common in Native employment, and these important characteristics can be improved upon by the use of psychological aptitude tests;[3]

vii. excessive costs of supervision are largely attributable to an excessive extent of work dilution.[4]

viii. the debilitating consequence of chronic malnutrition (such as poor physical fitness, proneness to infectious diseases, low work output, and consequently low productivity) can be overcome when subsidized meals are supplied by employers

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1. A. J. Norval, the former Chairman of the Board of Trade and Industries (S. A.), remarks as follows about Bantu productivity: "Overseas industrialists, having branch factories in S. A., have been able to bring the productivity of their Bantu workers very closely in line with the productivity of their workers at the parent factory". A. J. Norval, A Quarter of a Century of Industrial Progress in South Africa, Juta, Cape, Wynberg, Johannesburg, 1962, p. 47.
2. E. J. Berge, "Backward-sloping Labor Supply Functions in Dual Economies - The Africa Case", The Quarterly Journal of Economics, 1961, Vol. LXXV, No. 3, p. 468 ff.
   Compare also: Friedrich Mühlenberg, Wanderarbeit ..., ibid., pp. 201-226.
3. Sheila T. van der Horst, "The Effects of Industrialisation on Race Relations in South Africa", in: Industrialisation and Race Relations, A Symposium, Edited by Guy Hunter, Oxford University Press, London, New York, 1965, p. 98.
   Compare also E. Raymond Silberbauer, Understanding and Motivating the Bantu Worker, A Productivity Book, Personnel Management Advisory Service (Pty) Ltd., Cape and Transvaal Printers Ltd., Johannesburg, 1968, pp. 69 ff.
4. Kilby reports an interesting observation made in Nigeria in this respect. There, Natives were instructed to stop the machine and call the European supervisor should any irregularity arise. This principle of job dilution (which, in the short run, is certainly very convenient) has been instrumental in suppressing workers' initiative. The development of labour skills was consequently delayed and the release of European supervisors prevented, which again contributed to high labour costs. Peter Kilby, Industrialization in an Open Economy: Nigeria, 1945-1966, At the University Press, Cambridge, 1969, p. 224.

to their Non-White employees. [1]

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1. Malnutrition, which is caused both by lack of money and bad feeding habits, is evidenced for South Africa by numerous studies. For the Coloured township Bonteheuwel near Cape Town, for instance, it is reported that in 1964, one-third of the 4,368 children under the age of three suffered from malnutritional diseases. * As regards Bantu living in Reserves, the Tomlinson Commission found that 20 per cent of the children born alive die before their first birthday, which is attributed to the "unhygienic customs and conditions under which they are born and grow up". ** Theodore Gillman reports that "post mortem examinations on apparently healthy Africans killed in accidents almost invariably reveal widespread bodily damage, due directly or indirectly to the consumption of a grossly unsatisfactory diet". ***
In order to overcome the lethargic effects of malnutrition, South African employers have supplied subsidized or free meals to their Non-White employees for many years now. ****
The effect that these feeding schemes have on productivity, are reported in very favourable terms. *****

Sources:

* W. Wittman et alia, "An Evaluation of the Relationship between Nutritional Status and Infections by Means of a Field Study", South African Medical Journal (Supplement - South African Journal of Nutrition), Vol. 61, July 1967, pp. 664-602.

Compare also: T. Konno et alia, "Vitamin-A Deficiency and Protein-Calorie Malnutrition in Cape Town", South African Medical Journal (Supplement - South African Journal of Nutrition), Vol. 62, September 1968, pp. 950-955.

P. J. Pretorius, "The Clinical Nature and Extent of Protein Malnutrition in South Africa", South African Medical Journal (Supplement - South African Journal of Nutrition), Vol. 62, September 1968, pp. 956-8.

** U. G. No. 61-1955, Tomlinson Report (Summary), ibid., p. 26.

*** Theodore Gillman, "Malnutrition in African Conditions", in: Africa in Transition, Edited by Prudence Smith, Reinhardt, London, 1958, p. 11.

**** S. Viljoen, "Higher Productivity and Higher Wages of Native Labour in South Africa", The South African Journal of Economics, Vol. 29, 1961, p. 36.
For an early account compare: H. C. Fowler, "The Modern Factory, Some Principles", The Social and Industrial Review, Vol. II, 1926, pp. 624-7, here p. 627.

***** M. L. Neser, "Nutrition Services as Complementary to Health Services in Developing Area", South African Journal of Science, Vol. 62, September 1966, No. 9, pp. 299-304.
For an older account, compare: U. G. 40-1941, Industrial and Agricultural Requirements Commission, paras. 191, 216, II, 234.

12. 4 Macroeconomic Determinants of Racial Wage Differentials

12. 4. 1 The Outcome of the Bantu Wages Discussion

The low level of Bantu wages and the wide wage differentials between Whites and Bantu, have attracted the attention of both official Government Commissions and private scholars for decades.[1] At least one outstanding example, worth special mention, is Sheila van der Horst's "Native Labour in South Africa", 1942.[2] However, it is only since the early 1960's that a sustained interest has arisen in the economics of Bantu

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1. The earliest comprehensive report is that of the Economic and Wage Commission, 1925, (U.G.No. 14-1926).
Later official reports include:-
Report of the Native Economic Commission, 1932 (U.G. No. 22-1932);
Third Interim Report of the Industrial and Agricultural Requirements Commission, Fundamentals of Economic Policy in the Union (U.G.No. 40-1941);
Report No. 13 of the Social and Economic Planning Council: The Economic and Social Conditions of the Racial Groups in South Africa (U.G.No. 53-1942);
The Industrial Legislation Commission
Report (U.G.No. 62-1951);
Report of the Commission for the Socio-Economic Development of the Bantu Areas Within the Union of South Africa (Summary), (U.G. No. 61-1955);
The Report of the Commission of Enquiry into the Policy Relating to the Protection of Industries, (U.G.No. 36-1958);
Report No. 282 of the Board of Trade and Industries, Investigation into Manufacturing Industries in the Union of South Africa, (First Interim Report), Cape Town, 1945.

2. Sheila van der Horst, Native Labour in South Africa, Oxford University Press, London, 1942.

wages.[1] Reasons which led to this renewed concern were, inter alia, the fact that (i) different surveys on the minimum urban subsistence requirements of the non-European household, showed more or less substantial shortfalls of actual earnings, (ii) the Sharpville riots stirred up the political conscience, and (iii), seen from the economic angle, the economy had gained sufficient strength to make possible the provision of increased supply of consumer goods.

Besides the academic interest in the matter, practical propaganda for voluntary Bantu wage increases was also iniated by employers' associations and daily and weekly newspapers.

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1. The more significant contributions are:

S. P. Viljoen, "Higher Productivity and Higher Wages of Native Labour in South Africa", The South African Journal of Economics (hereafter referred to as SAJE), Vol. 29, No. 1, March 1961.

W. F. J. Steenkamp, "Comment on Viljoen's Paper", ibid. (in future referred to as Comment I.)

C. C. V. Graham, "Increased Non-European Semi-Skilled and Unskilled Wages - the Order of the Problem in Manufacturing Industry", Race Relations Journal, Vol. XXVIII, No. 3, July-September 1961.

L. H. Katzen, "The Case for Minimum Wage Legislation in South Africa", SAJE, Vol. 29, No. 3, September 1961.

W. F. J. Steenkamp, "Comment on Katzen's Paper", ibid. (in future referred to as Comment II.)

O. P. F. Horwood, "Is Minimum Wage Legislation the Answer for South Africa?", SAJE, Vol. 30, No. 2, June 1962.

W. F. J. Steenkamp, "Bantu Wages in South Africa", SAJE, Vol. 30, No. 2, June 1962.

W. F. J. Steenkamp, "In Quest of Aims and Norms for Minimum-Wage Fixing in Terms of the Wage Act", SAJE, Vol. 31, No. 4, December 1963.

W. F. J. Steenkamp, "The Problem of Wage Regulation", SAJE, Vol. 33, No. 2, June 1965.

Donald E. Pursell, "Bantu Real Wages and Employment Opportunities in South Africa", SAJE, Vol. 36, No. 2, June 1968.

Ian Hume, "Notes on South African Wage Movements", SAJE, Vol. 38, No. 3, September 1970.

In the debate, the inadequacy of Bantu wages was accepted as an established fact. But whereas consensus of opinion prevailed that substantial and sustained increases in Bantu wages were desirable, both for social and economic reasons, significant difference of opinion arose in respect of the economic consequences most likely to result. Widely contrasting views on the expected macroeconomic repercussions of wage increases were put forward.[1] Moreover, the argument blended certain political alignments with purely economic considerations, which contributed to the uncertainty which characterised the whole issue. The income-, substitution- and price effects of wage increases by, say x_1, and x_2 or x_3 per cent p. a., were conjectured differently, a fact which could hardly be avoided since reliable macroeconomic prediction techniques are not available in South Africa. Neither was an attempt made to assess the effects of an increase in Bantu wages on different economic sectors. Steenkamp adequately described the situation by pointing out that "no one has yet succeeded in proving that a large general rise in Bantu wages would exert a net favourable effect upon the economy".[2]

12. 4. 1. 1 Demand-Pull and Cost Push Effects of Wage Increases

In the main the discussion of the economics of Bantu wages centred around the effect of substantial increases in Bantu wage rates.[3] One line of argument put forward the view that Bantu labour was paid less than its marginal revenue product. In defence of this thesis it was suggested that Bantu are denied the running of powerful trade unions, that the statutory machinery for

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1. Compare for instance the assumed effects of wage increases on Bantu labour productivity by Viljoen, ibid., p. 36, Steenkamp, Comment I, ibid., p. 42, Katzen, ibid., p. 204 ff, Horwood, ibid., p. 120.
2. Steenkamp, Bantu Wages, ibid., p. 107, compare also: Steenkamp, Comment I., p. 43, Horwood, ibid., p. 125.
3. The actual proposals as to how Bantu wages should be increased, differed widely. Thus, both Viljoen and Katzen advocated theintroduction of minimum wage legislation (Katzen with the inclusion of the primary sector), whereas others only demanded a more effective employment of the existing wage setting machinery. The Minister of Labour refuted the introduction of minimum wages on the grounds that the "different living standards for different races in different areas" would render it unfeasible. *

* Senate Debates, No. 9, 1962, Cols. 2187-2191.

negotiating Bantu wages is inefficient, that influx control restricts the geographical mobility, and the colour bar the occupational mobility of the Bantu, that Whites are better informed and organized than the Bantu, that the Wage Board, in its regulations, adopts the 'ability-to-pay principle' of wage determination (rather than the 'civilized-wage principle'),[1] and finally, in the case of mining, that the operation of recruiting agencies, cuts out competition for labour between individual mines. Moreover, simply by virtue of his poverty, the Bantu worker would not be in a position to hold out for any lengthy period without a regular income. On the basis of the above considerations it was argued that an increase in Bantu wages would have a beneficial demand-pull effect on the economy, whereas the cost-push effect would be negligible. Great stress was laid on the thesis that the increase in demand, and the concomitant increase in the size of the market, would have a stimulating effect on the economy, allowing firms to benefit of the advantages associated with large scale production.[2]

Although the matter was not expressed quantitatively, a large body of opinion doubted the wisdom of the thesis that Bantu are paid less than their marginal revenue product. The view was held that the machinery of Bantu wage determination set up under the Wage Act, the Industrial Conciliation Act and the Native Labour (Settlement of Disputes) Act, is a sufficient safeguard in this regard.[3] During the period 1958/59 to 1963/64, for instance, Bantu wages increased relatively much faster than White wages.[4]

This latter school of thought explained the existing wide wage differentials between White and Bantu labour in terms of pure economic factors.[5] At the root of the problem was seen the elastic supply of Bantu labour, which in turn stems from the Bantu homelands' supply of unskilled labour which (for practical purposes) can be regarded as unlimited. For 1962, for instance, it was estimated that the number of unemployed Bantu was 500,000,[6] whereas the additional annual employment of Bantu during the early 1960's was only in the vicinity of 50,000 persons.[7]

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1. The 'civilized wage' provision was included in the original 1925-version of the Act, but subsequently dropped in 1937. Compare Steenkamp, In Quest ..., ibid., p. 250.
2. Katzen, ibid., p. 206.
3. Viljoen, ibid., pp. 36, 38; Steenkamp, Comment I., ibid., p. 44, and Comment II., p. 215.
4. Volume II, Table 47b.
5. Steenkamp, Comment II., ibid., p. 216; In Quest of Aims ..., ibid., p. 251, 2; Bantu Wages, ibid., pp. 101, 102, 118. Horwood, ibid., p. 124.
6. Fronemann Commission, Report of the Committee re Foreign Bantu, Pretoria 1962, p. 139, para. 292.
7. SteenkampBantu Wages in South Africa, ibid., p. 113.

In what follows, the main issues connected with the economics of increases in Bantu wages, will be analysed in greater detail.

12. 4. 2 Critical Examination of the Findings of the Bantu Wages Discussion.

12. 4. 2. 1 The Case of Industries Operating under Conditions of Large Demand Elasticities and Small Income Elasticities

It appears appropriate to consider the question of racial wage differentials in relation to the price and income elasticities under which different industries operate.[1] Exporters of primary products are frequently faced with no or little marketing power, when (i) the actual price setting is done on world markets, and (ii) the internal market for their product constitutes only a negligible portion of what they sell on export markets. This situation is characteristic of large demand elasticities and small income elasticities. In other words, the firms considered here are unable to increase their prices unless they are prepared to lose a large portion of their sales. Conversely, small or even zero income elasticities, mean that increases in internal income payments will not benefit firms through increases in demand.

In South Africa, the gold mining industry is a typical sector which faces large demand elasticities and small income elasticities for its final product. Other sectors which operate under similar conditions are mining other than gold mining (mainly coal mining), and agricultural export production, such as maize.[2]

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1. The price elasticity of demand measures the increase in demand in respect to a fall in price, and the income elasticity of demand, the increase in demand in respect of increased income payments. All magnitudes are measures in relative terms.
   Compare: Wilhelm Krelle, "Elastizität von Angebot und Nachfrage", Handwörterbuch der Sozialwissenschaften, Band 3, pp. 176-183.
2. Much of the ensuing arguments relate, however, only to the mining sector, since the racial wage and income statistics referring to the agricultural sector are non-existent or unreliable.

In this section, firms operating under conditions of large demand elasticities and small income elasticities, are considered separately, because the wage issue constitutes a case sui generis for them. Unlike consumer goods industries, for instance, which supply internal markets, the industries considered here will not benefit from demand-pull effects in the event of general wage increases. In contrast, their scale of operation is likely to be reduced if a wage increase occurs, owing to the cost-push effect this causes. This is particularly noticeable in the gold mining industry, which works under conditions of decreasing returns to scale. If, say, wages increase in the gold mining industry, low grade mines will cease to operate profitably, and in the case of richer mines, certain bodies of ore may now not be mined, since this may fall outside the limit of payability. Unless matched by corresponding increases in productivity, an increase in output requires the reduction of wage rates, and vice versa.

The most important employer among industries of this kind, is the Transvaal and Orange Free State Chamber of Mines. Knowledge about the wage policy observed by this Chamber and, in particular, by its Gold Producers' Committee, is practically unobtainable for the general public. It is possible, however, (and it seems to be substantiated by the facts), that even today the Chamber has not changed the view which it held in 1944, when the Witwatersrand Natives' Wages Commission reported that "in its evidence the Chamber laid great stress on the fact that its policy was to employ cheap native labour".[1] The available evidence on wage and income statistics of the mining sector displays in fact a long-term widening in the inequality of income distribution between Whites and Bantu. Whereas after the 1922 crisis the wage bill earned by Whites exceeded that earned by Bantu only by 6.3 per cent, the difference grew to 107.2 per cent in 1968, although the employment ratio between Bantu and Whites fell only insignificantly from 9.7 to 1 in 1922, to 8.9 to 1 in 1968.[2] The average wage differentials, which in 1922 stood at 1 to 19.2 between Whites and Bantu, consequently rose to 1 to 18.5 by 1968.[3] Graphs 45 to 47 illustrate the employment, income, and wage differentials of the mining sector.[4]

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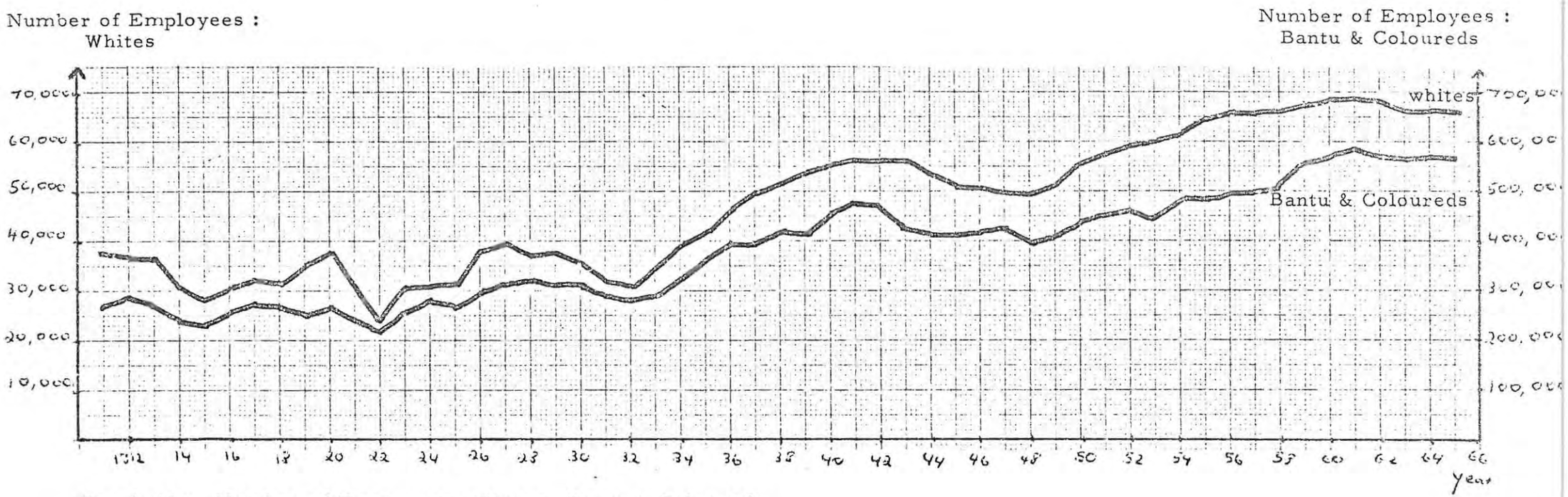
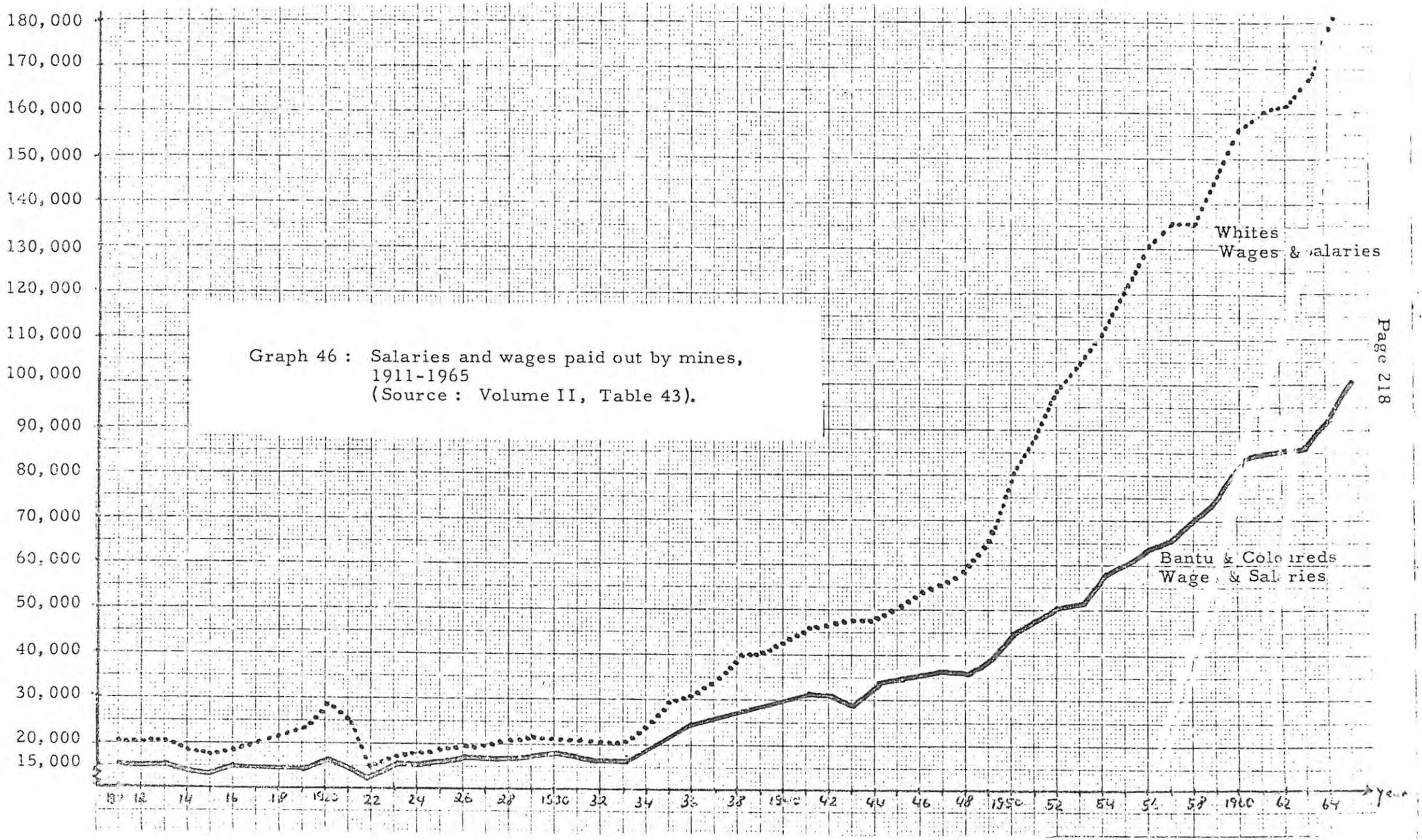
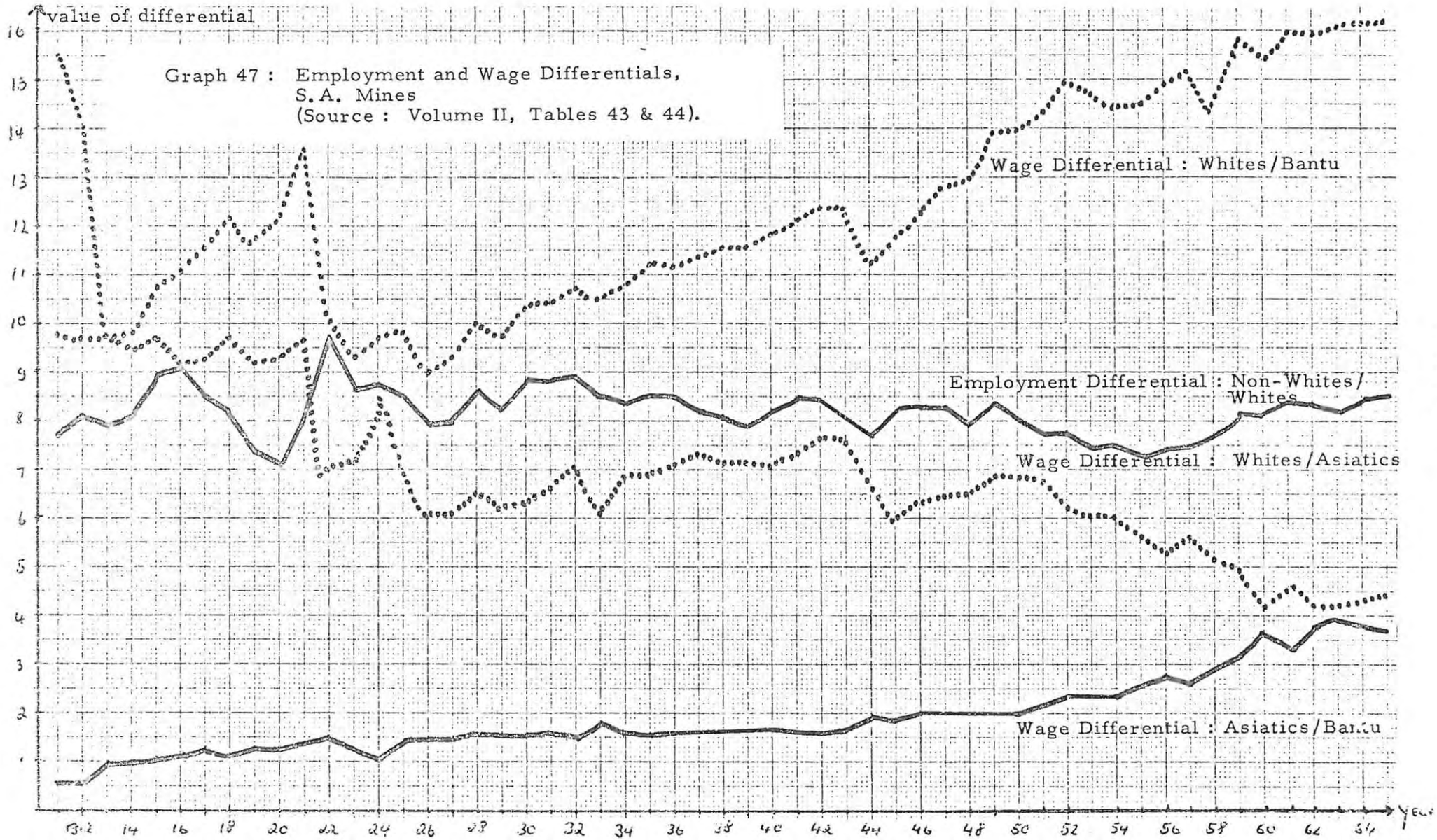
1. U.G. No. 21-1944, Report of the Witwatersrand Mine Natives' Wage Commission, para. 67, p. 5.
2. Volume II, Table 44.
3. ibid.
4. It is noticeable that Asiatics experienced a long-term improvement in racial wage differentials. This is attributable to the improved occupational status of Asiatics on the Natal coal mines. Compare graph 47 below.



Graph 45 : Number of Employees, Whites, Bantu & Coloureds S.A. Mines, 1911-1965.
(Source : Volume II, Table 43).



Graph 46 : Salaries and wages paid out by mines, 1911-1965
(Source : Volume II, Table 43).



Graph 47 : Employment and Wage Differentials, S.A. Mines
(Source : Volume II, Tables 43 & 44).

Racial income differentials on the mines are determined by two major factors: (i) by the income which accrues to capital and White labour, respectively, and (ii) by the scale of operation.

In regard to the first factor, it would appear that competitive (but not exorbitant) rates of pay have been paid to capital and White labour. As far as profits are concerned, there is no evidence for unusual returns on the capital invested. For the period 1887 to 1965, S. Herbert Frankel reports that "average gold mining rates of return have not been unduly high or unduly low in relation to others, and ... in the gold mining industry the supply of capital has been highly sensitive to and governed by the cost of capital on the international capital market".[1] In regard to White miners' earnings, it appears that the gold mines have certainly always paid competitive rates of pay to secure the necessary supply of White mine personnel. It must be noted, however, that the gold mines indirectly protected the interests of their White employees by observing the provisions of customary and statutory work reservation.[2] Presumably, this had to be done to secure peace on the labour front, and to avoid the repetition of the Rand Mine Revolt of the early 1920's.

The more important factor leading to large inter-racial income differentials on the mines, appears, however, to have been the fact that the mines have given priority to the growth, rather than to the distribution target. The gold mining sector, in particular, experiences decreasing returns to scale: there is always a marginal body of ore which becomes mineable only when the unit costs are correspondingly low. For the last quarter of 1965, for instance, it was estimated that a decrease in working costs from R5.89 to R5.40 per ton milled, would cause a gain of about 16 million ounces of gold for the industry. Conversely, an increase in working costs per ton milled from R5.89 to R6.40, would cause a loss of about the same quantity of gold.[3]

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1. S. Herbert Frankel, Capital Investment, ibid., pp. 18, 20. Compare also: Sheila van der Horst, Native Labour in South Africa, ibid., p. 261.
2. The Low Grade Mines Commission, 1920, reports for instance: "In the mines, ... native and coloured workmen perform those classes of work in which the least amount of skill is required. The scope of employment is limited ... to the performance of the rough and simple manual labour, such as the handling and carrying of material, the drilling of holes, the shovelling and tramming of broken rock, and so on". U.G. No. 34-1920, para 154, p. 25.
3. "The Outlook for Gold Mining", A Memorandum prepared by the Gold Producers' Committee of the Transvaal and Orange Free State Chamber of Mines, Swan Press, Johannesburg, (no date, presumably 1967), p. 17.

Confronted with the choice of (i) maximizing the scale of operation and using its monopsonistic buying power towards Bantu labour, or (ii) reducing the scale of operation and offering significant increases in real wages for Bantu labour, the mines have clearly taken the decision of maximizing the number of tons milled and thereby maximising their actual growth contribution to the economy. By doing so, the mines have also maximized their export earnings and hence the contribution they made to the establishment of the manufacturing sector.

From the economic point of view, it appears that the economic factors were taken into account as they actually presented themselves: on the one hand, there was a well-organized skilled White labour force commanding scarcity premiums by virtue of its strong bargaining position and, on the other hand, an unorganized monopsonistic Bantu labour market force whose economic aspirations were orientated in terms of African subsistence standards (which are frequently even lower than the South African averages, since about 60 per cent of the local Bantu labour force is recruited from outside the country).

12. 4. 2. 2 The Case of Industries Operating under Conditions of Falling Demand Curves and Large Income Elasticities

In this section, the wage issue will be considered in respect of firms operating under conditions of falling demand functions[1] and large income elasticities. Although both the secondary and tertiary sectors fall into the above category, this discussion will be confined to a consideration of South Africa's manufacturing and construction industries, because it is only here that racial wage and income data are available on an annual basis.[2]

The question which has to be answered is: do racial wage differentials in the manufacturing and construction sector display trends in conformity with the investment and growth performance of the economy?

In the discussion of the functional distribution of incomes, it was found earlier that during some periods of South Africa's economic history, income would have grown faster had the rate of consumption in income been higher than what it actually was, whereas during other periods, the opposite would have been true.[3] It appears

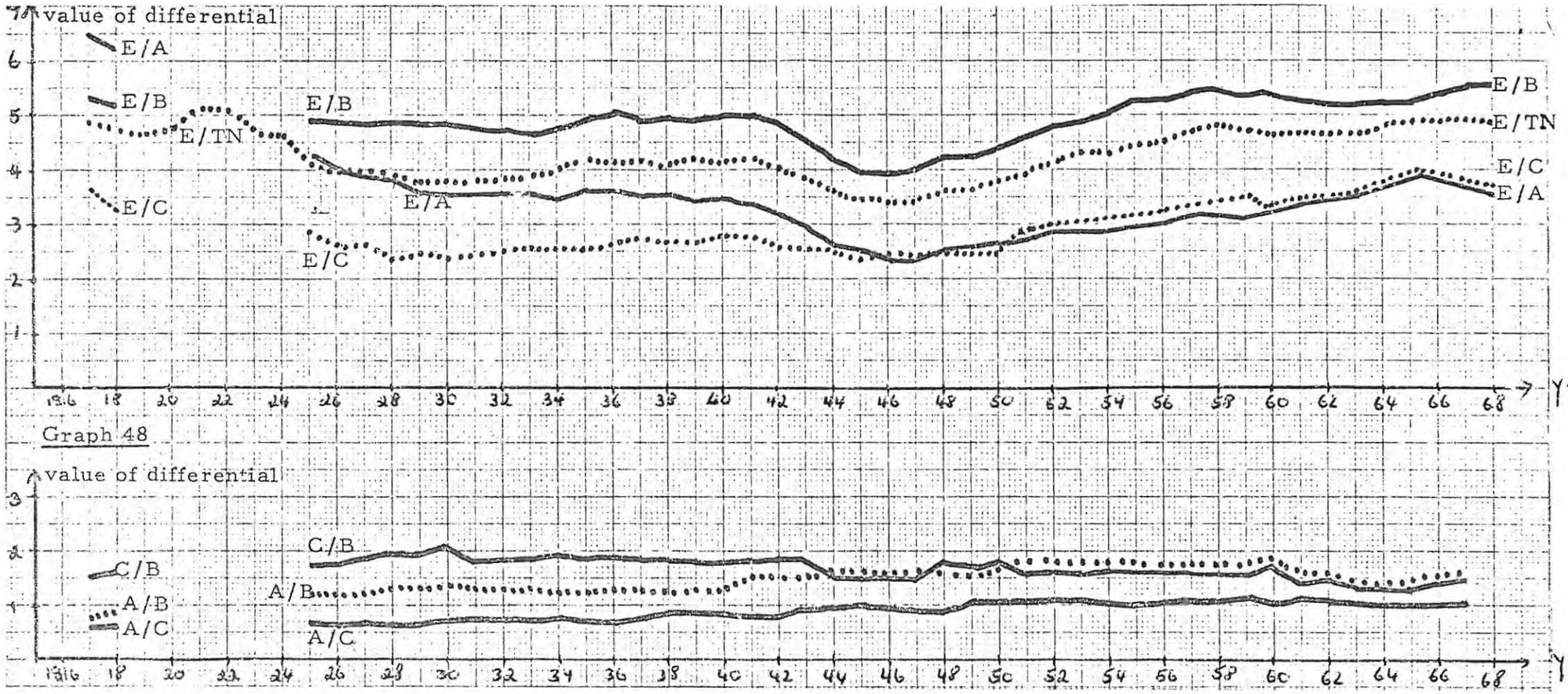
1. Erich Schneider classifies this case as "price-fixing on the basis of an expected price-sales relation". Pricing and Equilibrium, English Version by Esra Bennathan, Unwin, London, 1966, p. 50.
2. Compare Graphs 48 and 49 below.
3. Compare p. 110 above.

that this macroeconomic finding can be related to the trend in racial wage differentials, in that a narrowing of racial wage differentials can be expected to produce an increase in the rate of consumption in income, if one accepts that (i) the marginal propensity to consume is greater for Non-Whites, compared with that of Whites, and (ii) that improvements in Non-Whites' wages are unlikely to be paid at the expense of Whites' wages. This assumes that an improvement in the Non-Whites' relative wage and income position stems either from improved productivity, from the additional surplus created by a growing economy, or from a shift of economic activity from the investment to the consumer goods sector.

TABLE 23 : Comparison of Actual and Predicted Rates of Investment with Racial Wage Differentials in the Manufacturing and Construction Sector[1]

1.	Years during which actual investment was smaller than predicted investment	Wage rate differential: European over total Non-European
	1918	4.75
	1921-1934	falls from 5.13 to 3.96
	1940-1945	falls from 4.26 to 3.46
	1959-1963	falls from 4.64 to 4.61
2.	Years during which actual investment was larger than predicted investment	Wage rate differential: European over total Non-European
	1919-1920	rises from 4.75 to 4.85
	1935-1939	rises from 4.12 to 4.17
	1946-1958	rises from 3.42 to 4.69
	1964-1968	rises significantly[2]

1. Sources: pp. 125 ff and Volume II, Table 47.
2. During the period 1964 to 1968, the increase in White wages was faster in relative terms than that of Bantu. Consequently, the wage differential between Europeans and Non-Europeans must also have widened, in spite of the fact that the wage and income position of Asiatics and Coloureds improved somewhat in relation to the other races. This follows because the income bill of Asiatics and Coloureds is too small as to affect the overall picture significantly.
Compare Volume II, Table 45.



Graph 48 : Wage Differentials : Europeans in Relation to Non-Europeans
S. A. Manufacturing Industries

Graph 49 : Wage Differentials Between Non-European Races
S. A. Manufacturing Industries

(Source for graphs 48 & 49 : Volume II, Table 46).

Explanation of Symbols

E/B	Europeans to Bantu
E/C	Europeans to Coloureds
E/A	Europeans to Asiatics
E/TN	Europeans to Total Non-Europeans
C/B	Coloureds to Bantu
A/B	Asiatics to Bantu
A/C	Asiatics to Coloureds

Table 23 reveals a noticeable identity between the investment pattern of the total economy, and the racial wage differentials in the manufacturing and construction sector. During the three periods when actual investments were smaller than predicted investments (i.e., when economic growth would have been faster had the rate of consumption in income been higher), there has been a fall in the racial wage differential. Conversely, during the four periods when actual investment was larger than the predicted investment, there occurred rises in racial wage differentials. Hence it appears that the widening of wage differentials was associated with an increase in investment activity, and vice versa.

The close correlation between racial wage differentials in the manufacturing and construction sector, on the one hand, and the rate of growth of total income, on the other, suggests that the dichotomy between the distribution and growth targets, which was established above for the mining sector, is evident also for the secondary (and perhaps even the tertiary) sector. It must be borne in mind, however, that the cause - effect relation is different for the two cases. For the mining sector, the dichotomy between the two targets came about by virtue of the fact that the industry operates under conditions of decreasing returns to scale. For the manufacturing and construction sector, in turn, it appears that investments (and, hence, potential growth) are mainly a function of retained earnings, the accumulation of which stands in direct competition with the total wage bill. The hypothesis that firms plan their investments in accordance with the size of retained earnings at hand, has found frequent affirmation in econometrical studies.[1]

1. J. Tinbergen, Business Cycles in the United States, 1919-1932, League of Nations, Geneva, 1939. W. Heller, "The Anatomy of Investment Decisions", Harvard Business Review, March 1951, pp. 95-103. S. C. Tsiang, "Accelerator, Theory of the Firm, and the Business Cycle", Quarterly Journal of Economics, Vol. LXV, August 1951, pp. 325-341. John R. Meyer and Edwin Kuh, The Investment Decision, An Empirical Study, Harvard University Press, Cambridge 1959. By the same authors: "Acceleration and Related Theories of Investment: An Empirical Inquiry", Review of Economics and Statistics, Vol. XXXVII, August 1955, No. 3, pp. 217-230, with a note by Irving Morrissett and a reply by Meyer and Kuh in: Review of Economics and Statistics, Vol. XXXIX, 1957, pp. 91-93 and 218-222.

   The writer worked on a model to check the findings of American economists, for the South African economy. Unfortunately, the attempt had to be abandoned, because the available statistical data on firms' appropriation and profit and loss accounts, are not linked with information on sales and wages. However, there is a great deal of evidence which suggests that for South African firms, the availability of finance (mainly of risk capital) constitutes a bottleneck for the increase in their assets. Compare the discussion of this issue, pp. 117 above.

Although our knowledge is only fragmentary, it appears that there has been a tendency for the investment behaviour of South African manufacturing and construction companies to be dominated by liquidity and financial considerations, rather than by the working of the acceleration principle.[1]

12. 4. 3 South African Labour Legislation and Macroeconomic Implications

It appears that South African labour legislation has been supporting the ideal-objective of a maximum growth rate to a considerable extent.[2] In order to substantiate this thesis, it is necessary to analyse the more important parts of the labour legislation in some detail.

Statutory wage legislation is provided by the Industrial Conciliation Act (Act No. 11 of 1924), the Wage Act (Act No. 27 of 1925), and the Bantu Labour (Settlement of Disputes) Act (Act No. 48 of 1953). The first of these statutes, provides for the establishment of Industrial Councils, on which employers and employees (excluding Bantu employees) have equal representation. By way of collective bargaining, these Councils are empowered, inter alia, to regulate wages. In contrast with similar legislation in other countries, a criminal offence is committed if any party fails to observe the conditions of Agreements, which acquirethe force of law after being

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1. Compare the analysis of South African capital markets, pp.117 above.
2. Apart from labour legislation, the non-acceptance of statutory social insurance obligations (which were proposed by the Social Security Committee in 1943), must also be regarded as an example of the government's objective to promote the growth goal at the expense of the distribution goal.
   Compare U.G.No. 14-1944, Social and Economic Planning Council, Report No. 2, "A Summary of the Social Security Scheme recommended by the Social Security Committee", Appendix to the Report on Social Security, Social Services and the National Income.

   Compare also M. van den Berg, "The Objectives of Post-War Economic Policy in the Union", Finance and Trade Review, Vol. I, No. 8, January 1956, pp. 18-29.

approved and published by the Minister of Labour.[1] It is possible that Industrial Council Agreements are being extended so as to include the Bantu.[2]

The Wage Act, which was introduced as complementary legislation to the Industrial Conciliation Act,[3] provides for a minimum wage legislation on an industry basis, in industries which are not, or not sufficiently organized to avail themselves of the self-government granted under the Industrial Conciliation Act.[4] The wage fixation is undertaken by the Minister of Labour upon the recommendation of the Wage Board. It is possible for Bantu workers' organizations to appear before the wage board and represent their cases.[5]

Bantu representation in the fixation of wages is provided for by the Bantu Labour (Settlement of Disputes) Act. The Act provides for the establishment of a Central Bantu Labour Board, Regional Bantu Labour Committees, and Works Committees on a factory level. The Works Committees represent the labourers' interests vis-à-vis management, and are established if the workers wish it. The Regional Committees, which work in liaison with the Works Committee, are composed of Bantu members and a White Chairman. The Central Bantu Labour Board consists of Whites only. The Chairman is appointed by the Minister of Labour. In the event of a dispute, the above-mentioned authorities are authorized to settle it. If they fail, the Minister of Labour may direct the Wage Board to reach a settlement. Steenkamp reports that the Central

1. Compare State of the Union, Economic, Financial and Statistical Year Book for the Union of South Africa, 1960-61, Da Gama Publications, Johannesburg, p. 374.
2. W. F. J. Steenkamp, The Problem of Wage Regulation, ibid., p. 96 ff.
3. Compare Hansard, Vol. 29, 1937, col. 4323.
4. Although complementary, there may evoke conflict between the Wage Act and the Industrial Conciliation Act. Thus, if the determinations made under the Wage Act are more advantageous to employees than what they would be able to negotiate under the Industrial Conciliation Act, they may lose interest in the trade union movement. If, on the other hand, employers find that the board recommends wages lower than Industrial Agreement rates, they might wish to be subjected to Wage Board Regulations. The danger for the industrial council system to be disrupted by the Wage Act is therefore immanent. Compare: U. G. 38-1949, Report of the Department of Labour for the Year ended 31st December, 1947, p. 29.
5. Bantu trade unions were particularly successful with their recommendations during the World War II period. Compare: U. G. 62-1951, Report of the Industrial Legislation Commission of Enquiry, para. 1540 ff.

Labour Board and the Regional Committees have come into existence, but not many Works Committees have been formed. [1]

A considerable impact on the wage formation originated from the Wage Act, which applies to all economic activities excluding agriculture, domestic service, apprenticeships, and the public sector (but including municipalities). Moreover, although not excluded by the Statute, wage board investigations have never been undertaken in respect of the mining sector.

Between the years 1937 and 1955, wage determinations in respect of 297,405 persons were passed, of whom 137,765 were Bantu. [2] Thus, a considerable section of the labour force fell under the determinations here considered. [3]

12. 4. 3. 1 'Civilized-Wage Principle' versus 'Ability-to-Pay Principle' in South Africa's Labour Legislation

Under Section 3 (3) of the original Wage Act, No. 27 of 1925, the Wage Board was directed to make recommendations in respect of wage rates "upon which ... employees may be able to support themselves in accordance with civilized habits of life". With this stipulation, a colour bar was in fact introduced, because wage rates had to be stipulated for a particular job, and not according to race. This resulted in employers choosing mainly White men for skilled, and non-White men for semi-skilled and unskilled work operations. (see Footnotes 4 and 5.)

1. W. F. J. Steenkamp, The Problem of Wage Regulation, ibid., p. 96.
2. Table 22 above.
3. Compare Volume II, Table 57.
4. For evidence compare Table 22 above.
5. It is of interest that General Smuts, in the parliamentary debate on the Wage Bill in 1925, did not see (or did not want to see?) that the White employers would react in the manner indicated. Instead he surmised that the Black man would be put on an equal footing with the White man, as far as the average wage rates are concerned. On this assumption, he argued that "many industries will shut up because you will level up, you will have to level up, the wage of the black man ... The Bill... will close many industries, because you cannot, as our industries are today, here in South Africa, pay the black man a wage which will be a subsistance wage for the white man and still continue to run those industries". House of Assembly Debates, Hansard, 30th March, 1925, cols. 1601 and 1602.

Owing to the boom of the 1930's, the industrial prosperity after the Second World War, and the increased attention now being given to the economic conditions of the Bantu, the Wage Act "came to be regarded, increasingly, as an instrument for the betterment of the economic condition of the lower-paid workers, ... and in particular after 1957, the Act came to be more deliberately and more vigorously applied in the interests of the non-European worker".[1] This change in the application of the Act, has found its reflection in the fact that the criterion of a 'civilized' wage was dropped in the 1937 and 1957 amendments of the Act.[2] Instead, the 'civilized-wage principle' was replaced by the 'cost-of-living principle',[3] which prescribed different wage rate increases for skilled-, semi-skilled and unskilled workers.[4] It could thus be employed to prescribe warranted improvements in the wage rates for members of certain races.[5] This does not necessarily mean that discrimination took place against one particular section of the community. Between 1941/42 and 1945/46, for example, the cost-of-living allowances provided for considerably higher wage increases for non-Whites than for Whites.

Whilst the criterion of a 'civilized-wage' was written into the principal Act as an 'ideal-objective', a counter-weight was set by the 'ability-to-pay principle', which clearly dominates the former objective (see Footnotes 6 and 7). The legislator directed the

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1. W. F. J. Steenkamp, In Quest of Aims and Norms..., ibid., p. 250.
2. Compare Section 6 of Act No. 44 of 1937 and Section 5 of Act No. 5 of 1957.
3. For the importance of the cost of living allowances compare: F. van den Bogaerde, "The Development and Nature of Collective Agreements in the South African Metal Industry", Finance and Trade Review, Vol. V, No. 1, March 1962, pp. 13-37.
4. Compare U. G. 9-1947, ibid., para. 15, p. 33.
5. For example see U. G. 21-1944, para. 272, p. 22.
6. There were all in all seven principles of wage determination put into the 1925 Wage Act, but only the two principles mentioned above are here of relevance.
7. Various Commissions backed the 'ability-to-pay principle', such as the Economic and Wage Commission, 1925 (U. G. No. 14-1926, para. 336), and the Industrial Legislation Commission (U. G. No. 37-1935, para 145).

Wage Board to take into account in its investigations the "ability of employers in that trade ... to carry on the same successfully should any recommendation as to wages, rates or other conditions be carried into effect". (See Footnotes 1 and 2.)

In practice, when investigating a trade, the Wage Board calls for returns of employers giving the race, age, and sex of each of their employees and the conditions of their employment. In addition, employers have to furnish their latest balance sheet and the profit and loss accounts for the last one or two years.

The annual Wage Board Reports have time and again stressed the fact that great difficulties were experienced in reconciling the 'civilized-wage' with the 'ability-to-pay principle', since these two objectives were 'antipathetic'.[3] But whilst it was held that the financial statements of employers enabled the Board to make "an accurate financial analysis of the payability of the industry", ... "expressed in concrete mathematical terms"[4], the lack of generally accepted guidelines to establish the 'needs of the workers' was repeatedly deplored.[5]

To the writer it appears that the argument is rather unacceptable, since, in an evolutionary economy, the 'ability-to-pay principle' must be regarded as equally hazardous as is the determination of workers' needs (excluding, however, the case of gold mines). The thesis is therefore put forward that the Wage Board,

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1. Section 3 (2) of Act No. 27 of 1925. In the event of a conflict between the two objectives, the 1925 Act directed the Wage Board to make no recommendation, but merely to report to the Minister of Labour, who was then entitled to instruct the Wage Board to put forward a recommendation, in spite of the conflict in objectives. See Section 3 (3) of Act No. 27 of 1925.
2. In the case of the complementary Industrial Conciliation Act, the 'ability-to-pay principle' (although not mentioned by the Act), is nevertheless reported to constitute a "vital factor when negotiating wage agreements".
   U.G. No. 37-1935, Industrial Conciliation Commission Report, ibid., para. 203, p. 62.
3. U.G. No. 45-1941, Report of the Department of Labour for the Year 1940, p. 31.
4. U.G. 36-1940, Report of the Department of Labour for the Year 1939, p. 56.
   A limited revision of this statement was given by U.G. No. 9-1947, Report of the Department of Labour for the Year 1945, para. 14, p. 33.
5. U.G. No. 36-1940, ibid., p. 56.
   U.G. No. 45-1941, ibid., p. 31.
   U.G. No. 9-1947, ibid., para. 15, p. 33.

by accepting the rationality of the one principle and denying it for the other, gained sufficient room for manoeuvre to pursue whatever policy it deemed most fit. The change in the policy of the Wage Board which occurred at the end of the 1940's, may serve as an illustration of this hypothesis. Until then, Bantu wages had been generously increased in real terms, i.e., by 49.1 per cent during the period 1940/41 to 1945/46, whereas White wages, during the same period, improved by only 17.3 per cent.[1] This development was completely reversed during the 1950's, when Bantu real wages practically stagnated (improving by only 6.1 per cent during 1946/47 to 1959/60), whereas White wages rose considerably faster (improving by 34.4 per cent during the same period).[2] Although the 'ability-to-pay principle' is defined in the Statute as a principle referring to the individual firm, and not to the total economy, it has been shown above that harmony exists between the wage policy, on the one hand, and the investment and growth performance of the economy, on the other.[3] Thus, during the period of slow wage rate increases after the Second World War, the rate of net investment increased from an average of 11.1 per cent from 1941 to 1946, to 21.9 per cent from 1947 to 1956.[4] This supports the argument that the actual wage policy in South Africa was geared in accordance with the growth policy of the country. Although it is difficult to determine which is the cause and which is the effect, the evidence overwhelmingly illustrates that the impact of economic variables has been considerable in South Africa's wage policy.[5]

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1. Volume II, Table 47 b.
2. ibid.
3. p. 117 ff above.
4. Source: see footnotes to Tables 4 and 5, p. 115 above.
5. Some commentators claim that the politically determined power of Bantu trade unions, rather than economic factors, was responsible for the improvement in the standard of Bantu wages during the Second World War. * This may be true to a certain extent. What matters, however, is not the particular cause-effect relation which is inherent in the whole issue, but the fact that there existed, in South Africa, a congruence between both racial wage differentials and individual wage rates, on the one hand, and the economic growth performance, on the other.
   * "Interracial Wage Structure in Certain Parts of Africa", (no author), in: Labour Review, Vol. LXXVIII, July 1958, Geneva, p. 54.
   U.G. 62-1951, Industrial Legislation Commission, para. 1540.
   Muriel Horrell, South African Trade Unionism, South African Institute of Race Relations, 1961, Johannesburg, p. 75.

In this regard it is interesting to note that the argument officially put forward in 1952, for the reduction in the cost of living allowance referred to the "existing pyramid of inflation".[1] This was correctly observed, since the increase in investments naturally contributed to the sharp increases in the price index.

It would, nevertheless, be wrong to suggest that the development of the country was financed by a certain section of the community. As Frankel reminds us: "At that point, we have come full circle: because, at the last, the developers and the developees are not two distinct groups of persons in the abstract, but one group composed of differing individuals. The wherewithal for the process of civilizing or developing, call it what you will, has to be produced jointly, or not be produced at all!".[2]

12. 4. 4 Wage Levels and the Size of Markets

The empirical findings of this study suggest that during long periods (and particularly during most of the past 20 years), South Africa's economic development was not effectively curtailed by insufficient demand for consumer goods, but rather by too low a rate of investment.[3]

In contrast to this finding, it appears rewarding to examine the question whether a general increase in Bantu wages would have a potentially beneficial effect on the economy through the concomitant increase in the size of the markets, as has frequently been asserted by various economists.[4]

It seems appropriate at this stage to evaluate this issue in the light of some more precise information on the alleged underdevelopment of South Africa's markets, which is supposed to result mainly from two sources, viz.,

(i) the low purchasing power of the Non-White population, and

(ii) the diversification of markets owing to different purchasing habits of members of different races.

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1. House of Assembly Debates, Hansard, 12th February, 1952, columns 1064, 5.
2. S. Herbert Frankel, The Tyranny of Economic Development, ibid., p. 13.
3. Compare p. 111 above.
4. L. H. Katzen, The Case..., ibid., p. 206. D. Hobart Houghton, The South African Economy, ibid., p. 127 ff.

In order to gauge the impact of the alleged smallness of markets, recourse will be had to a proposal made by Simon Kuznets, who suggested that the size of the market can be defined in terms of the size of the population of a country.[1] Kuznets classifies a nation as 'large' if her population exceeds the dividing line of ten million. For small nations, Kuznets submits, the optimum scale of plant size, can often not be achieved simply because the size of the internal market is insufficient. Unless reliance can be placed on export markets, diseconomies of small scale will be significant.

The plurality of South Africa's population structure makes it inadvisable to use Kuznet's criterion of population size in its pure form. It would rather appear appropriate to transfer the size of the Non-White population into what may be called 'average European consumer units', thus accounting for the large differentials in purchasing power commanded by members of the four different races.

During 1960, for instance, the average per capita income of Whites was R1,217.5 p.a., as against R136.5 for Coloured persons, R168.0 for Asiatics, and R79.2 for Bantu.[2] The average per capita income of Whites was consequently 8.9 times higher than that earned by Coloured persons, 7.2 times higher than that earned by Asiatics, and 15.4 times higher when compared with the average income earned by Bantu.

The calculation of the size of South Africa's population in terms of 'average European consumer units', is shown below:-

TABLE 24 : Population of South Africa, 1970, Nominal and in Equivalents of 'Average European Consumer Units', in million.[3]

	Nominal Population	Per Capita Income Differentials	Population Size in terms of Av. Eur. Cons. Units
Whites	3.8	-	3.8
Coloureds	2.0	1 : 8.9	0.2
Asiatics	0.6	1 : 7.2	0.1
Bantu	14.9	1 :15.4	1.0
Total	21.3		5.1

1. Simon Kuznets, "Economic Growth of Small Nations", in Economic Consequences of the Size of Nations, Ed. by E. A. G. Robinson, International Economic Association, MacMillan, London, 1963, p. 14.
2. Volume II, Table LIII, for income values. South African Statistics, 1968, ibid., A-11, for population figures.
3. Population data for 1970 from: Hansard (House of Assembly Debates), 25th September, 1970, col. 5132.

According to the calculation submitted, it becomes apparent that the size of South Africa's population in 1970 was approximately 5.1 million 'European consumer units', in terms of which the country has to be grouped as a small nation.

However, the reduction of the actual population into equivalents of 'European consumer units' must still be regarded as merely suggestive, since what has now become equal in terms of average purchasing power, has not acquired equality in terms of actual expenditure patterns. South African management is, in fact, confronted with a large diversification of markets, because the expenditure pattern of Bantu is significantly different from that of Whites. This can be demonstrated by comparing the items of the consumption pattern of urbanized Bantu with that of European families, as is done in Table 25, p. 234 below.

It is clear from the illustration below, that whereas Whites can spend a large portion of their purchasing power on personal services, durable consumer goods and luxury handicrafts, it is necessary for the Bantu to channel their purchasing power mainly into products which give subsistence protection, such as staple food, housing, heating, and clothing.

Moreover, it is noteworthy that the Bantu expenditure pattern submitted below, refers to that of Bantu living in the Port Elizabeth/ Uitenhage area, in other words, representing those persons whose personal income is higher than that of all other Bantu in the Republic, particularly when compared with those who reside permanently in Bantu homelands.

Race as such becomes a generator of consumption inequalities whenever racial income differentials are large.[1] As a result of this pattern, the market for locally produced consumption items does not allow firms to materialise the potential advantages of large scale production in full. As to the disadvantages connected with the diversity of demand, J. Goudriaan reports for instance, that there are about 600 different kinds of glass bulbs regularly used in South Africa. This large number is due to the usage of 16 different voltages (including low voltage systems in operation on farms), and two different types of fittings, Swan and Edison.[2] In view of this diversification, the employment of specialized machinery is not

1. Compare: W. Paul Strassman, "Economic Growth and Income Distribution", The Economic Journal, Vol. 70, 1956, pp. 415-440, here pp. 431-35.
2. J. Goudriaan, "Automation", Finance and Trade Review, Vol. II, No. 3, Jan., Feb., 1957, p. 180.

feasible. For light bulbs it is reported that "one machine could satisfy the annual requirements of our whole market in six weeks".[1]

TABLE 25 : Percentage Distribution of Purchasing Power on Main Expenditure Groups, Whites, 1966, Bantu, 1965[2]

Expenditure Item		Expenditure as per cent of Household Income	
		Whites	Bantu
1.	Food	19.5	49.2
2.	Clothing, footwear and accessories	8.3	12.1
3.	Housing, incl. water, excluding dom. service	14.0	5.0[3]
4.	Fuel and light	1.9	4.3
5.	Transport & communication	13.3	4.0
6.	Medical and dental services	2.9	0.4
7.	Insurance	5.6	0.6
8.	Recreation, amusement, sport	2.3	0.8
9.	Beer and alcoholic beverages tobacco, cigarettes	3.3	6.7
10.	Washing, cleaning, dry-cleaning	1.6	4.4
11.	Personal care	2.3	2.2
12.	Miscellaneous	25.0	10.3
		100.0	100.0

Another example of the disadvantages of small markets is provided by the motor manufacturing industry. The minimum automated plant size requires that the output be 50,000 to 60,000 units p.a., a figure which exceeds the total annual car sales on the

1. G. C. V. Graham, "Increased Non-European Semi-Skilled and Unskilled Wages," ibid., p. 6.

2. Sources:

   for Whites: Bureau of Statistics, 11-06-01, Survey of Family Expenditure, November 1966, Average Expenditure and Income According to Income Groups - Ten Principal Urban Areas and the Urban Areas of the Vaal Triangle and the Orange Free State Gold Fields, p. xiii.
   for Bantu: Bureau of Market Research, Research Report No. 17, Income and Expenditure Patterns of Urban Bantu Households (Port Elizabeth/Uitenhage Survey), by G. R. Feldmann-Laschin, 1967, Table 27.

3. The percentage of expenditure going to housing is low because of heavy subsidization of Bantu housing in urban areas.

South African market about 5 times.[1] Likewise, the South African tractor market absorbs about 40 units per work day, whereas a small plant must at least rely on a production of 200 units per day, and a fully automated plant on 5,000 to 6,000 units per work day, in order to operate economically.[2]

In general, the economies of scale are reported to be large in the following sectors:-[3]

(i) Iron, Steel, and Engineering Industries
Rolling mills;
Aircraft;
Railway stock;
Electrical manufacturing;
Electronics;
Industrial machinery;

(ii) Chemical Industry
Processes are of a flow nature and therefore lend themselves to highly capital intensive procedures.

(iii) Paper
Particularly newspapers and fine paper production;

(iv) Textiles
Both printed and woven fabrics.

In judging the validity of the above arguments, it nevertheless appears to the writer that the diseconomies of small scale production hardly delayed South Africa's industrial development. Naturally, a qualitative issue of this kind requires tentative approach, but the following arguments are relevant:-

(i) In spite of the alleged diseconomies of small scale production, South Africa has made good progress with the introduction of automatic transfer machines and

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1. S. P. du Toit Viljoen, "Automation and its Possible Application in South Africa", The Manufacturer, January 1957, pp. 9-11, February 1957, pp. 9-13, March 1957, pp. 31-33. here: February 1957, p. 10.
2. ibid.
3. Royal Commission on Canada's Economic Prospects. Fullerton, D. H., and Hampson, H. A.: Canadian Secondary Industry, May 1957, Chapter 4, here quoted from: G. Marais, "Import Replacement and the Development of Intermediate Industries in the Republic of South Africa", Finance and Trade Review, Vol. VII, Nos. 1 and 2, March/June 1966, p. 12, 3.

automatic feed-back processing arrangements in the following industries: metal, food, textile, stone, clay, earthenware and glass, drugs, chemicals, paints, varnishes, and allied products. As from 1960, the wide-spread introduction of automation in government departments, insurance companies, banks, and commercial and transfer activities has also begun.[1]

(ii) Many industries which have started off with small but viable minimum sizes, have grown significantly with the expansion of the internal markets. Examples are, inter alia, the ceramic and brick making, paper and pulp, and motor assembly industries.[2]

Apart from these microeconomic considerations, certain macroeconomic thoughts are relevant as well. These are:-

(i) The cost-push and demand-pull effects of wage increases will not be equally spread over all firms of the economy. Thus, not only the mines and agricultural export producers, but also other industries which face relatively inelastic income elasticities will not be compensated for the wage increases by additional demand for their products.

(ii) Depending on the elasticity of demand for labour, higher wage rates will cause a decrease in employment, owing to firms' attempts to substitute, for instance, labour for machinery. It is therefore not certain at all whether increased wages will cause an increase in demand.

(iii) Higher wages may induce the growth of the consumer goods sector at the expense of the growth of the investment goods sector. This may not necessarily be in the interest of the long-term growth of the economy.

(iv) Wage increases, when undertaken during a temporary depression in order to stimulate internal demand, are usually irreversible when economic conditions improve and when rising prices constitute a menace - as in the case of South Africa - to the operation of the gold mines.

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1. S. P. du Toit Viljoen, Automation ..., ibid., February 1957, p. 11.
2. D. J. Viljoen, "Problems of Large-Scale Industry in Africa", in: Economic Development for Africa South of the Sahara, International Economic Association, Ed. by E. A. G. Robinson, ibid., p. 630.

Taking all this evidence into account, it would appear that the disadvantages arising from the smallness of internal markets have been negligible in South Africa - at least whenever upswings in the business cycle were experienced. The country's economy has been stimulated largely by autonomous investments, and not by induced investments through increased consumption. This conclusion is enhanced by the following opinion expressed by the Board of Trade and Industries: "(In South Africa) there are sufficient private investment outlets during the upswing of the trade cycle to obtain equilibrium at a high level of employment. Under such circumstances consumption and investment stand in a competitive rather than in a complementary relation to each other. In South Africa, therefore - and an analogous example is offered by Soviet Russia - the question of how much to consume is exclusively a problem of the future satisfaction of wants against the present satisfaction of want, and, therefore, a question of the rate of progress of the country".[1]

1. Board of Trade and Industries, Report No. 282, ibid., para. 137, p. 47.

12.5 Some Reflections on the Impact of Narrowing Inter-Racial Wage Differentials in South Africa.

Advocates of positivistic opinions[1] have time and again predicted that the 'Law of Change' must become operative in South Africa and lead (of necessity) to a change in economic and social conditions. To quote the Economic Commission for Africa (United Nations), 1963 : "In South Africa, present official policy aims ... rigorously at intensified racial discrimination and separate development. Apart from the direct economic waste and costs involved, in recent years the process has given rise to intense inter-racial tensions and conflicts... Further, racial discrimination and repression sooner or later increase the risks of investment and reduce a country's credit-worthiness..." [2]

Other well-known economic authorities have occasionally shared similar views. John Bates Clark, in an advocacy of what might be called naive economic ethics, once suggested that workers would become revolutionists if it were to appear that they were not paid in accordance with the laws of the marginal productivity theory.[3] In the event of the cultural subsistence

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1. It is true of course that the positivism has been responsible for the development of empirical social research during the 19th century.* But from this it was a small step only to formulate social 'laws' on the basis of observed facts.
   A powerful criticism of this mode of thinking has been put forward by Walter Eucken: "In dieser (d.h., positivistischen) Auffassung der Geschichte haben Persönlichkeiten, personale Freiheit, Uberzeugungen, Ideen von vornherein keinen Platz. Es wird der Versuch gemacht, 'aus den Gesetzen des Naturzusammenhangs den Imperativ für die Gesellschaft abzuleiten' (Dilthey). Vom fallenden Stein zu glauben, er besitze Freiheit und bewege sich nach eigener Entschliessung, is abwegig. Ebenso abwegig ist es für die positivistische Betrachtungsweise, hinter den Handlungen und Organisationen der Menschen Freiheit zu suchen..." **
   * Institut für Sozialforschung, Frankfurt (M.), "Sozialforschung, empirische", in : Handwörterbuch der Sozialwissenschaften, Bd. 9, 1956, p. 420.
   ** Walter Eucken, Grundsätze der Wirtschaftspolitik, herausgegeben von Edith Eucken and K. P. Hensel, 3. Auflage, J. C. B. Mohr (Paul Siebeck), Tübingen, 1960, p. 209.
2. United Nations, Economic Commission for Africa, Economic and Social Consequences of Racial Discriminatory Practices, E/CN. 14/132/Rev. 1, New York 1963, para. 398, p. 84
3. John Bates Clark, The Distribution of Wealth, ibid., p. 4.

standard being violated, Krelle maintains :- "... der Unwille der arbeitenden Bevölkerung (wird) das ganze System früher oder später in die Luft sprengen." [1]

None of these predictions has been valid for the South African case. The evidence suggests that, although the long-term real income command by Non-Europeans has improved considerably[2], and although racial wage differentials have widened rather than narrowed, [3] South Africa has nevertheless a record of being a country where labour relations are relatively peaceful. [4]

In what follows, an attempt will be made to outline a subjectively determined preference theory in order to interpret the perseverance of inter-racial wage and income differentials under non-revolutionary conditions.

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1. Wilhelm Krelle, Bestimmungsgründe der Einkommensverteilung in der modernen Wirtschaft, ibid., p. 67. Compare also section 7.4.3.1. above.
2. Volume II, Table 47 b.
3. Compare graphs 47 and 48 above.
4. Garfield Clack notes that "by international comparison, strike incidence (in South Africa) is extremely low. The number of working days lost per striker was similarly lower in South Africa than in other countries." Clack points out that the low strike incidence is inexplicable in conventional terms, and that the following factors can be expected to enhance the strike propensity in South Africa :
   i. the high rate of industrial development and attendant stresses;
   ii. the diversity of cultures and languages implying misunderstandings;
   iii. the pervasive importance of racial antipathies;
   iv. the severe limits placed on the fulfilment of non-white aspirations.

   "Industrial Peace in South Africa", British Journal of Industrial Relations, Vol. 1, 1963, p. 95.

According to James S. Duesenberry's theory of consumer behaviour, the utility of a person i, U_i, whose consumption expenditure is C_i, is given by the equation

$$(1) \quad U_i = U_i \quad \frac{C_i}{\Sigma a_{ij} C_j}$$

where C_j is the consumption expenditure of the j's individual and a_{ij} the weight applied by the i's consumer to the expenditure structure of j. (Footnote 1)

Equation (1) can be more specifically formulated.[2] For this it is necessary to define as S_i the economic situation of a person i. S_i is determined by

$$(2) \quad S_i = \begin{bmatrix} x_1 \ldots x_p \\ Y_1 \ldots y_q \\ x_1^- \ldots x_p^- \\ Y_1^- \ldots y_q^- \\ x_1^+ \ldots x_p^+ \\ y_1^+ \ldots y_q^+ \end{bmatrix}$$

number of purchases
number of supplies (commodities and services)
purchases of past periods
supplies of past periods
purchases of future periods
supplies of future periods.

The utility of person i, U_i is now given as

$$(3a) \quad \frac{\delta U_i}{\delta S_i} > 0 \qquad \text{and} \qquad (3b) \quad \frac{\delta^2 U_i}{\delta S_i^2} < 0$$

$$(4a) \quad \frac{\delta U_i}{\delta S_j} < 0 \quad \text{for } i \neq j, \text{ and } \delta S_j > L \qquad (4b) \quad \frac{\delta^2 U_i}{\delta S_j^2} < 0 \quad \text{for } i \neq j \text{ and } \delta S_j > L$$

Furthermore,

$$(5a) \quad \frac{\delta^2 U_i \ (\lambda S_1, \ldots, \lambda S_n)}{\delta \lambda} > 0, \quad \text{with } i = 1, 2, \ldots, n \text{ and } \lambda > 1$$

$$(5b) \quad \frac{\delta^2 U_i \ (\lambda S_1, \ldots, \lambda S_n)}{\delta \lambda^2} < 0, \quad \text{with } i = 1, 2, \ldots, n \text{ and } \lambda > 1.$$

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1. James S. Duesenberry, Income, Saving, and the Theory of Consumer Behaviour, Oxford University Press, New York, 1967, p. 32.
2. The discussion follows broadly Wilhelm Krelle, Präferenz- und Entscheidungstheorie (unter Mitarbeit von Dieter Coenen), J.C.B. Mohr (Paul Siebeck), Tübingen, 1969 pp. 35 ff.

Equations (3a) and (3b) show that the total utility of a person i increases with decreasing increments when his own economic situation (S_i) improves (Gossen's First Law).[1] This relation is reversed, however, in respect of an improvement in the economic situation of a persons j (i.e., S_j), which has a negative effect on the utility of person i. (equations (4a) and (4b)).

Equations (4a) and (4b) are valid only if $\delta S_j > \delta L_i$, where L_i is defined as the 'level of awareness' of person i.[2] L_i is a subjectively determined concept. It is assumed that people notice changes in their objective physical environment only if these changes exceed certain minimum sizes. Small changes will thus remain unnoticed, partly because people do not recognize them as such, and partly because changes, although recognized, are regarded as too minute so as to warrant any particular attention.[3] In regard to utility differences, L_i can be defined more specifically as a 'level of envy'. In this respect, it is necessary to bring into the argument a statement about the hierarchical relation between persons i and j. Thus, the level of envy will be very large (or infinite in the limiting case) whenever the hierarchical distance between two persons i and j is very far. A rise in the State President's emoluments probably falls outside the level of envy of the man in the street. Likewise, in multi-racial South Africa, an increase in the minimum wage of unskilled Bantu workers is unlikely to raise feelings of envy of well-paid White skilled workers. The level of

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1. Hermann Heinrich Gossen, Entwicklung der Gesetze des menschlichen Verkehrs und der daraus fliessenden Regeln für menschliches Handeln, Braunschweig 1854, 3. Auflage 1926.
   Compare Heinrich von Stackelberg, Grundlagen der Theoretischen Volkswirtschaftslehre, ibid., p. 115.
2. Krelle calls it 'Schwellenwert der Fühlbarkeit'.
   Wilhelm Krelle, Preistheorie, ibid., p. 12.
3. "Daneben gibt es ... einen individualpsychologischen Schwellenwert der Fühlbarkeit, eine Art verallgemeinertes WEBER-FECHNERsches Gesetz, der ... ein Charakteristikum einer jeden handelnden Person ist. Wir nehmen Unterschiede aller Art erst wahr, wenn sie eine gewisse Mindestgrösse überschritten haben. Wenn jemand z.B. zum Kaffee ein Stück Zucker liebt, so ist es ihm gleichgültig, ob dies Stück Zucker 1 Gramm mehr oder weniger enthält, weil er den Unterschied doch nicht merkt."
   Wilhelm Krelle, Preistheorie, ibid., p. 12.

envy becomes more sensitive, however, if the 'far-environment' of a person is left and when his 'near-environment' is considered.[1]

According to equations (5a) and (5b), it is assumed that Gossen's First Law is again valid if the economic situation of all members of a community improves by a certain factor λ $(\lambda > 1)$. This would mean that a proportionate increase in the income situation of all income earners would leave the level of existing tensions unaffected.[2]

In what follows an attempt will be made to substantiate the thesis that the large inter-racial wage differentials which characterize the South African labour market are closely related with the aspirations held by different sections of the population. Social barriers between the different races have - during South Africa's history of racial labour relations - retarded the formation of uniform aspirations.[3] This, together with the fact that the

1. The Economic and Wage Commission, 1925, pointed out already (U.G. No. 14-1926, p. 65):-
"No wage rate is an isolated thing; for every worker has other workers with whom to compare himself. Every change in a wage rate, therefore, excites hopes and fears in the minds of workers outside its scope, whose own rates bear a customary relation to the rate changed. Either they will expect a similar advance or fear a similar reduction. ... Discontent may be caused in one industry by the spectacle of advances awarded in another industry which the workers in the first industry are unable to secure."
Compare also Board of Trade and Industries, Report No. 282, ibid., para. 156, p. 52 :-
"Wage determinations also often aim at securing distributive shares which conform to the established expectation of power or status groups."
2. This hypothesis is by no means self-evident, because a proportionate increase in income, for instance, means different things for the high and low income earners, respectively, because the absolute difference in income will increase when incomes are raised in this manner. Equation (5a) must therefore be seen together with equation (3b), according to which the subjective enjoyment of increases falls with rising income standards.
3. S. Biesheuvel, "The Influence of Social Circumstances on the Attitudes of Educated Africans", South African Journal of Science, Vol. 54, July 1957, No. 12, p. 309.

Bantu is reported to assess his potential occupational advance realistically[1], has led to a rigid, racially defined stratification of the society. As a result, the effective 'near-environment', and with it the level of envy, is normally developed in relation to the immediate work and living environment, but falls off sharply at racial boundaries. Contrary to the expressions of positivistic opinions quoted above[2], it appears that the inclusiveness of group life, together with steady poverty and perpetuated inequality, are the best safeguards for social peace. Evidence in support of this thesis is had from W.G. Runciman's study on "Relative Deprivation and Social Justice", which analyses attitudes to social inequalities in 20th century England.[3] According to Runciman, a persons A is relatively deprived of X when :-

(i) A does not have X,
(ii) he sees some other person or persons, which may include himself at some previous or expected time, as having X (whether or not this is or will be in fact the case),
(iii) he wants X, and
(iv) he sees it as feasible that he should have x.[4]

Relative deprivation, in the sense defined above, creates discontent. Consequently, revolutions occur most often during periods of rising prosperity, i.e., when persons feel relatively deprived. It is a known fact, for instance, that discontent during the French Revolution was highest after

1. Nancy Charton, in a survey of the unemployed African in Grahamstown, reports that the Bantu evaluated his educational qualifications in relation to the labour market usually realistically. The Std. VI African did not, for instance, aspire for a white collar job: "His aspirations are more realistic, but nevertheless they do tend away from the strictly manual, unskilled jobs of the semi-skilled ones in commerce. The most prized work for these groups appeared to be that of 'delivery boy' or 'driver'."
Nancy Charton, "The Unemployed African in Grahamstown", South African Institute of Race Relations, Grahamstown, 1969, p. 14.
2. See p. 238 above.
3. W.G. Runciman, Relative Deprivation and Social Justice, Routledge and K. Paul, London, 1966.
4. ibid., p. 10.

certain improvements in the living standards of the people had occurred.[1] It is interesting in this regard also to consider reports of American disaster studies, such as the effects of a tornado on a community wholly unprepared for it. Studies undertaken by the National Opinion Research Centre in Arkansas found that "the feeling of being relatively better off than others increases with objective loss up to the highest loss category. ... Among those without serious personal losses, those with only medium property damage were subjectively worse off and less active than those with high property damage."[2]

The writer believes that the absence of race-antagonism in South Africa (at least in the sphere of individual human relations), can be explained only by the fact that racial boundaries are instrumental in the formation of reference groups. As yet, the South African economy has succeeded in outstripping the revolution of rising expectations.[3]

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1. Compare: Alexis de Tocqueville, The Old Régime and the French Revolution, Doubleday, New York, 1955, p. 176, 7:-

   "Thus it was precisely in those parts of France where there had been most improvement that popular discontent ran highest. This may seem illogical - but history is full of such paradoxes. For it is not always when things are going from bad to worse that revolutions break out. On the contrary, it oftener happens that when a people which has put up with an oppressive rule over a long period without protest suddenly finds the government relaxing its pressure, it takes up arms against it. ... Patiently endured so long as it seemed beyond redress, a grievance comes to appear intolerable once the possibility of removing it crosses men's minds."

2. Allen H. Barton, "Social Organization under Stress : A Sociological Review of Disaster Studies", National Academy of Sciences, National Council, Washington D.C., 1963, p. 63, here quoted from : W.G. Runciman, Relative Deprivation, ibid., p. 23.

3. Compare in this regard : E. Feit, "Conflict and Cohesion in South Africa : A Theoretical Analysis of the Policy of 'Separate Development' and its Implications", Economic Development and Cultural Change, Vol. XIV, No. 4, July 1966, p. 495.

A great number of Bantu are still so closely associated with their homesteads as to allow them to return when faced with financial misfortune. A powerful expression of grievances, and urge for redress, will probably not originate from this agriculturally orientated type of person. The feeling of relative deprivation has as yet remained dormant.

With the fast proceeding urbanization of Bantu, one can, however, expect that significant changes in the socia' equilibrium are likely to come about. Urban Bantu, and mainly those who have abandoned their communal ties, are reported to have become "frustrated, annoyed and antagonistic towards the Europeans as a group." [1]

K. Danziger, in a study of attitudes of University students or pupils in the last class of high school, found that 46.4 per cent of 84 Bantu who were interviewed, felt that South African events between 1960 and 2010 would be revolutionary. [2] Anthropological studies illustrate the direction of the change with great clarity. A good example is Philip Mayer's study of the Xhosa tribe, where the distinction between 'Red' and 'School' people is drawn. [3] Red people are "conservatives who still stand by the indigenous way of life", whereas school people "are products of the mission and the school, holding up Christianity, literacy and other Western ways as ideals." [4] The conservatism of Red people is distinctly expressed in their expenditure patterns. Even when travelling to town, the Red man is reported to wear "the real 'best' dress, which is a red-ochred blanket fastened over one shoulder, and a great amount of beadwork worn round the neck and ankles." [5] More importantly, however, is the overall attitude toward the process

1. J.C. Ridder, The Personality of the Urban African in South Africa, Routledge and K. Paul, London, 1961, pp. 93, 156.
2. K. Danziger, "Ideology and Utopia in South Africa : A Methodological Contribution to the Sociology of Knowledge", The British Journal of Sociology, Vol. 14, 1963, pp. 59-76, here pp. 65-71.
3. Philip Mayer, with Contributions by Iona Mayer, Townsmen or Tribesmen, Conservatism and the Process of Urbanization in a South African City, Oxford University Press, Cape Town, 1961, mainly Chapters 1 and 2.
4. ibid., p. 4.
5. ibid., p. 26.

of income earning. The Red man will attempt to minimize his expenditures in the town whilst saving a portion of his income for the purchase of cattle or for a deposit on the Post Office savings account.[1] The traditional expenditure behaviour is encouraged by the elders who admonishes that money "is not to be trifled away on short-lived pleasures : the man on whom the ancestors smile is the one who looks ahead and builds up his homestead."[2]

Against the conservatism of the Red people must be considered the income and expenditure aspirations of School persons. Theirs is a progressive orientation toward conspicuous consumption. They prefer European house types, household equipment and furniture.[3] They are reported to be strongly influenced by demonstration effects and love of European products.[4]

The economic wants of the Xhosa School people are consequently insatiable under existing conditions, resulting in bitter complaints about insufficient pay and exploitation.[5]

The relative number of Red and School people are unknown and can hardly be estimated for large areas.[6] It can, however, be suggested that there occurs a gradual transformation of the Bantu society which starts to lose its former polarization and becomes more and more urbanised and uniform. As this happens, the pressure for wage and income equality is likely to increase, probably even beyond racial boundaries. Until now, the racial stratification has been an

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1. P. Mayer, Townsmen ..., ibid., p. 138.
2. ibid., p. 137
3. ibid., Chapters 2, 8, 13.
4. Compare :
   Bureau of Market Research, University of South Africa, Research Report No. 15, "Motivational Factors in Bantu Buying Behaviour", Pretoria, 1966, pp. 7, 8, 12, 69, 71.
   Jacob Hendrik Meijer, Enkele Aspekte van die Konsumpsiefunksie in Suid-Afrika, unpublished M.A. Thesis, University of Pretoria, May 1959, Hoofstuk VI, pp. 142-147.
5. Philip Mayer, Townsmen ..., ibid., p. 44.
6. In 1958/59, 85 per cent of the Bantu population of the East London town district were Red. In King William's Town, the respective figure was significantly less with only 45 per cent.
   Mayer, ibid., p. 20.

important determinant for income differentials in South Africa, and, in the opinion of the writer, at the same time a condition for economic growth. [1] The fact that consumption aspirations have traditionally been cut off at the boundary of race, has allowed the economy to divert resources into the investment goods sector which would have flown into the consumer goods sector had conditions been different.

It appears that, as yet, the perpetuity of low expectations has not been broken in South Africa. Up to the present, the improvement of the White man's standard of living, and the deepening and widening of the country's asset structure, have commanded priority to the narrowing of inter-racial wage differentials particularly in the case of Whites as opposed to Bantu.

However, it is evident that a change will and must come. By the end of this century, South Africa will probably reach the stage of "high mass consumption" (Rostow) and the resultant increased efficiency will spread its fruits over all sections of the population. Whether the process of transition will occur peacefully, remains a question which, judged on the basis of historical experience, has to be faced with great vigilance.

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1. This statement is made under the ceteris paribus assumption in relation to the past and present work reservation determinations. South Africa's restrictive labour legislation would certainly not have come into existence had the country not possessed a plural society. This in turn would have resulted in a more efficient utilization of labour resources and consequently in a higher rate of economic growth. But whether these deliberations are also relevant for the gold mines, nobody probably knows. Given the present technology, the gold mines are dependent on a large supply of cheap and unskilled labour.

13. The Personal Distribution of Incomes and its Relation to Economic Growth

13.1 The Complexity of the Issue and the Inadequate Availability of Data

In this section, an attempt is made to relate the distribution of personal income to South African economic growth.[1] It must, however, be said at the outset that the present state of research on the personal distribution of income is still very inadequate. What we do know is that the size distribution of income is unequal and that a certain measure of income inequality is imperative for a growing economy. This follows from the assumption that private investment is essential for economic growth in a capitalistic country and that it is mainly persons earning high incomes who are responsible for the accumulation of the necessary investment finance.[2]

Apart from economic growth, numerous other factors are related to the size distribution of incomes. To quote D.G. Champernowne: "The forces determining the distribution of incomes in any community are so varied and complex, and interact and fluctuate so continuously, that any theoretical model must either be unrealistically simplified or hopelessly complicated. We shall choose the former alternative ..."[3]

It is interesting to note that the study of the size distribution of income originated from a mixture of a biological, anthropological, sociological, and economic analyses.[4] Even today, the

1. In what follows, the terms 'personal distribution of incomes' and 'size distribution of incomes' denote the same concept. For a definition, see p.23ff above.
2. This hypothesis will be examined below in greater detail.
3. D.G. Champernowne, "A Model of Income Distribution", The Economic Journal, Vol. 63, 1953, pp. 318-351, here p. 319. Compare also Jan Tinbergen, "On the Theory of Income Distribution", Weltwirtschaftliches Archiv, Band 77, 1956, pp. 155-173, here p. 156.
4. An early study is that by Otto Ammon, Die Gesellschaftsordnung und ihre natürlichen Grundlagen, 3. Auflage, Jena, Fischer, 1900.
   For a general survey, compare: Jean Marchal and Bernard Ducros, "Introduction", The Distribution of National Income, International Economic Association, Edited by Jean Marchal and Bernard Ducros, Macmillan, St Martin's Press, London, New York, 1968, pp. xiii-xxx.
   An interesting sociological study is that by Gerhard E. Lenski, Power and Privilege, A Theory of Social Stratification, McGraw-Hill, New York, 1966.
   Lenski puts forward a theory of distribution based on a multi-dimensional view of social stratification, where the dynamic element is provided by changes in the structure of power.

inter-disciplinary approach to the subject is very common,[1] and studies which amalgamate the personal distribution of incomes in a pure macroeconomic flow model are rare.[2]

Although it has been shown earlier that in theory there is the possibility of a unification between the functional and personal income divisions,[3] the writer was unable to make use of this possibility, because the availability of data on the personal distribution of incomes in South Africa is insufficient for an approach of this nature to be successful. Whereas the data describing the functional distribution of incomes are directly related to the value of the aggregate income ('wages' plus 'other income' sum up to the G.D.P.), it was found in Volume II of this study that none of the available data on the size distribution of incomes fulfils the necessary requirements in respect of classification and coverage.[4] The four sources of personal

1. For instance Armin Bohnet, Zur Theorie der personellen Einkommensverteilung, Kohlhammer, Stuttgart, 1967.
2. A breakthrough in this regard is Krupp's study Theorie der personellen Einkommensverteilung, ibid. Krupp amalgamates the functional and personal income distribution theories in a macroeconomic model which analyses the functional distribution in regard to expenditure streams, and the personal distribution in regard to the income receipt structure -*, and he maintains:- "eine Verweisung der personellen Einkommensverteilung in Soziologie und Statistik entspricht nicht mehr dem heutigen ökonomischen Denken". **
   But although Krupp has at his disposal a relatively rich choice of income distribution data for the German economy between 1955 and 1960 ***, he complains about the inadequacy of the statistical material (which is far superior to what is available in South Africa), and remarks: "Man wird ... kaum behaupten können, daß es mit Hilfe der zur Zeit vorliegenden Daten möglich ist, eine bestimmte Realisierung unseres theoretischen Ansatzes empirisch zu überprüfen. Alles, was zur Zeit geschehen kann, ist die Angabe von Entwicklungstendenzen und Größenordnungen". ****
   * H.J. Krupp, Theorie ..., ibid., p. 24 ff.
   ** H.J. Krupp, "'Personelle' und 'funktionelle' Einkommensverteilung", Jahrbücher für Nationalökonomie und Statistik, Vol. 180, April 1967, here p. 8.
   *** H.J. Krupp, Theorie ..., ibid., p. 151 ff. Compare also H.J. Krupp, "Möglichkeiten und Grenzen der Statistik der personellen Einkommensverteilung", Allgemeines Statistisches Archiv, Vol. 50, 1966, pp. 361-380.
   **** H.J. Krupp, Theorie ..., ibid., p. 155.
3. Compare Section 2.1.3 above.
4. Volume II, pp. 7 ff.

income distribution statistics in South Africa, viz., (i) income censuses, (ii) public expenditure estimates; (iii) income tax data, and (iv) family expenditure surveys, have each serious conceptual and factual shortcomings.

First of all, the 1951 and 1960 income censuses cover the White, Coloured, and Asiatic population, but exclude Bantu. Moreover, it appears that in 1960, Whites underreported their total income by some 14 per cent (and within this, their 'other income' by some 30 per cent), and Coloureds and Asiatics underreported their total incomes by 19 and 5 per cent, respectively.[1] Secondly, the usefulness of estimates of public expenditure as a source of personal income distribution statistics is limited by the fact that the published data show a strong bias in favour of high income groups, and that the degree of income inequality in the public sector differs significantly from that of the private sector.[2] Thirdly, the major difficulties encountered with regard to the income tax data are, (i) that important concepts such as income, wealth, depreciation and revenue, are differently defined by the Income Tax Acts on the one hand, and the economist on the other, (ii) that evidence on income receipts by low income groups is non-existent, (iii) that there is no classification of income receivers according to economic and sociological categories, and (iv) that certain inconsistencies in the data material are apparent, owing to the time lag between the production of the income and its assessment for tax purposes.[3]

Finally, in regard to expenditure surveys, it was found that these are regularly based on samples - often limited to a particular magisterial district or town - thus providing some indication of the distributive pattern, but no firm foundation on which a macroeconomic income study can be based.[4]

In view of the absence of classified statistical time series, the only analytical possibility was to calculate various measures of the inequality of the distribution of personal incomes and to relate these to the growth performance of the economy. On an annual basis, this could, however, be done only for the years 1920 to 1951, since the analysis of the available income tax statistics revealed the inadequacy of income tax data for purposes of income size distribution research, for years prior to 1920 and after 1951.[5]

1. Volume II, pp. 42 ff.
2. ibid., pp. 53 ff.
3. ibid., pp. 59 ff.
4. ibid., pp. 123 ff.
5. ibid., pp. 59 ff.

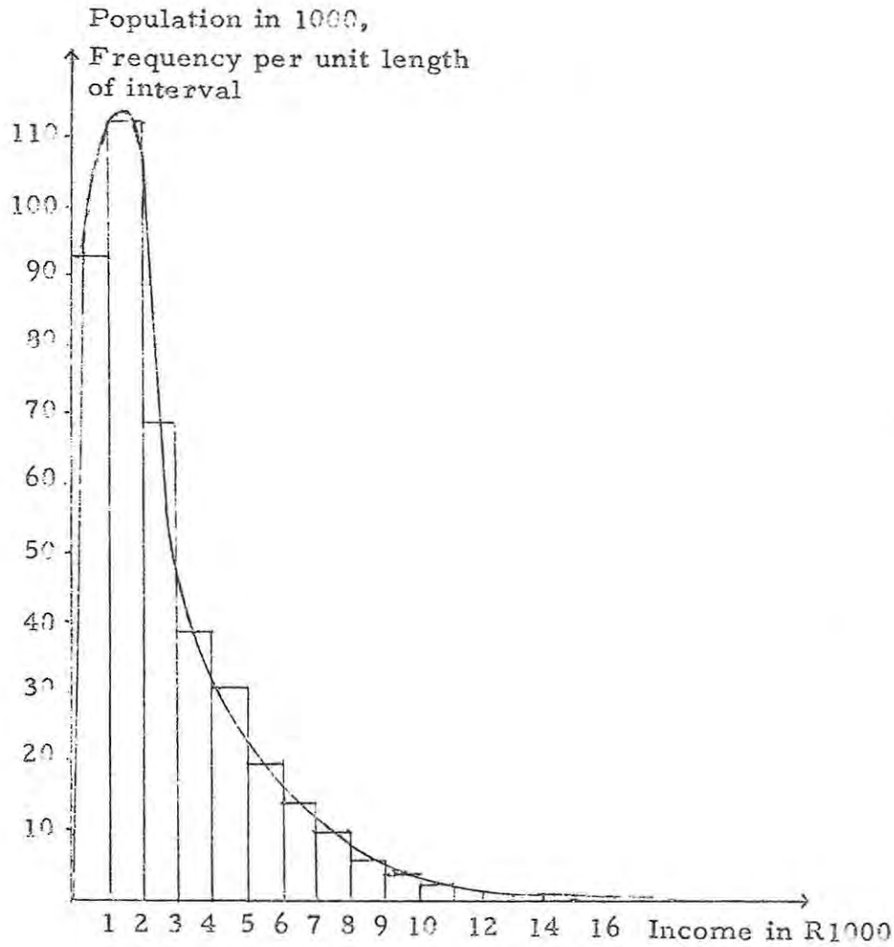
The lack of data made particularly difficult the appraisal of two important classifications, viz., the size distribution of incomes (i) by industry divisions, and (ii) by work status of income receivers (employers and workers on own account versus employees). Information on these two categories is available only for the 1960 census year. As a result, the appraisal of inter-industry and occupational shifts remains merely suggestive.

Personal income distribution data are assessed in respect of their departure from equality. Our failure to define a workable pattern of a 'justifiable' distribution and income forces us to choose two polarizing cases for reference in the assessment of income size data, viz., (i) the case of equality is the case where all income receivers receive equal (i.e. average) incomes, and (ii) the case of inequality is the case where one single individual receives the total, and all other individuals, no income whatsoever. The concepts of equality and inequality so defined, are therefore not compatible with real-world situations (note that each individual must at least command an income sufficient for his subsistence standard of living, otherwise he would not exist), but the concepts are defined in accordance with the demands for mathematical convenience.

Measures of income inequality will be discussed in Section 13.2. This will be followed by a discussion of changes of income and its distribution in South Africa in Section 13.3.

13.2 Consideration of a Typical Histogram and Frequency Polygon of a Personal Income Distribution

Graph 50 shows the personal distribution of work incomes received by Coloured persons in South Africa in 1960. The source on which the graph is based gives 22 income groups, the lowest one being the income range from R 0 - R 100 (average R 50), and the highest one the range R30,000 plus (estimated average income R32,500). [1]



Graph 50 : Histogram and Frequency Polygon for the Distribution of Incomes received by Coloured Wage Earners, 1960.

1. Source: Volume II, Table, XVI, p. 39.

The horizontal axis of graph 50 measures the income class-intervals in R1,000, and the vertical axis the frequency of cases falling within each class-interval. The actual size distribution of earnings has been plotted in two ways. First, a type of graph known as histogram is obtained by erecting over each class-interval, the height of the column depending on the number of cases in each interval. Note that the observed frequencies of the original source are divided by the length of income class-intervals in order to eliminate inequalities in the size of such intervals. Second, a frequency polygon is drawn, in which the number of individuals is indicated by a point, centrally located in respect of the class-interval. Successive points are approached by a line.

Owing to the small number of cases in very high income class-intervals, it is not possible adequately to indicate the actual long tail which is representative for high income groups.

The one fact which emerges clearly from graph 50 is that the distribution of income is asymmetrical - the peak of the frequency distribution is reached at relatively low income ranges, whereas a long tail is representative on the side of large incomes. The apparent skewness of the income distribution curve would be even more accentuated if, of the actual income receivers in low income groups, only those cases were considered where a full-time breadwinner has been working and earning an income right through the period under consideration. The problem which in reality has to be faced (and which cannot be solved unless detailed information is available about the individual fate of each individual income recipient), is that certain low incomes may have been earned, not during the full one-year period which was covered by the 1960 census, but only during a fraction thereof.[1] The statistical evidence pointing to the receipt structure of very low incomes is therefore unreliable.[2]

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1. A particular income earner might, for instance, only have entered the labour market toward the end of the period covered by the census. Alternatively, temporary sickness or unemployment might have prevented income earners from earning a full annual income.
2. Pareto failed to recognize these conclusions, as is testified by the following quotation: "En effet, de deux individus qui s'écartent également de la moyenne des qualités, celui qui a des aptitudes exceptionnelles pour gagner de l'argent peut avoir un revenu très élevé; et celui qui a des qualités négatives égales ne peut pas descendre, sans disparaître, au-dessous du revenu minimum qui permet de vivre". Vilfredo Pareto, Manuel d'Economie Politique, Traduit sur l'Edition Italienne par Alfred Bonnet, Deuxième Ed., Tome Deuxième, Paris 1963, p. 384.

13.2.1 Coefficients of Inequality

In order to measure the phenomenon of the inequality in the size distribution of incomes, various coefficients of inequality are employed. The inequality of income distribution and its peculiar shape have been instrumental in encouraging numerous statistical contributions to the subject.

Coefficients of inequality measure the concentration of statistical data. In this regard it is usual to distinguish between absolute and relative concentrations.[1]

Absolute measurements of concentration refer to the actual number of cases which are subject to the analysis. Assume for instance that the motor vehicle production of a country is in the hands of two firms only, each of which commands a 50 per cent market share. In this case there exists obviously a significant absolute concentration, whereas the relative size distribution between the two factories is equal. Absolute concentration and relative equal distribution therefore do not exclude one another.

Coefficients of income inequality measure the relative concentration of an income receipt structure. The value of an income concentration index therefore does not allow any conclusion in regard to the general standard of living of the population.

D. Yntema postulates the following a priori conditions for coefficients of inequality:-[2]

i. an acceptable coefficient must be both independent of the number of persons in a distribution, and independent of the unit in which income is measured;

ii. the coefficient must express a given distribution by a single definite value, which will lead to an unambiguous conclusion when the degree of inequality between different distributions is being compared;

iii. the coefficient should be easily computable and should have definite values (such as 0 and 1) which represent equality and inequality respectively.

1. Hans Kellerer, "Zur statistischen Messung der Konzentration", Schriften des Vereins für Socialpolitik, NF, Band 20, I, Die Konzentration in der Wirtschaft, Band 1, Stand der Konzentration, Ed. H. Arndt, Dunker & Humblot, Berlin, 1960, p. 41 ff.
2. Dwight B. Yntema, "Measures of the Inequality in the Personal Distribution of Wealth or Income", Journal of the American Statistical Association, Vol. 28, 1933, pp. 423 ff.

Below are outlined four plausible measures of the inequality of income distribution, viz., (i) Pareto's coefficient α ; (ii) Gini's coefficient δ ; (iii) Gibrat's coefficient γ ; and (v) Lorenz's coefficient of income inequality Λ . These four measures of inequality are associated with the notions of perfect equality and perfect inequality, as follows:-

Index	Perfect Equality	Perfect Inequality
Pareto's α	∞	0
Gini's δ	1	∞
Gibrat's γ	0	n-1
Lorenz's Λ	0	1

"n" denotes the total number of frequencies in the distribution.

An outline of the statistical properties of the individual indices is given below. [1]

13. 2. 1. 1 Pareto's Coefficient α

Pareto was the earliest author to describe the frequency distribution of income by an analytical formula. His 'Law of Distribution' states that if Y represents any income and N the number of persons who receive incomes equal to or higher than Y, the line received in a diagram which shows the logarithms of Y on the horizontal axis against the logarithms of N on the vertical axis, will be approximately a straight line, except at its extremeties. The Pareto formula is [2]

$$\log N = a - \alpha \log Y.$$

1. However, it is worthwhile to consider a reminder by Edward H. Chamberlin who writes: "The various indices (of concentration) which can be constructed are limited in their meaning and will always require further interpretation, particularly in relating them to each other. And it does not follow that because they are quantitative themselves they can be averaged or in some other way reduced to a single index. ... Here (as elsewhere) a comparison of economic with medical science may be helpful. Some aspects of health can be measured and others cannot. Among the former we have body temperature, blood pressure, metabolism, weight, etc. But these do not lend themselves to the construction of a single quantitative index of health. Edward H. Chamberlin, "Measuring the Degree of Monopoly and Competition", in: Monopoly and Competition and their Regulation, International Economic Association, Macmillan, London, 1954, pp. 255-267, here p. 267.

An analytical and pictorial presentation of a Pareto curve is given below in respect of the number of super tax assessments for the tax year 1920.

Table 26: Super Tax Assessments, Tax Year ended 30th June, 1919[1]

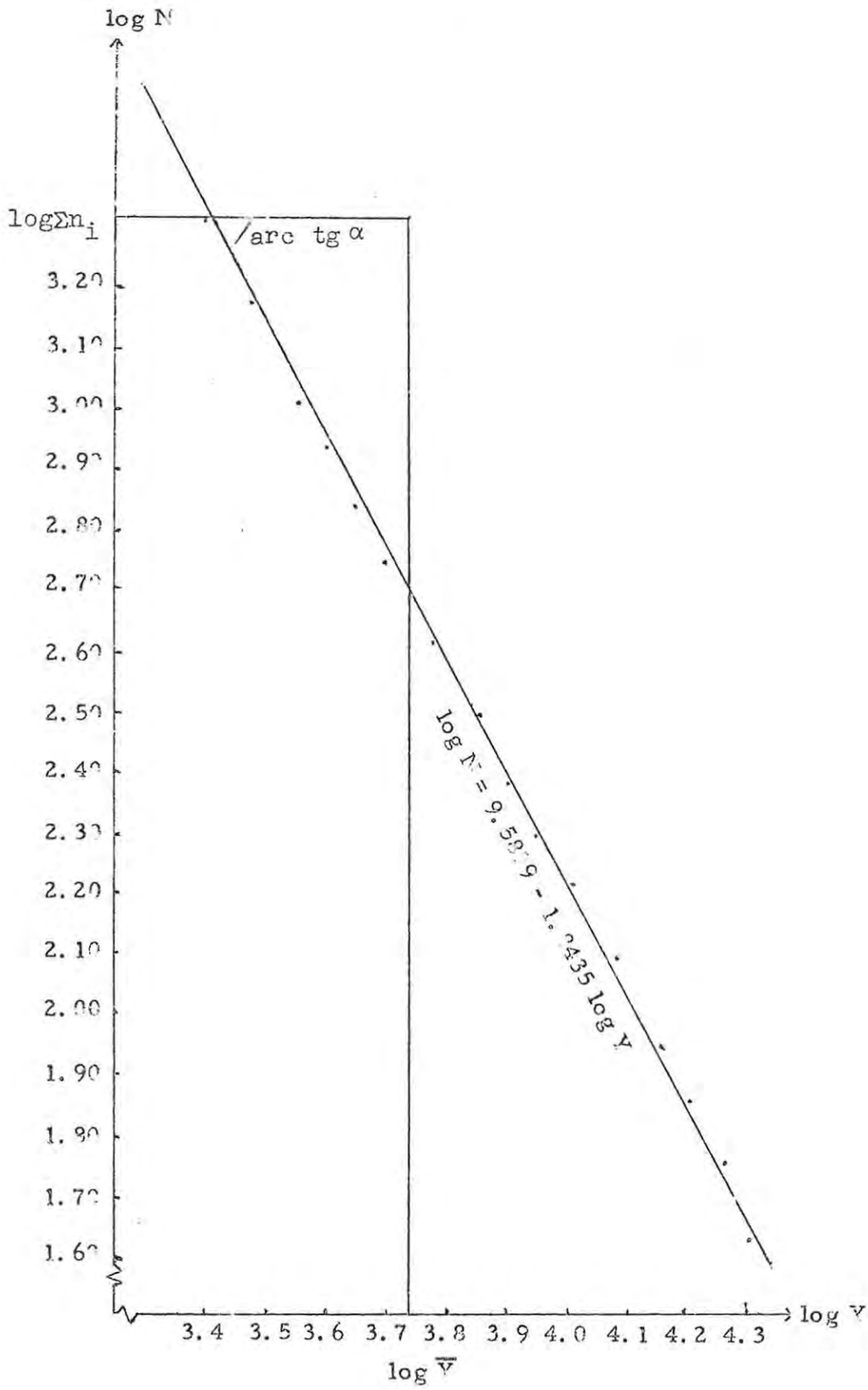
Y	n	N	log Y	log N
2500	565	2034	3.40	3.31
3000	364	1469	3.48	3.17
2500	240	1105	3.54	3.04
4000	184	865	3.60	2.94
4500	126	681	3.65	2.83
5000	149	555	3.70	2.74
6000	94	406	3.78	2.61
7000	72	312	3.85	2.49
8000	45	240	3.90	2.38
9000	33	195	3.95	2.29
10000	40	162	4.00	2.21
12000	34	122	4.08	2.09
14000	18	88	4.15	1.94
16000	14	70	4.20	1.85
18000	14	56	4.26	1.75
20000	42	42	4.30	1.62
	Σn_i 2034			

According to the least square fit, the Pareto curve for super tax assessment for the tax year ended 30th June, 1919, is
Log N = 9.6809 - 1.8435 log Y.

The slope of the Pareto curve is considered as a measure for the equality of income distribution, in that the greater the slope of the curve, the more equal the distribution of incomes. If all incomes were completely equally distributed, each individual would earn the average income, i.e., the Pareto curve would be a straight line starting in log Y (the logarithmic value of which is 3.7316 for $\bar{Y}$ = £5,390), and extending up to log Σn_i (logarithmic value 3.3084 for 2034 assessed persons).

1. Vilfredo Pareto, Cours d'économie politique, Lausanne, 1897, and Manuel d'Economie ..., ibid., p. 380 ff.
2. U.G. 64-1920, Report of the Commissioner for Inland Revenue for the Year 1919-20, Statement M, p. 24, before adjustment for arrear assessments.

Graph 51 below gives a pictorial illustration of the Pareto curve for the tax year ended 30th June, 1919.



Graph 51 : Pareto Curve, Tax Year ended 30th June, 1919,
Source: Table 26 above.

The shortcomings of the Pareto curve are as follows:-

(i) Higher income groups carry greater weight than lower income groups, by virtue of the particular type of summation and the use of logarithms. As a consequence if this, the regression equation is extremely sensitive concerning any changes in the population of high income groups, in a manner which is often not warranted by their random populations.

(ii) Pareto's coefficient is sensitive to changes in the size of class-intervals even if these are meaningless in regard to the actual distribution of incomes.

(iii) No consideration is taken of the value of the average income earned in particular income ranges. The disturbing effect of this is particularly noticeable in regard to the highest income group. Assume for instance, that the highest income group considered is £20,000+, and that the actual income averages earned by the persons within this group, increases from £22,000 to £36,000. However great the change in the average income might be, their effect on the value of Pareto's α is zero.

13. 2. 1. 2 Gini's Index of Concentration δ

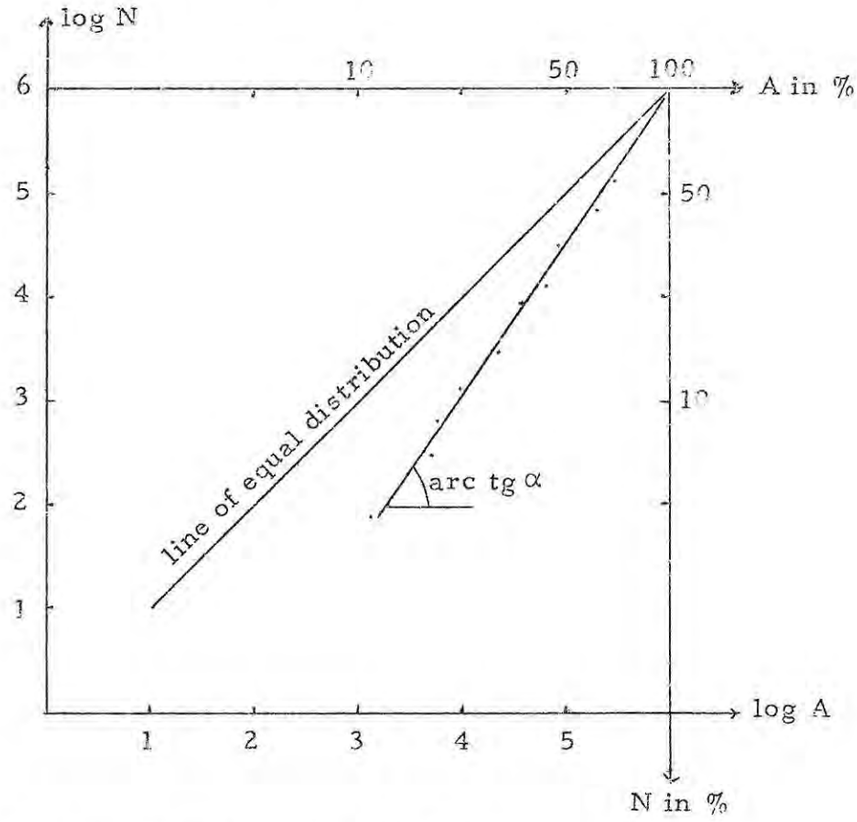
Gini, instead of considering the number N of income recipients with an income equal to or higher than Y, considers the amount of income A_x above the limit Y and fits the data to the formula

$$\log N = b + \delta \log A_x,$$

where δ is the index of concentration.[1] Compared with Pareto's formula, Gini's index of concentration offers various advantages, viz. (i) it takes into account taxpayers of low income classes in a more sensitive manner than is done by Pareto's formula; (ii) the statistical data fit Gini's formula more satisfactorily than Pareto's formula, and (iii) Gini's index is more sensitive than Pareto's.

1. Corrado Gini, "On the Measurement of Concentration with Special Reference to Income and Wealth", Abstracts of Papers Presented at the Research Conference held by the Cowles Commission, 1936, Colorado College Publication, Gen. Ser. No. 208, pp. 73-80, here p. 75. Gini first suggested the formula in 1908 in a paper presented to the Italian Association for the Advancement of Science.

In a similar manner as is done in Table 26 above, log N values are set against log A_x and drawn in a diagram which measures log A_x on the horizontal and log N on the vertical axis. Graph 52 illustrates a hypothetical Gini function with slope δ.



Graph 52: Hypothetical Gini Curve

The slope of the Gini function would be unity if all incomes were distributed equally (compare line P_1P_2 as the line of equal distribution). The steeper the Gini line, the more unequal the distribution of incomes.

As an example of the calculation of a Gini function may be quoted the result obtained for the tax year 1920 (all income ranges, R500-£20,000).[1] According to the least square fit, the Gini function is

log N = -5.5076 + 2.1214 log A_x, for taxable income before tax, and

log N = -4.9315 + 2.0090 log A_x, for taxable income net of tax.

It is evident from the above result, that the tax imposition worked toward the equilization of the distribution of personal incomes.

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1. Source for data: Volume II, Table 11.

13. 2. 1. 3 Gibrat's Coefficient δ

Gibrat analysed the distribution of various social phenomena, such as income, wealth, number of workers in factories, population of towns. He came to the conclusion that in the majority of his observations, an approximately normal distribution is shown not by the elements themselves but by their logarithmic values (logarithmic normal or lognormal distribution).[1] Analysing separately the distribution of wage incomes, capital gains and profits, Gibrat found that the distribution of wage incomes is usually less asymmetric compared with the distribution of capital gains and entrepreneurial profits.[2]

In recent times, there has been an increasing interest in the lognormal distribution and numerous mathematicians and statisticians who tested the function in respect of income data, found good fits.[3] J. Aitchison and J. A. C. Brown, in their study on the Lognormal Distribution, consider the "lognormal family of curves as a strong candidate whenever a statistical description of income size distribution is required. ... Of all skew, unimodal distributions the lognormal is the easiest to manipulate in the present state of statistical theory ..."[4]

1. Throughout the paper below log stands for common or decimal logarithm.
2. R. Gibrat, Les Inégalités économiques, Librairie du Recueil Sirey, 1931.
3. The best recent study is probably that of J. Aitchison and J. A. C. Brown, The Lognormal Distribution with Special Reference to its Uses in Economics, Cambridge, At the University Press, 1957.

   An interesting applied study is that by Choaro Takahashi, Ryotaro Iochi and Koichi Emi, Dynamic Changes of Income and its Distribution in Japan, Kinokuniya Bookstore, Tokyo, 1959.

   Modified models on Gibrat's distribution analysing South African data are presented by

   H. S. Steyn, "A Model for the Distribution of Incomes", The South African Journal of Economics, Vol. 27, No. 2, 1959, pp. 149-156.

   H. S. Steyn, "A Statistical Study of the Distribution of Income for Bantu Workers", The South African Journal of Economics, Vol. 32, 1964, pp. 53-67.

   R. W. Burton, A Statistical Analysis of the Income Distribution of Urban Bantu in the Pretoria Region, M. Com. Thesis, University of the Orange Free State, January 1963.
4. J. Aitchison and J. A. C. Brown, The Lognormal Distribution, ibid., p. 119, 120.

According to Gibrat, the lognormal distribution can be described by

$$z = a \log (y - y_o) + b,$$

where a, y_o and b are parameters, the values of which are determined in such manner that the approximation to the normal distribution is optimal.

The lognormal distribution curve is based on the assumption that there are many environmental changes, where it is more reasonable to assume that the process underlying change is multiplicative rather than additive (Gibrat's "loi de l'effect proportionnel"). In respect of the distribution of incomes, this means that the rate of growth of a particular income at any time is assumed to be directly proportional to the income at that time.

As an example of the calculation of Gibrat's coefficient may again serve the 1920 tax year.[1]

In Table 27 are listed:

column 1

the lower limit of income classes Y.

column 2

the actual number n of income recipients in each income class.

column 3

the actual number N of income recipients who received an income equal to or higher than y.

column 4

the ratio $N/\Sigma n_i$.

column 5

the z figures corresponding to $N/\Sigma n_i$.

The distribution formula on which the z values are defined, is[2]

$$\Pr (X \leq x) = N(x) = \int_{\infty}^{x} \frac{1}{\sqrt{\pi}} e^{-w^e/2dw}$$

Data for N(x) were used for the range $0.5 \leq N(x) \leq 1$, which required that the complement to unity was calculated when $N/\Sigma n_i \leq 0.5$.

---

1. Volume II, Table 11. For the definition of an income recipient unit, ibid., pp. 87 ff.
2. The table for the normal distribution was taken from Robert V. Hogg and Allen T. Craig, Introduction to Mathematical Statistics, 3rd Edition, Macmillan, London, 1965, p. 400. Data for x are tabulated there at intervals of 5/100. The values used here minimize the absolute distances.
   Note that the lognormal distribution values are divided by $\sqrt{2}$.
   Compare Wilhelm Krelle, Verteilungstheorie, ibid. p. 231, Ft. 1.

Column 6

values for log Y

Column 7

values for log $(Y-Y_o)$. In Table 27, $Y_o = 300$

TABLE 27: Calculation of Gibrat's Coefficient, 1920

Col. 1	Col. 2	Col. 3	Col. 4	Col. 5	Col. 6	Col. 7
y	n	N	$N/\Sigma n_i$	z	log y	log (y-300)
500	17827	60847	1.00000	—	—	—
600	11074	43020	0.70702	-0.3889	2.7782	2.4771
700	6517	31946	0.52502	-0.0354	2.8451	2.6021
800	4551	25429	0.41792	0.1414	3.0414	2.6990
900	3397	20878	0.34312	0.2828	3.0792	2.7782
1000	5520	17481	0.28729	0.3889	3.1139	2.8451
1250	3361	11961	0.19658	0.6010	3.1903	2.9777
1500	1989	8600	0.14134	0.7778	3.2553	3.0792
1750	1450	6611	0.10865	0.8839	3.3222	3.1614
2000	1002	5161	0.08482	0.9899	3.3617	3.2304
2250	814	4159	0.06835	1.0607	3.4065	3.2900
2500	1048	3345	0.05497	1.1314	3.4472	3.3424
3000	537	2297	0.03775	1.2728	3.5185	3.4314
3500	407	1760	0.02893	1.3435	3.5798	3.5052
4000	274	1353	0.02224	1.4142	3.6335	3.5682
4500	205	1079	0.01773	1.4849	3.6812	3.6232
5000	238	874	0.01436	1.5556	3.7243	3.6721
6000	145	636	0.01045	1.6263	3.7993	3.7559
7000	102	491	0.00807	1.6971	3.8633	3.8261
8000	75	389	0.00639	1.7678	3.9191	3.8865
9000	62	314	0.00516	1.8031	3.9685	3.9395
10000	78	252	0.00414	1.8738	4.0128	3.9868
12000	42	174	0.00286	1.9092	4.0899	4.0682
14000	24	132	0.00217	2.0153	4.1553	4.1367
16000	24	108	0.00177	2.0153	4.2122	4.1959
18000	12	84	0.00138	2.1213	4.2625	4.2480
20000	72	72	0.00118	2.1213	4.3075	4.2945

The curve which is obtained when one plots the z values of column 5 against the log y values of column 6 in a diagram which measures z on the vertical, and log y on the horizontal axis, is convex toward the origin (see Graph 53, p. 264 below). For the curve, the sum of square deviations from the best straight line is calculated, and this calculation is subsequently repeated for log $(y - \bar{a}\,100)$ values, where $\bar{a}$ increases in terms of 1 until the sum of square deviations from the set of alternative least square straight lines is minimized. In the case of the 1920 data here considered, the best value for $\bar{a}$ is 3, which in turn produces an optimum for log (y-300), i.e., $y_o = 300$. This again results in a shift of points to the left, which is also indicated in graph 53. For the case here presented, the best slope of the simulated straight line (Gibrat's γ) is 1.3697.

γ serves as an index of the inequality of income distribution, the larger value of γ the more unequal the distribution of incomes.

The fit of income size distribution data to the log-normal function is usually good.[1] Noticeable potential shortcomings of the lognormal distribution function are (i) that too much emphasis is put on the frequency distribution of low income groups, which weigh heavily in the least square fit, owing to their low logarithmic values, and (ii) that the definition of income ranges may be too limited. But both these shortcomings weigh less when the quality of data is improved.

Modified lognormal distribution functions have been suggested by Champernowne,[2] and Fisk,[3] without, however, producing significant improvements in the data fit.

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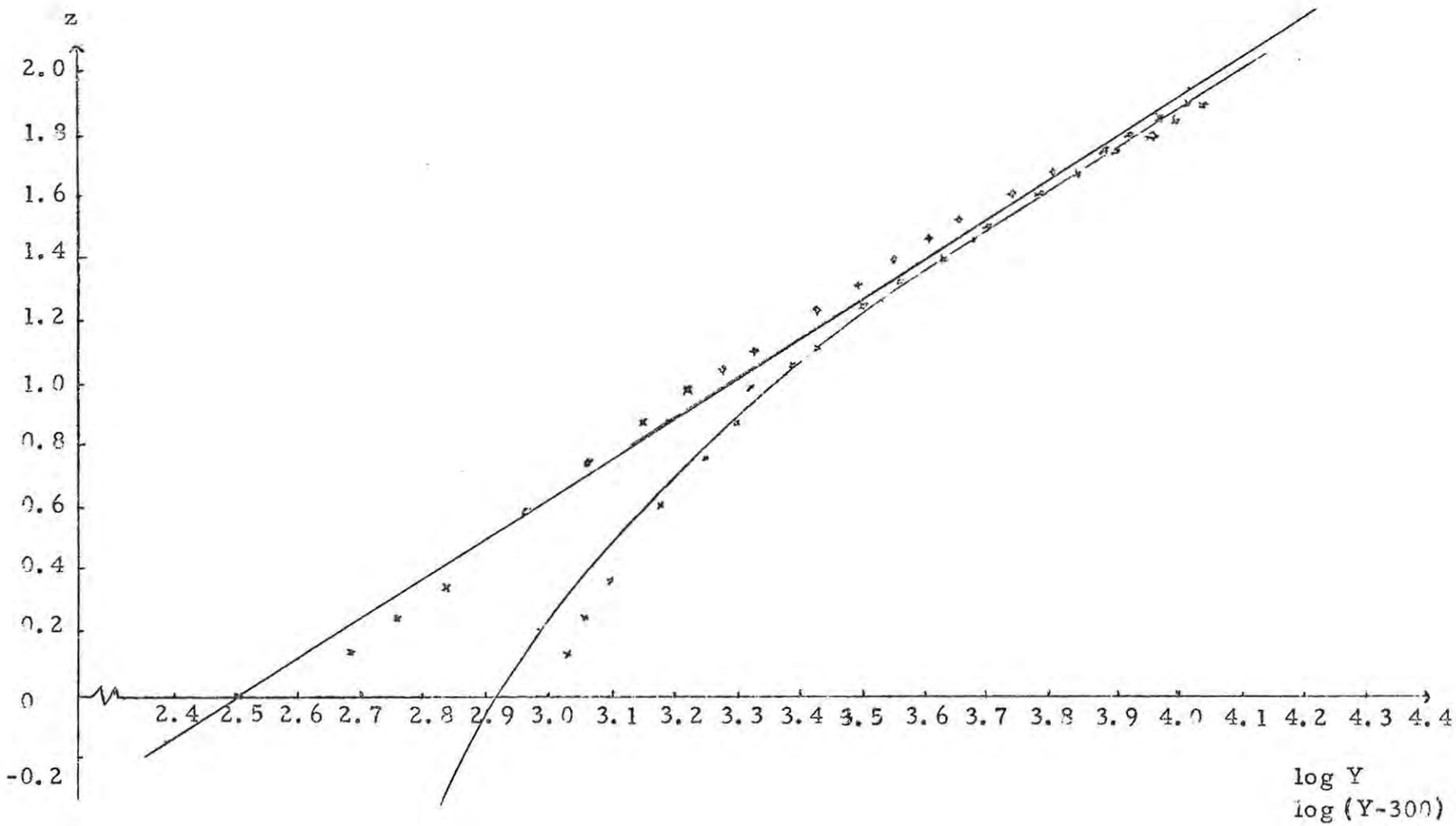
1. A number of examples for the 'Gibrat-phenomenon' are tabulated by M. Kalecki, "On the Gibrat Distribution", Econometrica, Vol. 13, 1945, pp. 161-170, here pp. 167 ff.
2. D. G. Champernowne, "The Graduation of Income Distribution", Econometrica, Vol. 20, 1952, pp. 591-615.
3. Peter R. Fisk, "The Graduation of Income Distributions", Econometrica, Vol. 29, 1961, pp. 171-185.



Graph 53 Gibrat Function, Income Tax Data, 1920

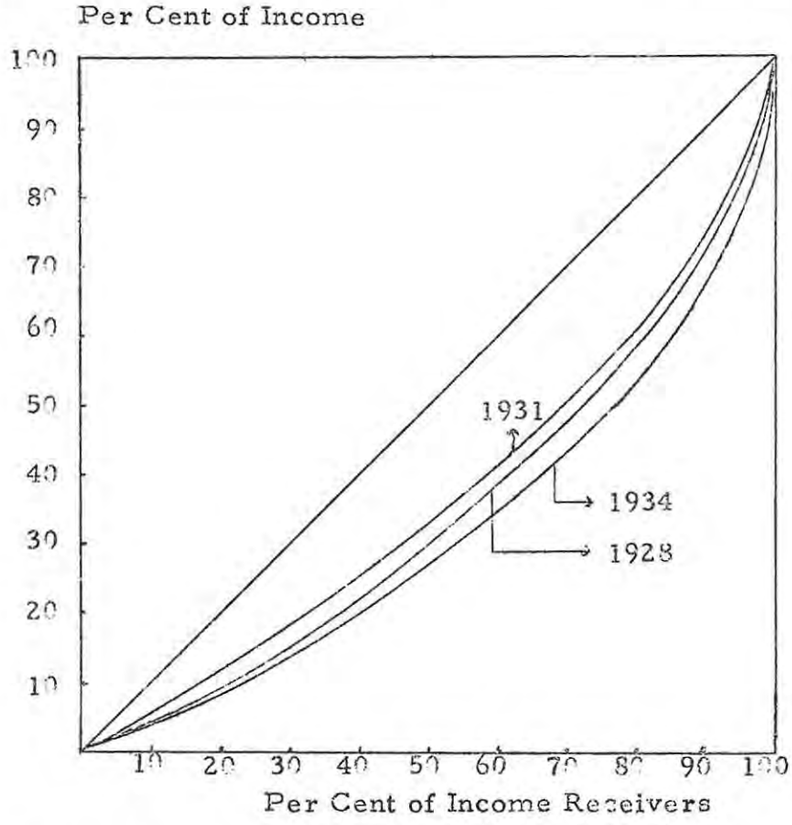
Source: Table 27

An interesting feature of the Gibrat function is that the quality of the fit improves when homogeneous population groups are chosen. Disaggregation in regard to occupation, age, education[1] and race[2] have regularly improved the fit of income size distribution data to the lognormal curve.

13. 2. 1. 4 Lorenz' Coefficient Λ

The so-called Lorenz graph is the technique most commonly used for the pictorial representation of income distribution data. In a Lorenz graph, cumulated percentages of the population from poorest to richest are plotted against the cumulated percentages of the aggregate income.[3]

Graph 54 shows three Lorenz curves drawn in respect of the distribution of South African supertaxable income (before tax) for the years 1927/8, 1930/1, and 1933/4.[4]

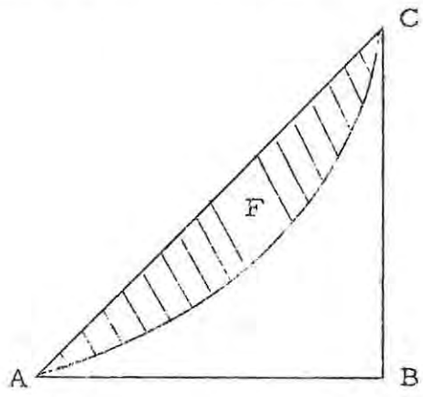


Graph 54 : Lorenz Curves, S. A. Supertaxable Incomes, 1927/8, 1930/1, 1933/4.

1. Aitchison and Brown, The Lognormal Distribution, ibid., pp. 116 ff.
2. H. S. Steyn, A Statistical Study ..., ibid.
3. M. O. Lorenz, "Methods of Measuring the Concentration of Wealth", American Statistical Association, N. S., No. 70, June 1905, pp. 208-219.
4. Sources: Reports by the Commissioner for Inland Revenue:
   tax year ended 30th June, 1928: U. G. No. 10-1930, St. XXXV,
   tax year ended 30th June, 1931: U. G. No. 3-1933, St. XXXV,
   tax year ended 30th June, 1934: U. G. No. 3-1936, St. XXXVII.

The inequality of income distribution for the three different years can be measured by the distance of the Lorenz curve from the diagonal line of the diagram, which is indicative of an equal arithmetical distribution. It is evident that of the three years considered, the distribution of supertaxable incomes was most equal in the depression year 1930/1, and least equal in the boom year 1933/4. The pre-depression year 1927/8 exhibits a measure of inequality which lies between those observed for the years 1930/1 and 1933/4, respectively.

The coefficient of concentration which is based on the Lorenz curve (Lorenz coefficient Λ) can be calculated as follows: in the Lorenz diagram below (graph 55), the relation F/ABC is known as the concentration ratio Λ and is used as a measure of income distribution.[1] As its value increases, income inequality increases, and vice versa.



Graph 55 : Lorenz Diagram

If all income were earned by one individual only, the value of Λ would be equal to unity. Conversely, if the total income were divided equally between all persons, the value of the coefficient would be zero.[2]

---

1. The Lorenz coefficient Λ was actually first proposed by Corrado Gini. Compare Gini, "On the Measure...", ibid.
2. Note that the diagonal line of the Lorenz chart is considered to represent the line of equal distribution. George Garvy and Robert T. Schutz * have suggested that a line of "economic equitability" be put into its place, which makes allowance for factors such as labour turnover, family sizes, retirement of income receivers, inter alia. Such a line of "economic equitability" would be bent toward the South-East sector. This approach has to be rejected, however, because of the uncertainty associated with this approach.
   * George Garvy, Discussion of Joseph A. Pechman's "Distribution of Income Before and After Federal Tax, 1941 and 1947", Studies in Income and Wealth, NBER, Riverside Press, Cambridge, 1951.
   Robert T. Schutz, "On the Measurement of Income Inequality", American Economic Review, March 1951, pp. 120-1.

The area of the triangle ABC $\frac{100 \cdot 100}{2} = 5000$, hence the Lorenz coefficient Λ is given as $\Lambda = F/5000$.

This ratio can be estimated by the use of the formula

$$\Lambda = 1/5000 \Sigma \left[5000 - (p_k q_k - p_{k-1} q_k)\right],$$

where p and q represent the cumulative percentages of population and income respectively.

The Lorenz coefficient has been criticised on the grounds that it "measures comparative degrees of inequality on the assumption that within any given distribution equal arithmetic differences in income are to be regarded as of equal importance, regardless of the size of the income".[1] This is a significant shortcoming of the Lorenz coefficient. If we take it for granted that the marginal utility of income decreases with increasing income, then it is necessary that income differences show small fluctuations when considered for high, but large fluctuations, when considered for low income groups.

13.3 Changes of Income and its Distribution in South Africa

Changes in the inequality of income size distributions, can be caused by a large number of possible factors, among them:-

(i) cyclical fluctuations i.e., changes in the level of economic activity;

(ii) shifts in the industrial structure, for instance a long-run decline in the contribution to the total product made by agriculture, and a corresponding relative increase in secondary and tertiary activities;

(iii) increase in the relative number of full-time employees or a reduction in disguised unemployment;[2]

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1. Mary Jean Bowman, "A Graphical Analysis of Personal Income Distribution in the United States", reprinted in: Readings in the Theory of Income Distribution, ibid., p. 88.

2. Disguised unemployed are those persons who "work on their own account and who are so numerous, relatively to the resources with which they work, that if a number of them were withdrawn for work in other sectors of the economy, the total output of the sector from which they were withdrawn would not be diminished even though no significant reorganization occurred in this sector, and no significant substitution of capital". United Nations, Dept. of Economic Affairs, Measures for the Economic Development of Under-Developed Countries, New York 1951, Sales No. 51.II.B.2., p. 7.

(iv) increase in the number of income earners per family or household, or changes in the composition of families or households.

(v) shifts in the distribution of income-yielding assets, occasioned, inter alia, by wars, inflation or taxation;

(vi) changes in the primary distribution of incomes through the effect of taxes and subsidies;

(vii) increase in the rate of urbanization and corresponding decrease in the value of self-supplied food and other commodities.[1]

It is recognised that an ideal model for the analysis of changes in the personal distribution of incomes, would have to be based on the economic fate of each individual of a society. Questions such as the following could then be tackled: - (i) what is the rate of income advance of individual persons over time? (ii) in what way is this income advance correlated to the labour market and what is the effect of the institutionalization of modern life on the rate of income advance? (ii) at what incomes are persons who leave the labour market (i.e., because of death or in the event of their going on pension), replaced? (iv) in what way do inheritances influence the size distribution of income?

In South Africa, the inadequacy of statistical data on the size distribution of incomes only allows a very limited analysis to be carried out. Thus, rather than reviewing a multitude of variables which are influenced by the size distribution of incomes and its changes over time, an attempt will be made to analyse the four problems outlined below, viz.,

(i) To what extent do human, and to what extent economic factors, determine the size distribution of incomes and its changes over time? (Section 13. 3. 1)

(ii) What is the effect of changes in the industrial structure on the size distribution of incomes? (Section 13. 3. 2)

(iii) What is the effect of changes in the wage share on the size distribution of incomes? (Section 13. 3. 3)

(iv) To what extent does the investment and growth performance have an influence on income size distribution? (Section 13. 3. 4)

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1. Note that the unexchanged part of all non-primary production performed by producers outside their own trades is for instance excluded from computation in national accounts statistics. J. J. Stadler, "The Gross Domestic Production of South Africa, 1911-1959", South African Journal of Economics, Vol. 31, 1963, pp. 185-208, here p. 187.

13. 3. 1 The Interaction of Human and Economic Factors in the Explanation of the Income Size Distribution Curve

In this section it is attempted to discuss the question as to whether the distribution of human abilities can serve as an explanatory variable for the skewness of the income distribution curve.

Evidence submitted by differential psychologists[1] suggests that most human characteristics are distributed according to the normal (Gaussian) probability curve.[2] In the 19th century already, the English biologist Francis Galton found that characteristics such as the sensory discrimination of persons, their motor capacities, and the strength of their movements and speed of their reactions, are distributed according to the normal probability law.[3]

Modern research by differential psychologists refined the earlier work by using principally large, representative samples (most of them including 1000 or more cases), and covering a wide variety of characteristics. Good approximations to the normal probability curve were discovered in respect of the following traits:-

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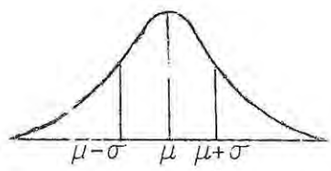
1. Differential psychology is the quantitative investigation of individual differences in behaviour. Compare Anne Anastasi, Differential Psychology, Individual and Group Differences in Behaviour, 3rd Edition, Macmillan, New York, 1958, p. 1.

2. Normal probability curves are symmetrical, single-peaked and bell-shaped. Approximately 68 per cent of the observations are within one standard deviation (σ) of the mean (μ) and approximately 95 per cent within two standard deviations. The normal distribution curve is bilaterally symmetrical in respect of the vertical axis which measures the relative frequency of the observation.



The function for a normal distribution with mean $\bar{\mu}$ and standard deviation σ is

$$P(x) = \frac{1}{\sigma\sqrt{2\pi}} e^{-(1/2\sigma^2)(\mu-\bar{\mu})^2}$$

William C. Merrill and Karl A. Fox, Introduction to Economic Statistics, Wiley, New York, 1970, p. 187.

3. Francis Galton, Hereditary Genius, An Inquiry into its Laws and Consequences, Appleton, New York, 1870.

(i) physical measurements in respect of a sample of 3585 English-born men;[1]

(ii) physiological measurements in respect of 1633 male college students;[2]

(iii) emotional and personality characteristics in respect of 87 school children;[3]

(iv) measurements of perceptual speed and accuracy of 1000 college students;[4]

(v) measurements of intelligence (Standford-Binet IQ tests) in respect of a sample of 2904 children between the ages of 2 and 18.[5]

The main reason for the good approximation of the distribution of human characteristics to the mathematical probability curve is that human characteristics usually depend on a large number of independent factors, so that the outcome will be in accordance with the laws of change. To quote Anastasi: "If some assumption regarding the distribution of a human trait must be made, that of the normal curve would seem to be the most plausible in the majority of situations".[6]

Occasional deviations from the normal distribution are usually attributable to inadequate preparation of the experiment. Skewness of the distribution curve may result for instance when two samples which differ pronouncedly in both mean and range are lumped together, as would be the case for instance with the joined consideration of an intelligence test which is administered for persons at two different age groups.

A second reason which may be responsible for the skewness of the distribution curve of human traits, might be sought in the careless choice of the measurement instrument. An example would be the allocation of the centre of a difficulty range either too far in the upper or lower direction.

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1. G. U. Yule and M. G. Kendall, An Introduction to the Theory of Statistics, 13th Edition, Griffin, London, p. 95.
2. J. A. Harris, C. M. Jackson, D. G. Paterson, and R. L. Scammon, The Measurement of Man, University of Minnesota Press, Minneapolis, 1930, p. 94.
3. M. A. Wenger and M. Ellington, "The Measurement of Autonomic Balance in Children: Method and Normative Data", Psychosomatic Medicine, Vol. 5, 1943, pp. 241-53, here p. 252.
4. Anne Anastasi, "Practice and Variability", Psychological Monograph, Vol. 45, 1934, No. 5, p. 32.
5. L. M. Terman and Maud A. Merrill, Measuring Intelligence, Houghton Mifflin, Boston, 1937, p. 37.
6. Anne Anastasi, Differential Psychology, ibid., p. 39.

A third possible reason for a one-sided skewness of the distribution curve is the abnormal frequency of a certain causal factor, such as a pathological condition, which could bring about a single-factor (rather than multi-factor) causation.

Income size distribution statistics, when carelessly constructed, might well exhibit examples for the above-mentioned inadequacies of sampling technique. A case where two samples differ in both income mean and income range would be given when income size distributions which are representative for different races, are added together. According to the 1960 income census, for instance, the median income[1] of the economically active population was as follows: (i) Whites: R1,550.0; (ii) Coloureds: R 208.6; (iii) Asiatics: R426.7.[2] The size distribution curve for all three races together, would consequently exhibit a tendency to become a multi-peaked polygon. Moreover, a one-sided skewness of the distribution of personal incomes might arise as a consequence of a high rate of unemployment. Since, in a depression, the occurrence of unemployment is likely to spread cumulatively from one sector to the other, individual cases of unemployment become dependent one on the other. Thus a greater than normal number of persons are likely to become unemployed during a depression, with consequent repercussions on the size distribution of incomes.[3]

Assume, however, that all inadequacies in sampling technique have been successfully eliminated from income size distribution statistics. The one fact that emerges with clarity from a frequency polygon which measures the size of incomes on the horizontal, and the frequency of income receipts on the vertical axis, is that it does not exhibit a shape similar to that of the normal distribution curve.

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1. The median is the central value of a set of observations that have been arranged in order of magnitude. W.C. Merrill and Karl A. Fox, Introduction to Economic Statistics, ibid., p. 19.
2. Bureau of Statistics, Population Census, 6th September, 1960, Volume 5, Personal Income, Tables A1, B1, C1.
3. A fine source for the effect of a cumulative spread of unemployment and consequent decreases in earnings, is Hans Staehle's article "Short-Period Variations in the Distribution of Incomes", Review of Economics and Statistics, Vol. 19, 1937, pp. 133-143. For the years 1928 to 1934, Staehle used statistics available as a by-product of the German invalidity-insurance scheme. This gave a reliable insight into the employment and earnings of German wage earners during this period.

Instead, an asymmetric polygon is regularly obtained, the peak of which is reached at relatively low income ranges, whereas a long tail persists on the side of high incomes.[1] It was therefore Gibrat's suggestion to consider logarithms of income instead of absolute income values, on the horizontal axis. With this transformation of the reference axis, the fit to the normal distribution curve was successfully restored.[2]

The lack of congruence between the shapes of a typical income size distribution curve on the one hand, and the distribution curve of human traits on the other, makes it advisable to ascertain whether economic (rather than human) factors can be used to explain changes in income size distribution functions.

In what follows, changes in the size distribution of incomes will therefore be related to:

(i) changes in the industrial structure (Section 13.3.2);
(ii) changes in the wage share (Section 13.3.3);
(iii) changes in the rates of investment and economic growth (Section 13.3.4).

13.3.2 The Effect of Changes in the Industrial Structure on the Size Distribution of Incomes

A characteristic change in South Africa's industrial structure since 1918 has been the significant decrease in the relative contributions to the G.D.P. rendered by the agricultural and mining sectors, and the corresponding increase rendered by the manufacturing and service sectors. The relevant percentage changes are given in Table 28 (p. 273 below).

The effect which the long-run change in the industrial structure has exhibited on the size distribution of incomes can be gauged on the basis of representative income concentration indices computed for the four different sectors. Unfortunately, the 1960 Personal Income Census is the only source available for an exercise of this kind. The computations of Lorenz coefficients for the four sectors agriculture, mining, manufacturing (including construction),

1. Compare Graph 50, p. 252 above.
2. Pareto and Gini also used logarithms in their income distribution functions. They did not, however, use the tool of the logarithmic normal distribution.

and services in respect of Whites (both males and females) yields the following results:-

	Lorenz coefficients, 1960, Whites, males and females
Agriculture	.8934
Mining	.5198
Manufacturing	.6972
Services	.5182

The computations for the Lorenz diagrams are given in table 29, p.275 below.[1] The pictorial representation is shown in graphs 56 and 57, p. 276 below.

TABLE 28 : Contribution to the G. D. P. by Main Economic Sectors, 1918 to 1963, Figures in Per Cent[2]

Period	Agriculture	Mining	Manufacturing	Services
1918-23	24.5	19.3	9.4	46.3
1923-28	22.0	20.4	10.2	47.4
1928-33	22.5	19.9	11.1	47.4
1933-38	21.6	14.9	14.8	48.7
1938-43	19.7	13.6	16.0	50.7
1943-48	16.6	11.9	13.4	54.0
1948-53	14.8	10.6	22.5	52.1
1953-58	14.1	11.7	24.0	50.2
1958-63	12.9	13.8	24.5	48.8
1963-68	10.4	12.7	27.4	49.5

In terms of these considerations, the personal income earned by Whites in 1960 was most unequal in agriculture, followed by services, manufacturing, and then mining (where it was least unequal). If one assumes that the distribution of personal incomes according to industry divisions, which was representative for 1960, was representative also for previous years, then it appears that the long-term decline in the contribution to the G. D. P. rendered by agriculture may have been conducive to the attainment of a greater degree of income equality.

1. Bureau of Statistics, Population Census, Personal Incomes, 1960, ibid., Table A3.
2. Source: Volume II, Tables 43 and 43a.

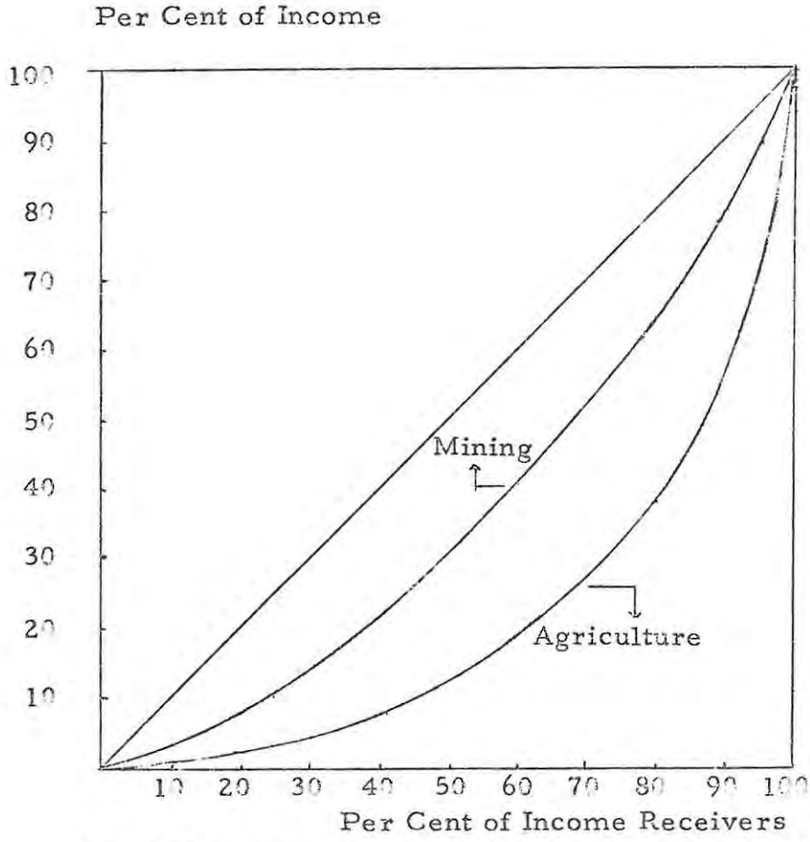
Against this must be considered the fact, however, that the contribution rendered by the mining sector also experienced a relative decline during the period under consideration. Since the mining sector shows the greatest degree of equality in relation to the other three sectors considered, it follows that at least a portion of the equalizing effect of the decline of agriculture must have been annihilated by the unequalizing effect associated with the decline in mining.

On the assumption that the year 1960 was typical for the size distribution of incomes by industry divisions, it follows that the dispersion arising from the distributive characteristics of the four sectors considered must have shrunk. This conclusion stems from the fact that the two sectors which show the greatest equality and the greatest inequality in their respective size distributions of income (viz., agriculture and mining), lost relatively in weight, whereas the two sectors exhibiting less extreme indices of income size inequality (viz., the sectors manufacturing and services), increased their relative contribution to the economy.

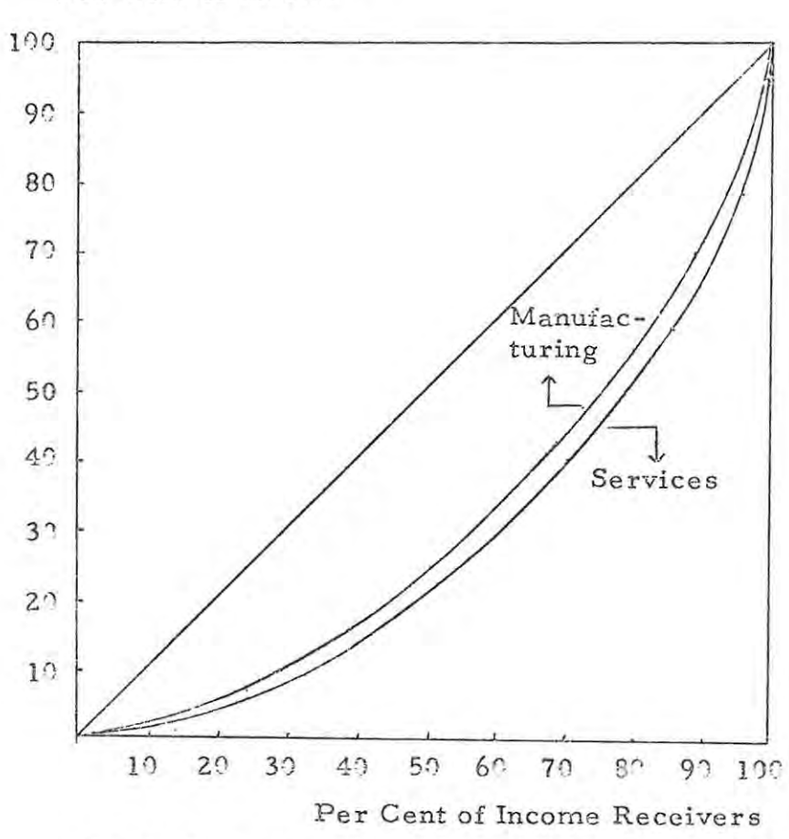
To summarize: The dispersion in income size inequality, arising from the distributive characteristics of the four main economic sectors, might well have shrunk over the past 50 years. This does not allow one to conclude, however, that the aggregate change in the composition of the G.D.P. has produced a clear-cut tendency either toward equality or toward inequality. Whether the one or the other effect has dominated, is impossible to be assessed with the data at one's disposal.

TABLE 29 : RELATIVE INCOME SIZE DISTRIBUTION, MAIN ECONOMIC SECTORS, 1960

Income Group	Agriculture		Mining		Manufacturing		Services	
	% Population	% Income	% Population	% Income	% Population	% Income	% Population	% Income
0	4.37	0.00	0.93	0.00	0.98	0.00	2.40	0.00
50	6.43	0.04	1.16	0.00	1.55	0.01	3.22	0.02
100	8.61	0.17	1.57	0.03	2.42	0.08	4.76	0.15
200	12.52	0.57	2.31	0.11	3.77	0.25	7.84	0.44
300	15.97	1.05	2.97	0.21	5.23	0.51	9.84	0.84
400	20.11	1.81	3.93	0.40	7.62	1.06	11.79	1.58
500	23.12	2.47	4.99	0.65	10.10	1.75	14.36	2.57
600	28.32	3.84	7.30	1.31	13.85	2.98	20.05	4.45
700	31.96	4.94	9.23	1.94	17.54	4.39	26.86	7.31
800	38.19	7.20	11.88	2.97	24.30	7.47	36.00	11.93
1000	45.49	10.44	14.82	4.38	30.46	10.90	44.25	17.02
1200	55.22	15.93	24.30	10.15	43.75	20.33	57.93	27.77
1600	63.74	22.12	41.27	23.44	61.56	36.58	72.06	42.04
2000	76.74	35.23	82.73	68.57	88.56	70.77	87.46	63.64
3000	93.54	44.83	94.60	86.56	94.45	81.23	93.60	75.69
4000	98.37	54.51	97.81	92.34	96.92	86.87	96.30	82.51
5000	91.62	60.59	98.82	95.25	97.96	89.77	97.51	86.24
6000	94.72	69.37	99.55	97.50	99.01	93.48	98.77	91.22
8000	96.57	76.06	99.80	98.48	99.44	95.46	99.30	93.89
10000	98.47	85.67	99.92	99.08	99.80	97.74	99.77	97.19
15000	99.23	91.01	99.95	99.36	99.91	98.67	99.91	98.52
20000	99.79	95.72	99.97	99.58	99.97	99.45	99.97	99.32
30000	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00
Lorenz Index	.8924		.5198		.6972		.3182	



Graph 56 Lorenz Curve: Agriculture and Mining, 1960, White Males and Females



Graph 57 Lorenz Curve: Manufacturing and Services, 1960, White Males and Females

13. 3. 3 The Effect of Changes in the 'Wage Income' Ratio versus 'Other Income' Ratio on the Size Distribution of Incomes

Information given by the 1960 Personal Income Census allows the calculation of income concentration indices for "employers and workers on own account", on the one hand, and "employees in labour force (excluding unemployed)" on the other.[1]

The values of the Lorenz coefficients for these two groups are .8638 and .7456 respectively, when calculated for White males and females.[2] Thus the income concentration of wage earners was considerably less when compared with that of employers and workers on own account. (See Table 31 and Graph 58 below.)

Table 30 lists the percentage share of work income in the total G.D.P., for the period 1918 to 1968:-

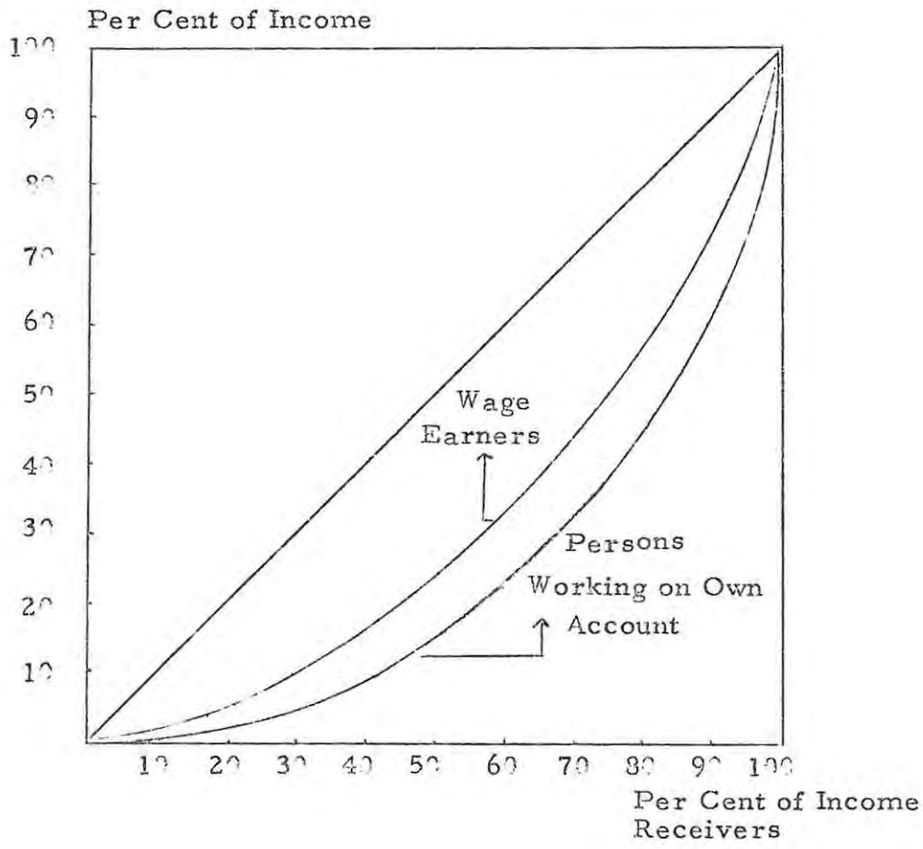
TABLE 30 : Percentage Share of Work Income in Total G.D.P., 1918 to 1968[3]

Period	Wage Share
1918-1923	50.9
1923-1928	50.1
1928-1933	51.9
1933-1938	50.2
1938-1943	52.6
1943-1948	56.9
1948-1953	55.0
1953-1958	55.1
1958-1963	54.7
1963-1968	54.3

1. Bureau of Statistics, Population Census, Personal Incomes, ibid., Tabulation 4.
2. The phenomenon that wage incomes are more equally distributed than other incomes, has been frequently reported also for other countries. Data for 1952 show that the share of wage incomes in England amounted to 90 per cent, that of profits to 5 per cent, and that of annuities, interests and dividends to 1 per cent in the £400-500 annual income category. The similar shares in the £1,500-2000 annual income category were 44, 43, and 13 per cent respectively. H. F. Lydall, British Incomes and Savings, Clarendon Press, Oxford, 1955, p. 43.

Table 31 : Relative Income Size Distribution, Wage Income & Other Income : 1960

	Other Income		Wage Income	
	% Population	% Income	% Population	% Income
0	2.32	0.00	0.96	0.00
50	3.71	0.02	2.02	0.03
100	5.12	0.09	3.09	0.12
200	7.66	0.30	4.70	0.35
300	10.06	0.57	6.57	0.72
400	13.06	1.02	9.05	1.35
500	15.36	1.43	11.60	2.15
600	19.19	2.24	16.26	3.87
700	21.93	2.92	21.94	6.29
800	26.48	4.25	29.93	10.36
1000	32.40	6.39	37.98	15.39
1200	41.66	10.63	51.71	26.30
1600	51.15	16.21	68.78	43.73
2000	67.32	29.43	90.00	73.84
3000	76.62	40.07	95.99	85.72
4000	84.28	51.35	98.04	90.95
5000	88.49	58.92	98.80	93.34
6000	93.46	70.30	99.44	95.88
8000	95.91	77.53	99.70	97.18
10000	98.35	87.48	99.89	98.55
15000	99.18	92.26	99.95	99.11
20000	99.67	96.26	99.98	99.57
30000	100.00	100.00	100.00	100.00
Lorenz Coefficient	0.8688		0.7156	



Graph 58 Lorenz Diagram, Wage Earners and Workers on Own Account, 1960, Whites, Males and Females

It appears that for the period 1918-23 to 1943-48, there occurred a noticeable increase in the contribution rendered by labour to the total G.D.P., whereas after 1943-48, labour's contribution has fallen slightly. When seen over the total 50 year period 1918 to 1963, labour's share in income has grown by 3.4 percentage points, which suggests that the shift in the occupational structure must have been income-equalising to a certain extent.

Apart from the shift in the occupational structure considered above, changes in the institutional organization of the economy are also likely to have promoted the degree of income inequality in the past. Salary scales for civil servants, for instance, are significantly less broad than salary scales for persons employed in private enterprise.[1] The extension of government employment, which has taken place in the past,[2] is therefore likely to have had a certain income-equalising effect on the size distribution of incomes.

13. 3. 4 The Effect of Changes in the Rates of Investment and Economic Growth on the Size Distribution of Incomes

Changes of income and its distribution for the South African economy can systematically be examined only for the period 1920 to 1951, since it is only for these years that annual data on the size distribution of incomes are available from income tax statistics.[3] Unfortunately, figures published by the Department of Inland Revenue for years after 1951, are of no use for the theoretical analysis, mainly because the incidence of tax avoidance through company formation gained such proportions after 1951, that the comparison between income tax data before and after 1951, does not make sense.[4] Additional shortcomings of data supplied by the Inland Revenue Department after 1951 are that

1. The effect of this on the concentration of personal incomes, is shown in Volume II, Table XXI, p. 53.
2. Compare C.S. Richards, "The Growth of Government in South Africa Since Union", The South African Journal of Economics, Vol. 25, 1957, pp. 239-263, here mainly pp. 246 ff.
3. Volume II, Tables 11-42. For the computation, see ibid., pp. 99 ff.
4. Compare ibid., pp. 71 ff.

(i) the amount of taxable income is not tabulated by income groups any longer;[1]

(ii) the highest income range for which data are supplied is reduced from £30,000 to £10,000 as from 1952, and the number of tabulated income groups from 60 to 19.[2]

(iii) no figures are published for the tax years 1952, 1953, 1961, and for the 8 months 1st July 1962 to 28th February 1963.[3]

(iv) owing to difficulties in the staffing position, the Department of Inland Revenue was not able to execute its functions properly during the early fifties, with resultant adverse repercussions on the quality of its work (and, consequently, on its statistics).[4]

For the assessment of the relation between income growth and income size distribution during the period 1920 to 1951, the following tables have been prepared:-

Table 32 — Financing of Gross Domestic Investments, 1918 to 1960, R million;

Table 33 — Number of Income Recipients by Six Major Income Groups, Total Value of Taxable Income, and Taxable Income as per cent of G.D.P.;

Table 34 — Values of the Pareto Coefficient (normal and super tax amalgamated and super tax only), Gini Coefficient (all income ranges, before and after tax) and Gibrat Coefficient (all income ranges).

In addition, the relation between the rate of investment and (i) Gibrat's concentration index, is illustrated in graph 59, and (ii) Gini's and Pareto's concentration indices, in graph 60.

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1. Volume II, Tables 11-42. Compare pp. 62 ff.
2. ibid., Table XXII
3. ibid., p. 61.
4. ibid., p. 61, Footnote 1.

TABLE 32 : Financing of Gross Domestic Investments, 1913-1968. Rm

Year	Private Savings		Surplus: Gen. Gov.	Depre-ciation	Gross Dom. Sav-ings	Net Capital Inflow	Change in Gold & For. Re-serves	Gross Dom. Invest-ments
	Personal	Corporate						
col. 1	col. 2	col. 3	col. 4	col. 5	col. 6	col. 7.	col. 8	col. 9
1913		61		23	84	- 8		76
1919		11[illegible]		25	135	-40		95
1920		3[illegible]		27	65	78		143
1921		[illegible]		29	37	12		49
1922		- 6		3[illegible]	24	12		36
1923		57		31	9[illegible]	2		9[illegible]
1924		56		32	88	12		1[illegible]
1925		51		33	84	10		94
1926		34		35	69	3[illegible]		99
1927		47		36	83	12		95
1928		57		37	94	16		110
1929		35		39	74	28		1[illegible]2
1930		15		39	54	14		68
1931		- 7		4[illegible]	33	6		39
1932		1		40	41	-34		7
1933		81		40	121	-40		81
1934		93		41	124	-1[illegible]		114
1935		117		44	161	- 6		155
1936		121		48	169	16		185
1937		120		52	172	28		2[illegible]
1938		122		56	178	12		19[illegible]
1939		136		59	195	—		195
194[illegible]		134		61	195	-28		167
1941		114		64	178	-16		162
1942		114		65	179	-66		113
1943		15[illegible]		65	223	-108		115
1944		192		68	26[illegible]	-9[illegible]		170
1945		198		72	27[illegible]	-6[illegible]		210
1946	95		23	1[illegible]	218	80	87	385
1947	61		4	113	178	352	2	532
1948	56		47	133	236	165	172	573
1949	123		33	155	311	105	1137	553
195[illegible]	296		41	179	516	182	-143	555
1951	2[illegible]3		38	205	501	137	72	760
1952	287		69	236	592	144	15	751
1953	223	91	108	269	681	113	54	848
1954	274	82	138	303	803	193	- 88	908
1955	3[illegible]	83	146	332	869	51	42	962
1956	331	145	136	361	973	35	- 24	984
1957	362	147	161	389	1059	- 47	63	1075
195[illegible]	299	160	133	420	1012	134	8	1154
1959	391	171	173	452	1177	- 61	-107	1009
196[illegible]	289	194	222	492	1197	-180	143	115[illegible]
1961	5[illegible]5	160	177	512	1362	-129	- 86	1147
1962	579	205	109	543	1435	- 89	-229	1118
1963	569	217	306	587	1679	- 89	- 86	1513
1964	407	342	313	648	1710	- 41	89	1758
1965	571	316	296	719	1902	255	41	2193
1966	719	335	258	791	2103	141	-140	2104
1967	865	301	474	87[illegible]	2519	162	19	2691
1968	661	333	475	945	2414	459	-534	2339

Sources : 1918 to 1945 : D.G. Franzsen and J.J.D. Willers. "Capital Accumulation and Economic Growth in South Africa", International Association for Research in Income and Wealth, Studies in Income & Wealth, Series VIII, The Measurement of National Wealth, Ed. by Raymond Goldsmith and C. Saunders, Bowes and Bowes, London, 1959, pp. 293-322, here pp. 316-7.

1946-1968 : South African Reserve Bank, "A Statistical Presentation of South Africa's National Accounts for the Period 1946 to 1970", June 1971, p. 36

Table 33 Number of Income Recipients by Six Major Income Groups, Value of Taxable Income, and Taxable Income as Per Cent of G. D. P.

Year	Number of Income Recipients							Value of Taxable Income, £1000	Taxable Income as per cent of G. D. P.
	£400	£400-1000	£1000-2500	£2500-5000	£5000-10,000	£10.000	Total		
	col. 1	col. 2	col. 3	col. 4	col. 5	col. 6	col. 7	col. 8	col. 9
1920	-	43366	14136	2471	622	252	60847	69334	25.1
1921	46267	90794	10999	1902	451	161	150574	96674	39.5
1922	47153	62713	9150	1501	313	113	120983	77072	35.1
1923	49550	60553	9559	1555	373	98	121688	77820	32.5
1924	52709	65644	10815	1852	431	147	131597	85161	33.1
1925	53620	67518	11677	1971	503	174	135463	88248	32.8
1926	-	69414	12721	2249	529	170	85083	73589	26.5
1927	-	71097	12828	2367	577	173	87042	77612	26.7
1928	-	75552	14183	2696	630	179	93240	81261	27.0
1929	-	66703	14226	2675	636	182	84422	79161	26.5
1930	-	66558	13026	2376	545	146	82651	76305	27.6
1931	52230	63834	11547	1983	471	102	130167	85456	34.3
1932	46711	54818	9323	1550	330	80	112812	71949	30.5
1933	42095	51309	9208	1640	350	153	104755	69042	26.0
1934	-	56172	11597	2229	527	232	70757	66235	20.3
1935	-	62410	12782	2559	641	222	78614	75531	21.9
1936	-	72838	14679	3102	782	276	91677	86679	22.7
1937	-	84159	16819	3674	934	336	105922	101277	24.8
1938	-	93469	17141	3487	903	248	115248	103380	24.5
1939	-	99963	17692	3458	882	242	122237	111241	24.9
1940	-	106504	19241	3566	916	259	130486	115585	23.4
1941	-	129770	22014	4485	1364	565	158198	154460	27.7
1942	-	162354	27149	5439	1590	553	197085	168379	27.3
1943	-	180883	32877	6440	1792	604	222596	189433	28.6
1944	-	206444	36392	7125	1773	651	252385	256954	36.7
1945	29695	188104	40262	7360	1936	600	267957	248736	32.9
1946	37683	203154	44050	10350	2967	1101	299305	292184	36.0
1947	40445	200900	51930	11842	3988	1640	310745	317430	35.2
1948	31416	150383	61858	13418	4489	1732	263296	314969	31.4
1949	36297	174349	78553	14867	4885	1637	310558	357761	32.9
1950	38185	187028	85114	14873	4692	1397	331289	381783	29.9
1951	38183	219978	102229	19483	6536	1608	388097	526612	37.2

Sources :

Number of income recipients and value of taxable income : Volume II, Tables 11 to 42.

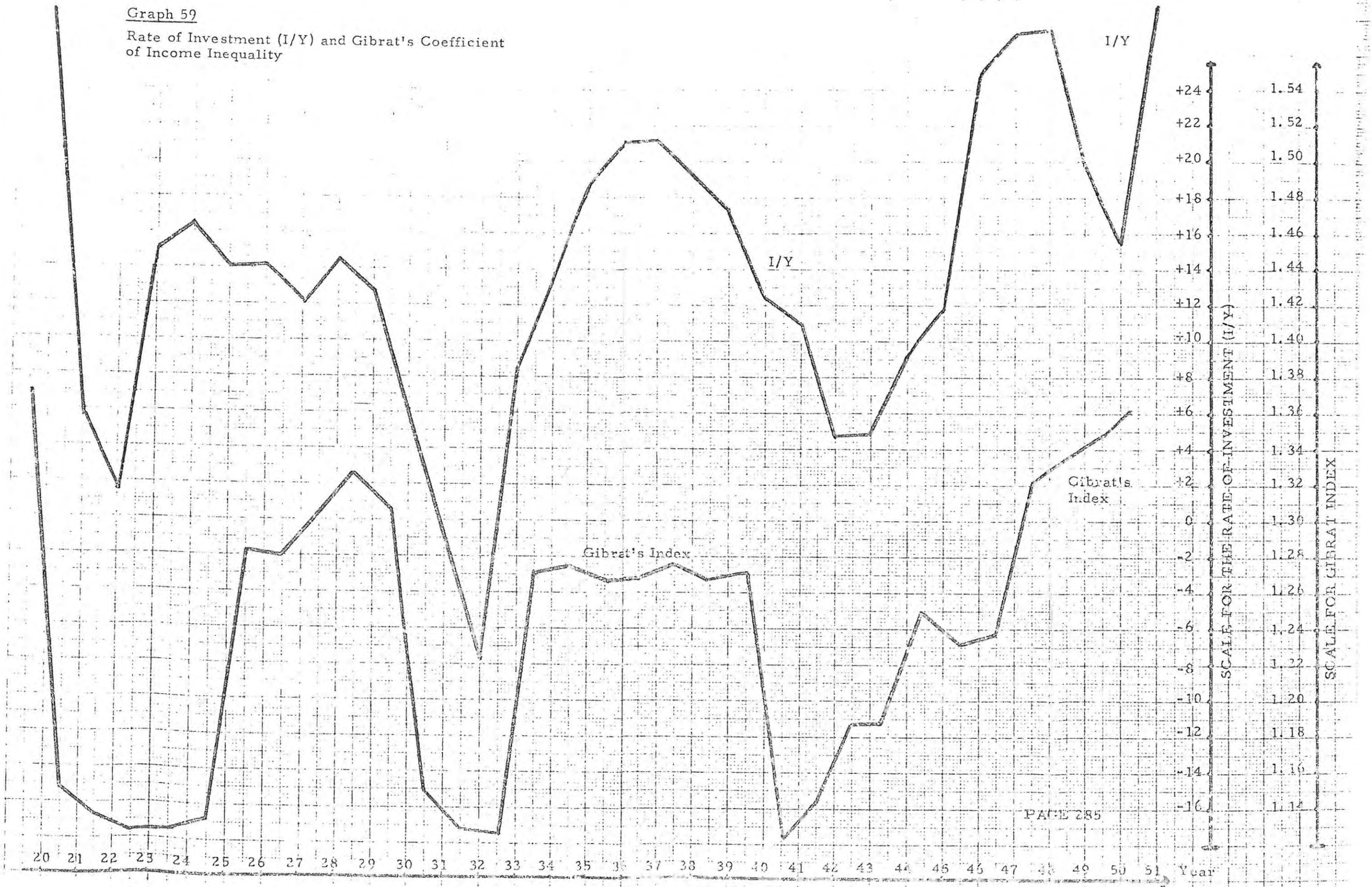
Gross domestic product : Volume II, Table 3.

Table 34 Values of the Pareto, Gini and Gibrat Concentration Indices, 1920 to 1951.

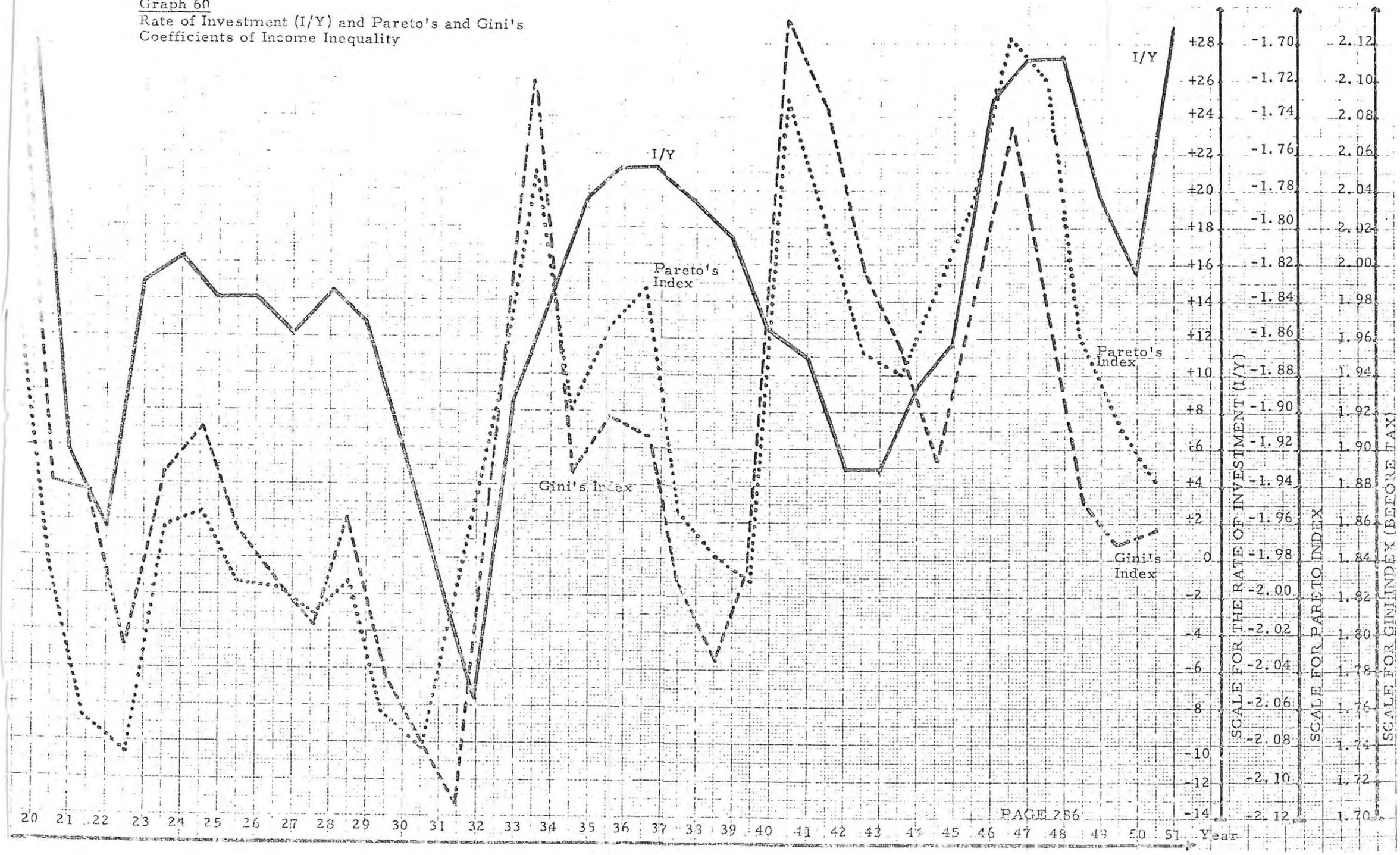
Year	Pareto Coefficients		Gini Coefficients all income ranges		Gibrat Coefficient
	normal & super tax amalgamated	super tax	before tax	after tax	
1920	-1.8387	-1.8288	2.1212	2.0091	1.3697
1921	-1.9833	-1.8435	1.8810	1.7498	1.1523
1922	-2.0678	-2.0318	1.8778	1.7520	1.1355
1923	-2.0860	-2.1610	1.7932	1.6717	1.1264
1924	-1.9615	-2.2719	1.8870	1.7546	1.1268
1925	-1.9477	-2.0007	1.9122	1 7848	1.1323
1926	-1.9915	-2.0324	1.8556	1.7186	1.2859
1927	-1.9940	-2.1473	1.8243	1.7012	1 2805
1928	-2.0113	-2.1894	1.8051	1.6829	1.3000
1929	-1.9920	-2.2293	1.8601	1.7270	1.3271
1930	-2.0619	-2.1983	1.7741	1.6621	1.3075
1931	-2.0813	-2.3289	1.7429	1.6402	1.1512
1932	-2.1810	-2.2908	1.7053	1.6136	1.1302
1933	-1.9003	-2.4972	1.9123	1.7590	1.1294
1934	-1.7786	-1.9139	2.0991	1.9019	1.2725
1935	-1.9003	-1.7408	1.8876	1.7460	1.2786
1936	-1.8530	-2.1116	1.9169	1.7773	1.2677
1937	-1.8335	-2.0199	1.8882	1.7488	1.2689
1938	-1.9536	-2.0076	1.8282	1.7097	1.2783
1939	-1.9798	-2.1995	1.7828	1.6693	1.2687
1940	-1.9911	-2.2063	1.8340	1.6940	1.2726
1941	-1.7268	-2.2056	2.1303	1.7880	1.1221
1942	-1.8037	-1.9968	2.0096	1.7636	1.1432
1943	-1.8674	-1.8464	1.9985	1.6820	1.1883
1944	-1.8785	-1.9504	1.9535	1.6350	1.1916
1945	-1.9452	-1.9322	1.8932	1.5720	1.2527
1946	-1.7913		1.9756	1.5943	1.2328
1947	-1.6995		2.0764	1.6277	1.2393
1948	-1.7172		1.9751	1.6912	1.3239
1949	-1.8566		1.8700	1.5441	1.3355
1950	-1.9040		1.8512	1.5323	1.3445
1951	-1.9356		1.8574	1.5466	1.3677

Graph 59

Rate of Investment (I/Y) and Gibrat's Coefficient of Income Inequality



Graph 60
Rate of Investment (I/Y) and Pareto's and Gini's Coefficients of Income Inequality



Using the statistical evidence presented above one can determine whether and to what extent changes in the rates of personal savings and investment have been correlated with changes in the size distribution of incomes. This in turn leads to an appraisal of the relation between the strategic variables considered in this study, viz., investments, savings, the size distribution of incomes, and economic growth.

The finding will be that during the period for which consecutive data are available, viz., during the years 1920 to 1951, high rates of investment, savings, and economic growth, have been associated with high degrees of income inequality, and vice versa. In other words, the inequality in the size distribution of incomes and its changes, correlate positively with the growth performance of the economy. It therefore follows that equality and growth targets are incompatible in the formulation of growth policies.

The arguments underlying the above finding will be outlined as follows:-

(i) Evidence will first be presented that the propensity to save out of high incomes is larger than the propensity to save out of low incomes. On the basis of this evidence it will be argued that the occurrence of high incomes is conducive to the accumulation of a high level of savings, and consequently to a high level of investments. (Section 13.3.4.1.)

(ii) The consideration of income tax data for the period 1920 to 1951 evidences that high rates of investment and savings have been correlated with high values for indices measuring the inequality in the size distribution of incomes, and vice versa. (Section 13.3.4.2.)

(iii) From (i) and (ii) it follows that the inequality in the size distribution of incomes has been instrumental in the accumulation of savings and investments. (Section 13.3.4.3.)

(iv) It will be concluded that in the long-run, the supply capacity of the South African economy (and not the level of effective demand), has been the main determinant for the growth performance of the economy. (Section 13.3.4.4.)

13. 3. 4. 1 The Propensity to Save in Relation to the Size of Income

Numerous empirical budget studies have established the fact that the average propensity to save increases with increasing incomes.[1] For South Africa, a certain, albeit very limited, evidence for this statement can be gained from the 1966 Survey of Family Expenditure by the Department of Statistics, which lists total income and total expenditures by income groups for 2,709 White families for the year 1966:-

TABLE 35 : Total Family Income and Expenditure, 2,709 White Families, 1966, Twelve Urban Areas Combined.[2]

Income Group R	Total Family Income	Total Expenditure	Savings
2,000	1497.51	1634.71	- 137.20
2,000 - 2,999	2565.15	2740.28	- 175.13
3,000 - 3,999	3479.35	3617.58	- 137.73
4,000 - 4,999	4453.53	4516.07	- 62.54
5,000 - 5,999	5454.20	5298.11	+ 156.09
6,000 - 7,999	6796.75	6428.96	+ 367.79
8,000 +	13193.64	11026.59	+ 2167.05
All Families	4601.48	4477.83	+ 123.65

As is shown in Table 35, only families receiving an income higher than R5,000 started to contribute to the accumulation of savings. To the extent that the pattern so obtained for the year 1966 is also typical for previous years (and there is no reason which would suggest that it is not), it is evident that the accumulation of personal savings is positively correlated with the incidence of high personal incomes. Moreover, it can be argued that an increase in the rate of investment, will invariably be associated with an increase in the inequality of income distribution (which in turn stems from the increase in the frequency of high incomes), and vice versa.

1. Compare for instance H. Lubell, "Effects of Income Redistribution on Consumers' Expenditures", American Economic Review, Vol. 37, 1947, pp. 157-170.
2. Department of Statistics, Report No. 11-06-04, Survey of Family Expenditure, November 1966, Detailed Expenditure of Families According to Occupational Groups, Income Groups and Family Composition, Twelve Urban Areas Combined, Table 2. 1. 2., p. 50.

It will now be analysed whether the statements made above are underlined by the available evidence from income size distribution data.

13. 3. 4. 2 The Relation of Changes in the Size Distribution of Incomes and the Rate of Investment

In what follows, the rate of investment (I/Y) will be correlated with various indices of income inequality. [1]

A certain qualitative insight into the issue under consideration can be gained from the joint consideration of Table 33 above, and the values for the rate of investment. [2] Column 6 of Table 33, which lists the number of income recipients in the income bracket £10,000+, illustrates that a fall in the number of persons in this bracket, is associated with a fall in the rate of investment. The early 1920's, and the depression of the early 1930's, both show an absolute decline in the two indices under consideration. For boom years, this situation is reversed.

A quantitative insight is given by graphs 59 and 60. Both graphs show the relation between the rate of investment and the value of various concentration indices, for the years 1920 to 1951. Note that in the plotting of the concentration indices, a six months time lag has been taken into account, in order to provide for the fact that the tax year is not identical with the calendar year. [3]

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1. The decision to correlate coefficients of income inequality with the rate of investment, rather than with the rate of saving, was based on the following deliberations:
   (i) During South Africa's history of economic growth since 1918, the rate of investment and the rate of economic growth have been closely correlated one to another. (Compare Section 6.2, p.66 ff above). It thus follows that the indices of the rates of investment and of economic growth, can be regarded as close substitutes one for the other.
   (ii) For the period prior to 1951, there are no figures available showing the value of "private personal savings" in its pure form. The only available savings figures are those which lump savings by private persons, corporations, and government together (Compare Table 32, p.282 above). Rather than rely on this agglomeration of incomprehensible magnitudes, it appears preferable to consider the rate of investment as a 'pure' economic variable for the purpose of ensuing correlation analyses.
2. Source: column 1, Table 4, p.66 above.
3. The 1934 tax year, for instance, lasted from 1st July 1933 to 30th June 1934.

A visual inspection of graph 59 reveals that there exists an obvious correlation between the values for Gibrat's concentration coefficient and the values for the rate of investment (I/Y). Both curves coincide in respect of the four major peaks and three major troughs. In the first place, a correlation exists between the two indices for the year 1920, a post-war I boom year. The ensuing depression of the early 1920's is illustrated by trough values for both time series, except that the Gibrat values display trough conditions right until 1924-25, whereas the rate of investment already showed a noticeable revival by 1923.

The second trough which lasted from about 1929 to 1933/34, is also exhibited by both time series, and so are the boom of the 1930's and the pre-war II trough. The only noticeable divergence of the two indices occurred in 1950, when the rate of investment declined temporarily, whereas Gibrat's coefficient of income concentration does not show any reaction at all.

Graph 60, which illustrates the behaviour of the Gini coefficient (before tax), and of the Pareto coefficient (normal and super tax amalgamated), is indicative of two facts: (i) there is a close similarity between the Gini and Pareto coefficients during the years under consideration (except for certain time lags, although all troughs and peaks are equally experienced) and (ii) the correlation between the ratio I/Y and the two income concentration indices, is clearly noticeable. All time series exhibit the post-war I boom, the trough of the early 1920's, the prosperous late 1920's (except for a minor trough early in 1927), and the Great Depression from 1929 to 1932. During the 1930's, the income concentration indices showed noticeable peaks in 1933/34 and 1940/41, but the ratio I/Y did not (with the exception of the peak in I/Y in 1936/37, which is also reflected by the intermediate peak in the two concentration indices). The post war II boom in investments is reflected in both concentration ratios, and so is the trough in 1950/1.

A comparison of Gibrat's index with the Pareto and Gini indices reveals that the latter two behave significantly more sensitively during the business cycle than the former. Short-term fluctuations in the ratio I/Y are consequently more discernably reflected in the Pareto and Gini indices, compared with Gibrat's coefficient. This is also underlined by the correlation coefficients listed in Tables 36a and 36b below, which are obtained from the calculation of a regression line which considers I/Y as the

independent, and the respective coefficients measuring income inequality, as the dependent variables.

TABLES 36a and 36b Correlation between the Rate of Investment and Coefficients of Inequality, 1920 to 1951[1]

Table 36a: All Years

	r	r^2	T	n-2
Pareto index	.6298	.3966	24.3	30
dto., 3 yrs ϕ[2]	.6067	.3680	21.4	28
Gini index	.4188	.1754	13.8	30
dto., 3 yrs. ϕ	.3188	.1016	9.4	28
Gibrat index	.5258	.2765	18.5	30
dto., 3 yrs ϕ	.5602	.3138	18.9	28

Table 36b: All Years, but Years 1939 to 1945 Excluded

	r	r^2	T	n-2
Pareto index	.8340	.6956	36.3	24
dto., 3 yrs ϕ	.8156	.6652	31.0	22
Gini index	.6803	.4628	22.3	24
dto., 3 yrs ϕ	.6241	.3895	17.6	22
Gibrat index	.4860	.2362	13.3	24
dto., 3 yrs ϕ	.5052	.2552	12.9	22

Table 36a illustrates that the correlation coefficient r between the rate of investment and various coefficients of income inequality, is largest for the Pareto index, followed by Gibrat's and then by Gini's index. In the case of the Pareto and Gini indices, the correlation coefficients are somewhat higher when unmodified year-to-year values go into the computations, rather than when 3-year sliding averages are being used. The opposite is true, however, in respect of the Gibrat index.

The r^2 column indicates the portion of the total variance of the dependent variable which is explained by the regression model. The value is best for the Pareto index (39.7 per cent) but significantly

1. Since the ratio I/Y leads the three indices of income inequality by 1/2 year, the 1951 value for the rate of I/Y (.284) has been discarded and set as .157, which was the value for the year 1950. In this manner, the correlations are somewhat better than would otherwise have been the case.
2. "3 yrs. ϕ" means "3 years sliding averages".

lower for the Gibrat and Gini indices. Nevertheless, the T-tests are significant for all cases, with $t_{.95}$ being equal to 1.70 for 28 to 30 degrees of freedom (n-2), 1.71 for 24 degrees, and 1.72 for 22 degrees, respectively.

The exclusion from the computation of the war period (1939 to 1945), significantly improves the correlation coefficients for the Pareto and Gini indices (r is .834 and .680 respectively), but slightly deteriorates the correlation coefficient for the Gibrat index (from .526 to .486). The r^2 values behave in a similar fashion as do the correlation coefficients, and the T test again exhibits relevance for all cases.

13.3.4.3 Capital Accumulation and Inequality in the Size Distribution of Incomes : Appraisal of Empirical Results

The computation of correlation coefficients is always open to the suspicion that, had any one of the independent variables been replaced by any other variable, an equally good fit might have been obtained. It is therefore important to note that the result of the correlation analysis must be assessed in conjunction with an a priori reasoning on which the choice of the variables is based. In other words, a statistical correlation makes sense only if it corresponds to an a priori expectation.

The regression model considered above relates the inequality in the size distribution of income to the rate of investment and produces a positive correlation between the two variables: an increase in the rate of investment is associated with an increase in measures of income size inequality, and vice versa.

In the economic interpretation of this finding it must be remembered primarily that the tax statistics on which the computation of the measures of inequality are based, measure the degree of income concentration only in respect of incomes received by a limited segment of the total population, i.e., by persons on the upper grade of the income scale. This is evidenced by column 9 of Table 33 which shows that the total amount of taxable income considered in the income size distribution statistics, varies between 20.3 per cent (lowest percentage) and 37.2 per cent (highest percentage) of the G.D.P. values for the years 1920 to 1951.

The finding of the regression analysis can therefore be reformulated to state that the more the size distribution of income is concentrated within the upper grades of the income scale, the higher the ratio of investments to income, and vice versa. Conversely, concentration of income in the hands of upper income groups, also produces a relative decrease in the rate of consumption in income, since, given the value foreign investments, the rates of investment and consumption are complementary one to the other.

13. 3. 4. 4 Aggregate Demand and Aggregate Supply in Relation to the Growth Performance of the South African Economy

The one fact that emerges with clarity from the previous considerations is that, in the short-term, the inequality in the size distribution of high incomes, and the ratio of I/Y, are positively related one to the other.

On closer reflection it appears possible to translate the short-term relation formulated above, into a consideration of the long-term as well. Thus it can be deduced that in respect of the period 1920 to 1951, the upper ceiling for economic growth has been set, not by limitations in effective demand, but by limited supply capacities. This relation is presumably valid also for the post-1951 years, because there is no apparent reason why a significant change should have taken place.

Whilst limited supply capacities have constituted a reason for long-term economic growth, lack of effective demand has constituted a short-term phenomenon which prevented the maximum possible expansion during certain depressive periods of South Africa's economic history.[1]

Being a semi-developed country, South Africa is still confronted with the incompatability between the distribution and growth goals. The preceding discussion showsclearly that a redistributive income policy would be detrimental to the growth performance of the economy, since any curtailment of the income command of high income groups (for instance by means of excessive taxation) would slow down the long-term growth rate of the economy.

1. Compare pp. 110 above.

14. Summary of Conclusions

It was the purpose of this study to examine the interplay of supply and demand factors for the South African economy, and to relate this to the functional, personal, and racial distribution of incomes. On the one hand, it appears that a concentration of incomes in the hands of those who possess both the ability and willingness to save, and to utilize the savings for productive investments, is a crucial determinant for the enhancement of economic growth. On the other hand, an excessive income concentration may severely limit the purchasing power of the major part of the population, thus inhibiting domestic investment.

Various models were applied in an attempt to solve this problem. The finding is that the answer to the question depends on whether one uses a short-term or a long-term type of analysis.

By employing a short-term model of income distribution, it is possible to separate periods during which the actual growth would have been faster had incomes been more equally distributed, from periods during which an acceleration of economic growth would have been achieved had incomes been more unequally distributed. The years 1918, 1921 to 1934, 1940 to 1945, and 1959 to 1963, fall into the first category, whereas the years 1919 and 1920, 1935 to 1939, 1946 to 1958, and 1964 to 1968, fall into the second.

In the discussion of the personal distribution of incomes, it then appeared that in the long-term there was regularity in respect of correlations between measures of the inequality in the size distribution of incomes on the one hand, and the rate of investment on the other. It was found that income inequality increased regularly when the rate of investment was growing, and vice versa. From this observation it became clear that in the long-term, inequality in the distribution of incomes was found to be a necessary condition for the attainment of economic growth. High economic growth rates were always associated with high rates of income inequality.

The major finding of this study, therefore is that, in the long-term, the aims of economic growth and of a more equal distribution of incomes have been irreconcilable in respect of South Africa's economic history since 1918. Savings and investments, but not consumption, have thus limited the economic growth performance. Over the total period considered, however,

there have been certain periods when income would have grown faster had the ratio of consumption to income been higher, i.e., had incomes been more equally distributed. But clearly, this latter phenomenon has to be interpreted as being of a short-term nature, because the revival of economic activity (which is associated with increasing rates of economic growth), regularly caused the level of investments, and not of consumption, becoming the bottleneck for economic expansion.

The scope of the investigation was severely hampered by the inadequacy of available economic data. In South Africa, adequate statistics describing the functional, racial, and personal distribution of incomes, are not readily available. In spite of the research reported in Volume II, the major shortcomings in the supply of data could not be fully overcome. In regard to the functional distribution of incomes, the analysis had to be argued within the available distinction between 'wages' and 'other income', since data on subdivisions of the 'other income' category, such as profits, interest, dividends, and rent, are not available. Secondly, in regard to racial income divisions, the two major shortcomings are that the distributions of aggregate income are not available on an annual basis, and that different studies of the aggregate income distribution by race have been based on differing income concepts. Finally, referring to the personal income distribution, it has to be noted that annual data were available only for the period 1920 to 1951, and that these data in turn cover high income groups only.

The data supply limited the elaboration of the economic models throughout. Of the functional income distribution models considered (mainly Boulding's, Kaldor's and Bombach's models), only a simplified approach could be utilised. Macroeconomic research in South Africa has only recently been facilitated by the provision of comparable annual national accounts data for the post-war period,[1] and the quality of our estimations would have improved had these publications been available earlier. Moreover, in regard to the racial distribution of incomes, a satisfactory

1. South African Reserve Bank, "A Statistical Presentation of South Africa's Balance of Payments and National Accounts for the Period 1946 to 1970", Supplements to the Quarterly Bulletins March and June, 1971.

analysis could be undertaken only for the manufacturing and mining sectors, and changes in the distribution of the aggregate income could be discussed only in very broad categories. Finally, the attempt to incorporate personal income distributions into a macroeconomic model had to be dropped - again because of the insufficient data supply. The only approach was therefore one of calculating certain indices of income concentration, and relating these to the rates of investment and economic growth.

In spite of the difficulties experienced with the data supply, it is noteworthy that the major conclusions in respect of the functional, personal, and racial distribution of incomes, were congruent. Conclusions derived from the employment of functional distribution models were therefore independently reinforced by results gained from personal and racial income models.

Although it was possible to arrive at a firm conclusion in regard to the long-term, it was not feasible to come to any conclusions concerning the very long-term. The available evidence does not suggest that decades during which wide income differentials persisted, are now being followed by periods exhibiting narrowing income distributions. It is left for future research to explore this fascinating possibility.

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INCOME DISTRIBUTION AND ECONOMIC GROWTH IN SOUTH AFRICA

VOLUME TWO: STATISTICAL FOUNDATIONS

by

Arnt Michael Karl Max Spandau

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Section I

STATISTICS ON THE FUNCTIONAL DISTRIBUTION OF INCOMES IN SOUTH AFRICA

1. Sources

The statistical foundations for a long-run analysis of the functional distribution of incomes in South Africa are provided by J. J. Stadler's D. Com. Thesis entitled Die Bruto Binnelandse Produk van Suid-Afrika, 1911-1959.[1] Certain of the original time series have recently been adjusted, and all time series have been extended by Stadler in cooperation with the Department of Statistics, Pretoria.

For the years 1911-1965, the writer has been supplied with the revised data by the Department of Statistics.[2] It was possible to bring this material up to date to the year 1968.[3]

2. Definition of the Total Income Concept and of Functional Income Divisions

The Gross Domestic Product (G. D. P.), which Stadler calculates, is defined by him as follows: "Die bruto binnelandse produk kan omskryf word as die waarde van al die finale goedere en dienste, wat binne die huishoudelike gebied of grense van 'n land gedurende 'n periode van 12 maande geproduseer word. Gesien van die inkome kant verteenwoordig hierdie waarde van finale goedere en dienste die som van die ontvangste van produksiefaktore uit hoofde van hul deelname aan lopende produksie van goedere en dienste binne die grense van 'n land plus waardevermindering."[4]

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1. Jacobus Johannes Stadler, Die Bruto Binnelandse Produk van Suid-Afrika, 1911-1959, unpublished D. Com. Thesis, University of Pretoria, Pretoria, July 1962. Compare also: J. J. Stadler, "The Gross Domestic Product of South Africa", The South African Journal of Economics, Vol. 31, 1963, pp. 185-208.
2. The writer is indebted to the National Accounting Section of the Department of Statistics, Pretoria, for the supply of unpublished material.
3. Department of Statistics, Statistical News Release, P. 12. 1, 17 March 1970. This source does not cover the data on work income and other income by type of organisation for the years 1966-1968. See footnote 2 above.
4. J. J. Stadler, Die Bruto Binnelandse Produk ..., ibid., p. 21.

The only functional division of income which is supplied by Stadler and the Department of Statistics, is that between 'work income' and 'other income'.

Stadler defines the concept of 'work income' as follows: "arbeidsvergoeding, waarby ingesluit is die werklike gereelde kontant salarisse en lone van werknemers, toelaes, direkteurs-vergoeding, spesiale of aanvullende vergoeding, soos kommissie, bonusse en fooitjies, vergoeding in natura en werkgewersbydraes tot pensioene-, voorsienings-en bestaansbeveiligingsfondse." [1]

Only direct work remuneration is included in this definition. Special contributions to pension funds, as well as contributions made by employers to such funds in the event of an employee terminating his services, are regarded as transfer payments and are therefore not included under 'work income'. [2] This is done on the grounds that such contributions do not constitute "vergoeding vir lopende deelname aan enige produksiebedrywighede." [2] All in all the amounts concerned are, however, of little magnitude. [3]

During the two World Wars, employers paid substantial amounts ("aansienlike bedrae") in respect of the difference between the former remuneration of employees and their military pay. [3] Only the latter has been regarded by Stadler as 'work income', whereas the subsidies paid by employers are defined as transfer payments.

Unemployment benefits paid by the Government have likewise been treated as transfer payments.

No attempt has been made by Stadler to separate into functional categories the incomes earned by non-corporate enterprises, such as farmers, retailers, contractors, and independent professional persons, who supply both capital and work services. Stadler allocates the total income earned by non-corporate businesses to the account 'other income', "alhoewel dit in baie gevalle oorwegend in die aard van arbeidsinkome is." [4]

'Other income', as defined by Stadler, includes: [5]

1. the total income of non-corporate businesses;
2. interest, with the exception of government interest and interest for consumer credit;

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1. J. J. Stadler, Die Bruto Binnelandse Produk ..., ibid., pp. 23, 4.
2. ibid, p. 58.
3. ibid., p. 59.
4. ibid., p. 26.
5. ibid., p. 24.

3. net rent on land and buildings, i.e., rent after deduction of expenses laid out for maintenance, rates, etc.;
4. gross profits, i.e., profits before deduction of direct taxes;
5. depreciation.

The calculations are separately submitted in respect of eleven economic activities.[1]

3. Methods of Calculations and Reliability of Estimates

The calculation of the contribution made to the G. D. P. by the primary and secondary sectors was undertaken according to the production approach (income-produced-method), whereas the contributions by the tertiary sector has been calculated according to the income approach (income-received-method).[2] The latter method has also been used to determine, for the primary and secondary sectors, the value of 'work income'. This value has been deducted from the total contribution to the G. D. P. made by respective sectors, in order to establish the value of the 'other income'. The value of 'other income' has therefore not been independently calculated and must consequently be regarded with the usual caution that is to be attached to any 'residual' value.[3]

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1. These activities are:
   Agriculture, Forestry, Hunting and Fishing;
   Mining and Quarrying;
   Manufacturing;
   Construction;
   Electricity, Gas and Water;
   Transportation, Storage and Communication;
   Trade;
   Financial Institutions and Real Estate;
   Ownership of Dwellings;
   General Government Services;
   Other Services.
   Compare Stadler, Die Bruto Binnelandse Produk..., ibid., p.66. ff.
2. For a description of these methods compare: Simon Kuznets, National Income, in: Encyclopaedia of the Social Sciences, Vol. XI, 1933, reprinted in: American Economic Association, Readings in the Theory of Income Distribution, Fourth Impression, 1967, George Allen and Unwin Ltd., 1967, pp. 3-43.
3. J.J.Stadler, Die Bruto Binnelandse Produk ..., ibid., p. 513. Stadler remarks in this connection: "... die beramings ten opsigte van arbeidsvergoeding (is) meer betroubaar ... as dié ten opsigte van ander inkome".

As to the reliability of the G. D. P. calculations, Stadler remarks that "die foutegrens in die totale binnelandse produk vir die jongste jare waarskynlik minder as 5 persent is en groter word hoe verder teruggegaan word na die begin van die periode wat in die studie gedek word, maar moontlik nie 10 persent vir enige indiwiduele jaar oorskry nie." (See Footnotes 1 and 2) Stadler believes that under- rather than over-estimations are more likely

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1. Stadler, Die Bruto Binnelandse Produk..., ibid., p. 513.

2. This estimation of the error margin is low when compared with Oskar Morgenstern's suggestion that "national income and consumers' spending power probably cannot be known now in part without an error of ± 10 to ± 15 per cent." * Morgenstern assumes these errors for the United States and Great Britain and remarks that "it is simply technically impossible for national income statistics of Africa, South and Central America, and Asia to be better than those of the United States and the United Kingdom." **

   Simon Kuznets, in a study of the National Income and Its Composition, 1919-1938, classified his estimates by size of the probable maximum error into the following categories: ***

I	an error of		5	to	10	per	cent,	with	7.5	as the	average;	
II	"	"	11	"	20	"	"	"	15	"	"	" ;
III	"	"	21	"	40	"	"	"	30	"	"	" ;
IV	"	"	41	"	80	"	"	"	60	"	"	" ;

   (If the margin of error appeared to be less than 5 per cent, the estimate was put into category I. If it appeared to be greater than 80 per cent, it was put into category IV).

   The sectors manufacturing industries and public utilities were grouped by Kuznets in sectors I and II. Agriculture, mining, trade, banking, insurance and government were grouped in groups II and III. An error margin of 30 per cent and higher was assumed for construction, water transportation, real estate, direct service industry, and the miscellaneous division.

   The evidence quoted above in respect of the United States suggests that Stadler's estimation of the margin of error has probably been on the low side.

   On the other hand it has to be kept in mind that it is not so much the absolute size of the G. D. P. in which we are interested, but rather the relative growth of this size over the years. As long as we can assume that mistakes made are of a systematic nature, the comparability between the years will hardly be affected. ****

   Sources

   * Oskar Morgenstern, On the Accuracy of Economic Observations, Second, Completely Revised Edition, Princeton University Press, Princeton, New Jersey, 1963, p. 9.

   ** ibid., p. 243.

   *** Simon Kuznets, assisted by Lillian Epstein and Elizabeth Jenks, National Income and Its Composition, 1919-1938, Vol. I., National Bureau of Economic Research, New York, 1941, pp. 503 ff.

   **** Compare for instance Milton Friedman, Comment on a Paper Delivered by Dorothy S. Brady, Research in the Size Distribution of Income, in: Studies in Income and Wealth, Vol. 13, National Bureau of Economic Research, The Riverside Press, Cambridge, 1951, p. 57.

to have occurred.[1] Great margins of error are assumed for the sectors Construction, Trade, Financial Services, Ownership of Dwellings and Private Services. A small margin of error is assumed for the sectors Transport and General Government Services.[2]

4. Shortcomings of the Available Estimates

The shortcomings of Stadler's calculations for our purpose lie in other directions, namely, that the value of 'other income' is not separated into its functional components, except for the item 'depreciation'.[3] A comprehensive functional analysis requires separate data for interest, rents, and profits, time series which are not available in South Africa. (See Footnotes 4 and 5) Even if the analysis is based on a two-class model which confronts receivers of 'work income' with receivers of 'other income', no pure categorization can be attained because of the fact that the total income of non-corporate businesses (which is in fact a mixture of wage and other income) is subsumed under the account of 'other income'.

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1. Stadler, Die Bruto Binnelandse Produk ..., ibid., p. 513.
2. ibid., p. 512.
3. ibid., p. 514, Table XXXII.
4. These kinds of data should be supplied with the assistance of the Department of Inland Revenue. It is a matter of great regret that even now, when the extraction of statistics has been facilitated through the successful use made of computers, the Department of Inland Revenue does not undertake the tabulation of different functional income receipts, although this office has data of a very high quality at its disposal. In this respect South Africa has hopelessly fallen behind other Western countries. It can only be hoped that in future, consideration will be given by the government departments concerned to the overcoming of the gap between factual data supply and theoretical requirements.
5. The same shortcomings characterize the data on the distribution of the functional incomes which are published by the South African Reserve Bank. 'Income from property' is a mixed income consisting of interest, dividend, and rent receipts, together with profits of non-corporate enterprises (in the case of households) and profits of public enterprises (in the case of government enterprises).
   Compare for instance: South African Reserve Bank, Quarterly Bulletin, No. 95, March 1970, S-65, Table: Distribution of National Income. See also ibid., footnotes 1 and 2.

5. Tabulation of Statistical Data

The following tables show the statistical data referring to the functional distribution of incomes.[1]

Table 1	Work Income by Type of Economic Activity
Table 2	Other Income by Type of Economic Activity
Table 3	Total Income by Type of Economic Activity
Table 4	Per Cent Distribution of Work Income
Table 5	Per Cent Distribution of Other Income
Table 6	Per Cent Distribution of Total Income
Table 7	Work Income as Per Cent of Total Income
Table 8	Weighted Work Income as Per Cent of Total Income
Table 9	Other Income as Per Cent of Total Income
Table 10	Weighted Other Income as Per Cent of Total Income

Tables 1 to 3 present the original data collected from the sources described in Section 1.1 above.

Tables 4 to 6 show the per cent distribution of the income values by type of economic activity.

Tables 7 and 9 list, for each individual economic sector, the 'work income' and 'other income' as percentages of the total income.

Tables 8 and 10 show the weighted work and weighted other income as percentages of the total income. The functional income values are weighted with the relative contribution which the different economic sectors made to the total product. Note that the 'Total' - columns of Tables 7 and 8, and 9 and 10, respectively, are identical. It is the basis which is different in the two groups of tables.

Tables 1 to 10 are shown in the Statistical Appendix.

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1. The calculations were done in the Rhodes University Computer Centre.

   The summations are subject to rounding errors.

SECTION II

STATISTICS ON THE PERSONAL DISTRIBUTION OF INCOME IN SOUTH AFRICA

1. Sources of Personal Income Distribution Statistics

Report No. 6 of the Social and Economic Planning Council suggested the following useful division of social and economic statistics, viz.,

(a) "statistics which can be obtained at regular intervals in the course of ordinary administration, or in a routine way by means of periodical questionnaires, e.g., income tax statistics or regular population census statistics, etc.;

(b) statistics which can only be obtained by special investigation by trained investigators, e.g., special costing studies, family budget enquiries, etc."[1]

In South Africa, contributions to personal income distribution statistics have been made both at regular intervals (definition (a).), and by special investigation (definition (b)).

Data which can be used for the construction of personal income statistics, and which were collected at regular intervals by offices of the South African administration, originate from

i. Income censuses taken together with the population censuses;
ii. Estimates of public expenditure;
iii. Income tax collections;
iv. Family expenditure surveys.

In addition, special investigations into the personal distribution of incomes have been conducted from time to time in South Africa, mostly by private scholars. Their findings have been published in journals and in special reports.

2. Data Provided by Personal Income Censuses. Their Usefulness and Reliability.

The scope and frequency of population censuses is regulated in Section 34 (ii) of the South Africa Act, 1909, and in the Census Act

1. U.G. No. 35-1944, Social and Economic Statistics in the Union, Social and Economic Planning Council, Report No. 6, para. 9, p. 2.

1910. The South Africa Act provided for a census of the European population to be taken every 5 years, [1] and the Census Act required that a census of the whole population be taken in 1911 and in every year thereafter as the Governor-General may determine (Act No. 2 of 1910, Section 3 (1), (2)).

Report No. 6 of the Social and Economic Planning Council summarizes the history of population censuses, prior to 1944, as follows:

> "By virtue of these two Acts the first census of the total population of the Union was taken in 1911. The European census due in 1916 had to be postponed until 1918 on account of the war. The second census of all races was taken in 1921. In 1926 an [sic] European census was taken. As an economy measure, the 1931 census was again restricted to Europeans. In 1936 a census of all races was again taken. It was the intention to include all races in the 1941 census but once more, for reasons of economy, it was confined to Europeans."[2]

Prior to 1941, no census asked for information on incomes.[3] It was only with the census of the European population in May, 1941, that a first enquiry was made into the structure and income of European families.[4] Unfortunately, income data collected at the 1946 Population Census have never been published and of the data collected at the 1951 Census only "Income and Median Income by Sex, Economically Active Population", have been made available

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1. J. E. Holloway commented on this provision as follows: "The Act of Union lays down the principle that a quinquennial census of the European population must be taken. The ostensible cause is the necessity for a re-delimitation of seats in the Union Parliament at short intervals. South Africa thus possesses (although only in respect of its white population) what most population statisticians regard as exceedingly desirable, but very few countries yet possess."
   U. G. No. 4 - 1931, Fourth Census of the Population of the Union of South Africa, 4th May, 1926, p. iii.

2. U. G. No. 35 - 1944, ibid., para. 4, p. 7.

3. Section 8 (5) of Act No. 2 of 1910 (Census Act) provided for "the collection of statistics relating to agriculture, education, religious denominations, industrial, mining, commercial, shipping, and fishing establishments and undertakings, and to friendly or building societies or trade unions or to any society formed for lawful objects, or to unemployment."
   It is a matter of regret that the tremendous value which is attached nowadays to income analyses was not predicted.

4. U. G. No. 28-1945, Census of Europeans 6th May, 1941, Report on Structure and Income of Families.

by the Bureau of Statistics. (See Footnotes 1 and 2) A first comprehensive picture of the personal income distribution in South Africa was only given by the 1960 Population Census.[3]

3. The 1941 Income Census of European Families

3.1 The Income Concept

The income which was required to be stated on the Census form was that of all members of a family combined during the twelve months, 1st May 1940, to 30th April, 1941.[4] The definition of income included "income from all sources , ... namely from wages or salary, interest, dividends, pensions and grants as well as the estimated money value of income in kind such as free quarters, rations, etc. Business and professional men were required to state the nett income remaining after deducting the usual expenses incurring in the earning of income."[4] Farm income was defined as the "combined gross income of the whole FAMILY ... from all sources: produce, wages, etc., reckoned in money."[5]

This definition of income conforms basically with the national accounting concept of personal income. Though it has not been specifically stated, it seems that government interest and government transfer payments were

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1. Population Census, 6th September, 1960, Vol. 5, Personal Income, D 1, D 7 and D 10, Tables I A, IB, IC.
2. In 1954 D.G. Franzsen reported that "in the 1946 and 1951 Population Censuses the income ranges have been expanded as far as £5,000+, and it is also planned to tabulate the data for the 1951 Census for the different occupational groups. This information will be availabe for Europeans, Coloureds, and Asiatics."
   D. G. Franzsen, "National Accounts and National Income in the Union of South Africa since 1933", The South African Journal of Economics, Vol. 22, 1954, p. 125.
   In a reply to a letter addressed to Professor D. G. Franzsen the writer was informed about the whereabouts of the 1946 Census figures on personal income as follows: "I do not know whether the information was actually tabulated, but it was certainly never published at that time."
   Letter received by Professor D. G. Franzsen, Head of the Economic Department, South African Reserve Bank, Pretoria, 21st November, 1968.
3. Population Census, 6th September, 1960, Vol. 5, ibid.
4. U. G. No. 28 -1945, ibid., para. 10, p. iv.
5. ibid., Annexure A, C. 11, Census Form, Question 5 B, p. x.

meant to be included in the income concept defined by the Census.

The income that had to be declared on the census form was not the actual amount of income earned but a grade income. There were ten income grades for urban families and non-farming families in rural areas, and six income grades for farming families in rural areas. The highest income grade for urban families and non-farming rural families was £400 and over; the highest grade for farming families in rural areas was £200 and over; the interval between any two income grades was £50. The tabulations showed the number of income receivers by income groups.

3.2 The Recipient Unit

It was the stated object of the Census to enquire into the "structure and income of families and not of households."[1] This basis was later held as having been inopportune, because it had often happened during the war time that a number of families formed one single household, a phenomenon which could not be statistically examined.[2]

The Census defined a family as

(i) husband and wife without children;
(ii) the father, mother and children, including step-children or adopted children;
(iii) a living parent and his, or her, children;
(iv) where both parents are dead, the brothers and sisters living as a family;
(v) the grandparent(s) with orphaned grandchildren.[3]

3.3 Coverage

The 1941 Income Census covered 85.8 per cent of the European population living in urban areas and 93.7 per cent of the European population living in rural areas, or 88.2 per cent of the total European population of the Union.[4]

1. U.G. No. 28 - 1945, ibid., Preface by the Director of Census and Statistics; also para. 3, p. ii.
2. "It is ... not possible to distinguish between lodging families and other families and hence the exact number of households cannot be determined." ibid., para. 3, p. ii.
3. ibid., para. 2, p. ii.
4. ibid., para. 4, p. ii.

3.4 Personal Income Tabulations

The income tabulations of the 1941 Census are given in Tables I and II.

TABLE I: European Income Census, 1941, Families According to Income in Urban Areas[1]; Non-farming Families in Rural Areas:[2]

Income Range £	Families in Urban Areas		Non-Farming Families in Rural Areas		Total	
	number	%	number	%	number	%
Under £50	12,304	3.8	3,772	8.3	16,076	4.3
50 - 99	20,263	6.2	6,478	14.2	26,741	7.2
100 - 149	28,273	8.7	6,230	13.7	34,503	9.3
150 - 199	26,211	8.1	4,888	10.7	31,099	8.4
200 - 249	33,383	10.3	4,850	10.6	38,233	10.3
250 - 299	25,704	7.9	3,206	7.0	28,910	7.8
300 - 349	34,109	10.5	3,881	8.5	37,990	10.3
350 - 399	30,310	9.3	3,065	6.7	33,375	9.0
400+	114,193	35.2	9,207	20.3	123,400	33.4
Unknown	243	-	23	-	266	-
TOTAL	324,993	100.0	45,600	100.0	370,593	100.0
Median Income	324		-		-	

TABLE II: European Families According to Income - Farming Families in Rural Areas:[3]

income range	number	per cent
under £50	23,345	22.9
£50 - 99	23,211	22.8
£100 -149	13,699	13.4
£150 -199	8,933	8.8
£200 +	32,656	32.1
Unknown	88	-
TOTAL	101,932	100.0

1. U.G. No. 28 - 1945, ibid., Table 6, p. 3.
2. ibid., Table 16, p. 15.
3. ibid., Table 13, p. 7.

3.5 Reliability and Usefulness of the 1941 Personal Income Census

The reliability of the personal income census has to be assessed from both the population and the income aspects.

The population coverage of the census has been indicated above.[1] The information available would suggest a proportionate increase over all income ranges of the number of families in urban areas by the ratio $\frac{1000}{858}$ and of the number of families in rural areas by $\frac{1000}{937}$. The high coverage of 88.2 per cent suggests that the mistake of a proportionate adjustment would certainly not be significant.

Less reliability can, however, be attached to the income coverage. As is the case with all income censuses it is difficult to check the degree to which individuals understate their actual incomes. The Census Report itself expresses a warning as to the reliability of income figures of the farming community: "Special attention is directed to the fact that farming families were required to include as income, in addition to wages, salary, pension and interest, the gross money income from the sale of farm produce and the estimated money value of income in kind such as farm produce. It is impossible to say whether, or to what extent, this has been done." (See Footnotes 2 and 3)

A more severe confinement of the usefulness of the 1941 income figures must, however, be seen in the fact that the census did not require the actual amount of income to be stated on the census form, but each family was requested to indicate into which income group their income fell. For the income ranges £50 - 399 (families in urban areas and non-farming families in rural areas) and £50 - 199 (farming families in rural areas) this shortcoming could be

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1. See 3.3 above.
2. U.G. No. 28 - 1945, ibid., para. 18, p. vi.
3. It has been suggested that there was little incentive for understatement because the Census required no particulars of incomes over £400, below which level few persons were liable for income tax.

   U.G. No. 48-1945, Taxation and Fiscal Policy, Social and Economic Planning Council, Report No. 7, para. 14, Ann. VI, p. 69.

overcome by the calculation of an average income value per income range. This method fails, however, in respect of the lowest income range, i.e., under £50, and of the highest income range, i.e., £400 + for families in urban areas and non-farming families in rural areas, and £200 + for farming families in rural areas. It can be seen from Tables I and II that these income ranges were heavily populated: 35.2 per cent of families in urban areas for example, earned an income higher than £400.

The usefulness of the 1941 Income Census is only that it throws some light on the income structure of low income groups.

4. The 1951 and 1960 Personal Income Censuses

The 1960 Personal Income Census (PIC) Report contained the following information: (See Footnotes 1 and 2)

Table number	
1	Income and median income, 1951 and 1960, economically active population, - South Africa
2	Income by occupations, urban and rural separately - South Africa and Provinces, 1960
3	Income by industry - South Africa, urban and rural separately, 1960; Provinces, urban and rural combined, 1960
4	Income by work status (also by age for work status "employee") - South Africa and Provinces, 1960
5	Income by identity of employer (also by work status for identity "private enterprise") - South Africa and Provinces, 1960.
6	Income by marital status, nationality and birthplace - South Africa and Provinces, 1960
7	Income by home language, urban and rural separately - South Africa and Provinces, 1960

The above information was collected and tabulated separately for three races, viz., Whites, Coloureds and Asiatics. Neither the 1951 nor the 1960 PIC collected data for Bantu.

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1. Population Census, 6th September, 1960, Vol. 5, ibid., p. iv.
2. The words 'Personal Income Census' will from now on be abbreviated by the letters 'PIC'.

4.1 The Income Concept

The questionnaire of the 1951 PIC did not include a definition of income.[1] This fact will necessarily confine the reliability of the 1951 PIC.[2]

The definition of personal income for the 1960 PIC was as follows:

"Salary and wage earners: Gross income, that is, including deductions for pensions, insurance, medical aid schemes, etc. Farmers, businessmen and professional men: Net income, that is, the expenses incurred in earning the income had to be deducted.

In addition to earned income, the following items were included:

(i) Pensions, dividends, interest and other regular income;
(ii) the value of free or privileged quarters and/or rations;
(iii) the value of self-produced agricultural and pastoral products (including livestock and poultry) consumed by the family.

Income excluded:

(i) Irregular or abnormal income such as inheritances, matured insurance policies, gratuities, etc.; and
(ii) household allowances and pocket-money transferred from one member of the family to another."[1]

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1. Population Census, 6th September, 1960, Vol. 5, ibid., p. ix.

2. Existence of a definition of income does, of course, not mean that individuals indicate the true value of their incomes. Report No. 4 of the Sample Tabulation of the 1960 Population Census notes in this respect: "For various reasons some questions are completed more accurately than others. The question on 'income' constitutes one of the more difficult questions in a population census, because, apart from failing to reply thereto for whatever reason, the information furnished does not always conform to the definition."
Population Census, 1960, Sample Tabulation, Report No. 4, Income: Whites, Coloureds, and Asiatics, p. v.

4.2 The Recipient Unit

The historical tables (Tables 1 of all series) relate to the economically active population only. All other tables include both economically active and not economically active persons. In Tables 2 and 3 unemployed persons are shown according to their usual occupation and industry, if stated, and as unemployed if these characteristics were not given. On the other hand, in Table 4 all unemployed persons are shown as such.[1]

Housewives, scholars, independent and retired persons, and inmates of institutions, are shown under 'not economically active persons'.[2]

The 1960 PIC Report notes furthermore:

(i) Persons enumerated on trains were shown according to their usual place of residence.

(ii) Where possible, South African residents who were abroad on census day were enumerated at a later date and these persons were also shown according to their usual place of residence.

(iii) Foreign visitors enumerated at the census were not included.

(iv) Members of the diplomatic services of other countries were not enumerated.[3]

4.3 Coverage

The income shown for the 1951 PIC refers to the total earnings during the 12 months, 1st January to 31st December, 1950.[4]

Income figures collected for the 1960 PIC are furnished either for the twelve months ended 30th June, 1960, or for the twelve months ended 31st August, 1960, whichever period was preferred by the respondent when furnishing income data.[5]

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1. Population Census, 6th September, 1960, Vol. 5, ibid., p. x.
2. Population Census 1960, Code List for Occupations, Bureau of Census and Statistics, compiled by the International Labour Organization (with adjustments for local conditions), January 1962, Reprint August, 1962, p. 28.
3. Population Census, 6th September, 1960, Vol. 5, ibid., p. ix.
4. Note that the so-called 1951 PIC covers the year 1950.
5. Population Census, 6th September, 1960, Vol. 5, ibid., p. ix.

Income did not always refer to twelve months, because not all persons were economically active for the full period, e.g., "students and scholars who completed their studies and started work during the period concerned."[1]

4.4 Income Ranges

The 1951 and 1960 (as was the case with the 1941) PICs did not require the actual amount of income to be shown. The size of income was to be indicated by income range only.

The number and range of income groups were greatly extended for the 1951 and 1960 PICs, when compared with the 1941 PIC. For the 1951 PIC, 21 income groups were tabulated, the highest one being Rand 10,000 (£5,000) +. For the 1960 PIC, 24 income groups were defined. The highest one was Rand 30,000 +.

Statistics on personal income distribution usually show increasing income intervals when incomes grow. Table III lists the different income intervals used for the 1960 PIC.

TABLE III: Size of Income Intervals for Different Income Ranges. All Values in Rand.

Size of income interval	income ranges
100	0 - 799
200	800 - 1199
400	1200 - 1999
1000	2000 - 5999
2000	6000 - 9999
5000	10000 - 19999
10000	20000 - 29999
no interval	30000 +

The increased number of income ranges, as well as the rise of the highest income value for which information was required, greatly enhance the informative value of the 1960 PIC, when compared with both the 1951 and 1941 PICs.

1. Population Census, 6th September, 1960, Vol. 5, ibid., p. ix.

4.5 Sociological Criteria in Relation to the Distribution of Incomes

The 1960 PIC tabulated personal income distributions by a number of socio-economic criteria which greatly increases the value of this income census. No criteria other than the distinction between male and female income receivers were tabulated for the 1951 PIC, whereas the 1941 PIC had analysed, among other things, the size distribution of income by the number of children and persons per family.

Tables 2 to 7 of the 1960 PIC combine the size distribution of incomes with a number of different socio-economic criteria, an outline of which is given below.[1]

Table 2: Income by Occupations

The size distribution of incomes is tabulated for the following 'major occupational groups', viz:

not economically active persons;
professional, technical, and related worker;
administrative, executive, and managerial worker;
clerical worker;
sales worker;
farmer, fisherman, lumberman, and related worker;
miner, quarryman, and related worker;
worker in transport and communication;
craftsman, production worker and labourer;
service, sports and recreation worker;
unemployed and unspecified.

Extensive definitions of these occupational groups are given in the Code List for the 1960 Population Census.[2]

1. Of these Tables only Tables 2 to 5 fall within the relevance of this study.

2. Code List for Occupations, ibid., pp. 1-25.

Table 3: Income by Industries

There are nine divisions of industries:

Division

0	agriculture, forestry, and fishing;
1	mining and quarrying;
2/3	manufacturing;
4	construction;
5	electricity, gas, water, and sanitary services;
6	commerce;
7	transport, storage, and communication;
8	government, business, recreation and personal services;
9	persons not engaged in industry.

The classification of industries was based on the International Classification of All Economic Activities, as compiled by the United Nations Organisation, with the necessary adaptations and amendments for local conditions.[1]

It should be noted that most of the above listed industry divisions are mixed in respect of private and public activities. Examples are:

Union Government:

hospitals	- code 824, division 8;
transport	- division 7;
Government Printer	- code 280, division 2;

Table 4: Income by Work Status

The socio-economic grouping is as follows:

Employer

i. employer and worker on own account;
ii. family assistant;

Employee

i. in labour force, broken down by the following age groups: -20; 20-24; 25-34; 35+;
ii. unemployed;

Not economically active.

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1. Code List for Occupations, ibid., p. vi.

Table 5: Income by Identity of Employer

The following identities of employers are tabulated in the Census Report: [1]

i. public authorities;
ii. public subsidized institutions;
iii. public corporations;
iv. private business enterprises;
v. non-profit motive organisations;
vi. not economically active persons;

4.6 Assessment of the Reliability of the 1951 PIC Data

A radical check of the reliability of the PIC data would require that an estimate be made of the total personal income of the total population according to the PIC, and that this total be compared - after appropriate adjustments have been made - with the official calculation of the net national income.

Unfortunately, the historical Table 1 of the 1960 PIC, which sets out the size distribution of income both for the years 1950 and 1960, is confined to the economically active population. Hence the size distribution of income for the population which was not economically active in 1950 is unknown. [2] For this reason, the attempt to compare the 1951 PIC with the national accounting total for that year, was abandoned.

It is of interest, however, to evaluate the accuracy of the 1951 PIC by comparing, for upper income groups, the population found in different income ranges, in the two following sources: -

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1. For further information see: Code List for Occupations, ibid., pp. 27, 8.

2. In 1960, 18.2 per cent of the White population in the income groups R10,000+, was not economically active. It is unknown, however, to what extent the relation between the occupational and income structures were similar or otherwise in 1960 and 1950.
Source: Population Census, 6th September, 1960, Vol. 5, ibid., pp. 44 and 49.

(i) the 1951 PIC, covering Whites, Coloureds, and Asiatics;[1]

(ii) the Report of the Commissioner for Inland Revenue for the year ending 30th June, 1950.[2]

The result of this comparison is listed in Table IV.

TABLE IV: Comparison of the Population of Different Income Ranges: 1951 PIC and Report of the Commissioner for Inland Revenue, Year ended 30th June, 1950.

Income Range £	Population		Column 2 as percent of Col. 3
	1951 PIC	Tax Year 1950	
Col. 1	Col. 2	Col. 3[3]	Col. 4
300 - 399	149, 103	38, 185	390.5
400 - 499	106, 154	28, 501	372.5
500 - 599	100, 448	30, 472	329.6
600 - 799	136, 938	66, 072	207.3
800 - 999	65, 497	61, 983	105.7
1000 - 1499	50, 330	57, 420	87.7
1500 - 1999	17, 228	18, 365	93.8
2000 - 2499	10, 794	9, 329	115.7
2500 - 2999	5, 805	5, 576	104.1
3000 - 3999	6, 109	6, 184	98.8
4000 - 4999	3, 148	3, 113	101.1
5000+	6, 728	6, 089	110.5

There is a surprising identity between the two sources of information in respect of the population of income ranges for incomes higher than £800. This close identity stands in striking contrast to the incompatability of the two sources for income ranges lower than £800. Here, the statistics

1. The omission of Bantu income earners is unlikely to cause serious errors, since the argument will be confined to income groups higher than R800. Eight years later, that is in respect of the tax year 1957-58, only 299 Bantu were assessed in income ranges R800+. In 1949-50, the respective number was certainly much smaller. Compare U. G. No. 10-1960, Annual Report of the Commissioner for Inland Revenue for the Tax Year Ended 30th June, 1958, Statement 15. This was the first Report by the Commissioner for Inland Revenue which showed the number of tax assessments by race.
2. The tax year ended 30th June, 1950, was chosen as a basis of comparison because census respondents are likely to have orientated themselves on the basis of their income tax assessments when filling in the census returns.
3. Source: Table 41, Statistical Appendix.

which are based on the Report of the Commissioner of Inland Revenue, cover only between 25 and 50 per cent of the true population. The difference becomes gradually greater with decreasing income groups.

The effect described above was to be expected in view of the South African income tax legislation, which provides for generous tax exemptions for lower income groups.[1]

We regard the close identity between the 1951 PIC and the Inland Revenue data, for income groups higher than £800, as a confirmation of the usefulness of both these sources.

4.7 Assessment of the Reliability of the 1960 PIC Data

The availability of data allows to compare an estimate of the total value of personal income, based on the 1960 PIC, with the corresponding value of the national accounts for the same year.

One can conclude beforehand that the PIC data are most likely to understate the actual income position. Selma F. Goldsmith, in a study on the Relation of Census Income Distribution Statistics to Other Income Data, observes in this respect:

"In the first place, some understatement of income is to be expected in all field interview studies if only because some respondents are apt to forget minor or irregular amounts of income, and because others may purposely understate their incomes for varied reasons. Furthermore, as the Census Bureau states in each of its income reports, not only are the schedule entries for income of the family members in most cases based on memory rather than on records, but 'in the majority of instances on the memory or knowledge of some one person, usually the wife of the family head.' It would indeed be surprising if the wife could report fully on all items of income for the entire family unit."[2]

Apart from an overall comparison of national accounts data

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1. For a discussion of this problem compare Section II. 6. below.
2. Selma F. Goldsmith, The Relation of Census Income Distribution Statistics to Other Income Data, with Comments by Joseph A. Pechman, Robert J, Lampman, Edwin Mansfield, in: An Appraisal of the 1950 Census Income Data, Studies in Income and Wealth. Vol. 23. A Report of the National Bureau of Economic Research, Bowes and Bowes, New York, Princeton, 1958, p. 72.

with PIC estimates it is necessary to analyse, as far as this is possible, the reliability of income components such as wages, salaries, rents and interest. For wages and salaries, Goldsmith suggests that these "...rank highest in reliability among the income shares mainly because of the adequacy of the social security data on which they are based."[1] The two latter components, rents and interest, are subject to greater error, because "the estimates for these income shares are residuals, based on the subtraction of business receipts from total payments in each category, and the source data on rent in particular are far from satisfactory."[1]

In view of the above observations it was decided to analyse the reliability of the 1960 PIC data threefold:

(i) estimation of the total income based on PIC data and assessment of its reliability;
(ii) assessment of the reliability of the PIC data by race;
(iii) assessment of the reliability of the PIC data by type of income.

4.7.1 Relation of the 'Total Income' Estimate of the PIC to National Accounting Income Data.

A number of adjustments are necessary in order to relate the 1960 PIC data to national accounting values.

4.7.1.1 Adjustment of National Accounting Data

The personal income account for the year 1960, and its adjustment for time coverage, is shown in Table V.

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1. Selma F. Goldsmith, The Relation ..., ibid., p. 74.

Table V: Personal Income Account, 1960 and 1959/60, Figures in R millions. (See Footnotes 1 and 2)

	1960	Adjustment factor	1959/60
	col. 1	col. 2	col. 3
Wages and salaries	2,731	- 28/1000	2,655
Income from property by households	1,095	- 28/1000	1,064
Current transfers received from general government	129	- 18/1000	127
Transfers from the rest of the world	42	+ 34/1000	43
Total	3,997		3,889

A further adjustment is necessary for the fact that employers' contributions to pension and provident funds are included in national accounting but excluded from the 1960 PIC definition of personal income. On the other hand, provision has to be made for the fact that employees' contributions to (i) the Unemployment Insurance Funds (ii) the Trade Union and Industrial Councils are regarded, by the national accounting definition of labour emoluments, as "direct expenditure in maintaining the labour force (which) must be deducted from the total salaries and wages ..."[3] These items are, however, included in the PIC's definition of personal income.

Table VI shows the relevant adjustments.

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1. The 1960 PIC data were furnished either for the 12 months ended 30th June, 1960, or 31st August, 1960.
2. Sources:
   column 1: South African Reserve Bank, Quarterly Bulletin, No. 90, December, 1968, S-70.
   column 2: South African Reserve Bank, Quarterly Bulletin, No. 78, December, 1965, p. 36.
   The index for the time coverage had to be based on the unrevised personal income accounts since the revision of this account goes back only to the year 1960.
3. Bureau of Census and Statistics, National Accounts, Net National Income, 1952-53, Memorandum No. 13, p. 1.

TABLE VI: Adjustment of Wages and Salaries of the 1959/60 Personal Income Account, Figures in R millions.

Wages and salaries [1]	2,655.0
-Employers' contributions to pension and provident funds [2]	58.4
+Employees' contributions to unemployment insurance funds [3]	4.6
+Employees contributions to Trade Unions and Industrial Councils [4]	2.6
Adjusted Value for Wages and Salaries	2,603.8

The adjusted value for wages and salaries has to be increased by the income from property by households, [5] and the value of current transfers received from general government. [6] The total adjusted 1959/60 personal income account is given in Table VII.

TABLE VII: Adjusted 1959/60 Personal Income Account, Figures in R millions.

Wages and salaries as adjusted [7]	2,603.8
+ Income from property by households [8]	1,064.0
+ Current transfers from general government [8]	127.0
Total Personal Income	3,794.8

1. Adjusted figure for wages and salaries from Table V, above.
2. This item refers to the year ended 31st March, 1960. Statistical Year Book, 1966, Compiled by the Bureau of Statistics, Pretoria, F-4, F-5.
3. Average 1959-60. Statistical Year Book, 1966, ibid., H-60.
4. Bureau of Statistics, Report No. 292, Labour Statistics: Labour Relations Trade Unions, 1962-63, 1963-64 and 1964-65, pp. 1 and 14. It was assumed that the contributions per employee remained unchanged during the period 1959/60 to 1962/63.
5. This item does not include imputed rents on owner-occupied houses. The Quarterly Bulletin of the South African Reserve Bank defines income from property to consist of "interest, dividend and rent receipts by households and the profits of non-corporate business enterprises."
   South African Reserve Bank, Quarterly Bulletin, No. 90, December 1968, S-70.
6. Transfers from the rest of the world are left out of account because they are not covered by the definition of personal income in the 1960 PIC Report.
7. See Table VI above.
8. See Table V above.

4.7.1.2 Adjustment of PIC Data

Thus far the national accounting values for personal income have been adjusted but it is necessary now to use the 1960 PIC data in such a way that a direct comparison of the two sources can be made.

The estimation of the total personal income which has to be allotted to the 1960 PIC data was based on Tables A4, B4, and C4 of the PIC report.[1] These tables specify, inter alia, income ranges for unemployed, unspecified, and not economically active persons.[2]

The specific kind of data available, i.e., the number of persons per income range, throws up two particular problems. Firstly, an estimate of the income distribution for income ranges higher than R30,000 has to be made, and secondly, a representative income average for each income group has to be defined.

The total number of White persons(both male and female), who fall into the income range R30,000 + is 843. The corresponding numbers for Coloured and Indian persons are 4 and 7. Whereas the low number of non-White persons who fall into the highest income group of R30,000+ does not warrant specific calculations, some hypothesis has to be made about the income distribution of 843 White persons who are found in this income range.

For the present task Pareto's Law of Income Distribution was tested and it appeared that its use could be justified. According to Pareto, if Y represents any income and N the

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1. Population Census, 6th September, 1960, Vol. 5, ibid.
2. Insufficient explanation of symbols and inadequate definitions make it difficult to ascertain the meaning of symbols and words of the headline to Tables 4. In reply to a letter dated 26th September, 1969, Mr Moll, Assistant Director of the Department of Statistics, Pretoria, reported as follows (letter dated 17th October, 1969):
   (a) "The note 1/ indicates that employees in the labour force who did not specify their age in the census return, were included with age group -20. The symbol "?" indicates persons whose work status was not specified in the census return. The column ruling is incorrect in showing the relevant persons under the general heading Employee.
   The persons shown in the column Unemployed (i.e. at census date) may have received income during the previous twelve months from labour, transfer payments (included in regular income) or from income yielding assets.
   (b) The origin of the income of persons in column "?" (work status not specified) cannot be ascertained."

number of persons who received incomes equal to or higher than Y, the line received in a diagram which shows the logarithms of Y (horizontal axis) against the logarithms of N (vertical axis) will be approximately a straight line, except at its extremities, i.e., the equation Log N = a $-\alpha$ log Y is approximately linear.

For the 1960 PIC data of the White population, it was found that the Pareto curve gave a good straight-line fit for income values from R2,000 onwards, whereas the curve flattened out for incomes lower than R2,000. It was therefore decided to distribute the 843 persons who earned incomes beyond R30,000+ on higher income groups, by calculating the least square line for 11 income points in respect of incomes equal to and higher than R2,000. The best fit was found to be

$$\log N = 13.0318 - 2.25504 \log Y.$$ [1]

A tolerable margin of error of 2.37 per cent was found, when the actual number of persons who received incomes higher than R30,000, was compared with the number who received such incomes according to the least square fit formula.

The question which now has to be answered, is the range up to which the extrapolation is to be made. Unfortunately, little evidence is available to serve as a guide. The only source which throws any light on the problem is the Report of the Commissioner for Inland Revenue for the tax year 1951. In this source, 120 assessments are shown in the income range £30,000+ (R60,000+). [2] This relatively large number shows that a substantial extrapolation is probably justified for the year 1960. Consequently, R120,000 was chosen as an upper limit. [3]

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1. The calculation was done on the Rhodes University Computer. The standard deviation for the slope is $0.1256 \cdot 10^{-3}$.

2. Compare: Statistical Appendix, Tabulation of Tax Assessments, 1950, below.

3. The writer tried repeatedly - both in writing and by means of a personal visit - to be supplied with the calculation of personal income data which was undertaken by the Franzsen Commission for the year 1965, and which extended up to R100,000. Unfortunately, these efforts were in vain.

Table VIII shows the calculation of the income distribution for incomes between R30,000 and R120,000, according to the Pareto fit. The Y values in column 1 are extended to R120,000 at intervals of R5,000. Columns 2 and 3 contain the calculation of log N, and column 4 indicates the numerus of N, i.e., the number of persons who received an income higher than Y. M is the number of persons found in any Y-interval, i.e., $M_i = N_{i+1} - N_i$, i = 1, 2, ..., 18 and $M_{19} = N_{19}$, where i = 1, 2, ..., 18 is the number of all but the highest income range and 19 the ordinal number of the highest income range.

TABLE VIII: Estimation of the Personal Income Distribution of White Persons, Male and Female, for Incomes Higher than R30,000.

$\log N = 13.0318 - 2,25504 \log Y$

Y	log Y	log N	N	M
Col. 1	Col. 2	Col. 3	Col. 4	Col. 5
30,000	4.4771	2.9358	863	254
35,000	4.5441	2.7847	609	158
40,000	4.6021	2.6539	451	105
45,000	4.6532	2.5386	346	73
50,000	4.6990	2.4354	273	53
55,000	4.7404	2.3420	220	39
60 000	4.7782	2.2568	181	30
65,000	4.8129	2.1785	151	23
70,000	4.8451	2.1059	128	19
75,000	4.8751	2.0383	109	15
80,000	4.9031	1.9751	94	12
85,000	4.9294	1.9158	82	10
90,000	4.9542	1.8599	72	8
95,000	4.9777	1.8069	64	7
100,000	5.0000	1.7566	57	6
105,000	5.0212	1.7088	51	5
110,000	5.0414	1.6632	46	4
115,000	5.0607	1.6197	42	4
120,000	5.0792	1.5787	38	38
			TOTAL:	863

The total income for each income range was calculated by multiplying the population of any income range with the corresponding arithmetical mean income value. For a White population group consisting of 4 persons the second highest arithmetical mean income value was thus R117,500, and for 18 persons[1] the highest average income value was R120,000. For Coloured and Asiatic persons, the average income figure for incomes higher than R30,000 was assumed to have been R32,500.[2] The results of the calculations are shown in Table IX, (page 29 below).[3]

4.7.1.3 Estimation of the Personal Income Earned by Bantu

The total income values shown in Table IX have to be enlarged by the value of personal income received by Bantu, since the 1960 PIC only covered incomes received by Whites, Coloureds, and Asiatics.

An estimate of this income value was undertaken on the basis of J. J. Stadler's calculation of the South African G. D. P. by economic activity and race for the year 1960.[4] Table X (p. 30) gives the value of the G. D. P. received by Bantu together with the portions of income earned in 'mining and quarrying', and 'fixed property and owner-occupied houses'.

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1. 20 persons who constitute the error of the Pareto fit were deducted from the population of the highest income range.
2. It is theoretically impossible to make a probability statement in respect of the confidence intervals of these extrapolations.
3. Sources:

   For incomes received by Whites up to the average income of R25,000, and for incomes received by Coloureds and Asiatics for all income ranges, see: Population Census, 6th September, 1960, Vol. 5, ibid., Tables A4, B4, C4, 'Total'-columns.

   For incomes received by Whites as from the average income R32,500, and higher see: Table VIII above.
4. J. J. Stadler, Die Bruto Binnelandse Produk van die Republiek volgens Produksietak en Rassegroep, 1960, R'000[e], handwritten manuscript, 1969. I am indebted to Professor Stadler for his permission to copy the data from his manuscript.

TABLE IX: Distribution of Total Incomes, PIC, 1960, Figures in R

Average Income	WHITES		COLOUREDS		ASIATICS	
	Number	Incomes	Number	Incomes	Number	Incomes
no income	1,764,083	-	987,147	-	365,575	-
50	23,467	1,173,350	133,511	6,675,550	10,326	516,300
150	25,127	3,769,050	130,676	19,601,400	12,819	1,922,850
250	82,551	20,637,750	76,632	19,158,000	17,754	4,438,500
350	44,204	15,471,400	43,014	15,054,900	13,341	4,669,350
450	45,022	20,259,900	34,305	15,437,250	13,145	5,915,250
550	37,058	20,381,900	21,931	12,062,050	7,501	4,125,550
650	65,909	42,840,850	16,441	10,686,650	7,737	5,029,050
750	66,620	49,965,000	11,395	8,546,250	5,738	4,303,500
900	99,849	89,864,100	14,072	12,664,800	6,862	6,175,800
1100	90,789	99,867,900	8,797	9,676,700	4,611	5,072,100
1400	161,135	225,589,000	10,109	14,152,600	4,297	6,015,800
1800	171,754	309,157,200	4,428	7,970,400	2,367	4,260,600
2500	227,397	568,492,500	1,705	4,262,500	2,075	5,187,500
3500	69,042	241,647,000	193	675,500	708	2,478,000
4500	33,404	150,318,000	62	279,000	510	2,295,000
5500	15,136	83,248,000	30	165,000	200	1,100,000
7000	15,630	109,410,000	16	112,000	124	868,000
9000	7,030	63,270,000	8	72,000	38	342,000
12500	6,443	80,537,500	14	175,000	69	862,500
17500	2,158	37,765,000	34	595,000	13	227,500
25000	1,209	30,225,000	4	100,000	6	150,000
32500	254	8,255,000	4	130,000	7	227,500
37500	158	5,925,000				
42500	105	4,462,500				
47500	73	3,467,500				
52500	53	2,782,500				
57500	39	2,242,500				
60000	161	9,666,000				
62500	30	1,875,000				
67500	23	1,552,500				
72500	19	1,377,500				
77500	15	1,162,500				
82500	12	990,000				
87500	10	875,000				
92500	8	740,000				
97500	7	682,500				
102500	6	615,000				
107500	5	537,500				
112500	4	450,000				
117500	4	470,000				
120000	18	2,160,000				
Total	3,055,860	2304,512,900	1,494,528	158,252,550	475,823	66,182,650
Average Income		R754		R106		R139

TABLE X: Value of the Gross Domestic Product Received by Bantu, Stadler-Estimate, 1960 and 1959/60, R thousands.

Division	Stadler Estimate 1960			Stadler Estimate Deflated, 1959/60[1]		
	Work Inc.	Other Inc.	Total Inc.	Work Inc.	Other Inc.	Total Inc.
Total G. D. P.	722, 437	138, 792	861, 229	702, 209	134, 906	337, 115
Portion earned in the sector 'mining and quarrying'	123, 150	802	123, 952	119, 702	780	120, 482
Portion earned in fixed property and owner-occupied houses	6, 155	6, 168	12, 323	5, 983	5, 995	11, 978

Stadler's figures are calculated on a gross domestic product basis which does not conform to the PIC's definition of personal income. Adjustments between the two income values are necessary in respect of:-

i. Incomes received by non-South African Bantu.
ii. Imputed rent on owner-occupied houses.
iii. Depreciation.
iv. Transfer payments and employers' contributions to unemployment insurance funds.

i. Stadler's calculations include the wages earned by non-South African Bantu in South Africa, whereas these are not taken into account in the 1960 PIC.[2]

The 1960 Population Census counted 3, 561, 227 Bantu as economically active.[3] Of these, 417, 351 persons had their permanent domiciles outside the Republic.[4] It can be estimated that 251, 846 of the non-South African Bantu were employed by the Transvaal and Orange Free State gold and coal mines,[5] constituting some 46 per cent of the total Bantu labour force in

1. Compare footnotes to Table V above. The adjustment factor is 28/1000.
2. Compare Population Census, 6th September, 1960, Vol. 5, ibid., p. ix.
3. Bureau of Statistics, Population Census, 6th September, 1960, Vol. 7, No. 2, Characteristics of the Population in Each Magisterial District and Economic Region, Occupation, Industry and Type of Abode, BANTU, Table D 2, p. 350.
4. Bureau of Statistics, Population Census, 6th September, 1960, Sample Tabulation No. 8, Part IV, Miscellaneous, Bantu, p. 93.
5. The Witwatersrand Native Labour Association, Limited, Report of the Board of Directors for the Year ended 31st December, 1960, p. 1.

this sector of the economy. (See Footnotes 1 and 2) The remaining 165, 505 non-South African Bantu constituted some 5. 5 per cent of the total Bantu labour force in economic activities, other than mining.

On the assumption that the average remuneration of Bantu was independent of whether they resided permanently inside or outside the Republic, 46 per cent of the work income earned on the mines, and 5. 5 per cent of the work income earned in economic activities, other than mines, can be allotted to non-South African Bantu.[3] This gives a total of R87, 101, 000.

ii. Stadler's estimate of the GDP by race, includes imputed rent on owner-occupied houses, and other income from fixed property, valued at R5, 995, 000. Portion of this item representing imputed rent on owner-occupied houses has to be eliminated in order to assure exact comparison with the 1960 PIC's definition of personal income. The respective value for 1959/60 is R4, 587, 000.[4]

iii. For the year 1959/60, depreciation amounted to 9. 7 per cent of the net national income at factor cost.[5] This relation cannot be regarded, however, as being representative for all races, because the percentage

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1. The calculations assume that all non-South African Natives were economically active.
2. For the distribution of the Bantu labour force by industry, see Footnote 3, p. 30.
3. It is assumed that the total value of 'other income', earned by Bantu, accrued to persons who permanently resided in South Africa.
4. In his calculation of the G. D. P. by race Stadler grouped together the items "vaste eiendom en woningbesit." We estimated that 76. 5 per cent of this total is attributable to imputed rent on owner-occupied houses and 23. 5 per cent to income derived from fixed property. The percentages constitute the average for the years ended 31st December, 1956 to 1959.
Sources: Statistical Year Book, 1966, ibid., Table W-10, column 110, for "fixed property and ownership of dwellings", and J. J. Stadler, Die Bruto Binnelandse Produk..., ibid., Table XIX, p. 391, column 8, for "Besit van wonings - ander inkome."
5. South African Reserve Bank, Quarterly Bulletin, No. 78, December 1965, Table XXXI, p. 35.

of 'other income' in 'total income' varies greatly from race to race, as shown in Table XI.

TABLE XI: Composition of Income by Race, 1960, Stadler's Estimate, R thousands

	Other Income	Total Income	Other Income as percentage of total income
Whites	2,028,001	3,736,606	54.3
Coloureds	21,358	205,229	10.4
Asiatics	32,004	79,986	40.0
Bantu	138,792	861,229	16.1

The percentage share of 'other income' in 'total income', earned by Bantu, is substantially below the corresponding percentages of the White and Asiatic races. It was therefore decided to adjust for depreciation only the value of 'other income net of imputed rent on owner-occupied houses'. [1]

iv. Pensions and ex gratia payments to needy Bantu are estimated to have been R6,923,000 in 1959/60. [2] This item must be added to the portion of the G. D. P. received by Bantu.

Employers' contributions to pension and provident funds, on the other hand, are included in Stadler's definition of work income but excluded from the PIC's definition of personal income. [3] The estimate for this item is R5,100.000. [4]

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1. The calculations are as follows (figures in R thousands) :-

Other income received by Bantu	134,906	(Table X above)
-Imputed rent on owner-occupied houses	4,587	(Ft.4,p.31 above)
Other income net of imputed rent	130,319	
9.7 per cent of the above	12,641	(Ft.5,p.31 above)

2. The total value paid in respect of pensions and ex gratia assistance to needy Bantu during 1960/1 was R7,121,988. This value has been deflated for purposes of time coverage by 28/1000 which gives a value of R6,922,572.
Source: R.P. No. 78-1964, Report of the Department of Bantu Administration and Development for the Period 1st January, 1960 to 31st December, 1962, pp. 17, 8.

3. Compare Stadler's definition of 'work income', p. 2 above.

4. Statistical Year Book, 1966, ibid., F-4, F-5.

The value of the personal income received by Bantu (which corresponds conceptually with the estimated personal income value received by White, Coloured, and Asiatic persons, as calculated on the basis of the 1960 PIC), is given in Table XII.

TABLE XII: Personal Income Received by Bantu, 1959/60, R thousands.

Portion of the G. D. P. earned by Bantu	837, 115
- Income earned by non-South African Bantu	87, 101
Portion of the Gross National Product Received by Bantu	750, 014
- Depreciation	12, 641
Portion of the Net National Product received by Bantu	737, 373
- Imputed Rent on Owner-Occupied Houses	4, 587
+ Pensions and ex gratia Assistance to needy Bantu	6, 923
- Employers' Contributions to Pension and Provident Funds	5, 100
Portion of the Personal Income received by Bantu	734, 609

4.7.1.4 Conclusion

Table XIII compares the 1959/60 Personal Income Account, as adjusted, with the income estimate which is based on the 1960 PIC data.

TABLE XIII: Comparison of the 1959/60 Personal Income Account with the Total Personal Income Based on the 1960 PIC, Figures in R millions.

Value of Personal Income, Estimate Based on National Accounting Data[1]			3, 794.8
Value of Personal Income, Estimates Based on 1960 PIC	Whites[2]	2, 304.5	
	Coloureds[2]	158.3	
	Asiatics[2]	66.2	
	Bantu[3]	734.6	3, 263.6
	Difference		531.2

1. Table VII above.
2. Tab le IX above.
3. Table XII above.

According to this calculation, the personal income, as estimated on the basis of the 1960 PIC data for Whites, Coloureds, and Asiatics, and on the basis of Stadler's estimate for Bantu, constitutes 86.0 per cent of the adjusted personal income estimate as computed by the National Accounting Section of the South African Reserve Bank.

In conclusion it seems that the gap between the PIC and the national accounting personal income values (as adjusted), is attributable mainly to the understatement of the actual income position on census returns. This assumes of course, that great reliability can be attached to (i) Stadler's calculation of the income by race for the year 1960, [1] and (ii) to the comprehensiveness of the 1960 PIC, as far as the actual numbers of Whites, Coloureds and Asiatics, are concerned. [2]

In order to throw more light on the question under discussion, the PIC data will be assessed in the ensuing paragraphs by race and type of income.

4.7.2 Relation of the PIC Data to Stadler's Calculation of Income by Race

For Whites, Colcureds and Asiatics, the calculations of the personal income based on the PIC data can individually be compared with Stadler's estimates.

Table XIV shows the income total by race for work and other income, both for 1960 as calculated by Stadler[3] and adjusted for 1959/60. The value of 'other income derived from owner-occupied houses' is indicated in brackets as 'imputed rent'. (See Footnotes 4 and 5)

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1. This will be discussed in Section IV below.
2. On the reliability of South Africa's Population Censuses, compare: J. L. Sadie, "An Evaluation of Demographic Data Pertaining to the Non-White Population of South Africa", Parts I to III, The South African Journal of Economics, Vol. 38, No. 1, March, 1970, pp. 1-34, and No. 2, June 1970, pp. 171-191.
3. J. J. Stadler, Die Bruto Binnelandse Produk van die Republiek volgens Produksietak en Rassegroep, ibid.
4. For the method of calculation, compare footnote 4, p. 31.
5. Abbreviation (Table XIV): Imp. R. = Imputed Rent.

TABLE XIV: Work Income and Other Income by Race (Excluding Bantu), Stadler Estimate for 1960, Adjusted for 1959/60, Figures in R thousands

	GDP by Race, 1960, Stadler Estimate			GDP by Race, 1959/60, 1960 Figures Deflated by 28/1000		
	Work Income	Other I. (Imp.R.)	Total Income	Work Income	Other I. (Imp.R.)	Total Income
Whites	1708605	2028001 (137481)	3736606	1660764	1971217 (133632)	3631981
Coloureds	183871	21358 (2570)	205229	178723	20760 (2497)	199483
Asiatics	47982	32004 (2346)	79986	46,639	31108 (2280)	77747

The necessary adjustments of the 1959/60 estimates are as follows:-

i. During the year ended 30th June, 1960, the total net contribution by the rest of the world to South Africa's net domestic product was Rm451.[1] Of this Rm 87.1 were earned by non-South African Bantu.[2] This leaves Rm 363.9 for allocation between Whites, Coloureds, and Asiatics. It is estimated that in 1960, 103 Coloured and 22 Asiatic persons came to South Africa for business purposes,[3] as against 15,044 Whites.[4] The number of non-White foreign business men who visited South Africa during the period under review is relatively so small that the total work income contributed by foreigners to South Africa's G.D.P. was attributed to Whites.

No evidence was found that foreign non-Whites earned

1. South African Reserve Bank, Quarterly Bulletin, No. 78, December 1965, Table XXIX, p. 31.
2. See Table XII above.
3. Figures for the year 1960 are not directly available. For 1963, the number of Coloured and Asiatic visitors is known from:-
   Bureau of Statistics, Report No. 297, Statistics of Migration 1963 and Earlier Years, p. 82.
   The number of Coloured and Asiatic persons who came to South Africa for business purposes during 1960 was estimated by using as an index the number of persons enumerated at the 1960 Population Census.
   Source: Population Census, 6th September, 1960, Vol. 9, Miscellaneous Characteristics According to Race, pp. 270, 336, 440.
4. Bureau of Statistics, Report No. 297, ibid., p. 2.

investment income in South Africa during 1960.[1]

ii. The adjusted value for depreciation for the year 1959/60 was Rm 472. Of this, Rm 459.4 were allocated to Whites, Coloureds and Asiatics[2] according to the respective values of their 'other income'.[3]

iii. For the year 1959/60, it is estimated that Rm 58,595 were paid to Whites as welfare payments. The corresponding figures for Coloureds and Asiatics are 7,441 and 2,351, respectively.[4]

iv. During the year ended 31st March, 1960, Rm 53.3 were spent by employers for contributions to public pension and provident funds, in respect of their White, Coloured, and Asiatic employees.[5] This sum was distributed according to race by using the wage incomes of these three races as an index.

The relation of the PIC data to Stadler's calculation of income by race is given in Table XV.

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1. As far as Asiatics are concerned, it is reported by Hilda Kuper that Indians did not come to South Africa as genuine migrant labourers or capitalists with the intention to repatriate wages and profits. The passengers were usually not wealthy and had little or no capital. Hilda Kuper, Indian People in Natal, At the University Press, Pietermaritzburg, 1960, Part I, Ch. 1, and p. 59.
2. Rm 12.6 were allocated to Bantu, see Table XII above.
3. See Table XIV above.
4. R.P. No. 58-1962, Report of the Department of Social Welfare and Pensions for the Period 1959 to 1962, p. 8. This source reports on the total amount of welfare expenditures for Whites, Coloureds, and Asiatics (the latter two races grouped together). As an index for the distribution by race, welfare payments spent in favour of Coloureds were used. These are reported in :

   R.P.No. 82-1964, Department of Coloured Affairs, Report for the Period 1st January, 1962, to 31st March, 1964, p. 15.

   As a deflator was used the value of 'current transfers received from general government', Statistical Yearbook, 1966, ibid., Table 3, line 3.7, W-7.

   It was also assumed that welfare payments per head were equal for Coloured and Asiatic persons. For the respective population figures see Statistical Yearbook, 1966, ibid., A-9.
5. Statistical Yearbook, 1966, ibid., F-4, F-5.

TABLE XV: Relation of the PIC Data to Stadler's Calculation of Income by Race, as Adjusted, 1959/60. Figures in R thousands

	Whites	Coloureds	Asiatics
Contribution to G. D. P.	3, 631, 981	199, 483	77, 747
-Income earned by non-South Africans	363, 900	-	-
Contribution to G. N. P. [1]	3, 268, 081	199, 483	77, 747
-Depreciation	447, 600	4, 700	7, 100
Contribution to N. N. P. [2]	2, 820, 481	194, 783	70, 647
-Imputed Rents	133, 632	2, 497	2, 280
+ Transfer payments	58, 595	7, 441	2, 351
- Employers Contributions to Pension Funds	47, 700	4, 300	1, 300
Value of Personal Income, Stadler Estimate, as Adjusted	2, 697, 744	195, 427	69, 418
Value of Personal Income, PIC Estimate [3]	2, 304, 513	158, 253	66, 183
PIC Estimate as per cent of Stadler's Estimate	85. 4	81. 0	95. 3

These calculations show the noteworthy result that the reliability of the PIC data is greatest for Asiatics - with an underreporting of less than 5 per cent - and least for Coloureds - with an underreporting of almost 20 per cent. For Whites, the size of underreporting is approximately 15 per cent.

4. 7. 3 Relation of the PIC Data to Stadler's Calculation of Income by Type of Income

It has been observed in the literature that non-labour incomes tend to be substantially underreported in comparison with labour incomes. Margaret Reid reports that "underreporting by the self-employed, especially the farm self-employed, is likely to lead to an undue number of farm families in low-income brackets. ... The underreporting of interest and dividends is

1. G. N. P. = Gross National Product.
2. N. N. P. = Net National Product.
3. Table IX above.

likely to be heavily concentrated at high-income levels, so that the amount of the total income going to the top 5 or 10 per cent of the income units is appreciably understated."[1] To overcome this difficulty Irving Kravis suggests that "..it is necessary to adjust the survey figures for each type of income upwards to control totals obtained from national accountancy data." (See Footnotes 2 and 3)

Stadler's calculation of the income by race for the year 1960 is classified by race and type of income.[4] Likewise, the number of White, Coloured, and Asiatic income receivers is reported for different work status in the 1960 PIC.[5] It therefore is possible to establish the relative degree of underreporting separately in respect of 'work-' and 'other income'.

According to the 1960 PIC, there were 192 White, 2 Coloured, and 5 Asiatic persons who received work income higher than R30,000. For the White persons, a Pareto function was again computed.[6] The equation which gave the best fit for income ranges from R12,000 to R30,000 was

$$\log N = 13.9623 - 2.61949 \log Y.$$

Additional income ranges were defined in R5,000 intervals

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1. Margaret G. Reid, Distribution of Income and Consumption, in American Income and Its Use, Produced by a Study Committee of the Federal Council of Churches, Harpers and Brothers, New York, 1954, p. 100.
2. Irving B. Kravis, The Structure of Income, Some Quantitative Essays, McGregor and Werner, Inc., Washington D. C., 1962, p. 58.
3. Compare also the interesting studies by Selma F. Goldsmith, The Relation of Census Income Distribution Statistics to Other Income Data, ibid., and Appraisal of Basic Data Available for Constructing Income Size Distributions, in: Studies in Income and Wealth, Vol. 13, Conference on Research in Income and Wealth, National Bureau of Economic Research, New York, The Riverside Press, 1951.
4. J. J. Stadler, Die Bruto Binnelandse Produk van die Republiek volgens Produksietak en Rassegroep, ibid.
5. Population Census, 6th September, 1960, Vol. 5, ibid., Tables A4, B4, and C4.
   The number of employees in the labour force is reported for four different age groups. The lowest of these (-20 years) includes unspecified persons.
   Unemployed persons are treated as 'other income' receivers because their income is an inseparable mixture of work income, transfer income and income from property yielding assets.
6. Compare 4. 7. 1. 2 above.

from R30, 000 to R60, 000.[1] The difference between the true number of persons who earned incomes higher than R30, 000, and the corresponding number calculated by the Pareto function, was 21 persons. In respect of these the conservative assumption was made that their average income was R32, 500.

The results of the calculations are shown in Table XVI.

TABLE XVI: Distribution of Work Income, PIC 1960, Figures in R.

Average Income	WHITES		COLOUREDS		ASIATICS	
	Number	Incomes	Number	Incomes	Number	Incomes
50	6, 663	333, 150	93, 354	4, 667, 700	4, 626	231, 300
150	10, 425	1, 563, 750	113, 389	17, 008, 350	9, 227	1, 384, 050
250	15, 629	3, 907, 250	68, 602	17, 150, 500	14, 060	3, 515, 000
350	17, 398	6, 089, 300	38, 794	13, 577, 900	11, 000	3, 850, 000
450	25, 025	11, 261, 250	31, 000	13, 950, 000	10, 782	4, 851, 900
550	22, 992	12, 645, 600	20, 167	11, 091, 850	6, 102	3, 356, 100
650	47, 395	30, 806, 750	14, 924	9, 700, 600	6, 056	3, 936, 400
750	52, 795	39, 596, 250	10, 392	7, 794, 000	4, 460	3, 345, 000
900	79, 261	71, 334, 900	12, 867	11, 580, 300	5, 211	4, 689, 900
1100	70, 665	77, 731, 500	8, 009	8, 809, 900	3, 221	3, 543, 100
1400	132, 566	185, 592, 400	9, 349	13, 088, 600	2, 580	3, 612, 000
1800	147, 105	264, 789, 000	4, 109	7, 396, 200	1, 139	2, 050, 200
2500	189, 957	474, 892, 500	1, 458	3, 645, 000	644	1, 610, 000
3500	49, 175	172, 112, 500	96	336, 000	158	553, 000
4500	17, 878	80, 451, 000	17	76, 500	119	535, 000
5500	6, 774	37, 257, 000	14	77, 000	58	319, 000
7000	5, 831	40, 817, 000	2	14, 000	27	189, 000
9000	2, 283	20, 547, 000	-	-	6	54, 000
12500	1, 750	21, 875, 000	4	50, 000	20	250, 000
17500	504	8, 820, 000	16	280, 000	4	70, 000
25000	285	7, 125, 000	2	50, 000	1	25, 000
32500	77	2, 502, 500	2	65, 000	5	162, 500
37500	34	1, 275, 000				
42500	22	935, 000				
47500	14	665, 000				
52500	10	525, 000				
57500	7	367, 500				
60000	28	1, 680, 000				
Total	902, 548	1, 577, 498, 100	426, 567	140, 409, 400	79, 506	42, 132, 450
Average Income		R174. 78		R32. 92		R52. 99

Against these figures must be considered the calculation of work income by race, as undertaken by Stadler, and adjusted for employers' contributions to pension and provident funds.[2] The comparison of the different

1. It was assumed that the highest 'work income' was one-half of the highest 'total income'. Compare p. 26 above.

2. This item is included in Stadler's definition but not in the PIC's definition of work income. For values compare Table XV above.

   It was assumed that the work income earned by non-South African Whites, Coloureds, and Asiatics, was negligible. It was also assumed that persons who earned work income did not receive transfer income at the same time.

sources is given in Table XVII.

TABLE XVII: Comparison of Work Income by Race: Stadler Estimate (as Adjusted[1]) and PIC Estimate. Figures in R thousands.

Work Income	Whites	Coloureds	Asiatics
PIC Estimate	1, 577, 498	140, 409	42, 132
Stadler Estimate	1, 660, 905	179, 571	46, 682
PIC Estimate as per cent of Stadler Estimate	95. 0	78. 2	90. 3

By using the appropriate residual values it is now possible to compare the values of 'other income' for Stadler's and the PIC estimates.[2] The result is given in Table XVIII.

TABLE XVIII: Comparison of Other Income by Race: Stadler Estimate (as Adjusted) and PIC Estimate. Figures in R thousands.

Other Income:	Whites	Coloureds	Asiatics
PIC Estimate	727, 015	17, 844	24, 051
Stadler Estimate	1, 034, 739	15, 856	22, 736
PIC Estimate as per cent of Stadler Estimate	70. 3	112. 5	105. 8

For the White population group, these relations show exactly what was to be expected, namely that the value of other income is substantially underreported in the PIC, constituting only some 70 per cent of the true value, whereas the PIC coverage of work income is excellent with 95 per cent of the expected value.

In view of the above it is a surprising result that Coloureds should have overreported their actual 'other income' by 12. 5, and Asiatics by 5. 8 per cent, respectively. Two reasons may be responsible for this effect: Either Stadler's calculation of work income received by Coloureds and Asiatics is an underestimation, or the distinction between work income and other

1. Adjusted for time coverage and employers' contributions to Pension and Provident funds.

2. Sources:

   PIC: Table IX above for total income and Table XVI above for work income.

   Stadler: Table XV above for total income (adjusted value) and Table XVII above for work income.

income was wrongly reflected in Coloured and Asiatic census returns. We believe that the latter is true, because it is a striking feature that Coloureds underreported their work income substantially by some 22 per cent, whereas they overreported 'other income' by 12.5 per cent, which resulted in an overall underreporting of 19 per cent.[1] The figures are similar for Asiatics, although less pronounced. This leads to the conclusion that many Coloureds and Asiatics, who were counted as 'unemployed' or 'not economically active' at the Census date, had in fact received work incomes during the year which was covered by the 1960 PIC. Lack of information does, unfortunately, not allow any follow up of this interesting question.[2]

4.7.4 Summary of Findings and Conclusion

United States economists, who probably have the world's most reliable wealth of economic statistics at their disposal, have often expressed their frustration when it comes to income size distribution statistics. To quote Milton Friedman as one of the many authoritative speakers: "The attempt to estimate frequently conflicts with the attempt to understand. We seek to measure what we want to measure; we often end by measuring what we can and producing a convincing rationalization that this is what we 'really' want to measure."[3]

If such concern is expressed in respect of United States data, what can we expect to find for South Africa?

Until now, three income censuses have been officially taken and reported upon. An assessment of these censuses reveals the following picture:-

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1. Compare Table XV above.
2. Different results are obtained already when all unemployed persons are regarded as 'work income' receivers. In this case, Table XVIII above would change so that Coloureds would seem to have underreported their 'other income' by some 14 per cent, and Asiatics by some 1 per cent.
3. Milton Friedman, Comment on a Paper by Dorothy S. Brady, Research on the Size Distribution of Income, in: Studies in Income and Wealth, National Bureau of Economic Research, New York, The Riverside Press, Cambridge, 1951, p. 57.

(1) The main shortcoming of the 1941 Family Income Census is the complete neglect of the income structure of upper income groups.

(2) The data supplied by the 1951 PIC show a striking identity with the 1950 income tax assessments for incomes higher than £800. This result is encouraging both in respect of the accuracy of income tax statistics (which will be discussed later on), and of income censuses in general.

As was pointed out earlier, the 1951 Income Census did not supply a definition of the personal income concept. It is unlikely that this omission reduced the reliability of these data to any substantial extent. [1]

(3) For the 1960 PIC we found the following results:-

(i) The total personal income based on the PIC data covered 86 per cent of the comparable total based on national accountancy data.

(ii) On a racial basis, the calculations suggest that Whites underreported their total income by some 14 per cent, Coloureds by 19, and Asiatics by only some 5 per cent.

(iii) The underreporting by Whites was particularly heavy for the category of 'other income' (some 30 per cent underreporting), whereas 'work incomes' were satisfactorily covered (the underreporting being only some 5 per cent).

(iv) For Coloureds and Asiatics, the distinction between 'work income' and 'other income' proved to be of little value, because the two categories were not clearly separable for these two race groups in the census report. [2]

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1. This finding agrees with an opinion expressed by Report No. 3 on Income of the Survey of Family Expenditure - November, 1955, (Preliminary Results), Bureau of Census and Statistics, p. 35, where it is suggested that the 1951 PIC would "at most include, besides, salaries and wages, income from such sources as rent of fixed property, interest, dividends, pension fund and social security and that income from other sources ... would have been omitted." --- Contrary to this Report's reservation we believe that if all the income items enumerated were in fact included, the quality of the 1951 PIC must be excellent.

2. The relative size of unemployment is less for Whites than it is for Coloureds and Asiatics.

The tabulation of the 1960 PIC data by certain sociological criteria, was of great help for the detailed analysis of its reliability, comparability, and usefulness. [1]

It has often been said that the relative, rather than the absolute, accuracy is more important for income - size distribution research. [2] The advantage of this concession is unfortunately limited for South Africa, because the 1941 Income Census was based on a family basis, whereas the 1951 and 1960 Censuses were based on a personal basis. The details supplied by the 1960 PIC are unmatched by its two predecessors as far as the different tabulations are concerned. It is only the two historical tables of the 1951 and 1960 PICs which as yet allow a comparison of the size distribution of income over a period of time.

In comparison with the United States, South Africa has now only reached the standard of data available there prior to World War II. [3]

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1. In this respect we agree with the following opinion expressed by the Bureau of Statistics: "The data obtained ... give a reasonable indication of the distribution of income and in fact, serve many useful purposes and are of inestimable value to users of statistics." Bureau of Statistics, Population Census, 1960, Sample Tabulation, Report No. 4, Income: Whites, Coloureds and Asiatics, p. v.

2. For instance: Dorothy S. Brady, Measurement and Interpretation of the Income Distribution in the United States, International Association for Research in Income and Wealth, Studies in Income and Wealth, Vol. VI, Edited by Milton Gilbert and Richard Stone, Bowes and Bowes, London 1956, p. 80.

3. For the supply of income size-distribution data in the United States, compare:
Selma F. Goldsmith, Appraisal of Basic Data Available for Income Size Distribution Statistics, ibid.

5. Estimates of Public Expenditures

A statistical insight of great reliability into the personal distribution of incomes of employees of the public sector, is provided by various estimates to be defrayed from revenue funds. Such estimates are published annually by numerous public bodies. To quote van Waasdijk: "Public spending is done by a vast complex of financially interlocked authorities, with the Treasury in the centre and public corporations such as the State-sponsored iron and steel and oil-from-coal industries on the periphery. ... The public sector is taken as comprising the Government sector and the Government-sponsored public bodies. The Government sector is defined as the departments, offices, boards and other ancillary agencies, government enterprises and extra-budgetary funds and accounts which are under the direct and detailed financial and political control of the Central Government, the provincial administrations or local authorities."[1]

The usefulness of the annual estimates of expenditure for the construction of income-size distribution statistics will be discussed under the headings:-

i. Main Estimates

(i) Estimates of Expenditures to be defrayed from Revenue Funds, excluding Railways and Harbours Administration;

(ii) South African Railways and Harbours, Estimates of the Expenditures to be defrayed from Revenue Funds;

(iii) Estimates of the Expenditures to be defrayed from Bantu Education Account;

ii. Other Estimates

(i) Estimates of the four Provinces;

(ii) Estimates of the Municipalities and Other Local Authorities, including Trading Departments;

(iii) Estimates of Government-Sponsored Public Bodies;

5.1 Main Estimates

5.1.1 Estimates of Expenditure to be Defrayed from Revenue Funds, Excluding Railways and Harbours Administration

The budget year of the Central Government begins on 1st April. Early in the calendar year, the Minister of Finance presents estimates of expenditure to be defrayed from revenue funds, to

1. Tom van Waasdijk, Public Expenditure in South Africa, A Study of the Growth, Co-ordination and Control of Budgets, Witwatersrand University Press, Johannesburg, 1964, p. 65.

both the Houses of Parliament. The estimates consist of two parts, a memorandum and an abstract. In the abstract, the estimated expenditures are grouped under different votes, "each broadly representing a ministerial portfolio."[1] For each individual vote, estimated expenditures are listed under sub-heads, one of them being "salaries, wages and allowances".[2] This item is usually split up in great detail, either by reporting the emoluments of individual income receivers (such as the respective Ministers or their senior staff members), or by reporting the number of income receivers and the total income of homogeneous occupational groups (such as clerical assistants, shorthand-typists, etc).

In the case of non-European income receivers the custom has always been observed of indicating their races separately. This indication is given twice, viz.,

i. in the list of the income receivers itself, and
ii. in the final sum-total, where the number of non-European income receivers has been separately indicated.

5. 1. 2 South African Railways and Harbours, Estimates of the Expenditure to be Defrayed from Revenue Funds

The annual report of the estimates of the expenditure to be defrayed from revenue funds of the South African Railways and Harbours is submitted by the Minister of Transport.[3]

Staff remuneration is shown, in different sections for different activities, in a separate statement on 'Particulars of Staff'.

This statement shows the number of income receivers by size of income.

5. 1. 3 Estimates of the Expenditure to be Defrayed from Bantu Education Account

As from 1956, estimates of the expenditure to be defrayed from

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1. T. van Waasdijk, Public Expenditure, ibid., p. 85.
2. Local and other allowances are shown separately but included in the total salary or wage figure. Not included is the value of various wages in kind, such as the annual value of quarters, food, or uniforms. Grants of such additional income are indicated in footnotes.
3. Railway and Harbour expenditures are subject to Parliamentary approval (Section 99 of the Republic of South Africa Constitution, Act No. 32 of 1961).

Bantu Education Account, have been presented annually to both the Houses of Parliament. [1]

The published report consists of a summary and of detailed explanations. As far as the detailed listing of salaries, wages, and allowances is concerned, it is only the relatively unimportant amounts which have been received by the Administration and the Inspectorate, which have been split up according to personal income receipt. The two major items of expenditure, viz., subsidies paid to Bantu Community Schools in terms of Section 6 (1) (a) and (b) of the Bantu Education Act, 1953, and to State-Aided Schools in terms of Section 8 (1) of the Bantu Education Act, 1953, are not represented - as far as provision for wages, salaries, and allowances are concerned - in any further detail. It is therefore not possible to assess the personal income distribution of all persons connected with the education of Bantu.

5. 1. 4 Assessment of the Accuracy of the Main Estimates for Purposes of Income Size Distribution Statistics.

As to the accuracy of the various estimates, the question has to be asked whether or to what extent the estimates are representative ot the actual money withdrawals during the respective year of budget execution. This question has to be discussed both in respect of over- and underspending.

A hidden overspending of estimates is forbidden by Section 100 of the Republic of South Africa Constitution, Act No. 32 of 1961, according to which "no money shall, subject to the provisions of the Exchequer and Audit Act, 1956 (Act No. 23 of 1956), be withdrawn from the Consolidated Revenue Fund or the Railway and Harbour Fund, except under appropriation made by law."

According to this provision, all actual expenditure must be appropriated either through main, supplementary or additional estimates. [2] This regulation, together with the fact that "all votes of expenditure shall be gross amounts" [3], is a sufficient

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1. Prior to 1956, the responsibility for Bantu education lay in the hands of the four different Provincial Administrations.
2. For most years, the supplementary and additional estimates are insubstantial in value when compared with the main estimates. The way in which estimates are formulated in South Africa is described by Vincent Aubrey Rogers, The Constitutional Control of Public Finance in South Africa, Butterworths, Durban, 1961, p. 62 ff.
3. T. van Waasdijk, Public Expenditure, ibid., p. 68.

safeguard against hidden overspending.

A certain percentage of underspending is, however, normal practice in the course of budget execution. Van Waasdijk regards margins up to 4 per cent as "normal deviations".[1]

5.1.5 The Usefulness of the Main Estimates for Income Size Distribution Research

In order to assess the economic significance of the personal income distributions which can be calculated in the way indicated above, a comparison is made in Table XIX of the total value of wages, salaries, and allowances allowed for under the three main estimates, with the total value of wage income of all economic activities, for selected years.

TABLE XIX: Comparison of the Total Value of Wages, Salaries, and Allowances, Recorded in the Three Main Estimates, with the Total Value of Work Income of All Economic Activities, for Selected Years. Figures in Rm.[2]

	Central Government	SAR & H	Bantu Education	Total	Work Income, All Economic Activities	Col. 4 as percentage of Col. 5
	Col. 1	Col. 2	Col. 3	Col. 4	Col. 5	Col. 6
1921-22	20	28	-	48	263	18.3
1931-32	19	30	-	49	265	18.5
1941-42	24[3]	44	-	68	573	11.9
1951-52	98	140	-	238	1,482	16.1
1961-62	192	230	3	425	2,880[4]	14.7
1967-68	354	380	4	738	4,842[4]	15.2

1. T. van Waasdijk, Public Expenditure, ibid., p. 68. Compare also ibid., Table 20, p. 303.
2. Time Coverage: Years ended 31st December, 1921, and subsequent years for Column 5. Years ended 31st March, 1922, and subsequent years, for Columns 1 to 4.
   Sources:
   Central Government: U. G. No. 2 -1921, p. 6, for 1921/22.
   U. G. " 1 -1931, p. 1, for 1931/32.
   U. G. " 1 -1941, p. iv, for 1941/2.
   U. G. " 1 -1951, p. x, for 1951/52.
   U. G. " 1 -1961, p. xi, for 1961/62.
   R. P. " 1 -1967, p. xi, for 1967/68.

(Footnote continued on p. 48)

(Footnotes for Table XIX continued ...)

SAR and H	U. G.	No.	17-1921,	p. 29,	for 1921/22.
	U. G.	"	8-1931,	p. 28,	for 1931/32.
	U. G.	"	5-1941,	p. 30,	for 1941/42.
	U. G.	"	5-1951,	p. 37,	for 1951/52.
	U. G.	"	5-1961,	p. 38,	for 1961/62.
	R. P.	"	5-1967,	p. 38,	for 1967/68.
Bantu Education:	U. G.	"	9-1961,	p. 1,	for 1961/62.
	R. P.	"	9-1967,	p. 3,	for 1967/68.

Work Income, all economic activities: J. J. Stadler, Die Bruto Binnelandse Produk..., ibid., p. 505, Table XXXI, Column 9, for the years 1921/22 to 1951/52.
Bureau of Statistics, Statistical News Release, P.12, Gross Domestic Product of South Africa and South West Africa, 1967 and Previous Years. Table 1.1, p. 3, for the years 1961/62 and 1967/68.

2. Excluding the civil and military establishment of the Department of Defence. Compare U. G. 1-1941 and 23-1941, p. iv.

3. South Africa and South West Africa.

Except for the year 1941-42 (when defence expenditures were kept secret) some 15 to 18 per cent of the total work income paid in South Africa was budgeted through the main estimates. This would constitute a sample of considerable magnitude. For macro-economic research, however, the usefulness of these data depends entirely on whether they can be proved to be a representative sample for the whole economy. This question will be investigated in paragraph 5.3 below in greater detail.

5.2 Other Estimates

The coverage of the main estimates, can to a certain extent, be increased by having recourse to other budget estimates, i.e., the estimates of the Provinces, Municipalities, Local Authorities, and Government-Sponsored Public Bodies.

5.2.1 Estimates of the Provinces

Since Union, annual estimates have been published by the Provinces of the Cape of Good Hope, Transvaal, Natal, and the Orange Free State.

The financial structure of the Provinces is characterised by a high degree of labour intensity caused mainly by the mainte-

nance of education and hospital services.[1]

For the assessment of the scope of personal income data which can be derived from the 'Estimates of the Expenditure' of the various Provinces, the year ended 31st March, 1959, was used as an example. It was found that the votes under which the different Provinces classified their expenditures were broadly identical.[2] Table XX lists the number of provincial employees, together with their total estimated remuneration, insofar as these are classified by individual income recipients. This constitutes, however, only a portion of the total estimated staff budgetings, because a great part of the staff establishment is not listed in any detail.

TABLE XX: Number and Incomes of Employees Whose Incomes are Listed by Size of Income in Provincial Estimates, Year Ended 31st March, 1959.

	Nos. of employees	Total income thousand £ s	Average Income, £
Transvaal[3]	14, 308	13, 602	951
Orange Free State[4]	5, 662	3, 910	691
Natal[5]	15, 487	8, 319	537
Cape Province[6]	17, 976	15, 228	847
TOTAL	53, 433	41, 059	768

1. Other reasons are that the maintenance and construction of national roads, although financed out of central government funds, lie in the hands of the Provinces. Compare van Waasdijk, Public Expenditure, ibid., p. 58.
2. These are (with minor differences for different Provinces): General Administration; Education; Hospitals, Medical and Health Services; Roads, Bridges, and Public Works; Miscellaneous Services (such as Libraries and Nature Conservation); Interest and Redemption; Capital Expenditure; National Roads and Bridges.
3. T. P. 4-1958, Final Print, Province of Transvaal, Estimates of the Revenue to be Collected and Expenditure (Excluding Capital Expenditure) to be Defrayed during the Year ending 31st March, 1959.
4. P. R. - P. C. 2 - 1958, First and Final Print, Province of the Orange Free State, Estimates of Revenue and Expenditure (Including Capital Expenditure) for the Year Ending 31st March, 1959.
5. N. P. 2, 1958, Final Print, Province of Natal, Estimates of the Expenditure to be Defrayed from Revenue to be Collected During the Year Ending 31st March, 1959, (Excluding Capital Expenditure).
6. C. P. /K. P. 1-1958, First and Final Print, Province of the Cape of Good Hope, Estimates of the Expenditure (Excluding Capital Expenditure) to be Defrayed from Revenue Funds During the Year Ending 31st March, 1959.

The usefulness of provincial estimates for purposes of assessing income distribution statistics by size, is limited for two reasons:

i. only a portion of the total work income paid out by Provinces is coveredby detailed estimates;

ii. the detail covered by different estimates varies between different Provinces.

As far as the comprehensiveness of the detailed staff estimates is concerened, as much as 61.7 per cent of the total work income paid out by Provincial Administrations is shown in the different budgets by the size of incomes paid to individuals.[1] However, the 53,433 employees[2] for whom the estimated income was budgeted, constitute only 39.8 per cent of the total number of 134,269 provincial employees in 1958/59.[3] Thus there exists a strong bias in the tabulated data in favour of high income receivers. The statistical picture which can be derived from the provincial estimates is, therefore, not representative.

A second reason which makes the provincial estimates of limited use for income size distribution research is that the amount of detail given in the estimates varies, to a certain extent, between different Provinces. This is particularly true in respect of the votes for education and hospital services. During the year ended 31st March, 1959, the Orange Free State, for instance, tabulated the budgeted income payment for Coloured education in one lump sum,[4] whereas the other Provinces budgeted the corresponding expenditure by individual groups of employees.

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1. R82,118 were budgeted by the Provinces in such a manner that the size of incomes paid to individuals became visible. (Compare Table XX, above). This constitutes 61.7 per cent of the total work income paid by Provincial Administrations during the year 1958-59. The value of the total work income was R133,083. Source: J. J. Stadler, Die Bruto Binnelandse Produk..., ibid., Table XXI, p. 435.
2. Table XX above.
3. At 31st March, 1960, the provincial administrations employed 139,139 persons. It is estimated that 134,269 persons were employed during the year ended 31st March, 1959. Statistical Yearbook, 1966, ibid., H-48, col. 596. The deflator is 3.5 per cent and refers to the number of employees employed in 1961, compared with 1960.
4. P. R. - P. C. - 2 - 1958, ibid., p. 28.

5.2.2 Estimates of Municipalities and Other Local Bodies

Local government in South Africa is highly differentiated and departmentalized. The number of local authorities during 1958 was as follows:- 284 municipalities; 112 local and village management boards; 23 townships; and 226 other bodies, such as health committees, village councils, and divisional councils.[1]

By reason of their external control, local authorities are under the legal obligation to frame and print annual estimates of income and expenditure.[2]

As to the practical fulfilment of this obligation we are informed by the City Treasurer of Pretoria that the budget preparation is handled in this city as follows:- "... The various departments submit with their annual requirements for budget purposes a statement of the approved staff establishment for all White as well as salaried Non-white employees, analysed according to the various votes, together with the name and pay number of every employee, and the staff establishment of the Non-white wage-earners.

These statements are then verified by the Personnel Department and all calculations checked by my own Department. Only totals under each subvote appear in the draft estimates."[3]

Consequently, it is not possible to calculate from the Estimates of City Councils the income structure of their employees. (See Footnotes 4 and 5)

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1. Official Year Book of the Union of South Africa and of Basutoland, Bechuanaland Protectorate and Swaziland, No. 30, 1960, p. 124.
2. I.Q. Holmes, Local Government Finance in South Africa, Butterworth, Durban, 1949, p. 25 ff.
3. Letter received from The City Treasurer of Pretoria, B 13/1, Pretoria, 24th October, 1969.
4. Compare:- City Council of Pretoria, Estimates for the Year Ending 30th June, 1969, Revenue and Capital Account.
5. The publication or otherwise of inter-departmental staff statements is regulated by the Standard Financial Bye-Laws -Provincial Gazette No. 3299, 1st November, 1967.

   "2. The annual estimates of the Council on the revenue account and the capital account shall be drawn up in the form prescribed by the Management Committee from time to time...

   5. The Management after considering the draft estimates for each department and amending them in any manner it deems necessary, shall submit them to the Council for approval."

5.2.3 Estimates of Government-Sponsored Bodies

Government-sponsored bodies are "sponsored by Government authorities established by special legislation or administrative act, as opposed to private initiative, and subordinated in matters of broad policy to Government authority."[1]

The most important government-sponsored bodies are the South African Iron and Steel Industrial Corporation (ISCOR), and the ISCOR group; the South African Coal, Oil, and Gas Corporation (SASOL); the Phosphate Development Corporation (FOSKOR); the Klipfontein Organic Products (KOP); and the Electricity Supply Commission (ESCOM). (See Footnotes 2 and 3)

Annual parliamentary control of most government-sponsored bodies, is enabled by the publication of annual reports, together with the balance sheet, and profit and loss, or income and expenditure accounts. These reports contain no information at all of the nature here required, i.e., a tabulation of the income structure of employees by size of incomes. (See Footnotes 4 and 5)

5.3 Summary of Findings and Conclusion

A certain insight into the structure of income by size can be gained in South Africa by having recourse to the three main estimates of the Central Government and the estimates of the four Provinces.

For two reasons the usefulness of public estimates is restricted, however, in respect of income size distribution

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1. T. van Waasdijk, Public Expenditure, ibid., p. 65.
2. On the importance of these five major companies compare: State of the Union, Year-Book for South Africa, Economic, Financial and Statistical Year-Book for the Union of South Africa, 1960-61, Da Gama Publications, Johannesburg, South Africa, pp. 418-429.
3. For a detailed list of all public bodies see: Official Year Book of the Union of South Africa, No. 30-1960, pp. 92, 93.
4. Complaints about insufficient information of the public and of Parliament have been frequent, compare:- Ellison Kahn, "Public Corporations in South Africa; A Survey", The South African Journal of Economics, Volume 27, 1959, p. 291.
5. The writer has been informed by the Personnel Managers of the South African Iron and Steel Industrial Corporation, Limited, (letter dated 24th October, 1969, Pretoria, JGB/LB), and the Electricity Supply Commission (letter dated 31st October, 1969, Johannesburg, S.G. 21), that detailed data on staff remuneration - comparable to those listed in the estimates of expenditure of the Central Government and the Provinces, - cannot be divulged.

research, viz.

i. the data which are published by size of income show a strong bias in favour of high income groups; this renders the sample unrepresentative;

ii. the degree of inequality of income distribution of the public sector is different from that of the private sector. Hence the tabulated income distribution data which refer to employees of the public sector cannot be used as a 'pars pro toto' for all South African employees.

To prove the latter point, the degree of income inequality of the private and public sectors of the economy was calculated by using the Pareto formula. The public sector was defined to comprise:[1] (i) Public authorities; (ii) public subsidized institutions; (iii) South African Railways and Harbours; (iv) Other Public Corporations. All employees who were not employed by one of the above mentioned bodies were defined as being employed by the private sector.

Table XXI gives Pareto coefficients for Whites in respect of incomes higher than R100 and higher than R1,000, and for Coloureds and Asiatics for incomes higher than R400.

TABLE XXI: Pareto Coefficients: Public and Private Employees, 1960, Whites, Coloureds, and Asiatics.[1]

	Employees of Sectors		Column 2 as per cent of Column 1
	Public	Private	
	Col. 1	Col. 2	Col. 3
Whites, Income R100+	-2.0524	-1.5705	76.5
Whites, Incomes R1,000+	-3.1027	-2.3871	76.9
Coloureds and Asiatics, Incomes R400+	-3.2217	-2.8353	88.0

The Pareto distribution gives a reasonably straight line for incomes received by Whites when equal to or higher than R1,000, and for incomes received by Coloureds and Asiatics, when equal to or higher than R400.

1. Population Census, 6th September, 1960, Vol. 5, ibid., Table 5.

For all three comparisons undertaken, the Pareto coefficients are substantially higher for the employees of the public sector, compared with the private sector. This means that the incomes are more equally distributed in the public sector, compared with the private sector.

It follows from the above that the pattern of income distribution between employees of the public and private sectors is different. It is therefore not possible to regard the one as representative for the other.

The insight which can be gained into the structure of personal income distribution is of great value when research is undertaken which only deals with the public sector of the economy. For a general macroeconomic study of South Africa's economy, however, little use can be made of the data material discussed above.

6. Personal Income Distribution Data Provided from Income Tax Returns

6.1 Use Made of Income Tax Data for Applied Economic Research

Data on income tax collections have initiated analysis of the personal income distribution patterns since the 19th century. R. Dudley Baxter,[1] Otto Ammon[2] and particularly Vilfredo Pareto[3] deserve special mention. Many of the early writers on the subject, such as Otto Ammon, sought to connect data on the personal income distribution with the distribution of individual abilities of human beings, a study that had been initiated by Francis Galton.[4]

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1. R. Dudley Baxter, National Income, London, Macmillan, 1868.
2. Otto Ammon, Die Gesellschaftsordnung und ihre natürlichen Grundlagen, 3. Auflage, Jena, Fischer, 1900.
3. Vilfredo Pareto, Cours d'economie politique. Lausanne, Rouge, 1897, Livre III, Ch. I.
4. Francis Galton, Hereditary Genius. An Inquiry into its Laws and Consequences, New York, Appleton, 1870.

In South Africa, frequent use has been made of data provided by the Secretary (formerly the Commissioner) for Inland Revenue, for purposes of social and economic research. The earliest of the South African sources which were employed for this purpose were the income tax data of the Cape of Good Hope, 1907-8.[1] For these, Corrado Gini found that the value of the Gini-coefficient of income distribution, δ, was 6.3 when corporations were included, and 1.6, when physical persons only were considered. (See Footnotes 2 and 3)

After the introduction of a general income tax in South Africa in 1914, R. A. Lehfeldt was the first economist to discuss the value of statistics on income tax in an interesting chapter on the Range of Incomes, which was part of his book on the National Resources of South Africa.[4]

At the time of writing, Lehfeldt had only the income tax statistics up to 1917-18 at his disposal.[5] These he found of little use for analytical research because of insufficient coverage.[6]

During the thirties, R. Leslie published three notes in the South African Journal of Economics, two of which dealt with the effect of the abandonment of the goldstandard on the distribution of incomes.[7] His finding was that the value of Pareto's α had

1. In the Cape of Good Hope an income tax was instituted in 1904 and abolished upon the establishment of the Union. See: M. H. de Kock, An Analysis of the Finances of the Union of South Africa, Cape Town, Port Elizabeth, Uitenhage, Johannesburg, 1922, p. 137.
2. Corrado Gini, On the Measurement of Concentration with Special Reference to Income and Wealth, Abstracts of Papers presented at the Research Conference held by the Cowles Commission, 1936, Colorado College Publication, Gen. Ser. No. 208, pp. 73-80, here pp. 75, 6.
3. Gini improved Pareto's formula of income distribution by taking account not only of the distribution of the taxpayers but also of their incomes.
   If A stands for the amount of the income above a limit x, and N for the number of persons receiving such incomes, the data can be fitted to the formula $\log N = \log K + \delta \log A$, where $\log K$ and δ are constant.
   Compare: Wilhelm Krelle, Verteilungstheorie, J. C. B. Mohr (Paul Siebeck), Tübingen, 1962, p. 273 ff.
4. R. A. Lehfeldt, The National Resources of South Africa, With a Preface by the Right Hon. J. C. Smuts, Prime Minister of the Union of South Africa, Johannesburg: University of the Witwatersrand Press, London: Longmans, Green and Co., 1922, pp. 57-70.
5. ibid., p. 57
6. ibid., pp. 57, 8.
7. R. Leslie, "The Effect of the Abandonment of the Gold Standard on the Distribution of Incomes in South Africa", The South African Journal of Economics, Vol. 3, pp. 279-280, 1935.
   R. Leslie, "The Change in the Distribution of Incomes in South Africa after the Abandonment of the Gold Standard", The South African Journal of Economics, Vol. 4, p. 122, 1936.
   R. Leslie, "Distribution of Incomes in South Africa", The South African Journal of Economics, Vol. 5, p. 95, 1937.

become larger at the beginning of both the 1922 and 1929 depressions which indicated that the distribution of incomes had become more equal during those periods. The opposite result was found during periods of revival. [1]

In 1943 S. Herbert Frankel and H. Herzfeld submitted that the standard of progress was unsatisfactory: "The question of income distribution is one which in spite of its importance has found comparatively little statistical treatment in this country." [2] Their own article on the European Income Distribution in the Union of South Africa and the Effect Thereon of Income Taxation can be regarded as the first major and comprehensive study of personal income statistics in South Africa, confined, however, to the years 1925/26, 1931/32, 1936/37, 1938/39, 1939/40, and 1940/41. Three years later J. de V. Graaff published an essay on Fluctuations in Income Concentration with Special Reference to Changes in the Concentration of Supertaxable Incomes in South Africa: July, 1915-June, 1943. [3] Using the data on supertaxable incomes from the annual reports of the Department of Inland Revenue, de V. Graaff found a slight evidence of a decreasing inequality of income distribution for the period under review.

Until about 1945, Inland Revenue data were used also to calculate the value of the national income according to its income receipt structure. [4] Later on, less reliance was, however, placed in South Africa on this particular source. To quote D. G. Franzsen:- "For investigators in many different countries income tax returns have served as a point of departure in making calculations required for the income type approach to national income. With the expansion and improvement that have taken place in the statistical services of the more developed countries, reliance on this particular statistical source has diminished to a large extent." [5]

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1. R. Leslie, "The Effect of the Abandonment of the Gold Standard on the Distribution of Incomes in South Africa", ibid., p. 280.
2. S. Herbert Frankel and H. Herzfeld, "European Income Distribution in the Union of South Africa and the Effect Thereon of Income Taxation", The South African Journal of Economics, Vol. 11, June 1943, p. 121.
3. J. de V. Graaff, "Fluctuations in Income Concentration with Special Reference to Changes in the Concentration of Supertaxable Incomes in South Africa; July, 1915 - June, 1943", The South African Journal of Economics, Vol. 14, 1946, pp. 22-39.
4. Compare T. H. Kelly, "Social and Economic Statistics in the Union", The South African Journal of Economics, Vol. 13, 1945, particularly p. 310.
5. D. G. Franzsen, "Some Methodological Problems Raised by the Calculation of the Union's National Income by Income Type", The South African Journal of Economics, Vol. 16, 1948, p. 157. Compare also D. G. Franzsen, "A South African Accounts Research Programme", The South African Journal of Economics, Vol. 19, 1951, p. 237.

In South Africa, as in many other western countries, the Department of Inland Revenue is concerned with incomes only from the administrative point of view. The lack of interest by this Department in supplying more detailed information has often been regretted.[1] To quote Report No. 6 of the Social and Economic Planning Council on Social and Economic Statistics in the Union: "The Department of Inland Revenue obtains details of all companies and a very large number of individuals. The Department, however, only publishes statistics of the incomes assessed for tax purposes. The statistics available in the Department of Inland Revenue, but not collated and published, are amongst the most important for policy determination, including taxation policy itself, and for the accurate calculation of the national income, national savings and investment."[2] T. H. Kelly complains equally when writing: "It is a matter for regret that the Inland Revenue Department does not open up the vast storehouse of raw material contained in its files" and he goes on to say that "most economists are convinced that the fullest publicity about all incomes is in the general public interest."[3] Recently, however, after the introduction of electronical equipment during the early 1960s, the annual reports of the Department of Inland Revenue have become more comprehensive.[4]

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1. Lack of cooperation by the Department of Inland Revenue has already been recorded in a letter from the Commissioner of Inland Revenue, Pretoria, dated 24th September, 1925, and addressed to the Secretary of the Economic and Wage Commission, Pretoria: "...I regret that I am not in a position to furnish your Commission with a statement embodying information that might be found useful by that body in its investigations."
   Archives, Economic and Wage Commission, Union Buildings, Pretoria, R. 10/188 III, Volume 23, File L. D. 1747/8.
2. U. G. No. 35-1944, Social and Economic Planning Council, Report No. 6, Social and Economic Statistics in the Union, para. 12, p. 2.
3. T. H. Kelly, Social and Economic Statistics, ibid., p. 311.
4. In respect of the present situation, we are informed by the South African Inland Revenue Department that "there appears to be no legislation under which the report of the Secretary for Inland Revenue is published but it is tradition that as head of the administrative department the Secretary reports back to the political head. ... With the introduction at various times of more up to date accounting machines to meet departmental requirements and in consultation with interested outside bodies the scope of the statistics collated and published has been extended over the years."
   Letter received from Miss E. M. Teggin, Department of Inland Revenue, Pretoria, dated 22nd December, 1969.

It is interesting in this context to examine some experience made in other countries with the use of income tax data. G. Göseke[1] and Paul Jostock and Albert Ander[2] report for Germany that little use has been made so far of the rich material of income tax statistics in relation to the problem of income concentration. Deviations between the economic and the taxable income concepts[3] and frequent changes in the Income Tax Acts[4] are made responsible for this fact.[5]

Others ignored conceptual shortcomings of income tax data. Tibor Barna for instance, estimated the distribution of assessed incomes over £125 for Great Britain for the years 1937-38 and 1938-39.[6] Simon Kuznets calculated the percentage share of upper income groups in total income for 1913-47 for the United States of America, basing his research on federal income tax returns.[7] Kjeld Bjerke studied Danish income distributions for the years 1939-52 on the basis of assessed incomes only.[8] H. P. Brown undertook similar research into the Australian income structure, claiming that "the main source data for size distribution of incomes is almost inevitably statistics of income tax..."[9] Simon A. Goldberg

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1. G. Göseke, The Effects of Redistribution on Size Distribution of Personal Income and Household Net Income in Germany in 1955 and 1959, International Association for Research in Income and Wealth, Series X, Income Redistribution and the Statistical Foundations of Economic Policy, Edited by Colin Clark and Geer Stuvel, Bowes and Bowes, London 1964, p. 221.
2. Paul Jostock and Albert Ander, Konzentration der Einkommen und Vermögen, Schriften des Vereins für Sozialpolitik, N. F., Band 20, I., Die Konzentration in der Wirtschaft, Herausgegeben von Helmut Arndt, Berlin 1960, pp. 179 ff.
3. G. Göseke, The Effects ..., ibid., p. 221.
4. Paul Jostock and Albert Ander, Konzentration der Einkommen..., ibid., pp. 180, 1.
5. It is noteworthy that in 1968 a parliamentary Bill in Germany, which provided for the Department of Inland Revenue to tabulate statistics according to economic - rather than according to administrative - criteria, was defeated by the veto of the Bundesrat.
   Jahresgutachten 1968 des Sachverständigenrates zur Begutachtung der gesamtwirtschaftlichen Entwicklung, Drucksache V/3550, 2 Dezember, 1968.
6. Tibor Barna, Redistribution of Incomes Through Public Finance in 1937, Oxford, At the Clarendon Press, 1945, pp. 254-58.
7. Simon Kuznets, Shares of Upper Income Groups in Income and Savings, Occasional Paper 35, National Bureau of Economic Research, Inc., New York, 1950, p. 2.
8. Kjeld Bjerke, Changes in Danish Income Distribution 1939-52, International Association for Research in Income and Wealth, Income and Wealth, Series VI, Edited by Milton Gilbe. . and Richard Stone, Bowes and Bowes, London, 1956, p. 98 f.
9. H. P. Brown, Estimation of Income Distribution in Australia, International Association for Research in Income and Wealth, Income and Wealth, Series VI, Edited by Milton Gilbert and Richard Stone, Bowes and Bowes, London, 1956, p. 203.

and Jenny R. Podoluk, who undertook an enquiry into the Canadian income structure, found that data collected in connection with the administration of the Income Tax Act of the Federal Government was a source which "is becoming increasingly useful."[1]

Generalizing, one might say that the kind of data published by income tax authorities has such an attraction for economists that it is difficult to find countries where no research use has been made of published material at some time or other.

6.2 Problems Connected with the Use of Income Tax Statistics for Personal Income Distribution Research

Income taxes are collected according to the concepts, and rules of procedure, of income tax laws. When use is made of the tabulated data for socio-economic research, the following problems usually have to be faced:-

i. Important concepts such as income, wealth, depreciation and revenue, are sometimes differently defined by the tax acts on the one hand and the economist on the other hand.

ii. Non-taxable events are often excluded from statistical coverage as are taxable events insofar as individuals manage to evade tax liability.

iii. The statistical value of income distributions of lower income groups, is usually small, owing to the fact that persons who receive assessments, but who do not pay taxes because of abatements or rebates for which they qualify, are frequently not listed in the tax statistics.

iv. The classification of income receivers and income producers into economic groups is usually unsatisfactory.

v. The amount of arrear tax assessments may be substantial if there is a time lag between the production of income and its assessment for tax purposes.

These and other shortcomings of the data material are compen-

1. Simon A. Goldberg and Jenny R. Podoluk, Income Size Distribution Statistics in Canada - A Survey and Some Analysis, in: International Association for Research in Income and Wealth, Income and Wealth Series VI, Edited by Milton Gilbert and Richard Stone, Bowes and Bowes, London 1956, p. 177.

sated for by the comprehensiveness and reliability of the primary sources, and by the fact that errors of the material can usually be regarded as being of a systematic nature.

6.3 Income Taxes and Income Tax Statistics in South Africa

Prior to the establishment of the Union, there was no tax on general incomes in the Transvaal and the Orange Free State. In the Cape of Good Hope and Natal colonies there were statutes which imposed a general tax on incomes, namely the Cape Act, No. 36 of 1904, and the Natal Act, No. 33 of 1908.

Increase in public expenditure and a general lessening of public revenue[1] induced the Union Government to introduce a general income tax in 1914. The first Income Tax Act, Act No. 28 of 1914, has since been amended or consolidated from year to year. (See Footnotes 2 and 3)

The Principle Income Tax Act covered incomes accrued during the 12 months ended 30th June, 1914, (tax year 1914).[4] From this year until the tax year 1962, which ended on 30th June, 1962, all tax years ended mid-year. The tax year 1962 was followed by an 8 months interval " which was known as the tax-free period".[5] With effect from 1963, the tax year for persons other than companies, has ended on the last day of February of each year, which accords more closely with the financial year of the State, which ends on 31st March.[6] The change in the timing of the tax year was introduced hand in hand with the change over to the Pay-As-You-Earn system of tax collection.

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1. Compare:- J. H. Botha, Unie-Finansies, 'n Kritiese Ontleding, Stewart-Drukkersmaatskappy, Kaapstad, 1936, p. 55.
2. A consolidating Act repeals the former consolidating Act and the amendments thereto, "provided that notwithstanding such repeal or amendment, any tax which would have been leviable under any such law may be collected in accordance with and subject to the provisions of such repealed or amended law." Act No. 31 of 1941, Sec. 96.
3. There have been four consolidating Income Tax Acts since 1914, i. e., Act No. 41 of 1917; Act No. 40 of 1925; Act No. 31 of 1941; Act No. 58 of 1962. All other Income Tax Acts were amending acts.
4. Act No. 28 of 1914, Sec. 4 (2).
5. R. P. 52-1963, Report of the Secretary for Inland Revenue for the Year 1961-62, para. 13, p. 2.
6. For a company the tax year is defined as "the period covered by its accounts ending during the relative calendar year." R. P. 73-1967, Report of the Secretary for Inland Revenue for the Year 1965-66, p. 4, Definition No. 2.

Data on the administration of and the assessments made under each annual Income Tax Act have been published from 1914 until the present day. No figures are, however, available for the tax years ended 30th June, 1952, 1953,[1] 1961;[2] and for the eight months from 1st July, 1962 to 28th February, 1963.[3]

Of the numerous different taxes which have been collected by the Department of Inland Revenue at some time or other, only four types, viz., the normal tax, super tax, personal tax, and provincial income tax have been reported in the annual reports under categories according to amounts of taxable income. Normal tax has been imposed annually since 1914; super tax was levied between the years 1916 and 1959; personal and provincial income taxes were in force before, but have been reported on by categories of amounts of taxable income only since 1954.

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1. The Commissioner for Inland Revenue, commented on the grievances encountered by his Department during the 1952 and 1953 tax years, as follows: "Because of the volume of arrear work which had resulted from war-time legislation and because that volume far exceeded the volume which the staff and mechanical equipment of the Department could handle conditions became chaotic. All activities which, so far as the Department was concerned, were non-productive, were discontinued or reduced to a minimum. ... One of the discontinued unproductive activities was the compilation, for report purposes, of the statistical data." *

   The Commissioner also reported that "such information as was extracted for Departmental purposes was however supplied to interested organisations on request." The writer wrote to the Department about this and asked for the information on tax collections to be given to him, but was subsequently informed that "the only information availabe to the Department is that given in the official reports." **

   * U. G. No. 26-1957, p. 1.
   ** Letters dated 19th September, 1968, Grahamstown, and 1st October, 1968, Pretoria.

2. Report R. P. 28-1961 which, according to its title, covers the years 1959-1961, reports in fact only on the tax years ended 30th June, 1959 and 1960. No indication is given why the tax year ended 30th June, 1961, was not reported on.

3. R. P. 50-1966, para. 2 states in this respect: "The statistical data which could have been extracted from returns for that period would ... have been unrealistic and would have served no purpose."

6.4 Information Provided by the Annual Reports of the Department of Inland Revenue

For the purposes of calculating personal income distributions, income tax statistics are of interest mainly only insofar as the number of taxpayers, the amount of taxable incomes and the amount of the tax payable are shown under categories of assessed taxable incomes and assessed losses.

The presentation of income tax statistics imposed on individuals and tabulated by size of incomes has been undertaken in South Africa as follows:-

6.4.1 Presentation of Statistics on Normal Tax

For the years 1914 to 1951, the following criteria were classified by income ranges in the annual reports of the Department of Inland Revenue, viz., (i) the number of taxpayers; (ii) the amount of taxable income, and (iii) the amount of tax payable.

From 1954 onwards, the amount of taxable income has no longer been shown. Since then, only the number of taxpayers and the amount of tax payable have been tabulated by income groups.

As from 1920, individuals have been listed according to their marital status.

Up to and including the tax year 1940, the abatement system was in force, but since then rebates have been allowed to certain categories of taxpayers. Abatements are the sum of allowances which intend to equalise the burden of different taxpayers, according to their family responsibilities, and which are deducted from the taxable income prior to ascertaining the final amount of the tax payable. Rebates, on the other hand, are concessions which reduce the calculated amount of normal tax.

From 1924 to 1940 abatements granted have been tabulated in the Annual Reports of the Department for Inland Revenue by income categories, classified according to primary and secondary abatements. The latter include abatements granted in respect of children, dependents, and insurance.

As from 1941 onwards, rebates have been listed annually according to similar categories.

Statistics on a racial basis were first introduced in 1958 under the following headings, viz., (i) the number of persons in income groups and rebates allowed; (ii) source of income; (iii) number of persons in each district of the Republic who received assessments. [1]

For the purposes of income size distribution research, the quality of income tax tabulations depends mainly on two criteria, namely on the distance (in terms of income) between the lowest and the highest income range, and on the number of income ranges which are separately listed. The greater the distance between the two extreme income ranges, and the larger the number of income ranges, the better will be the quality of the statistical material. [2]

Table XXII shows the number and extension of income ranges since the first imposition of the normal income tax in 1914.

TABLE XXII: Number and Extension of Income Ranges- Normal Tax Assessments, 1914-1965. [3]

Tax Year(s)	Number of Income Ranges	Extension of Income Range	
		Lowest Income	Highest Income
1914	8	£ 1,001	£ 20,000+
1915 to 1917	16	301	20,000+
1918 to 1920	29	301	20,000+
1921 to 1933	30	not exceeding 300	20,000+
1934 to 1941	29	" " 400	20,000+
1942 to 1944	30	" " 300	20,000+
1945 to 1948	60	" " 300	26,400+
1949 to 1951	60	" " 300	30,000+
1952 to 1953	-	-	-
1954 to 1960	19	assessed loss	10,000+
1961	-	-	-
1962	48	assessed loss	R 20,000+
1963	-	-	-
1964 to 1965	48	assessed loss	R 20,000+

It is clear from Table XXII that the quality of the annual reports of the Department of Inland Revenue has changed frequently since 1914. The reports for the years 1914-1918 were little

1. Compare the Report of the Commissioner for Inland Revenue for the years 1959-1961, R. P. 28-1961, p. 9, Nos. 13-17.
2. It is of interest to note that Prussian income tax data were listed by more than 120 income ranges during the 19th century. In South Africa, the greatest number of income ranges ever to be reached was 60. Compare Table XXII above.
3. Source: Annual Reports of the Department of Inland Revenue.

ambitious but were followed by a rather consolidated construction of statistical tables for the years 1918 to 1944. A great improvement in the standard of reporting was made for the tax years 1945 to 1951 when the number of income ranges was increased to 60 and the highest reported income to £26,400, and, since 1949, even to £30,000. It it a matter for regret that this high standard of reporting could not be maintained for reasons indicated earlier.[1] In the ensuing years the supply of useful information has shrunk substantially. £10,000 has since been the highest reported taxable income and the number of income ranges has been reduced to 19 for 1954 to 1960, although later on, increased again to 48. Worse still, the Department discontinued the tabulation of the value of assessed incomes by income groups since 1954 which seriously affects the possibility of estimating the distribution of income beyond the highest reported income, i.e., £10,000.

6.4.2 Presentation of Statistics on Super Tax

As is the case with normal taxes, the amount of supertaxable income was reported by income ranges up to 1951. For later years this information has not been given.

Prior to 1945 the number of income ranges for which supertax assessments were listed, was smaller than those listed for normal taxes because the liability to pay super tax commenced only at incomes equal to or higher than

£	2,500	for the	years	1916-1940;
	2,000	" "	"	1941-1943;
	1,775	" "	"	1944-1955;
	2,300	" "	"	1956-1959.[2]

Since 1945, however, the information on the collection of super taxes has been incorporated into that given on the assessment of normal taxes.

`le XXIII shows the number and extension of income
` since the first imposition of super tax in 1916.

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[1] note 1, p. 61 above.

2.

TABLE XXIII: Number and Extension of Income Ranges. Super Tax Assessments, 1916 to 1959[1]

Tax Year(s)	Number of Income Ranges	Extension of Income Ranges	
		Lowest Income	Highest Income
1916 to 1917	5	£ 2,501	£ 20,000+
1918 to 1939	16	2,501	20,000+
1940	17	not exceeding 2,500	20,000+
1941 to 1943	19	" " 2,000	20,000+
1944	20	" " 1,775	20,000+
1945 to 1948	60	" " 300	26,400+
1949 to 1951	60	" " 300	30,000+
1952 to 1953	-	-	-
1954 to 1959	19	assessed loss	10,000+

For the years 1916 to 1944, the information given consisted of (i) the number of taxpayers who paid super tax; (ii) the amount of supertaxable income, and (iii) the amount of super tax payable.

Unlike the distinction made between married and single persons in normal tax tabulations, none was made in those of super tax tabulations.

For the years 1945-1951, the size of tabulated information has been greatly increased. For this period, the information which was then tabulated by income ranges consisted of:-[2]

Normal Tax:	i. number of taxpayers; ii. taxable income; iii. normal tax payable;
Public Company Dividends:	i. number of taxpayers who received public company dividends; ii. amount of public company dividends;
Super tax:	i. income tax subject to super tax ;
Taxes payable:	i. normal tax; ii. super tax.

Unfortunately there is one remarkable shortcoming in these tabulations, i. e., the number of persons who received super-taxable incomes of certain sizes remains unknown. It would be wrong to add up the number of persons who received normal

1. Annual Reports by the Commissioner for Inland Revenue.
2. U. G. Nos. 27-1948; 23-1949; 35-1950; 47-1951; 67-1952.

tax and those who received public company dividends, because those persons who received both normal taxable incomes and public company dividends, would then be added up twice. The number of persons who earned supertaxable incomes during the years 1945 to 1951, cannot therefore be established according to income ranges.

In respect of the ensuing tax years 1954 to 1959, the numbers of taxpayers and the amounts of tax payable have been listed separately for normal and super tax. [1]

6.4.3 Presentation of Statistics on Provincial Taxes

Direct provincial taxation consists of personal and provincial taxes. [2] The income concept on which the personal tax is founded is very broad, and comprises both the taxable income of the taxpayer, as determined under the Income Tax Act, plus dividends received or accrued. [3]

The provincial income tax, on the other hand, is levied on the income of persons "in the form of a percentage of the whole or any portion of the amount payable by any such person in respect of normal or super tax or both normal and super tax. ..." [4] As a result of this provision, the number of taxpayers assessed under the provincial income tax, corresponds closely to the number assessed under normal tax, whereas the amount of tax payable under the former is only a fraction of the amount payable under the latter.

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1. Compare R. P. 28-1961, Statement 12 B, p. 40, Note (1):- "... A taxpayer assessed for Provincial Personal Tax only is counted as one taxpayer under Personal Tax in column 3 and a taxpayer assessed for all three heads, Normal Tax, Personal Tax and Provincial Income Tax is counted as one taxpayer in each of the Columns 2 to 4."
2. The personal tax has developed from a poll tax to a mildly progressive tax. The provincial tax was previously assessed by way of supertax.
   Compare: R. P. 24-1969, Taxation in South Africa, First Report of the Commission of Enquiry into Fiscal and Monetary Policy in South Africa, November 1968 (Franzsen Commission), para. 136, p. 31.
3. A. S. Silke, Silke on South African Income Tax, Being an Exposition of the Law, Practice and Incidence of Income Tax in South Africa, 3rd Edition, Juta and Co., Cape Town, Wynberg, Johannesburg, 1963, para. 228, p. 319.
4. Financial Relations Consolidation and Amendment Act, Act No. 38 of 1945, Sec. 8 (4) (b).

Both the provincial and personal taxes are calculated by the Central Government on behalf of the Provinces. Since 1954 the Department of Inland Revenue has begun to tabulate the assessments made in respect of both the personal and the provincial income taxes.[1] These data are grouped by size of income and can therefore be used for income size distribution research. For this purpose, preference will be given to the personal rather than to the provincial tax, since the income concept is wider for the former than for the latter type.

6.5 The Influence of Tax Evasion and Tax Avoidance on the Quality of Taxable Income Data.

6.5.1 The Prominence of Tax Evasion

Before any statistical use can be made of income tax data it is necessary first to assess the quality of the data in terms of accuracy.

Income tax returns often do not disclose the entire income of taxpayers. A portion of the "mysterious gap"[2] between the total personal, and the total taxable income of a nation, can be explained with reference to tax evasion and tax avoidance.

In the literature, the term 'tax evasion' is usually used to denote a deliberate and illegal arrangement on the side of the taxable subject, aiming at reducing the tax liability below the real obligation. The term 'tax avoidance', on

1. Prior to 1953 no data were available showing the distribution of personal income tax by income groups. Only "in 1952 the Income Tax register and the Personal Tax declaration register were amalgamated and it is from the 1953 tax year that assessments were issued to all persons on the combined register who rendered an income tax return regardless of whether such persons were liable to normal tax, personal tax only or exempt from all taxes." Letter received from Miss E. M. Teggin, Department of Inland Revenue, dated 23rd April, 1969, Pretoria, p. 2.

2. Compare Marius Farioletti, Some Income Adjustment Results from the 1959 Audit 239 Control Program, with comments by Charles F. Schwartz, Joseph A. Pechman, Hyman B. Kaitz, Irving Schweiger, in: Appraisal of the 1950 Census Income Data, Studies in Income and Wealth, Vol. 23, National Bureau of Economic Research, New York, Princeton, 1958, p. 277.

the other hand, "denotes that the taxpayer has arranged his affairs in such a perfectly legal manner that he has either reduced his income or that he has no income on which tax is payable."[1] Thus tax evasion is illegal whereas tax avoidance is lawful.

The attitudes of people toward the payment of taxes is determined by what Schmölders calls 'Steuermoral': - "In diesem Sinne ist die Steuermoral (besser:Steuerdisziplin) die allgemeine Einstellung (Attitüde) der Gesamtheit der Steuerpflichtigen zu ihren steuerlichen Pflichten, eine Einstellung, die von Volk zu Volk, aber auch von Zeitalter zu Zeitalter und von Ort zu Ort starke Unterschiede erkennen läßt; die Steuermora' ist in der allgemeinen Geisteshaltung (Mentalität) der Bevölkerung, insbesondere in ihrem staatsbürgerlichen Bewußtsein, verankert..."[2] Schmölders also observes that the attitude towards taxation has deteriorated during the course of the 20th century. He suggests, however, that this attitude has always been higher in Anglo-Saxon countries when compared with Roman nations.[3]

As far as the writer knows, the phenomenon of tax evasion has not as yet been made a subject of systematic research in South Africa. In order to gain some insight into this practice recourse must therefore be had to research undertaken in other countries.

Kjeld Bjerke in a study on changes in Danish income distribution 1939-1952, which is based solely on Danish taxation statistics, notes that there was a tendency for the upper income brackets "... to be recorded with too small amounts in tne distribution indicated by the statistical data."[4] Proprietors and owners are particularly quoted as having underassessed their actual incomes.

A certain quantitative insight into the question of tax evasion is gained from a report by H. C. Jørgensen, who studied the phenomenon for Denmark for the years 1921 to 1931.

1. A. S. Silke, Tax Avoidance and Tax Reduction, Within the Framework of the South African Income Tax Legislation, With Special Reference to the Effect on the Fiscus and to Current Anomalies and Inequities, Juta and Co., Cape Town, Wynberg, Johannesburg, 1958, p. 1.
2. Günter Schmölders, Steuermoral, Handwörterbuch der Sozialwissenschaften, Band 1o, Göttingen, 1959, p. 119.
3. ibid., p. 122.
4. Kjeld Bjerke, Changes in Danish Income Distribution 1939-1952, in: International Association for Research in Income and Wealth, Series VI, Edited by Milton Gilbert and Richard Stone, Bowes and Bowes, London 1956, p. 102.

Jørgensen found that "the percentage of the income not declared may be estimated at almost 30 per cent for agriculture and just below 20 per cent for manufacturing and handicrafts; for other industries, including public servants, the professions, domestic servants, etc., tax evasion may be estimated at just over 10 per cent. In making these estimates it was assumed that tax evasion by manual workers amounts to only 5 per cent. ... 5 per cent should also be the maximum tax evasion for salaried people and public servants, while ... for professional people the evasion percentage probably exceeds 10 per cent." [1]

The evidence on the distribution of tax evasion by different income groups is various. Thomas R. Atkinson maintains that "evasion and avoidance favours upper-income groups", [2] whereas Rufus Tucker suggests the contrary: tax evasion is "more important in the lower brackets, which are not so carefully checked by the Internal Revenue Bureau." [3]

To the extent that Jørgensen's evidence is representive for South Africa it can be suggested that the relative decline of agricultural incomes and the corresponding increase in incomes of salaried persons, should have been conducive to a reduction of tax evasion. It can also be assumed that the introduction in 1962 of the Pay-as-you-Earn system of tax collection will have substantially reduced the possibilities open to salaried persons to evade taxes.

Against this must be held the likelihood that peoples' attitudes toward taxation probably deteriorated over the past 60 years, [4] a development which is likely to have counter-acted the aforementioned influences to a certain

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1. H. C. Jørgensen, Hvor stor en del af indtaegten unddrager skattesnyderne det offentlige? 1946. Quoted from Kjeld Bjerke, ibid., p. 112.
2. Thomas R. Atkinson, Some Frontiers of Size-Distribution Research, in : Studies in Income and Wealth, Vol. 23, National Bureau of Economic Research, New York, Princeton, 1958, p. 34.
3. Rufus Tucker, "The Distribution of Income Among Taxpayers in the United States, 1863-1935," The Quarterly Journal of Economics, Vol. LII, 1938, p. 549.
4. A certain evidence for this is given in the Annual Reports of the Department of Inland Revenue where the results achieved from special investigations of taxpayers' books and accounts are tabulated. This gives, however, little insight into the true size of tax evasion, since not all cases of tax evasion are brought to the knowledge of the Department.

extent.[1]

It is tax evasion in the form of fringe benefits granted to employees which has become particularly popular during the post-war II period in South Africa. Although it is laid down by the South African income tax legislation that the value of any fringe benefits in cash or otherwise has to be included in the taxpayer's taxable income, we are nevertheless informed by the Manager of the Johannesburg Chamber of Commerce that "fringe benefits granted to employees in South Africa have been increasing during the past number of years and, particularly before the amendment of the Income Tax Act and the lowering of income tax rates (in 1969), fringe benefits were of great importance in attracting new members to the staff." (See Footnotes 2 and 3)

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1. The Social and Economic Planning Council reported in a Memorandum on Social and Economic Statistics in the Union in 1944 on the checks undertaken by the Department of Inland Revenue in respect of tax evasion as follows:- "As a check to make sure that they (i. e., the inland revenue authorities) reach all salary, wage, interest and rent incomes of £300 per year, the tax authorities require employers to make returns of wages, salaries, and fees paid by them, Banks and Trust Companies, Building Societies, etc., to make returns of interest and dividends paid by them and agents of property owners of rents paid."

   Dependent upon the thoroughness of these checks, and the actual knowledge, on the side of the taxpayer, that such checks were undertaken, it can be suggested that the above measures may have been very effective to curtail tax evasion in South Africa. Source: Social and Economic Planning Council, Memorandum and Annexures on Social and Economic Statistics in the Union, addressed to the Director of Census, the Receiver of Inland Revenue, and Professor Hutt, typewritten, Pretoria, 7th March, 1944, p. 45.

2. Letter received from Mr H. J. van der Merwe, Johannesburg, dated 21st November, 1969.

3. In 1966 the Financial Mail reported that "of a wide range of local companies, some 25 per cent provide key men with houses, 90 per cent give cars, 3 per cent top-hat pensions ... (which may yield bigger incomes after, than before, retirement), ... and 82 per cent bonuses." * Another report which was based on a sample of 600 senior executives, stated that "60 per cent of all executives qualify for an annual bonus and 45 per cent for the use of a company car, ... 27 per cent have their club and professional institution subscription paid by the employer and 53 per cent have life insurance cover provided by the firm." **

   * "Business Brain-Bait", Financial Mail, Vol. XX, No. 8, May 20, 1966, p. 472.

   ** "The Executive Salary Structure in South Africa, A Report on a Recent Survey, Embracing 600 Senior Executives", F. C. I. Viewpoint, Official Journal of the South African Federated Chamber of Industries, Vol. II. Number 4, April 1968, p. 20.

As far as the granting of fringe benefits is concerned, it can be assumed that these tend to be concentrated in favour of higher income groups. The exclusion from taxable income of the whole or portion of fringe benefits granted to employees will therefore result in income distribution statistics being biased in favour of equality. The availability of information does not allow for this particular shortcoming to be corrected with any degree of precision.

6.5.2 The Prominence of Tax Avoidance

The formation of companies in recent decades has allowed the taxpayer considerable opportunity for tax avoidance.

Prior to 1941, the floatation of holding companies was frequently used to avoid payment of super tax. As long as the net income of a company was not distributed, but was retained in the company, saving of super tax could be effected. The Social and Economic Planning Council reports that "the temptation to evade was strong and the loss of revenue appreciable." [1]

In 1941 the distinction was drawn in the Income Tax Act between a private and a public company. (Sec. 33 of Act No. 31 of 1941). Basically, public companies were such companies which did not restrict or discriminate against particular shares. From the above date, if a company failed to satisfy these provisions, it was regarded as a private company. For purposes of taxation, public companies were treated much as before, whereas the income of private companies was made subject to normal and super tax, both paid by the shareholders. This was done after the company income had been apportioned to shareholders, according to their rights of participation in the profits of the company. The private company itself was thus subject neither to normal nor super tax. The amount of dividend which might be declared was irrelevant for purposes of taxation. The taxable income was treated as if it had been distributed and the taxes were levied on the actual or theoretical recipients. By the institution of private companies, it was intended to attack the formation

1. U. G. 48 - 1945, ibid., para. 53, p. 17.

of companies for purposes of tax evasion.[1]

With effect from 1st July, 1951, the system of apportionment relating to the taxation of private companies was repealed. From then on the distinction between public and private companies has been significant only in respect of the Undistributed Profits Tax. (See Footnotes 2 and 3)

With the repeal of the apportionment system in 1951, Parliament re-instated the de facto position which had prevailed prior to 1941. This provision was subsequently used as a "loophole(s) for avoidance of super tax in respect of undistributed profits."[4] During the 1950s, individual proprietor and partnership businesses disappeared fast in South Africa, and the Franzsen Commission reported in 1968, that of the some 140,000 registered companies in the Republic, one-third were registered during the past five years. The Commission submitted that the annual number of registrations was some 15,000 companies "... three-quarters of which have an authorized share capital of at most R200."[5]

Tax savings through company formation were then effected through

(i) the distribution of accumulated (and tax free) profits to shareholders by way of a sale of shares;

(ii) the advantages drawn of the difference between the marginal rates of taxation between companies and private persons;

(iii) the exemption from tax of dividends which were not distributed to shareholders.[6]

1. For commentary detail see A. S. Silke, The Taxation of Private Companies, An Exposition of the Working of the Special Provisions Relating to Private Companies Contained in the Income Tax Act and Provincial Tax Ordinances, Juta and Co., Cape Town and Johannesburg, 1950, Chs. 1 and 2.
2. Compare A. S. Silke, Illustrations to Income Tax, 5th Edition, Juta and Co., Cape Town and Johannesburg, 1953, p. 171, and David Shrand, The Taxation of Companies in South Africa, Legal and Financial Publishing Company, Cape Town, 1968, p. xviii, p. 1, pp. 38 ff.
3. The reasons for the abolition of the apportionment system were explained in the 1952 Budget Speech by the Minister of Finance, N. V. Havenga. Compare: Debates of the House of Assembly (Hansard), 5th Session, 10th Parliament, Vol. 78, March 17th to May 9th, 1952, column 3429.
4. A. S. Silke, Tax Avoidance and Tax Reduction, ibid., para. 36, p. 74.
5. R. P. 24-1969, ibid., Footnote 3, p. 13, together with para. 63, p. 13. The information given refers to private companies.
6. ibid., para. 323 (b) (i) to (iii), p. 70.

Facing ever increasing marginal tax rates, the South African taxpayer is reported to have learnt to "juggle"[1] with the allocation of incomes between companies and shareholders in order to maximize the benefits which could be derived under the law.[2]

It can be assumed with certainty, that the formulation of companies had the effect of making the income distribution of income tax statistics look more equal than would otherwise have been the case. This is so because savings in tax through company formation were achieved only once the income of a person had reached a certain minimum level below which it was more advantageous to pay the low marginal rates of normal tax instead of the constant rate of company tax. During the 1950s, the switch over to company status paid at income levels between £3,000 to £6,000.[3]

The incidence of tax avoidance, through company formation, since 1951 seems to have reached such an extent that a direct comparison of income tax data before and after 1951, does not seem to make sense.[4] In order to judge the development of the distribution of income during the 1950s, the analysis will therefore have to rely on a comparison of the 1951 and 1960 PIC data.

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1. Compare A. S. Silke, Tax Avoidance and Tax Reduction, ibid., para. 27, p. 52.
2. In the second reading of the Income Tax Bill on 23rd June, 1959, the Minister of Finance stated: "Experience has shown that the formation of companies has been one of the most fruitful means of organising a scheme for the evasion (of) liability for tax. ..." (Hansard omits the 'of' before liability, but certainly this is a printing mistake). Debates of the House of Assembly, (Hansard), Vol. 102, June 8th to July 1st, 1959, column 8821.
3. Compare A. S. Silke, Tax Avoidance and Tax Reduction, ibid., paras. 26, 7, Tables I and II, pp. 51, 2.
4. Other reasons for discarding the tabulations of income tax data for the 1950s (excluding 1950 and 1951), are:-
   (i) only until and including the tax year 1951 the Commissioner of Inland Revenue tabulated the amount of taxable income by income groups. For later years this information has not been given; *
   (ii) no statistics have been published by the Commissioner of Inland Revenue for the tax years 1952 and 1953.
   (iii) after the tax year 1951 the highest income range was reduced from £30,000 to £10,000; **
   (iv) after 1951 the number of income groups was reduced from 60 to 19. **

   * Compare p. 62 above.
   ** Compare Table XXII above.

For the periods of rapid growth during the 1960s, however, it seems that - in view of the lack of alternative data - reliance will have to be placed again on data provided by the Department of Inland Revenue.

6.6 The Taxable Income Concept

6.6.1 Introduction

Income tax statistics tabulate the distribution of assessed taxable incomes by income groups. When use is made of income tax data, it has to be borne in mind, that the taxable income concept is not necessarily identical with the national accounting concept of 'personal income'.[1] The comparison of data over a period of time is, furthermore, complicated by the fact that the definition of taxable income changed from time to time when income tax acts were amended or consolidated. Still another factor which adds to the uncertainty in this respect, is the extent of tax avoidance and tax evasion employed by the citizens of a country at particular times, and psychological and sociological changes in attitudes towards the Receiver of Revenue.

The South African income tax legislation is based mainly on the source principle.[2] This means that part of a person's income will not - except under certain conditions - belong to his taxable income. Receipts of a capital nature, and receipts from a source outside the country, as well as imputed rents on owner-occupied houses, belong to the category of non-taxable income sources. Rapid changes in the legislation have from time to time taken place in the definition of allowable deductions, as well as in the determination of allowable abatements and rebates. To quote Franzsen: "Die hedendaagse ingewikkelde inkomstebelastingwetgewing is dus 'n spieëlbeeld van die ingewikkelde produksiestelsel waarin die inkomstevloei sy ontstaan het."[3]

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1. The national accounting definition of the term 'personal income' is a purely economic category. The definition of the concept of 'taxable income', on the other hand, reflects the social preferences of a nation at a particular time.
2. "Suid-Afrika se Inkomstebelastingwet aanvaar die 'bron van inkomste' as basis ...". D. G. Franzsen, Die Sentrale Regering se Belastingstruktuur, in: Inleiding tot die Suid-Afrikaanse Staatsfinansies, onder redaksie van D. H. Steyn, Van Schaik, Pretoria, 1961, p. 119.
3. ibid., p. 117.

The South African Income Tax Act defines the taxable income concept by means of a carefully graded deduction formula:-[1]

Total receipts (receipts and accruals of every kind from every source)
- Receipts of a capital nature and receipts from a source outside the Union

= Gross income
- Income exempt from tax

= Income
- Allowable deductions

= Taxable income

In the ensuing paragraphs, the individual elements of the deduction formula will be critically analysed.

6.6.2 Receipts or Accruals of a Capital Nature

The term "receipts or accruals of a capital nature" is not defined in the Income Tax Act. Silke comments on this as follows: "No doubt the legislator has realised that it is not possible to define the qualities which render a receipt or an accrual either capital or income as the case may be. ... There is no single infallible test for settling the question as to whether a particular receipt or accrual is income or capital."[2]

The "golden rule" according to which the South African courts decided whether a particular transaction was or was not of a capital nature, has been the test of intention. "If in the carrying out of a scheme for profit-making an asset is acquired for the purpose of resale at a profit, the proceeds derived from the sale of such asset constitute revenue derived from capital ... and are of an income nature. ... If an asset is acquired to produce an income in the form of say rent or dividends and not for the purpose of resale at a profit, the proceeds derived from the subsequent disposal of such an asset are of a capital nature."[3]

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1. Compare Act No. 40 of 1925, Sec. 7 (1).
2. A. S. Silke, Silke on South African Income Tax, ibid., para. 31, p. 27.
3. ibid., para. 32, pp. 27, 8.

In South Africa, capital gains and losses "do not come within the purview of the (Income Tax) Act at all."[1] From the point of view of economic research, this is advantageous insofar as capital gains do not constitute a portion of the national income according to national accounting definitions. This treatment of capital gains stems from the fact that capital gains originate from pure transfers which normally are not based on real production processes. A study which analyses the forces of real economic growth (rather than the welfare problems connected with the process of growth) can therefore ignore the distribution of capital gains between persons. Only to the extent, that it can be proved that persons set up their expenditure plans according to the value of realised capital gains and losses it would be detrimental to ignore this effect.[2]

6.6.3 Receipts from a Source Outside the Union

Income comes under purview of the Income Tax Act only if it accrues "from any source within the Union or deemed to be within the Union." (See Footnotes 3 and 4). The test to be applied is whether the source of income is within South Africa or not. Residence of the income receiver is not as a rule

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1. W. J. Barnes, Income Tax Handbook, 7th Edition, Edited by B. E. J. Blann, Butterworth, Durban, 1951, p. 2.

2. This is what Titmuss has in mind when he suggests that "all these opportunities ... (i. e., to convert income into capital gains) are far more readily available to the large property owner than to the small saver, and it is well-known from American experience that capital gains are a major source of large incomes but unimportant as a source of smaller incomes." *
   For South Africa, little is known about the quantity of capital gains and their effect on the expenditure patterns of the public. **
   * Richard M. Titmuss, Income Distribution and Social Change, George Allen and Unwin, London, 1962, p. 109.
   ** Certain transactions are recorded in R. P. 24-1969, (Franzsen Commission), ibid., para. 237, (i) to (v), pp. 50, 1.

3. Act No. 31 of 1941, Sec. 7.

4. There was one exception to this rule: During the years 1916 to 1921, sources of income in a native territory bordering on the Union were regarded as taxable income from a source within the Union.
   This provision was instituted by Act No. 35 of 1916, Sec. 1 (2) and repealed by Act No. 29 of 1921, Sec. ..

regarded as a test for liability. [1]

At the same time, the total income of the nation is calculated in South Africa on the domestic, rather than on the national, basis. [2] In this respect compatibility exists between the 'income tax' and the 'national accounting' concepts of income.

This congruence of coverage is most suitable for the research here undertaken. A study of economic growth, is to a large extent, a study of the elements of aggregate demand, i.e., consumption, investment, exports, and imports. Whether such aggregate demand is generated by incomes which accrue to the people who comprise the nation, or by incomes accrued to foreigners who work in South Africa, is immaterial for the development of the argument, and the domestic income concept is therefore more useful than the national income concept.

6.6.4 Gross Income

For the purposes of the later statistical analysis three different income concepts have to be distinguished, viz.,

i. income subject to normal tax;
ii. income subject to super tax;
iii. income subject to personal tax. [3]

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1. To quote Silke: "If an employee is stationed outside the Republic to render services there on behalf of a South African employer, his salary is not taxable in the Republic being from a source outside the Republic, and this would be the case even though the contract of employment was concluded in the Republic or the salary is payable in South Africa. Conversely, if an oversea [sic] employer sends his employee to the Republic to buy wool and such an employee is stationed here for that purpose the salary he receives is from a South African source, the services being rendered in the Republic." A. S. Silke, Silke on South African Income Tax, ibid., para. 77, p. 107. For similar examples referring to investment income, compare ibid., paras. 74, 5, pp. 103-7.
2. This is contrary to the practice of the United States where the Gross National Product is the central national accounting concept.
3. For a definition of these different taxes, compare:- U. G. No. 75-1951, First Report of the Committee of Enquiry into the Income Tax Act, p. 5.

6.6.4.1 Income Subject to Normal Tax

The South African income tax legislation defines the term 'gross income' exceedingly widely, embracing everything "which comes in".[1] It includes "rents, interest, salaries, stipends, wages, allowances, the estimated annual value of any quarters or board or residence or any other advantage of any kind granted in respect of employment, whether in money or otherwise, or any pension, stipend, charge, or annuity."[2]

One important item is, however, left out from the computation of the gross income, namely dividends of public companies. This income item is taxable as income subject to super tax.

6.6.4.2 Income Subject to Super Tax

The gross income subject to super tax is calculated as follows:[3]

the taxable income as determined for normal tax, except when that determination results in an assessed loss;
\+ dividends of public companies, deemed to have accrued to the taxpayer;
\+ any loss assessed for normal tax which was set off against super tax during the preceding year;
\- any expenditure (not of a capital nature) incurred in the production of the income;
\- any loss assessed for normal tax during the current year (up to an amount sufficient to relieve the taxpayer from liability to super tax).

Super tax liability, commenced only after the income subject to super tax had reached or exceeded a certain minimum size.[4] From 1916 to 1940 the minimum income subject to super tax was £2,500. This figure was subsequently reduced to £2,000 and then to £1,775. The relative ambit of super tax liability increased as incomes rose and as the liability limit was lowered. Only in 1956 was the limit income raised again to £2,300.

1. Walter J. Barnes, Income Tax Handbook, Third Edition, (revised), The Natal Witness, Pietermaritzburg, 1933, p. 5.
2. Act No. 41 of 1917, Sec. 6.
3. U. G. 48 - 1945, Social and Economic Planning Council, Report No. 7, ibid., para. 52, p. 16.
4. Compare Table XXIII above.

6.6.4.3 Income Subject to Personal Tax

The personal tax is leviable on the taxable income subject to normal tax, plus all dividends which might not have been included in the determination of the taxable income.[1]

6.6.5 Income Exempt from Tax

Although no adjustment (except for dividends) of data derived from income tax statistics will be made in respect of incomes exempt from tax, statistical accuracy requires that the relative importance of these exempted incomes be estimated in order to assess the margin of error.

The Income Tax Act defines income as "the amount remaining of the gross income ... after deducting therefrom any amounts exempt from normal tax."[2] Whereas capital receipts and income from non-South African sources do not come under the purview of the Act at all, income exempt from tax is regarded as income, but is exempted from the liability to pay tax for some or other reason. Exemption is granted, for example, "because of the special character of the taxpayer, or the special nature of the income, or to encourage thrift or savings by investment in certain securities, or to encourage investment by non-residents in Government Stocks or to avoid income being taxed twice."[3]

Exemption from tax is granted either appertaining to the special character of the income recipient, or to the special type of income.

6.6.5.1 Exemption from Tax Appertaining to the Character of the Income Recipient

Exemptions granted on the grounds of the character of the income recipient mainly favour legal (rather than natural) persons.[4]

1. Compare para. 6.4.3 above.
2. Act No. 40 of 1925, Sec. 7 (1).
3. A. S. Silke, Silke on South African Income Tax, ibid., para. 94, p. 123.
4. The incomes of legal persons such as government and local authorities, building and friendly societies, mutual savings banks, loan associations, trade unions, pension-/superannuation-and provident funds of a permanent nature, mutual assurance companies, companies which do not derive profit or gain, amateur sporting associations, ecclesiastical, charitable and educational institutions, have at some or other time been exempted from the liability to pay income tax.

The exclusion of legal persons from the set of income taxpayers is conducive to the calculation of a personal distribution of incomes.

As far as natural persons are concerned, exemption is granted mainly for two groups of income recipients, i. e.,

i. the Governor General (and, up to and including 1940, his personal staff[1]), as from 31. 5. 1961 the State President, and

ii. foreign consuls and members of their staff.[2]

The number of natural persons who are exempted from the payment of income tax is statistically insignificant and no correction of the tabulated data need therefore be made.[3]

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1. First introduced with Act No. 28 of 1914, Sec. 5 (i). Prior to 1936, British citizens held the office of the Governor General in South Africa. With the appointment of Sir Patrick Duncan in 1936 it has become the custom to appoint a South African citizen on this post. Compare Henry John May, The South African Constitution, 3rd Edition, Juta and Co., Cape Town and Johannesburg, 1955, p. 170.

2. For selected years, the number of foreign diplomats in South Africa was as follows: 1911: 51 persons; 1936: 77 persons; 1940: 74 persons; 1945: 62 persons, 1950: 104 persons; 1957: 135 persons; 1960: 150 persons.
Source:
1911: The South African Almanack and Reference Book, 1911-12, South African Chronicle, Gazetteer and Year Book, Edited by Ernest Glanville, The Argus Printing and Publishing Company, Cape Town, 1911, pp. 852-3.
1936-60: South African Who's Who, Social and Business, Edited by Ken Donaldson, Cape Town. Edition 1936, pp. xiv-xvi; 1940, pp. xxiv-xxv; 1945, pp. 25-26; 1950, pp. 45-49; 1957, pp. 19-31; 1960, pp. 21-37.

3. The income of the Governor General remained unchanged at £ 10, 000 p. a. during the period 1914 to 1960. In 1940, his personal staff consisted of 9 persons, with the highest income payment being in the £ 1 251-1500 bracket.

As to the income data of the personnel of foreign consulates, only 12 per cent of the staff was accounted for by heads of embassies. Other high ranks represented 32 per cent, and low ranks 56 per cent (average for selected years, indicated above).

It is evident that the incomes of the exempted persons were not necessarily biased in favour of either low or high income recipients, but consituted some sort of representative average. For this reason we believe that their omission from the size distribution data cannot cause an error of any considerable magnitude.

6.6.5.2 Exemption from Tax Appertaining to the Type of Income

As to exemptions from tax which appertain to the special type of income, incomes received in the form of dividends are most important.

The Principal Income Tax Act, Act No. 28 of 1914, Sec. 5, k, exempted "income received or accrued as dividends from any company which has paid in the Union income tax on the profits from which such dividends were paid."

Since the introduction of the super tax in 1916, incomes received in the form of dividends had to be included in the income subject to super tax. This means that we possess data on the assessed taxable income - including incomes from dividends - for upper income groups in respect of the years 1916 to 1960.

For the years 1945 to 1951, the information provided by the Department of Inland Revenue has been greatly increased, insofar as the accrual of public company dividends to all income receivers who were assessed and who paid tax under the Act, has been tabulated by income classes.[1] It is a matter of regret, that similar tabulations were not given for earlier years, since the 1917 Income Tax Act already provided for any dividend accruals to be set out on taxpayers' returns, irrespective of whether or not such persons had to pay super tax on such dividends.[2]

In order to adjust for dividend incomes, the income structure of persons who were liable to normal, but not to supertax, the 1945-1951 data have been used, to estimate the relative size of dividend incomes, for persons who received taxable incomes below the assessment limit for super taxes. An adjustment of the size of lower income groups has subsequently been calculated for the years 1917 to 1944.[3]

1959 was the last year for which super tax was assessed. Subsequently the statutory treatment of dividend incomes which have since been assessed together with normal taxes, has substantially changed. Sec. 19 (3) of Act No. 58 of 1962 lays

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1. Compare p. 65 above.

2. Act No. 41 of 1917, Sec. 16 (1).

3. pp. 101 ff, below.

down the following enactment: "In respect of income in the form of dividends ... derived by any person other than a company there shall be allowed as a deduction in the determination of the taxable income of such persons an amount representing a percentage of such dividends calculated in accordance with the following scale:

Where... the taxable income of the taxpayer... for the year of assessment in question -	Percentage of aforesaid dividends to be deducted
would not exceed R2, 600	100 %
would exceed R2, 600 but not 2, 800	94 %
" " R2, 800 " " 3, 000	88 %
" " R3, 000 " " 3, 200	82 %
" " R3, 200 " " 3, 400	76 %
" " R3, 400 " " 3, 600	70 %
" " R3, 600 " " 3, 800	64 %
" " R3, 800 " " 4, 000	58 %
" " R4, 000 " " 4, 200	52 %
" " R4, 200 " " 4, 400	46 %
" " R4, 400 " " 4, 600	40 %
" " R4, 600	33 1/3 %"

With this change in legislation the accounting of dividends has become more even and gradual than before. The hard penalty of a taxable income passing the limit beyond which super tax was payable has been removed.

The statistical consequence of the new legislation is that the assessed income of a person may be considerably lower than his actual income. At least 33 1/3 per cent of the income derived from dividends is always exempted from taxable income. As a result of this legislation, a taxpayer will be shown in a lower income range than he would be had his total income derived from dividends been taken into account.

Other incomes exempted from tax appertain to incomes received in the form of war pensions,[1] incomes received in compensation for miners' Phthisis,[2] incomes received in the

1. This provision came first into force with Income Tax Act No. 41 of 1917, Sec. 16 (1) (g). It can be taken for granted that most of the war pension payments were lower than the minimum taxable income during any tax year. In the event of a 100% disablement, for instance, the disablement pension amounted to £200 p. a. for European Males and Female Doctors, and £50 p. a. for Natives. The minimum rates of pensions differed between £132 p. a. for Europeans and £25 p. a. for Natives. (Figures refer to the year 1948). Source: U. G. No. 46-1948, Report of the War Pension Advisory Committee, para. 24, p. 5 and para. 42, p. 6.
2. In 1929-30, the average annual payment to a benefi ciary (European) miner with wife and children was estimated to have been £219. 6s. p. a. Source: U. G. No. 38-1930, Report of the Miners' Phthisis Commission of Enquiry, 1929-30, para. 58, p. 24.

form of interest accrued in the Post Office Savings Bank and in respect of Union Loan Certificates,[1] and imputed rent on owner-occupied houses. Whereas the former three types of income are of relatively little magnitude, a noteworthy clash exists between the national accounting concept of income and the statutory concept of taxable income in respect of the treatment of imputed net rent on owner-occupied houses.

Whilst scholars of national accounting insist nowadays on the inclusion of imputed rents on owner-occupied houses in the value of national income,[2] this item is excluded from the coverage of the concept of taxable income.[3] This reduces the usefulness of income tax data for economic research to some extent. Assume, for instance, that two persons, A and B, earn identical salaries and live in identical houses. Whereas A's house is fully paid for, B's house is encumbered with a mortgage, interest on which has to be paid monthly.

1. During any year between 1920 and 1950, the amount of interest paid in respect of both union loan certificates and post office savings bank accounts never exceeded 0.9 % of the value of assessed taxable income for the respective years. Data on the size distribution of these interest payments are not available.
   Sources:
   i. Post Office Savings Bank, Interest Credited 31st March 1920-1945: South African Reserve Bank, Quarterly Bulletin of Statistics, No. 3, March 1947, Table IX, p. 13. for 1950: ibid., No. 24, June 1952, VIII, p. 9.
   ii. Interest paid on Union Loan Certificates: 1920-1950: Union Statistics for 50 Years, Jubilee Issue, R-9.
   iii. Value of Assessed Taxable Income: Statistical Appendix, below.
2. According to Paul Studenski, the "interchangeability between rented and owner-occupied dwellings makes completely unwarranted any sharp distinction between their services in national income accounting." Paul Studenski, The Income of Nations, Part Two, Theory and Methodology (with corrections and emendations), University Press, New York and London, 1958, p. 18.
3. The economic inconsistency inherent in this treatment was already observed by the Report on the Working of the Income Tax Act, 1914, as follows:- "The exemption of annual value of houses occupied as residences by the owners, adopted by the House of Assembly last year, results in an anomaly which existed under the law in the Cape Colony prior to Union. ... Under the law as passed, an individual investing capital in the purchase of his dwelling house and hiring business premises, pays no rent for his house; and his taxable income, and consequently the tax payable by him, is less than it would be if he invested the same amount of capital in acquiring business premises, and paid rent for his dwelling house."
   U. G. No. 29-1915, Report on the Working of the Income Tax Act, 1914, for the Year ended 30th June, 1915, p. 6.
   G. J. Trotter reports that the trend works in the direction of excluding the imputed rental value of owner-occupied houses from taxable income. He cites the case of Britain where this "practice has now been abandoned altogether."
   G. J. Trotter, "Personal Income Tax", The South African Journal of Economics, Vol. 37, 1969, p. 317.

Income tax statistics will show A and B in the same income group, although A commands a higher real income than B. This failure of the income tax law to include imputed rent on owner-occupied houses, in the definition of taxable income, will therefore distort the measure of income inequality to a certain extent. It is difficult precisely to assess the size and direction of this distortion. If Schwabe's Law is representative for South Africa, then it can be suggested that with increasing incomes people spend an increasing absolute amount of money but a decreasing relative proportion of their incomes on housing rentals.[1]

6.6.6 Deductions

Deductions are subtracted from 'income' in order to establish the value of the 'taxable income'.[2] Broadly, deductions consist of expenses laid out in the production of income, such as costs of goods sold, wages, rents, repair costs, and wear and tear allowances. An assessed loss is regarded as a deduction in the ensuing year. Expenses of a capital nature, such as money spent on the purchase of new premises do not constitute an allowable deduction.[3]

The deduction formula of South Africa's Income Tax Act is narrow and restrictive. The law has therefore occasionally been described as being inconsistent with "ordinary commercial and accountancy principles."[4] This is mainly occasioned by the fact that the taxable income concept is not identical with the concept of profit, as established according to sound commercial rules.

Expenditures are deductible only if they are not of a capital nature and if they have actually been incurred in the production of income.[5] These conditions make the definition of taxable income somewhat more comprehensive than the definition of income according to national accounting principles. Examples of such non-deductible expenditures are outlays on vacant property (rates, interest); expenses incurred to

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1. Compare Heinrich von Stackelberg, Grundlagen der Theoretischen Volkswirtschaftslehre, 2. Auflage, J. C. B. Mohr (Paul Siebeck) Tübingen 1961, p. 158.
2. See deduction formula, p. 75 above.
3. A comprehensive list of deductions allowed and of those forbidden is given by Walter J. Barnes, Income Tax Handbook 3rd Ed., (revised), The Natal Witness, Pietermaritzburg, 1933, pp. 88-92.
4. A. S. Silke, Tax Avoidance and Tax Reduction, ibid., p. iii.
5. Compare for instance Act No. 41 of 1917, Sec. 17 (1).

avoid or reduce deductible expenditures (legal fees); or expenditure incurred in one year the income to which will accrue only in some later year. Until 1959 no wear-and-tear allowance was granted in respect of industrial buildings, although "prudent accounting procedure dictates that allowance for the depreciation of industrial buildings should be made ..." [1]

Agreement between the concepts of taxable income and personal income (as based on the national accounting definition) exists, however, as far as the negative test for deductions is concerned. Sec. 21 (1) of Act No. 41 of 1917 enacted that no deduction should be made in respect of the following matters:-

(a) the cost incurred in the maintenance of any taxpayer, his family, or establishment;
(b) domestic or private expenses;
(c) any loss or expense which is recoverable under any insurance contract or indemnity;
(d) normal tax, super tax, and dividend tax;
(e) income carried to any reserve fund or capitalized in any way.

It would seem as if the somewhat narrow and restricted deduction formula of the South African income tax legislation results in the assessed taxable incomes being somewhat higher than would be the case, had ordinary accounting principles been applied in the determination of taxable income. The magnitude of the deviation is, however, certainly not substantial. There is also no evidence to suggest that the deduction formula would introduce a bias into the income tax statistics, in favour of or against particular income groups.

6.6.7 Abatements and Rebates

Until the year 1940, the marital status and other domestic responsibilities of the taxpayer were taken into account through a concession in terms of taxable income, called abatement.

Fortunately the Commissioner of Inland Revenue tabulated the value of assessed taxable income prior to the deduction of abatements in his annual reports. After the introduction of rebates in 1941 the unreduced tabulation of assessed taxable incomes was, of course, self-evident.

1. A. S. Silke, Tax Avoidance and Tax Reduction, ibid., para. 149, p. 291.

TABLE XXIV: Normal Tax: Primary and Secondary Abatements and Reduction Formulae, 1914-40. All Values in £.

	1914	1915	1916	1917	1918	1919	1920	1921	1922	1923	1924	1925	1926	1927	1928	1929	1930	1931	1932	1933	1934	1935	1936	1937	1938	1939	1940
Primary Abatement for Married Persons	1000	300	300	300	300	300	500	300	300	300	300	300	400	400	400	400	400	300	300	300	400	400	400	400	400	400	400
Primary Abatement for Single Persons	1000	300	300	300	300	300	500	300	300	300	300	300	300	300	300	300	300	300	300	300	400	400	400	400	400	400	400
Secondary Abatements: Insurance Premiums	-	25	25	25	25	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50
Fees to Friendly Societies	-	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10
Children under 16 Years of Age	-	20	20																								
Children under 17 Years of Age				30	30																						
Children under 18 Years of Age						30	30	50	50	50	50	60	60	60	60												
Unmarried children under 21 years of age																75	75	75	75	75	75	100	100	100	100	100	100
Dependants			20	20	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30

Schedule of Reduction Formulae

1. Primary Abatements, Married Persons.

   1914-1920 Full amount deductible for incomes lower than £24,300.
   1921-1940 Full amount deductible for incomes lower than £600. The amount deductible decreases by £1 for every £10 for incomes exceeding £600.

2. Primary Abatements, Single Persons.

   1914-1916 Full amount deductible for incomes lower than £24,300.
   1917-1933 The amount deductible diminishes by £1 for every £1 by which the abatement exceeds £300.
   1934-1940 The amount deductible diminishes by £1 for every £1 by which the abatement exceeds £400.

3. Secondary Abatements

   1915 Full amount deductible for incomes smaller than £500.
   1916-1920 Abatement diminishes by the amount by which the income exceeds £600.
   1921-1940 The abatement granted is reduced in the case of

   (i) married taxpayers by £1 for every completed £10 by which the taxable income exceeds £600.

   (ii) single taxpayers by £1 for every £1 by which the taxable income exceeds £300 (1921-1933) or £400 (1934-1940), respectively.

Abatements consisted of primary abatements, which were granted in respect of the marital status and secondary abatements granted for insurance premiums, fees to friendly societies, children and dependants. With increasing income, the size of abatements was reduced according to a certain formula.

The value of the primary abatement constituted, at the same time, the limit value of the tax liability. The income of a person who, during any tax year earned less than the value of the primary abatement would not have been tabulated in the annual report, unless such income was earned during a portion of the tax year only.[1]

The secondary abatement, on the other hand, distorted the true income pattern of taxpayers, insofar as an unknown number of persons, who earned incomes higher than the minimum taxable income, were not liable to tax because of the secondary abatements to which they were entitled. Those persons who earned higher incomes than the minimum taxable income were not included in the tabulations of the Commissioner of Inland Revenue.

Table XXIV lists the primary and secondary abatements in force between 1914 and 1940 (See p. 86 above).[2]

The adjustment of the tabulated statistics for secondary abatements will be undertaken in the ensuing paragraphs.

6.7 Adjustment of Income Tax Statistics

6.7.1 Treatment of the Recipient Unit

In South Africa, a husband and wife are jointly assessed when both persons earn an income.[3] This makes the treatment of

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1. Where the tax period was less than a year the abatement was proportionately reduced.
2. Sources: Income Tax Act, 1914-1940.
3. The South African Income Tax Act defines a taxpayer as "every person required by this Act to furnish such return." (Act No. 28 of 1914, Sec. 49). In the case of a married couple the two persons are treated as one income unit: "The income of a woman married with or without community of property and not separated from her husband under a judicial order or written agreement shall, for the purposes of this Act, be deemed to be income accrued to her husband and shall be included by him in returns of income..." (Act No. 28 of 1914, Sec. 11).

the income recipient unit difficult and Frankel and Herzfeld commented that "if we take an ordinary case of a family with both parents earning incomes, one child earning a small wage and one dependent child, we arrive at the following classification: 4 persons; 3 income earners; 2 'incomes' according to the definition of the income-tax authorities, and 1 family unit." (See Footnotes 1 and 2).

With effect of the tax year ended 30th June, 1920, the Commissioner of Inland Revenue has reported the statement of assessments on normal tax, separately for married and unmarried taxpayers.[3] The same was done for super tax as from the tax year ended 30th June, 1945. Before that year supertaxable incomes were simply classified by "number of taxpayers".

The term 'number of taxpayers' referred clearly, not to the number of individuals,[4] but to the total number of married and unmarried taxpayers, because no provision was made in the South African income tax legislation for a different treatment of married and unmarried persons, as far as the assessment of super tax was concerned.

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1. S. H. Frankel and H. Herzfeld, European Income Distribution..., ibid., p. 127, 8.

2. It is noteworthy that neither R. Leslie nor J. de V. Graaff, who used statistics on supertaxable incomes for the calculation of income distribution, discussed the nature of the data they used in respect of the marital status of the taxpayer. Instead, they treated the aggregate of married and unmarried persons, which they found in the annual reports of the Department of Inland Revenue, as one economic unit. R. Leslie, Various Notes and Memoranda in the South African Journal of Economics, ibid. J. de V. Graaff, Fluctuations in Income Concentration, ibid.

3. A certain error is introduced into the statistics if two taxpayers marry during the tax year. In reference to this question we are informed by the Department for Inland Revenue that "an assessment would be issued to the female in respect of the period (say) 1st March, 1968 to date of marriage. The assessment issued to the husband would be in respect of their combined income, i. e., his income for the full income tax year 1st March, 1968 to 28th February, 1969, and his wife's income for the period 'date of marriage' to 28th February, 1969." Letter received from Miss E. M. Teggins, Department of Inland Revenue, Pretoria, dated 22nd December, 1969.

4. The concept "individuals" which is used in the headline of the tabulations does not refer to the family status of the taxpayer. It is clearly used as a distinction from the concept "companies". Compare U. G. No. 27-1944, p. 28, Statement XXXVI, Super Tax, Individuals and Companies.

Basically, there are two options in solving the relevant implications. Tax returns can either be converted into size distributions for natural persons or for units of taxpayers. The first method has frequently been used in the U.S.A., where husband and wife have an option to submit either joint or separate returns.[1]

The nature and presentation of South African data on income tax assessments allows neither for the conversion of income receivers into natural persons, nor into families. To convert the joint income of a married couple into two separate incomes is impossible, because we do not know in what proportion the two different persons contributed to the joint income. The conversion of the tabulated information into family units is likewise not feasible, because the South African income tax legislation regards bona fide income paid to a minor child as an income in its own right.[2]

In view of the aspects mentioned above it was decided to add together the numbers of married and single income taxpayers, and to treat this artificially defined "unit of taxpayer" as an economically significant unit. The income recipient unit so defined would be identical with that of a household if (i) no minor children earned incomes in their own rights and (ii) all taxpayers who were singly assessed had individual households.

It is unlikely that prior to 1951, there has been any substantial number of minor children earning taxable incomes in their own rights. This can be submitted, firstly, because the primary abatement for single persons was £300 in the earlier years, and increased to £400 as from 1933. Only a few minor persons are likely to have earned incomes of this size. Secondly, there was a clear tendency for male persons under the age of 20 to join the working force

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1. Frank A. Hanna, Joseph A. Pechman, and Sidney M. Lerner, Income Received in Wisconsin, 1936, in: Analysis of Wisconsin Income, Conference on Research in Income and Wealth, Vol. 9, National Bureau of Economic Research, New York, 1948, p. 20. Selma F. Goldsmith, Appraisal of Basic Data Available for Constructing Income Size Distributions, in: Studies in Income and Wealth, National Bureau of Economic Research, The Riverside Press, New York, Cambridge, 1951, pp. 272 and 314.

2. A minor child is a natural person under the age of 21.

successively at higher ages during the 1920s and 1930s.[1]

Whether or not persons who were assessed as single individuals had households in their own rights, is difficult to assess. It can be suggested, however, that the financial independency which was achieved once an income was falling under the tax liability, will have furthered the establishment of individual households.

To the extent that the above considered conditions were valid, the "unit of taxpayer" was identical with the concept of a household.

6.7.2 Treatment of Arrear Tax Assessments

Until 1946 the Commissioner of Inland Revenue regularly published data on tax assessments after 1 year of compilation. Data on tax assessments for the year which ended, say, 30th June, 1930, were collated up to 30th June, 1931, and then subsequently published. This practice resulted in under-reporting gaining considerable proportions during and immediately after the World War II period[2] and D.G. Franzsen observed in 1948 that "in practice ... there is an enormous discrepancy between the number of returns sent out to liable persons, and the number of taxpayers whose incomes are actually assessed in the given income tax year. ... Naturally no use can be made of the figures of any income tax year unless the investigator has the assurance that the figures represent the true income situation of the statistical universe."[3] (See Footnotes 3 and 4)

1. During the 30 year period 1926-1946, the male working sector as a ratio of the total male working population dropped considerably. In 1926, 71 per cent of the seventeen years old male population was in work employment. This dropped to 65 per cent in 1936 and 57 per cent in 1946. This development was occasioned by the fact that schools had a greater retaining power over pupils in later years. Sources: Years 1926 and 1936: - U.G. 11-1942, Population Census 5th May, 1936, Occupations and Industries of the European, Asiatic and Coloured Population, p. ix.
   1946: -U.G. 41-1954, Population Census 7th May, 1946, Vol. V, Table 1, p. 12.
2. The size of arrear taxes was a point of frequent debate in Parliament during the early fifties. In 1951 N.C. Havenga, was urged to admit: "For a number of years...there was no relation between the income-tax becoming payable during the year and the amount for which provision was made in the Budget. It was necessary, during that time, for one to ask, not how much was owing to the State, but how much could be collected." Union of South Africa, Debates of the House of Assembly, (Hansard), Fourth Session, Tenth Parliament, 19th January to 22nd June, 1951, Vol. 75, Col. 4019.
3. D.G. Franzsen, Some Methodological Problems..., ibid., p. 159.
4. Mention of this point was already made by M.H. de Kock, An Analysis of the Finances ..., ibid., p. 2.

TABLE XXV: Number of Assessments and Value of Assessed Tax: Normal and Super Tax; Grand Totals and Data After 1 Year of Compilation; £ thousands, 1914-1951

	NORMAL TAX						SUPER TAX					
	Grand Total		1 yr. Compilation				Grand Total		1 yr. Compilation			
Year	Numbers of Assess.	Tax Assessed	Numbers of Assess.	Tax Assessed	Col. 4 % Col. 2	Col. 5 % Col. 3	Numbers of Assess.	Tax Assessed	Numbers of Assess.	Tax Assess-ed	Col. 10 % Col. 8	Col. 11 % Col. 9
Col. 1	Col. 2	Col. 3	Col. 4	Col. 5	Col. 6	Col. 7	Col. 8	Col. 9	Col. 10	Col. 11	Col. 12	Col. 13
1914	5,542	178	5,140	167	92.7	93.8	--	--	--	--	--	--
1915	44,127	843	39,712	787	90.0	93.4	--	--	--	--	--	--
1916	47,183	1,031	40,175	926	85.1	89.8	1,140	336	1,006	314	88.2	93.5
1917	53,618	1,348	48,245	1,213	90.0	90.0	1,663	572	1,523	482	91.6	84.3
1918	66,209	1,806	57,869	1,564	87.4	86.6	2,218	847	1,952	730	88.0	86.2
1919	79,560	1,924	71,227	1,654	89.5	86.0	2,383	709	2,034	606	85.4	85.5
1920	62,990	2,175	53,595	1,773	85.1	81.5	3,346	991	2,694	789	80.5	79.6
1921	106,647	2,132	96,453	1,913	90.4	89.7	2,515	1,080	2,231	1,009	88.7	93.4
1922	82,472	1,620	76,768	1,516	93.1	93.6	1,929	787	1,828	746	94.8	94.8
1923	81,770	1,645	78,300	1,562	95.8	95.0	2,025	785	1,954	744	96.5	94.8
1924	88,644	1,833	84,273	1,754	95.1	95.7	2,433	1,036	2,344	1,023	96.3	98.7
1925	88,790	1,924	85,729	1,859	96.6	96.6	2,649	1,146	2,554	1,166	96.4	101.7
1926	69,903	1,825	66,264	1,736	94.8	95.1	2,947	1,205	2,795	1,171	94.8	97.2
1927	71,734	1,915	67,432	1,790	94.0	93.5	3,117	1,313	2,991	1,223	95.6	93.1
1928	76,974	1,691	72,508	1,584	94.2	93.7	3,503	1,324	3,318	1,283	94.7	96.9
1929	71,137	1,593	66,699	1,479	93.8	92.8	3,494	1,456	3,360	1,359	96.2	93.3
1930	68,474	1,751	65,993	1,658	96.4	94.6	3,067	1,214	2,985	1,104	97.3	90.3
1931	85,787	1,746	82,716	1,675	96.4	95.9	2,557	898	2,506	882	98.0	98.2
1932	74,280	1,430	71,586	1,372	96.4	95.9	1,961	660	1,906	630	97.2	95.5
1933	69,807	1,516	68,048	1,469	97.5	96.9	2,142	965	2,080	925	97.1	95.9
1934	47,917	1,326	46,460	1,275	96.9	96.2	2,986	1,631	2,902	1,578	97.2	96.8
1935	50,661	1,166	48,538	1,097	95.8	94.1	3,421	1,603	3,275	1,469	95.7	91.6
1936	59,466	1,394	57,318	1,316	96.4	94.4	4,161	1,898	3,947	1,812	94.9	95.5
1937	69,152	1,664	65,167	1,543	94.2	92.7	4,945	2,284	4,658	2,122	94.2	92.9
1938	73,724	1,786	67,825	1,642	92.0	91.9	4,637	1,903	4,377	1,805	94.4	94.9
1939	77,549	1,605	73,072	1,465	94.2	91.3	4,583	1,849	4,278	1,705	93.3	92.2
1940	81,606	2,846	76,245	2,575	93.4	90.5	4,751	2,325	4,389	2,157	92.4	92.8
1941	158,192	6,000	135,681	4,687	85.8	78.1	9,408	5,745	7,089	4,281	75.4	74.5
1942	192,381	7,170	161,182	5,440	83.8	75.9	11,339	6,264	8,161	4,399	72.0	70.2
1943	214,805	9,325	172,587	6,683	80.3	71.7	13,598	7,332	9,009	4,899	66.3	66.8
1944	242,130	10,611	172,039	6,555	71.1	61.8	19,299	8,619	11,146	4,944	57.8	57.4
1945	269,620	11,568	156,435	6,011	58.0	52.0	20,462	8,997		4,591		51.0
1946	317,571	15,726	178,218	7,284	56.1	46.3	25,292	15,244		6,163		40.4
1947	332,331	18,387	189,473	9,101	57.0	49.5	29,588	20,546		9,060		44.1
1948	267,675	14,022	131,977	6,024	49.3	43.0	33,692	17,202		6,805		39.6
1949	315,141	17,909	159,444	7,760	50.6	43.3	37,540	19,713		8,041		40.8
1950	336,090	18,118	162,395	7,666	48.3	42.3	37,967	19,143		7,440		38.9
1951	395,210	25,638	191,574	10,941	48.5	42.7	48,657	28,309		11,435		40.4

A tabulation of the Number of Assessments Issued and Net Value of Tax Assessed Under Each Annual Act From the First Imposition of Union Income Tax which was regularly published by the Commissioner of Inland Revenue until 1957/8[1] allows to gauge the extent of the arrear number of assessments and the arrear value of tax assessed under each income tax act since Union.

Table XXV shows the grand total of the number of assessments and the value of assessed tax from 1914 to 1951 together with the number of tax assessments and the value of assessed tax after 1 year of compilation in respect of both normal and super tax.[2]

The problem which now had to be solved was the expansion of the published distribution of taxable income data, so as to include income parts which were assessed in arrear. Since the Commissioner of Inland Revenue did not, in his annual reports, indicate the amount of taxable income assessed in arrear for previous tax years, an estimate of this value was calculated by using the published figures for the tax yield (in pence) per 1 £ of taxable income. The difference between the grand total of tax assessed and the value of tax reported after 1 year of compilation[3] was then multiplied by 240 and divided by the tax yield in pence. The result showed the additional taxable income actually attributable to a particular tax year but assessed during subsequent years.[4] For the years 1924-1951, both in respect of normal and super tax, the necessary calculations were done on the Rhodes University Computer.

6.7.3 Distribution of Arrear Assessed Taxable Incomes by Income Groups

An examination of columns 6 and 7 of Table XXV reveals that, for normal tax assessments, the lower income groups which

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1. U.G. No. 10-1960, Statement 28.
2. Sources to Table XXV: (p. 91 above):
   Columns 2, 3, 8, 9,
   Years 1914-1948: U.G.No. 10-1960, St. 28, Compilation to 30.6.1958;
   " 1949-1950: U.G.No. 71-1960, St. 21, Compilation to 30.6.1959;
   " 1951- U.G.No. 28-1961, St. 21, Compilation to 30.6.1961.
   Columns 4, 5, 10, 11,
   Annual Reports of the Commissioner for Inland Revenue. Since 1920 tax assessments made in respect of single and married persons have been added.
   For the years 1945 to 1951 the number of assessments after 1 year of compilation cannot be established because the tabulated "Number of Taxpayers Receiving Public Company Dividends" need not be identical with the number of super-tax assessments.
   Compare for instance U.G. No. 26-1947, St. XXVIII.
3. In the case of the years 1945 and 1950, the compilation was also reported after 2 and sometimes even after 3 years.
4. This follows a proposal made by D.G. Franzsen, Some Methodological Problems ..., ibid., p. 159.

were assessed on a relatively low marginal tax rate tended to be assessed prior to those income groups which fell under high marginal tax rates For the year 1944 for instance, 71.1 per cent of the final number of normal tax assessments were actually assessed after 1 year of compilation. These assessments were, however, only responsible for 61.8 per cent of the final value of tax assessed. This means that 28.9 per cent of the final number of tax assessments which were assessed only after the first year of compilation, turned out to have been responsible for 38.2 per cent of the final value of tax assessed. It follows from this that the Department of Inland Revenue assessed predominantly low income earners during the first year of assessment. [1]

In spite of the conclusions considered above it was decided to program the adjustment for arrear assessments for all years, on the assumption that the completion of the assessments during the remaining years was linear through time. This approach had to be taken because we do not know anything about the skewness of the distribution of arrear assessments by income groups, for most of the years considered. The method chosen contains a certain bias in favour of a more equal distribution of incomes.

6.7.4 Treatment of Persons Who Are Assessed But Who Are Not Liable to Pay Tax

Until the year 1945 the Commissioner of Inland Revenue published statistics only in respect of the taxable income of individuals who had been assessed to pay tax. The assessments

1. The writer was informed about this aspect by Dr Groenewald, Head of the Economics Department of the S.A. Reserve Bank, Pretoria, in a letter dated 21st November, 1968, as follows:- "I have ascertained from the Receiver that an attempt was made years ago, particularly when Super-tax was still in force, to deal with the assessments in the way you surmise. The attempt, however, was not successful owing to the fact that the available staff could not cope effectively with the somewhat complicated instructions for sorting. The scheme was therefore abandoned. The Receiver has expressed the opinion that the difference between the averages based on original and arrear assessments respectively may be considered negligible for practical purposes." J. de V. Graaff surmises exactly the same: "... It is unlikely that the (fairly complete) sample given is biased in favour of the exclusion of incomes of any particular size." J. de V. Graaff, Fluctuations in Income Concentration..., ibid., p. 28. Nonetheless, the facts suggest that the Department of Inland Revenue assessed the relatively unprofitable tax returns first. If the Department did not undertake any prior sorting (as Dr Groenewald suggests), this must probably be accounted for by the fact that tax assessments referring to high income groups went under appeal more frequently than assessments belonging to low income groups. This would result in a certain delay in assessing the material.

made in respect of persons who earned incomes higher than the primary abatements, but who were exempted from the payment of income tax because of the secondary abatements to which they were entitled, were not included in the annual reports. The Memorandum for Technical Comment on Social and Economic Statistics in the Union pointed out for instance that "in respect of the income tax year ending 30th June, 1941, more than 200,000 forms were issued to individuals. Of this number less than 60,000 were liable for income tax."[1]

A substantial improvement of the situation was effected only when the income of persons not liable to Union Income Tax were tabulated. This was done for the years 1946-1949 under categories "according to amounts of income subject to super tax",[2] and for the years 1950 and 1951 under categories "according to amounts of taxable income for provincial tax purposes."[3]

For the years 1920-1940 it was possible to estimate, on a year-to-year basis, the number of persons and their incomes, who did not appear in the tabulations of assessed incomes because of the secondary abatements to which they were entitled.

Quantitatively, the most important secondary abatement was that granted in respect of children.[4] For the estimation of the number of persons who did not pay income tax because they were entitled to claim abatements for children, we followed a method which was suggested by S. H. Frankel and H. Herzfeld.[5] Using data on nuptial fertilities, Frankel and Herzfeld called p_o, p_1, p_2 ... the proportionate ratio of married couples with o, 1, 2 ... children to that of all married couples. After having eliminated children over 21 years of age they arrived at the following Tables of 'Nuptial Fertility' for 1926 and 1939/40, showing the frequency of married couples (in percentages) according to the number of children per couple from 0 to 5 children.[6]

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1. Memorandum and Annexures on Social and Economic Statistics in the Union, ibid., para. 5, p. 46. See also para. 24, p. 54. Compare also final Report, U.G. 35-1944, ibid., Ann. I V, p. 15 ff.
2. UG No. 27-1948, pp. 63-66 for the tax year 1946;
   UG No. 23-1949, pp. 60-63 " " " " 1947;
   UG No. 35-1950, pp. 65-68 " " " " 1948;
   UG No. 47-1951, pp. 70-73 " " " " 1949;
3. UG No. 68-1951, Statement 48, " " " 1950;
   UG No. 67-1952, " 48, " " " 1951.
4. Compare Table XXI V above.
5. S. H. Frankel and H. Herzfeld, European Income Distribution ..., ibid., particularly pp. 130-6.
6. ibid., p. 131.

TABLE XXVI a : Percentage of Married Couples with $p_o, \ldots, p_5$ Children Under 21 Years of Age, Frankel and Herzfeld Estimate

	1926 (adjusted)		1939/40	
	%	cumulated %	%	cumulated %
p_o	34	34	37.4	37.4
p_1	17	51	20.5	57.9
p_2	17	68	19.2	77.1
p_3	12	80	12.3	89.4
p_4	8	88	5.5	94.9
p_5	5	93	2.05	96.95

We used the 1926 data until the tax year 1928. From 1929 onwards the 1939/40 figures were relied upon, because as from 1929, parents were entitled to claim abatements for children up to the age of 21 years. Formerly the age limit had been 18 years.

The calculation of the number of persons who did not appear in the tabulations because of the assessments to which they were entitled, was extended back to 1919/20. Prior to that year no adjustments were feasible, because the Department of Inland Revenue did not then separately tabulate income data for married and unmarried taxpayers.

6.7.5 Adjustment of Data for the Years 1920 to 1940

Frankel and Herzfeld called A_r the total number of married couples in the income group between £$_r$ and £$_{(r+100)}$ and N_r the corresponding number of married income taxpayers. N_r is smaller than A_r because of the abatements for children to which taxpayers are entitled. If, as was the case in 1939/40, the lowest taxable income was £400 and the abatement granted per child £100, then the total number of married couples in the income group £400-500, i.e., A_{400}, was equal to $\frac{N_{400}}{p_o}$.

This is so because the complement of p_o to 100 per cent, i.e., 100 - 37.4 = 62.6 per cent, was the percentage of families who had 1 child or more than 1 child in 1939/40. This percentage of families would therefore not have been liable to pay any income tax if their incomes had been between £400-500 during the year under discussion. One could also say that N_{400} consisted of only

p_o per cent of the total number of married couples in the respective income bracket, i.e., A_{400}.

In the ensuing income tax bracket, only such persons who had no or one child became liable to pay tax. The real number of married income receivers in that income range is therefore established by the equation

$$A_{500} = \frac{N_{500}}{p_o + p_1} .$$

The calculation of higher A-values was done according to the same method.

Prior to 1935 the abatement granted per child was smaller than £100, i.e., £30 for the years 1917-20, £50 for 1921-24, £60 for 1925-28, and £75 for 1929-34.[1] The ranges for which incomes were adjusted had to be correspondingly smaller during those years.

Besides abatements for children, the South African income tax legislation granted abatements in respect of contributions paid to Friendly and Benefit Societies, insurance premiums, and dependants. Frankel and Herzfeld discarded the two former types of abatements in their calculations because "the actual payment made ... can certainly only be small in the income groups just above the tax limit, as a man with an income of say £450 can probably not afford to pay more than £15 to £20 for insurance premiums."[2]

A test of this assertion revealed that it was not substantiated by the available data.[3] It was therefore decided to take all types of secondary abatements into account when the adjustment of income tax data for lower income groups was made.

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1. Compare Table XXI V above.
2. S.H. Frankel and H. Herzfeld, European Income Distribution ..., ibid., p. 132.
3. From a tabulation entitled: "Normal Tax: Classification Under Categories of (Gross) Abatements" (which has been supplied by the Commissioner of Inland Revenue since 1926), it was found that in respect of, for example, the tax year ended 30th June, 1932, the gross abatements granted to single individuals who were grouped in the £301-400 income bracket was £109,298 for insurance premiums.* On the assumption that the maximum allowable abatement of £50 was claimed in respect of each individual contract, 2,186 persons or 24.2 per cent of the total number of 9,047 single taxpayers in the £301-400 income group, had claimed the abatement for insurance premiums. An analogous calculation revealed that 32.4 per cent of the total number of married persons who were grouped in the £301-600 income group were in possession of insurance contracts. For the same year and the same income group it was found that 28.4 per cent of single and 14.4 per cent of married taxpayers supported one dependant on average.
   * UG 4-1934, pp. 28, 9.

As an example, the adjustments undertaken in respect of married taxpayers for the tax year 1932, will be explained below.

The distribution of married taxpayers by the seven lowest income ranges served as a point of departure. The distribution as shown in Table XXVI b refers to the situation after adjustment for arrear assessments.

TABLE XXVI b : Distribution of Married Taxpayers by Seven Lower Income Groups, Tax Year 1932. £100 Income Ranges

Income Group	Number of Married Taxpayers
£ 301- 400	9933
401- 500	13071
501- 600	9951
601- 700	6452
701- 800	4081
801- 900	2824
901-1000	1944

These data had to be re-grouped into income intervals of £75, because this was the abatement granted in respect of 1 child during 1932.[1] The re-grouped data are shown in Table XXVI c.[2]

TABLE XXVI c : Distribution of Married Taxpayers by Lower Income Groups, Tax Year 1932, £75 Income Range

Income groups, £75 intervals	Number of Married Taxpayers
£ 301-375	7450
376-450	9019
451-525	9024
526-600	7463
601-675	4839
676-750	3654
750-825	2746

As was indicated above, 32.4 per cent of married taxpayers of the income group £301-600, claimed a £50 abatement for insurance

1. Compare Table XXIV above.
2. In order, for instance, to establish the population of the income group £376-450, one-quarter of the number of persons in the income group £301-400, and one-half of the number in the income group £401-500, were added.

premiums and 14.4 per cent a £30 abatement for one dependant. In order to make these claims comparable with the abatements granted in respect of children it was necessary to convert them into £75 claims. As a result of the conversion it was found that 27.4 per cent of the married taxpayers in the income group £301-600, claimed an abatement of £75 in respect of insurance premiums and dependants.[1]

In order to perform the adjustment for abatements granted in respect of insurance premiums and dependants, 27.4 per cent of the married taxpayers who were found in the seven lower income groups were shifted into the respective income ranges immediately below. By this operation the taxpayers were transferred into that income group they would have been in, had they not been entitled to claim secondary abatements for dependants and insurance premiums. Table XXVI d shows the adjustment.

TABLE XXVI d : Distribution of Married Taxpayers by Lower Income Groups, after Adjustment for Insurance and Abatements

Income group £	Number of taxpayers[2]	Shift of 27.4 per cent of the number of taxpayers into the income group immediately below		Number of taxpayers, adjusted
301-375	7,450		+2,471	9,921
376-450	9,019	-2,471	+2,473	9,021
451-525	9,024	-2,473	+2,045	8,596
526-600	7,463	-2,045	+1,326	6,744
601-675	4,839	-1,326	+1,001	4,514
676-750	3,654	-1,001	+ 752	3,405
751-825	2,746	- 752		irrelevant

After this operation the adjustment for abatements granted in respect of children was undertaken. For this, the number of taxpayers was divided by the cumulated percentage of the relative nuptial fertility,[3] according to a method explained earlier.

1. The conversion for the insurance abatement is
$$\frac{32.4 \cdot 50}{75} = 21.6,$$
and for dependants, $\frac{14.4 \cdot 30}{75} = 5.8.$
2. Compare Table XXVI c above.
3. Compare Table XXVI a above.

TABLE XXVI e: Married Persons, 1932: Adjustment for Abatements Granted in Respect of Children

Income group	Number of taxpayers, after adjustment for abatements re ins. and dep.	Cumulated nuptial fertility: p_o p_o+p_1 etc.	Total number of incomes	Average income £	Total value of income thousand Pounds
£301-375	9921	37.4	26527	337.50	8,953
376-450	9021	57.9	15580	412.50	6,427
451-525	8596	77.1	11149	487.50	5,435
526-600	6744	89.4	7544	562.50	4.244
601-675	4514	94.9	4757	637.50	3,033
675-750	3405	96.95	3512	712.50	2,502

Columns 1, 4, and 6 of Table XXVI e show the final result of the adjustments. The calculations so obtained were used as substitutes for the original tabulation of income tax data, as given in the annual reports of the Department of Inland Revenue, after adjustments for arrear assessments. The calculations were undertaken (separately for married and single taxpayers) for all years from 1920 to 1940.[1]

As far as single taxpayers were concerned, notice had to be taken of the fact that abatements to which single taxpayers qualified were reduced by 1 £ for every 1 £ by which the taxable income exceeded £300.[2] For married taxpayers the reduction formula was not taken into account, because reductions came into effect only when incomes exceeded £600 and because the reduction itself was slight, constituting only 1 £ for every completed 10 £ of income.

6.8 Combination of Normal and Super Tax Data

There are three ways in which South African income tax data can be used for purposes of estimating a size distribution of income, viz.,

1. The rebate formula which was introduced as from 1940 does not allow a similar adjustment to be made. This explains the large discrepancies between the 1951 PIC and the corresponding income tax figures, in respect of income ranges lower than £800. Compare Table IV, p. 20 above.
2. Compare Table IX above.

(i) Use can be made of supertaxable income data only. In this case the analysis is confined to upper income groups, but the advantage is that the income concept is theoretically faultless, because it includes income received in the form of public company dividends.

(ii) The analysis can be confined to normal income tax data. The advantage of this method is that the important lower income groups are taken into account. The disadvantage to be held against this is that public company dividends are excluded from liability to normal tax.

(iii) An attempt can be made to combine super and normal tax income data. Naturally this solution is superior to both (i) and (ii) above, because of its comprehensiveness. The unavoidable negative feature of this approach, is that the distribution of public company dividends for income groups lower than the limit at which super tax was payable, and for years prior to 1945, has to be based on estimates.

In what follows a method will be described which was used with regard to a combination of normal and super tax income data.

6.8.1 The Statistical Amalgamation of Normal and Super Tax Data

We are fortunate in possessing for the years 1945 to 1951 data on taxpayers who received public company dividends, and whose normal taxable income extended downward to as low as £300-399. The availability of this distribution of public company dividends over low income groups is presented twofold, viz., under categories of income subject to normal and to super tax. For the present analysis the former type of tabulation was used.[1]

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1. The following sources were used:

1945:	UG No. 27-1948,	St.	XXXVIII,	compiled to	30th	June,	1947
1946:	UG No. 23-1949,	St.	XXXVIII,	"	"	"	"	1948
1947:	UG No. 47-1951,	St.	XLI,	"	"	"	"	1950
1948:	UG No. 47-1951,	St.	XXXVII,	"	"	"	"	1950
1949:	UG No. 67-1952,	St.	31,	"	"	"	"	1952
1950:	UG No. 67-1952,	St.	29,	"	"	"	"	1952
1951:	UG No. 67-1952,	St.	27,	"	"	"	"	1952.

TABLE XXVII: Number of Persons Assessed and Value of Assessed Income, Normal and Super Tax, Income Groups Liable to Super Tax Only, Arrear Assessments Included, 1920 - 1951, Assessments of Married and Single Persons Added.

Tax Year	Super Tax Liability Limit	Number of Assessments			Value of Tax Assessed, £1,000[e]		
		Super Tax	Normal Tax	Col. 1 as per cent of Col. 2	Super Tax	Normal Tax	Col. 4 as per cent of Col. 5
	£	Col. 1	Col. 2	Col. 3	Col. 4	Col. 5	Col. 6
1920	2,500	3,346	2,668	125.4	17,973	13,982	128.5
1921	"	2,515	1,972	127.5	11,675	8,826	132.3
1922	"	1,929	1,528	126.3	9,059	6,479	139.8
1923	"	2,025	1,582	128.0	9,451	6,794	139.1
1924	"	2,433	1,903	127.9	11,384	8,132	140.0
1925	"	2,649	2,027	130.7	12,284	8,884	138.3
1926	"	2,947	2,336	126.2	13,627	10,087	135.1
1927	"	3,117	2,509	124.2	15,143	10,909	138.8
1928	"	3,503	2,862	122.4	15,787	12,359	127.7
1929	"	3,494	2,829	123.5	16,824	12,264	137.2
1930	"	3,067	2,362	129.8	14,911	10,008	149.0
1931	"	2,557	1,919	133.2	11,364	7,896	143.9
1932	"	1,961	1,521	128.9	8.711	6,198	140.6
1933	"	2,142	1,657	129.3	10,486	7,799	134.5
1934	"	2,986	2,310	129.3	15,639	11,590	134.9
1935	"	3,421	2,575	132.9	17,359	11,578	149.9
1936	"	4,161	3,178	130.9	20,331	14,405	141.1
1937	"	4,945	3,847	128.5	24,634	17,611	139.9
1938	"	4,637	3,656	126.8	21,837	15,337	142.4
1939	"	4,583	3,446	133.0	21,665	13,845	156.5
1940	"	4,742	3,477	136.4	22,265	13,880	160.4
1941	2,000	9,290	7,171	129.5	42,328	34,440	122.9
1942	"	11,195	8,607	130.1	48,014	31,528	152.3
1943	"	13,382	10,108	132.4	54,515	33,825	161.2
1944	1,775	19,020	11,116	171.1	68,130	49,617	137.3
1945-51	"	data not available			546,764[1)]	508,588	107.5

1) For incomes higher than £ 2,500.

As has been explained earlier,[1] the main shortcoming of the 1945-1951 tax data was that the number of super tax assessments was not tabulated according to ranges of incomes. The analysis had therefore to rely solely on the tabulation of different income types by income groups which were tabulated according to the formula

taxable income subject to normal tax
\+ amount of public company dividends
= total income subject to super tax.

From this schedule, the amount of taxable income and the amount of public company dividends were compared by income groups. The figures were added for married and single persons. In order to arrive at maximum representation, the data for the tax years 1945 to 1951 were grouped together after the longest compilations had been chosen, but prior to adjustments for arrear assessments. The data were aggregated within five major income groups, viz., £301-1000, £1001-1500, £1501-2000, £2001-2500, and £2500-26000+. Table XXVIII shows the relationship between the amount of income subject to normal tax and the value of public company dividends.

TABLE XXVIII: Public Company Dividends in Relation to Normal Taxable Income, Five Major Income Groups, Tax Years 1945-1951, Categories according to Taxable Incomes, Thousand Pounds.

Income Group	Value of Income Received in the Form of		Col. 2 as per cent of Col. 1
	Income Subject to Normal Tax	Public Company Dividends	
	Col. 1	Col. 2	Col. 3
£301-1000	842,091	15,642	1.9
1001 - 1500	295,112	8,535	2.9
1501 - 2000	151,809	5,776	3.8
2001 - 2500	101,542	4,467	4.4
2501 - 26000+	503,588	38,176	7.5

The amalgamation of normal and super tax data for the years 1920 to 1944, was based on the following distributive assumptions:[2]

1. Paragraph 6.4.2 above.
2. Distributive assumptions have a direct influence on the distribution of incomes. Over and above, certain technical assumptions will have to be made, which refer to the actual process of calculation. The technical assumptions will be discussed later on.

i. that the average relationship, by major income group, of public company dividends to income subject to normal tax, which prevailed for the years 1945 to 1951, was representative for the years 1920 to 1944; and

ii. that, in respect of incomes not liable to super tax, public company dividends were distributed among income receivers in the same proportions as was the normal taxable income among normal taxpayers.

The relationship between the number of persons assessed for super tax and the corresponding value of super taxable income, on the one hand, and the number of persons assessed for normal tax and the value of normal taxable income, on the other hand, in respect of data equal to and higher than the super tax liability limit, is tabulated in Table XXVII above.

For the tax year 1932, for instance, 1961 persons were assessed for super tax and 1521 persons for normal tax, arrear assessments included, in respect of income ranges from £2,000+, which constituted the super tax liability limit in 1932. This means that there were 28.9 per cent more persons assessed for super tax than for normal tax. The corresponding income assessed for super tax was 40.6 per cent higher than the income assessed for normal tax.

In addition to the distributive assumptions which were discussed earlier, the following technical assumptions had to be made, viz.,

i. that the relative surplus, during any year, of the number of persons who received incomes subject to super tax, over the number of persons who received normal taxable incomes, and

ii. that the relative surplus of income subject to super tax over the income subject to normal tax, always in respect of higher income groups,[1]

was identical for lower and higher income groups in particular years.

It can be seen from Table XXVII that the relative average surplus of the value of super taxable income, over the value of normal taxable income, was 7.5 per cent for the years 1945-1951 (column 6). In order to make comparable the base years 1945-1951 and the years 1920-1944, the relative surpluses of

1. Lower income groups are defined as constituting income groups below the super tax liability limit. Higher income groups are income groups for which super tax liability was legislated.

i. the number of super tax assessments over the number of normal tax assessments - called A-series-, and

ii. the value of income assessed for super tax over the value of income assessed for normal tax - called C-series -

were divided by the factor 7.5 - yielding the B- and D- series, respectively. These calculations were undertaken for higher income ranges only.

In order to find the transformation parameters for lower income groups, the values of the B- and D- series were multiplied alternatively by the factors 1.9, 2.9, 3.8, and 4.4,[1] which constitute, for the years 1945-1951, the percentage relation of public company dividends, to the value of assessed income subject to normal tax, for the income groups £301-1000, 1001-1500, 1501-2000, and 2001-2500, respectively. As aresult of these operations, eight series of parameters were obtained, which were called A' to H' according to the following schedule:-

Income Range	Transformation Parameters	
	Nos. of assess-ments	Taxable income
£ 301 - 999	A'	E'
£ 1000 - 1499	B'	F'
£ 1500 - 1999	C'	G'
£ 2000 - 2499	D'	H'

The values of the parameters A' to H' are listed in Table XXIX, page 105 below.

6.8.2 The Nature of Data Processing

The final calculations and tabulations of income tax statistics were done on the Rhodes University Computer. The programmes were arranged as follows:-

years 1920 - 1940

(i) Income groups for which adjustments for abatements in respect of insurance premiums, dependants and children were undertaken:
This category was converted by linear transformation to £100 intervals, separated for single and married taxpayers, and then multiplied by the respective values of the A' to H' series.

1. Compare Table XXVIII above.

TABLE XXIX: Transformation Parameters A' to H', 1920 to 1944

Year	A'	B'	C'	D'	E'	F'	G'	H'
1920	106.441	109.831	112.882	114.916	107.220	111.021	114.440	116.720
1921	106.973	110.643	113.946	116.148	108.189	112.499	116.378	118.964
1922	106.669	110.179	113.338	115.444	110.089	115.399	120.178	123.364
1923	107.087	110.817	114.174	116.412	109.989	115.109	119.798	122.924
1924	107.068	110.788	114.136	116.368	110.127	115.457	120.254	123.452
1925	107.771	111.861	115.542	117.996	109.709	114.819	119.418	122.484
1926	106.631	110.121	113.282	115.356	108.892	113.572	117.784	120.592
1927	106.137	109.367	112.274	114.212	109.823	114.993	119.646	122.748
1928	105.681	108.671	111.362	113.156	107.011	110.701	114.022	116.236
1929	105.947	109.077	111.894	113.772	109.424	114.384	118.848	121.824
1930	107.543	111.513	115.086	117.468	112.407	118.937	124.814	128.732
1931	108.417	112.847	116.834	119.492	111.115	116.965	122.230	125.740
1932	107.315	111.165	114.630	116.940	110.279	115.689	120.558	123.804
1933	107.429	111.339	114.858	117.204	108.740	113.340	117.480	120.240
1934	107.429	111.339	114.858	117.204	108.835	113.485	117.670	120.460
1935	108.341	112.731	116.682	119.316	112.635	119.285	125.270	129.260
1936	107.828	111.948	115.656	118.128	110.412	115.892	120.824	124.112
1937	107.220	110.020	114.440	116.720	110.108	115.428	120.216	123.408
1938	106.783	110.353	113.566	115.708	110.735	116.385	121.470	124.860
1939	108.360	112.760	116.720	119.360	114.307	121.837	128.614	133.132
1940	109.215	114.065	118.430	121.340	115.295	123.345	130.590	135.420
1941	107.467	111.397	114.934	117.292	105.795	108.845	11.590	113.420
1942	107.619	111.629	115.238	117.644	113.243	120.213	126.486	130.668
1943	108.208	112.528	116.416	119.008	115.504	123.664	131.008	135.904
1944	109.443	114.413	118.886	121.868	109.443	114.413	118.886	121.868

(ii) Income groups higher than those discussed under (i) but lower than the super tax liability limit:
This category was taken from the tabulations of normal income tax, adjusted for arrear assessments. The values were multiplied by respective factors of the A' to H' series.

(iii) Income ranges which were subject to super tax:
These data were only adjusted for arrear assessments.

years 1941 - 1944

The respective operations (ii) and (iii), above, were employed. Since the system of abatements was abolished with effect from the 1941 tax year, the adjustments mentioned under (i) above had become unnecessary.

years 1945 - 1951

The adjustment for arrear assessments caused some problems because of the special character of the tabulations.[1] It was decided to combine the number of persons who were assessed for normal tax, with income values inclusive of public company dividends. For the calculation of arrear assessments the necessary parameters were determined as follows:-

(i) Calculation of the tax yield:[2]

The number of normal tax assessments, married and single(called i-series),
and the total income subject to super tax (called j-series),
and normal plus super tax payable (called k-series) were established from the annual reports.
The figures after inclusion of arrear assessments were used in respect of:-
number of normal tax assessments (called i' series);
total tax paid (called k' series).
The tax yield was established by the ratio

$$\text{Tax Yield} = \frac{240 \cdot \text{k-series}}{\text{j-series}}$$

(ii) Adjustment of the i-series for arrear assessments:

Lack of information did not allow the extension of the i-series so as to include the number of persons who

1. See paragraph 6.4.2 above.
2. See paragraph 6.7.2 above.

were assessed to pay super tax but who did not pay normal tax.

(iii) Adjustment of the value of tax paid:

This series is the aggregate of both normal and super tax assessed.

Strictly speaking the tabulations for the years 1945 to 1951 were constructed according to the assumption that all persons who received public company dividends, and who were assessed to pay super tax, did also receive an income subject to normal tax.

6.9 Tabulation of Income Tax Statistics

A presentation of data on personal income distribution statistics is given in the Appendix. The tabulations are listed separately for the years 1920 to 1951.[1] The number of categories (i.e., of income ranges) is indicated in brackets under the word 'categories'.

The 'no. of income recipient units' refers to the total number of married and single tax assessments. The 'value of income' is listed before and after deduction of tax.[2]

The figures for the 'no. of income recipient units' and the 'values of income' and 'tax payable' include

(i) adjustments made in respect of arrear assessments;
(ii) adjustments calculated for abatements (years 1920 to 1940);
(iii) adjustments made in respect of dividend incomes received by income groups which were not liable to pay super tax.

6.9.1 Summary Tabulations: Size Distribution of Income, European Population

Table XXX shows a summary of the distribution of the European population by size of income.[3] Six income ranges are distinguished, viz.,

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1. Tables 11-42.
2. This was done under the assumption that all taxes assessed in arrear were in fact paid during the year for which they had been assessed.
3. It is assumed that there were no Non-Europeans who earned incomes higher than £400 during any of the years considered. Compare: S. H. Frankel and H. Herzfeld, European Income Distribution..., ibid., p. 122.

£ 0	- 399
400	- 999
1,000	- 2,499
2,500	- 4,999
5,000	- 9,999
over 10,000	

The total population of Europeans is expressed in terms of 'units of taxpayers'.[1] This was achieved by deducting the estimate of the number of married females[2] from the estimate of the European population.[3] The difference between these two totals gives a population total which is measured in terms of income recipient units comparable with the South African income tax legislation.

A comparison of the average income of the total European population with that of the European population whose income exceeded the £ 10,000 limit, is shown in Table XXXI. Again the population numbers are defined in units of taxpayers. The income value on which the calculation of the average income of the total population was based, was defined as 61.9 per cent of Frankel's estimate of the national income in South Africa.[4] The calculation of the average income of the £ 10,000+ income group was based on the tabulated income tax statistics.[5]

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1. See paragraph 6.7.1 above.
2. Union Statistics for Fifty Years, Jubilee Issue, ibid., A - 15, The interpolation between different census dates was done according to Table A-8.
3. ibid., A-8.
4. In respect of the year 1939/40, Frankel and Herzfeld estimated that 61.9 per cent of the national income was paid out to the European population. This ratio was assumed to be representative for all years under consideration.
   S.H. Frankel and H. Herzfeld, European Income Distribution ..., ibid., p. 128.

   As an index for the value of income during different years, Stadler's series of the net domestic product was used.
   J.J. Stadler, Die Bruto Binnelandse Produk, ibid., Table XXXII, p. 514, column 3.
5. See Appendix, Tables 11 - 42.

TABLE XXX: Distribution of European Income Receivers, 1920-1951. Two Married Persons are Regarded as One Income Recipient Unit.

Year	Number of Income Receivers in the Income Range						Total
	£0-399	400-999	1000-2499	2500-4999	5000-9999	over 10000	
1920	1,172,153	43,366	14,136	2,471	622	252	1,233,000
1921	1,147,693	90,794	10,999	1,902	451	151	1,252,000
1922	1,199,170	62,713	9,190	1,501	313	113	1,273,000
1923	1,228,862	60,553	9,559	1,555	373	98	1,301,000
1924	1,248,112	65,644	10,815	1,852	430	147	1,327,000
1925	1,269,157	67,518	11,677	1,971	503	174	1,351,000
1926	1,291,917	69,414	12,721	2,249	529	170	1,377,000
1927	1,309,958	71,097	12,828	2,367	577	173	1,397,000
1928	1,325,760	75,552	14,183	2,696	630	179	1,419,000
1929	1,355,578	66,703	14,226	2,675	636	182	1,440,000
1930	1,379,349	66,558	13,026	2,376	545	146	1,462,000
1931	1,407,063	63,834	11,547	1,983	471	102	1,485,000
1932	1,443,899	54,818	9,323	1,550	330	80	1,510,000
1933	1,469,340	51,309	9,208	1,640	350	153	1,532,000
1934	1,486,243	56,172	11,597	2,229	527	232	1,557,000
1935	1,504,386	62,410	12,782	2,559	641	222	1,583,000
1936	1,520,323	72,838	14,679	3,102	782	276	1,612,000
1937	1,528,078	84,159	16,819	3,674	934	336	1,634,000
1938	1,548,752	93,469	17,141	3,487	903	248	1,664,000
1939	1,567,763	99,963	17,692	3,458	882	242	1,690,000
1940	1,582,514	106,504	19,241	3,566	916	259	1,713,000
1941	1,581,802	129,770	22,014	4,485	1,364	565	1,740,000
1942	1,565,915	162,354	27,149	5,439	1,590	553	1,763,000
1943	1,565,404	180,883	32,877	6,440	1,792	604	1,788,000
1944	1,560,615	206,444	36,392	7,125	1,773	651	1,813,000
1945	1,599,738	188,104	40,262	7,360	1,936	600	1,838,000
1946	1,604,378	203,154	44,050	10,350	2,967	1,101	1,866,000
1947	1,630,700	200,900	51,930	11,842	3,988	1,640	1,901,000
1948	1,727,120	150,383	61,858	13,418	4,489	1,732	1,959,000
1949	1,730,709	174,349	78,553	14,867	4,885	1,637	2,005,000
1950	1,740,896	187,028	85,114	14,873	4,692	1,397	2,034,000
1951	1,710,086	219,978	102,229	19,483	6,536	1,688	2,060,000

TABLE XXXI: Average Incomes of European Income Receivers:

i. Average of all Income Receivers

ii. Average of Income Receivers whose Incomes Exceed £10,000 p. a.

Year	Average Income p. a.	
	All Income Receivers £	Income Receivers with Incomes Higher than £10,000 p. a.
1920	135.0	21,253.9
1921	126.8	16,776.4
1922	99.3	17,628.3
1923	100.6	17,030.6
1924	108.1	17,423.6
1925	116.2	16,885.1
1926	112.2	16,788.2
1927	116.4	17,213.9
1928	121.6	16,435.8
1929	122.5	18,120.9
1930	114.8	17,493.2
1931	100.6	16,627.5
1932	89.0	15,875.0
1933	88.8	17,268.0
1934	104.6	20,112.1
1935	116.9	17,716.2
1936	130.0	17,500.0
1937	143.1	17,953.6
1938	142.7	16,931.5
1939	149.6	16,694.2
1940	156.7	17,034.8
1941	175.1	20,171.7
1942	193.4	19,969.3
1943	209.3	18,521.5
1944	220.1	19,153.6
1945	233.8	19,040.0
1946	243.5	18,794.7
1947	262.2	18,668.9
1948	279.7	17,945.2
1949	292.9	15,911.3
1950	324.3	17,297.4
1951	379.4	19,734.8

6.10 Assessment of the Reliability of the Submitted Calculations

The calculations here submitted seek to offer the most comprehensive approach to the problem of personal income distribution statistics, by combining statistics on normal tax with those on super tax. Although in general the calculations will be more reliable for upper than for lower income groups, some factors contribute towards an underestimation of higher income groups as well, i.e., the phenomena of tax evasion and tax avoidance, the exclusion of imputed rents from the concept of taxable income and the method adopted by us for distributing arrear assessments over different income ranges. The combined influence of these factors will tend to make the distribution of incomes appear more equal than was the case in reality.

It is impossible to estimate the magnitude of the absolute error for particular years. The main value of the statistics here submitted is that they are comparable on a year-to-year basis, and that errors can be regarded as having been of a systematic nature, which leaves the trend of the distributive inequality relatively undisturbed.

7. Personal Income Distribution Data Provided from Family Expenditure Surveys.

7.1 Data Provided by Official Expenditure Surveys

Until now, three official surveys of family expenditures have been taken in South Africa, in respect of the years 1936, 1955, and 1966. (See Footnotes 1 and 2)

The common features of these surveys are:-

(i) they are confined to European families;

(ii) they are based on certain urban areas only;

(iii) they are based on samples;

(iv) they are conducted in order to provide a basis for the construction of retail price indices.

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1. Sources:

   a) 1936 Expenditure Survey
   U.G. No. 21-1937, Report on the Inquiry into the Expenditure of European Families in Certain Urban Areas, 1936.

   b) 1955 Expenditure Survey
   Report No. 1 Ten Principal Urban Areas: Average Expenditure and Income (According to Expenditure and Income Groups), Preliminary Results.
   Report No. 3 Income, Ten Principal Areas, Preliminary Results.

   c) 1966 Expenditure Survey
   Report No. 11-06-03, Survey of Family Expenditure-November 1966, Family Income.

2. Prior to 1936, a number of small Family Budget Inquiries were undertaken, none of which having any major importance. Compare U.G. No. 21-1937, ibid., p. 4.

7.1.1 The 1936 Family Expenditure Survey

This survey was based on a sample of 1618 European families. The data of this survey cannot be used for purposes of determining the personal distribution of incomes, mainly because only incomes equal to or less than £ 600 p.a. were recorded.[1]

7.1.2 The 1955 and 1966 Family Expenditure Surveys

Both these surveys tabulate valuable data referring to the distribution of personal incomes. Unfortunately, there is little scope for comparison between these two surveys, because the arrangement of tables between them is different.

7.1.2.1 The Income Concept

The value of income is recorded on a family basis, comprising the income of husband, wife, and contributions by other members of the family to the common household budget.

The income concept is very broad, comprising[2]

i. income from work and services rendered
ii. income from investment
iii. income from pension and provident funds
iv. insurance and other claims and compensation
v. social security income
vi. donations, gifts and grants.

Income had to be indicated as a gross amount, i.e., prior to deductions for taxes and contributions to social insurance funds.

The income concept recorded is somewhat more comprehensive than the personal income concept, i.e., in comparison with the latter, the former is enlarged by items such as claims from insurances, donations, gifts and grants.

7.1.2.2 Tabulation of Income Distribution Data

Table XXXII compares the distribution of family incomes by income groups for the 1955 and 1966 surveys.[3]

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1. Compare U.G. No. 21-1937, ibid., p. 6.
2. 1955 Expenditure Survey, Report No. 1, ibid., p. 7 and Report No. 3, pp. 7-9.
   Report No. 11-06-03, ibid., pp. v, vi.
3. Sources:
   1955 Expenditure Survey, Report No. 3, ibid., p. 12.
   Report No. 11-06-03, ibid., p. 1.

TABLE XXXII: Percentage Distribution of Families According to Income Groups, 1955 and 1966

Income Group	Percent distribution of all families		Percent distribution of salary and wage earning families	
	1955	1966	1955	1966
Under R1,500	9.8	1.1	7.8	3.6
1,500 - 1,999	20.6	3.8	22.4	4.8
2,000 - 2,499	24.0	7.5	25.8	7.2
2,500 - 2,999	17.8	11.7	19.1	10.9
3,000 - 3,499	) 15.0	16.7	) 15.6	14.9
3,500 - 3,999	)	14.3	)	13.1
over R4,000	12.8	-	9.3	-
4,000 - 4,499		11.4		10.7
4,500 - 4,999		10.0		9.0
5,000 - 5,499		6.1		5.6
5,500 - 5,999		3.7		3.7
6,000 - 6,999		5.2		5.5
7,000 - 7,999		2.6		2.9
8,000 - 8,999		1.9		2.1
9,000 - 9,999		0.8		1.1
10,000 -12,499		1.4		2.2
over 12,500		1.8		2.7
TOTAL	100.0	100.0	100.0	100.0

For the year 1955, Table XXXIII shows additional information referring to the average income and the income contributed by individual income groups to the total income.[1]

1. 1955 Expenditure Survey, Report No. 3, ibid., p. 12.

TABLE XXXIII: Distribution of Family Incomes by Income Groups, 1955

Income Group	All Families		Salary and Wage Earning Families	
	Average income	Income contributed by each group as percentage of total income	Average income	Income contributed by each group as percentage of total income
Under R1,500	1202	4.2	1284	3.7
1,500 - 1,999	1772	13.1	1776	14.9
2,000 - 2,499	2234	19.2	2230	21.6
2,500 - 2,999	2728	17.4	2724	19.5
3,000 - 3,999	3388	18.2	3368	19.7
over R4,000	6088	27.9	5894	20.6
Average	2770	100.0	2646	100.0

Table XXXIV shows the percentage distribution of families according to income and occupational class for the year 1955.[1]

1. 1955 Expenditure Survey, Report No. 3, ibid., p. 65
No similar tabulation is available for 1966.

TABLE XXXIIIa: Family Income Distribution by Occupational Classes, 1955, Weighted Average of 10 Urban Areas

INCOME GROUP	OCCUPATIONAL CLASS							GRAND TOTAL
	Persons working for own account	Salary and Wage Earners					Pensioners, other retired persons and persons not elsewhere classified	
		Professional and technical workers, managers and other administrative officials	Clerical and other office workers, shop assistants, salesmen and related occupations	Mine and factory workers, journeymen, manual workers and labourers	Transport and service workers	Total		
	%	%	%	%	%	%	%	%
Under £500	-	-	-	1.1	1.7	0.6	21.7	1.9
£500-£749	0.9	0.7	5.9	9.4	17.4	7.2	26.6	7.9
£750-£999	5.7	6.0	18.7	29.7	40.3	22.4	13.6	20.6
£1,000-£1,249	13.1	13.6	29.2	31.7	19.9	25.8	11.4	24.0
£1,250-£1,499	9.6	23.5	23.6	15.5	12.7	19.1	8.7	17.8
£1,500-£1,749	7.5	14.7	9.3	9.3	3.4	10.1	3.3	9.4
£1,750-£1,999	7.5	11.6	6.5	2.4	1.7	5.5	3.8	5.5
£2,000-£2,499	12.7	13.6	4.2	0.9	2.1	4.7	4.4	5.3
£2,500-£2,999	13.2	4.4	0.4	-	0.4	1.2	0.5	2.0
£3,000-£3,499	11.0	3.6	1.9	-	-	1.3	3.8	2.2
£3,500-£3,999	12.7	1.8	0.3	-	0.4	0.6	-	1.4
£4,000-£4,499	2.2	2.3	-	-	-	0.5	1.1	0.7
£4,500-R4,999	1.3	1.3	-	-	-	0.3	-	0.4
£5,000 and over	2.6	2.9	-	-	-	0.7	1.1	0.9
TOTAL	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
Average income £	2,361	1,886	1,284	1,083	1,001	1,323	1,032	1,385
Median income £	2,244	1,614	1,222	945	945	1,197	790	1,209

7.1.2.3 Testing of Survey Results

The Bureau of Statistics compared the results of the 1955 Family Income Survey with the 1951 Population Income Census. The figures were adjusted for differences in time, coverage and concepts of income.[1]

The overall difference in the average income between the 1951 Population Income Census and the 1955 Expenditure Survey was found to be 16 per cent.[2] Most of this difference was attributed to the influence of deductions from gross income. The difference was neither regarded as "excessive", nor as "indicative of serious bias in the Survey average income."[3]

8. Personal Income Distribution Data Provided from Private and Institutional Research Work

In what follows, a few characteristic examples have been chosen from the literature dealing with statistics on the size distribution of incomes.

8.1 Lehfeldt Estimates

An early investigation into the structure of personal income distribution in South Africa was submitted by R.A. Lehfeldt.[4] Lehfeldt estimated that the annual modal income of white income earners was somewhat less than £ 181 in 1917-18,[5] while that of "coloured artisans and factory hands" was £ 75 a year[6] and that of Natives £ 30 a year.[7] Lehfeldt surmises that in the case of South Africa, "... the series (i.e., of personal income distribution of all races) would show a discontinuity that is not observable in most countries. There would be two levels of income standing out as 'modal' - that is, as occuring more frequently than others:

1. Incomes under £ 200 were omitted from the comparison.
2. £ 965 was the average income of the 1951 Population Census, and £ 1,123 the respective (adjusted) figure of the 1955 Income Expenditure Survey.
3. 1955 Expenditure Survey, Report No. 3, ibid., p. 36.
4. R.A. Lehfeldt, The National Resources of South Africa, ibid., pp. 57-70.
5. ibid., p. 60.
6. ibid., p. 61. "Coloureds" include Indians as well.
7. The average income of Natives is here assumed to have been 1/6 of the average income of Whites, the latter taken to have been £ 180. Lehfeldt remarks on this discrepancy that "it does not correspond with the value of their work (i.e., the work of the skilled and unskilled workers, respectively)." He calls this discrepancy "artificial and uneconomic" without, however, defining what he meant by "uneconomic". See p. 62.

one characteristic of white labour and one of black. Although the coloured artisans and factory hands constitute a bridge between the two groups, it is probable that there are not enough of them to fuse the two groups into a continuous series, such as is found in countries with a homogeneous population."[1]

8.2 Estimate by the Economic and Wage Commission, 1925

The Economic and Wage Commission, 1925 (which was substantially influenced by R.A. Lehfeldt's advice),[2] submitted an estimate of the personal income distribution of Whites, Coloureds and Asiatics (one group), and Natives. Their estimates are shown in Table XXXIV.

TABLE XXXIV: Distribution of Incomes by Race, 5 Income Ranges, 1925, Population in thousands. (See Footnotes 3 and 4)

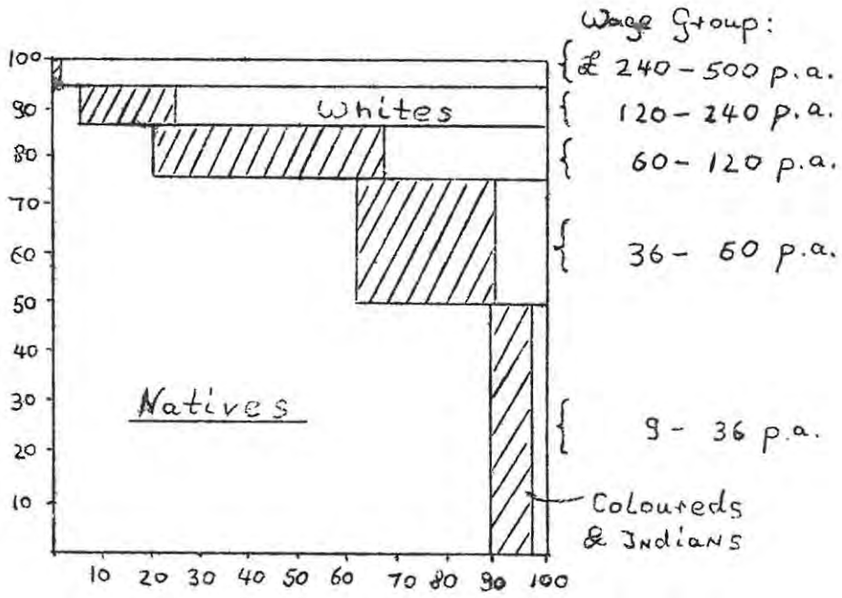
Income Group	Natives	Coloureds and Asiatics	Whites	Total
£ 9 - 36	800	75	20	895
£ 36 - 60	250	100	30	380
£ 60 - 120	45	75	50	170
£ 120 - 200	4.5	24	75	102.5
£ 200 - 500	0.5	1	75	77.5
TOTAL	1.100.0	275	250	1,625.0

Graph 1 illustrates the distribution of wages, as based on Table XXXIV.

As to the reliability of the calculations, the Commissioners wrote: "With no precise statistics available it is impossible to give a completely accurate and detailed picture of the position, but the

1. R.A. Lehfeldt, The National Resources of South Africa, ibid., p. 61.
2. Compare U.G. No. 14-1926, Report of the Economic and Wage Commission, 1925, para. 24, p. 267.
3. Archives of the Economic and Wage Commission, Volume 18, File: Statistics on Wages, etc. The original is handwritten.
4. There is no clear indication as to the year to which the calculations refer, since the statistics used are based partly on the year 1918 and partly on 1925. We take it that the Commissioners intended to portray the 1925 situation because this was their base-year.

GRAPH 1: "Diagram Illustrating the Distribution of Wages in the Union" [1]



NOTE:

"The square represents the total number of wage earners in the Union.

The rectangles when measured horizontally indicate the relative number of persons of each race falling within the wage group as shown on the right hand side.

The rectangles when measured vertically indicate the relative number of persons of all races falling within the respective wage groups."

1. U. G. No. 14-1926, ibid., p. 264, and Archives to the Economic and Wage Commission, Vol. 18, File: Statistics on Wages, etc., ibid.

diagram gives a sufficiently definite representation of the proportions of each class of the community within certain ranges of earnings to show the overlapping of the rates of wages of Europeans, coloured and natives." (See Footnotes 1 and 2)

8.3 Frankel-Herzfeld Estimates

In collaboration in 1943, Professor S.H. Frankel and H. Herzfeld published calculations of the personal income distribution of European incomes, both before and after the deduction of Union and Provincial Income Taxes, for the years 1925/26, 1931/32, 1936/37, 1939/40, and 1940/41. (See Footnotes 3 and 4) The interesting features of their calculations are:-

i. that they related the value of the personal income received by Europeans, to the value of the net national income, and
ii. that they based their calculations on the total number of European income receivers.

As to the reliability, the authors write that "the calculations presented here are unavoidably rough estimates and are consequently subject to a considerable margin of error."[5]

It was discussed earlier that the amount of arrear assessments accumulated substantially with the beginning of the Second World War.[6] This introduced a considerable bias in favour of the lowest income group ('under £400') into Frankel and Herzfeld's calculations, because they had to base their figures on the Reports by the Commissioner of Inland Revenue, after 1 year of tax collection. The bias was different for different years, but particularly great for the year 1940/41. It was therefore decided to adjust the Table

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1. U.G. 14-1926, para. 20, p. 264, ibid.
2. We multiplied the average income values of each income group by the number of recipients which totaled up to £100,802,500. This figure is £30,597,500 short of Stadler's estimate of the wage income for the year 1925.
   J. J. Stadler, Die Bruto Binnelandse Produk van Suid-Afrika, ibid., Table XXXI, p. 505.
3. S.H. Frankel and H. Herzfeld, European Income Distribution ..., ibid.
4. With this choice the authors wanted to gain a representative picture of years over the trade cycle: "1925/26, an early year on the upward trend of the trade cycle; 1931/32, the worst depression year; 1936/37, a normal year of almost full peace-time activity; 1938/39, the last pre-war year; and 1939/40 and 1940/41 - the war years." ibid., p. 122.
5. ibid., p. 122.
6. Compare paragraphs 6.7.2 above.

submitted by the authors on the Distribution of European Incomes (Before Deducting Income Taxes)[1] for arrear assessments for all years concerned, using a method which has been described above.[2] As a result of this adjustment all years will show a somewhat greater inequality of income distribution, in the sense that income groups 'higher than £400' gain at the expense of the income group 'under £400'. Table XXV shows the recalculated figures.

8.4 Estimate by D. Hobart Houghton and D. Philcox

A number of remarkable field surveys have from time to time been undertaken and reported upon in South Africa. To the extent that such surveys were undertaken by private individuals or institutuions, they naturally had to be confined to limited areas and narrow population groups (usually one particular race). Regularly sampling methods were being employed.

As an example of these surveys can serve a study undertaken during the year 1949 by D. Hobart Houghton and D. Philcox who conducted an income and expenditure survey in a Ciskei Native Reserve.[3] 260 Native families constituted the sample of this survey, which was undertaken both on a family and a per head basis. The authors expressed their surprise about the unequal distribution of incomes as follows: "One of the most interesting facts that has emerged from this survey is the very wide range between the lowest and highest family incomes and expenditures." (See Footnotes 4 and 5) Their observation was based on the following distribution of average weekly cash income per head in 1/- intervals:- (See Footnotes 6 and 7)

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1. S. H. Frankel and H. Herzfeld, European Income Distribution, ibid., Table I, p. 123.
2. Paragraph 6. 7. 2 above.
3. D. Hobart Houghton and D. Philcox, "Family Income and Expenditure in a Ciskei Native Reserve", The South African Journal of Economics, Vol. 18, December, 1950, pp. 418-438.
4. ibid., p. 423.
5. A similar observation was made by the Tomlinson Commission which reported:- "The inequality of income is very striking. For instance 12. 7 per cent of the families in the Reserves earn 46. 3 per cent of the total income of these territories." U. G. 61-1955, Summary of the Report of the Commission for the Socio-Economic Development of the Bantu Areas within the Union of South Africa (Tomlinson Report). Ch. 24, II. 8., p. 98.
6. D. H. Houghton and D. Philcox, Family Income ..., ibid., p. 426.
7. Excluding income in kind which constituted "less than 20 per cent of the combined cash and kind income." ibid., p. 429.

TABLE XXXV: Distribution of European Incomes (Before Deducting Income Taxes), Values Adjusted for Arrear Tax Assessments

	1925/26			1931/32			1936/37			1938/39			1939/40			1940/41		
	Number of Income Receivers	Income £ 1000	Average Income £	Number of Income Receivers	Income £ 1000	Average Income £	Number of Income Receivers	Income £ 1000	Average Income £	Number of Income Receivers	Income £ 1000	Average Income £	Number of Income Receivers	Income £ 1000	Average Income £	Number of Income Receivers	Income £ 1000	Average Income £
A. Under £400	472,750	87,347	184.8	622,505	91,088	146.3	686,278	132,091	192.5	701,820	151,828	216.3	718,057	161,071	224.3	691,086	111,039	160.67
B. £400-1000	55,681	32,934	591.5	51,976	30,867	593.9	73,633	44,576	605.4	86,390	49,057	567.9	91,298	51,457	563.6	144,695	94,752	654.8
C. £1000-2500	13,850	19,304	1,393.8	11,465	16,567	1,445.0	20,777	29,977	1,442.8	21,826	32,115	1,471.4	23,610	33,664	1,425.8	27,091	39,304	1,450.8
D. £2500-5000	2,248	7,322	3,257.1	1,551	5,213	3,361.1	3,674	12,586	3,425.7	3,458	11,621	3,360.6	3,576	11,782	3,294.7	7,480	21,774	2,911.0
E. £5000-10000	529	3,451	6,523.6	330	2,228	6,751.5	935	6,318	6,757.2	883	6,004	6,799.5	916	6,074	6,631.0	1,364	9,283	6,805.7
F. Over £10000	170	2,854	16,788.2	80	1,270	15,875.0	336	5,730	17,053.6	242	4,039	16,690.1	259	4,409	17,023.2	564	11,397	20,207.4
G. Total	545,228	153,212	281.0	687,907	147,233	214.0	785,633	231,278	294.0	814,619	254,664	312.6	837,616	268,457	320.5	872,280	287,549	329.7

Class	Total
0 - 1/-	533
1/- - 2/-	415
2/- - 3/-	192
3/- - 4/-	72
4/- - 5/-	23
5/- - 6/-	15
6/- - 7/-	6
7/- - 8/-	4
8/- - 9/-	3
9/- - 10/-	4
over 10/-	19
Total	1286

8.5 Investigation into the Distribution of Income by the Bureau of Market Research, Pretoria

Since its inception in 1960, the Bureau of Market Research of the University of South Africa (in future referred to as the 'Bureau') has published a great number of limited regional surveys on consumption patterns and consumer behaviour of South Africa's non-White population group.[1] The expenditure surveys are accompanied

1. Bureau of Market Research, University of South Africa, Research Reports - Income and Expenditure Surveys.

Nos. 3 Income and Expenditure Patterns of Urban Bantu Households (Pretoria Survey), by C. de Coning, et al.

5 Income and Expenditure Patterns of Urban Bantu Households (Benoni Survey), by C. de Coning.

6 Income and Expenditure Patterns of Urban Bantu Households (South Western Townships, Johannesburg), by F. E. Rädel, C. de Coning and G. Feldmann-Laschin.

8 Income and Expenditure Patterns of Urban Bantu Households (Cape Town Survey), by G. R. Feldmann-Laschin.

9 Income and Expenditure Patterns of Coloured Households (Cape Peninsula), by G. R. Feldmann-Laschin, F. E. Rädel and C. de Coning.

11 Income and Expenditure Patterns of Urban Coloured Households (Durban Survey), by A. J. Jordaan and G. R. Feldmann-Laschin.

12 Income and Expenditure Patterns of Urban Indian Households (Durban Survey), by G. R. Feldmann-Laschin.

13 Income and Expenditure Patterns of Urban Bantu Households (Durban Survey), by G. R. Feldmann-Laschin.

14 Comparative Income Patterns of Urban Bantu: Pretoria, 1960-1965, by T. J. Seres and M. Loubser.

16 Income and Expenditure Patterns of Urban Coloured Households (Port Elizabeth/Uitenhage Survey), by G. R. Feldmann-Laschin.

17 Income and Expenditure Patterns of Urban Bantu Households (Port Elizabeth/Uitenhage Survey), by G. R. Feldmann-Laschin.

18 Income and Expenditure Patterns of Bantu living under other than family conditions in Pretoria, 1965, by M. Loubser.

Of the twelve surveys published up-to-date, eight are devoted to the analysis of Bantu households, and three and one respectively to the analysis of Coloured and Indian households.

by income surveys which are necessary side-products, in order to establish the accuracy of the amounts of expenditure indicated by respondents.

It is a salient feature of the different reports that the methods employed and the basis of classification are basically identical.

8.5.1 General Features of the Surveys and Definitions

The surveys were based on probability samples. The size of the sample was normally increased by the expected sample loss. The sample units were chosen by means of random tables. The size of the sampling error was established by means of the standard error concept. The mean and median income of households, and the mean and median size of households were usually indicated by means of 95 per cent confidence intervals.[1]

The Bureau defined a household as

" i. a family or group of two or more persons dependent on a common or pooled income, sharing a common table and usually living in the same house,
or
ii. a single person who is financially independent of any family or household group, living in a separate house or room."[2]

Household income was defined as "the sum of the earnings of the members of the household, together with all other money income accruing to members of the household and/or the household unit."[3]

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1. Compare Research Report No. 6, ibid., pp. 17-21.
2. Research Report No. 3, Vol. 1, ibid., Annexure A, p. i.
3. ibid., Annexure A, p. v.

8.5.2 Tabulation of Income and Expenditure Patterns

Certain results of the Research Reports have been compiled in Tables XXXVI to IXLb. [1]

1. Sources:

Table XXXVI

Research Report No.	Period of Field-work, No. of page	Size of Universe, No. of page	Size of Sample, No. of page
3, Vol. 1	9	4, 5, 59	10
5	4, 5	2	6
6	9	2, 3	11
8	8	60	60
13	3	79	79
14	8	116	116
17	5	90, 91	90
18	8, 9	3	3

Table XXXVII

Research Report No.	Table
3, Vol. 2	44
5	XXII, p. 57
6	XIX, p. 65
8	XXV, p. 40
13	XXV, p. 45
14	no information available
17	21
18	no information available

Table XXXVIII

Research Report No.	Page
3	59
5	60, 61
6	68, 69
8	44, 45
13	53
14	104 - 107
17	59

Table IXLa

Research Report No.	page
12	49
9	56
11	39, 40
16	72, 74

Table IXLb

Research Report No.	Table/page
12	Table 33
9	page 54
11	Table 18
16	Table 23

TABLE XXXVI: Bureau of Market Research: Research Reports on Bantu Income and Expenditure Patterns. Sources: p.124 above

Survey	Report No.	Period of Fieldwork	Size of Universe		Size of Sample[1]		Remarks
			Households	Persons	Households	Persons	
Pretoria	3	October 1960-April 1961	15,662	98,280	1,080		
Benoni	5	October 1961-January 1962	10,754	69,000	424		
Johannesburg	6	July 1962-December 1962	70,217	387,500	1,409		
Cape Town	8	October 1963-December 1963	9,866	57,600	206		
Durban	13	October 1964-July 1965	25,406	161,800	431		
Pretoria, 1960/65	14	September 1965-January 1966	20,584	131,750	516		62 additional questionnaires were completed by European employers
Port Elizabeth/Uitenhage	17	October 1964-May 1965	25,882	139,763	511		
Pretoria, Single Earners[2]	18	September 1965-December 1965		40,853		550	

1. Measured in terms of accepted questionnaires.
2. i.e., living under other than family conditions.

TABLE XXXVII: Percentage Distribution of Bantu Households by Income Groups, All Earners Sources: p. 124 above.

Income, R	Pretoria	Benoni	Johannesburg	Cape Town	Income, R	Durban	Port Elizabeth Uitenhage
p.a.	1960/61	1961/62	1962	1963	p.a.	1964	1964/65
0.01 - 119	0.6	0.2	0.3	0.5	0.01- 239	2.6	4.3
120 - 239	3.2	2.4	2.2	0.5	240 - 479	26.9	22.3
240 - 359	19.2	14.6	6.2	6.3	480 - 719	32.0	32.3
360 - 479	24.8	23.8	19.3	15.5	720 - 959	17.6	21.1
480 - 599	16.7	17.9	18.5	15.5	960 -1199	10.4	10.0
600 - 719	12.3	10.6	14.8	12.6	1200 -1439	3.9	4.7
720 - 839	10.1	11.1	10.6	15.0	1440 -1679	3.3	2.5
840 - 959	5.6	6.6	8.2	11.7	1680 -1919	1.6	1680+ 2.7
960 -1079	3.0	4.0	6.7	6.3	1920+	1.6	
1080 -1199	2.0	1.7	3.9	6.8			
1200+	2.5	7.1	9.4	9.2			
TOTAL	100.0	100.0	100.0	100.0		100.0	100.0

TABLE XXXVIII: Calculation of Average Income Values. Source: Bureau of Market Research. Bantu Income and Expenditure Patterns. Sources: p. 124 above

Survey	1960 Pretoria	Benoni	Johannesburg	Cape Town		Durban		1965 Pretoria	P.E./ Uitenhage
Date:	1960/61	1961/62	1962	1963		1964/65		1965	1964/65
	Permanent Residents	Permanent Residents	Permanent Residents	Permanent Residents	Males in hostels	Permanent Residents	Males & Females in hostels	Permanent Residents	Permanent Residents
R per annum Mean income	569.16	634.44	724.08	796.44	529.08	756.96	396.00	766.32	749.40
Disposable Income	8,000,000	6,505,800	47,503,560	7,297,380		17,385,883		14,082,588	16,769,400
+ Taxes	64,000	54,000	376,440	46,380		123,529		113,462	110,940
=Cash Income	8,064,000	6,559,800	47,880,000	7,343,760		17,509,412		14,196,000	16,880,340
+ Income in kind	336,000	75,000	2,176,440	368,160		697,412		932,640	1,200,960
= Total Income	8,400,000	6,634,800	50,056,440	7,711,920	10,581,600	18,206,824	38,016,000	15,128,640	18,081,300
No. of households	15,600	10,750	70,200	9,866		25,406		20,586	25,063
Size of population	98,000	69,000	387,500	57,600	20,000	161,800	96,000	131,750	152,000
Total income per household	538.46	617.19	713.06	781.67		716.63		734.90	721.44
Total income per head of population	85.71	96.16	129.18	133.89	529.08	112.53	396.00	114.83	118.96

TABLE IXL a: Percentage Distribution of Indian and Coloured Households by Income Groups. All Earners.
Sources: p. 124 above

	Indian	Coloured		
R p.a.	Durban	Cape Peninsula	Durban	Port Elizabeth /Uitenhage
	1964/65	1963/64	1964/65	1964/65
0.01 - 249	1.6	2.3	2.2	2.8
240 - 479	11.2	10.2	5.5	11.9
480 - 719	22.1	19.0	9.8	11.7
720 - 959	17.0	16.4	9.9	13.1
960 -1199	13.4	12.6	5.5	14.4
1200 -1439	11.4	11.0	7.7	9.7
1440 -1679	6.2	9.6	8.8	10.0
1680 -1919	4.4	5.2	7.7	9.4
1920 -2159	2.4	4.5	14.3	5.8
2160 -2399	2.1	3.0	9.9	3.1
2400 -2639	2.4	2400+ 6.2	5.5	2400+ 3.1
2640 -2879	1.3		2.2	
2880 -3119	1.1		1.1	
3120 -3359	0.9		3.3	
3360 -3599	0.1		3.3	
3600+	2.4		3.3	
Total	100.0	100.0	100.0	100.0

TABLE IXL b: Calculation of Income Values: Indian and Coloured Race Groups. R per annum. Sources: p. 124 above.

Race Group:	Indian	Coloured		
	Durban	Cape Peninsula	Durban	Port Elizabeth /Uitenhage
Date:	1964/65	1963/64	1964/65	1964/65
Mean household income	1,099.80	1,124.88	1,514.16	1,247.64
Disposable Income	33,443,376	64,053,660	7,473,000	22,624,380
+ Taxes	71,569	1,785,720	277,800	503,100
= Cash Income	33,514,945	65,839,380	7,750,800	23,127,480
+ Income in Kind	16,148	921,000	42,000	236,160
= Total Income	33,531,093	66,760,380	7,792,800	23,363,640
No. of households	30,367	57,229	4,885	17,104
Size of population	203,461	331,927	27,306	80,391
Total income per household	1,104.20	1,166.56	1,595.25	1,365.98
Total income per head of population	164.80	201.13	285.39	290.63

8.6 National Readership Survey - 1962[1]

Table XL shows data both on the personal and racial distribution of incomes in South Africa which were collected by the National Readership Survey of 1962:

TABLE XL: Income Distribution Data Collected by the National Readership Survey, 1962

	Whites	Coloureds	Asiatics	Bantu
No. of informants	10,378	3,497	2,163	5,048
	%	%	%	%
R 1 - 39	2	46	20	89
40 - 59	3	19	22	7
60 - 99	7	19	28	3
100 - 159	16	10	17	1
160 - 199	15	3	5	-
200 - 259	18	2	5	-
260 - 319	12	+	1	-
320 - 399	8	+	1	-
400 - 499	7	+	+	-
500 - and over	12	+	+	-
TOTAL	100	100	100	100
Average claimed Income per month	R258	R60	R91	R25
Annual Household Income	R3,096	R720	R1,092	R300
Est. No. of 'Households' in group (as at 1962)	796,000	262,000	63,000	2,357,000
Total claimed income per race	R2,464m	R189m	R69m	R707m
Each Racial Group as % of TOTAL (100%=R3,429m)	71.9%	5.5%	2.0%	20.6%

1. National Readership Survey by Market Research South Africa, 1962. The Survey was based on 21,086 questionnaires. Information on the concept of income is not available.

SECTION III

STATISTICS ON THE RACIAL DISTRIBUTION OF INCOMES IN SOUTH AFRICA

1. Introduction

The supply of data on the distribution of aggregate income[1] by race in South Africa is scanty. As yet, the Department of Statistics does not officially calculate and publish the distribution by race of the aggregate income.

This is an extraordinary fact, when one considers that the demographic and political classification in South Africa has for long been carried out on a racial basis.

A list of studies of the distribution of aggregate income by race which will be discussed in this section, is given on page 132 below.

1. Aggregate income studies are defined to refer to the gross or net domestic product, or to the net national income, or to the personal or disposable income concepts.

Year	Calculator	Income Concept	Types of Income	Races
1917/18	R. A. Lehfeldt[1]	net domestic income	---	Europeans Non-Europeans
1924/25	A. Spandau[2]	gross domestic product	---	all races
1936	Department of Economics, Natal University College[3]	net domestic income and net national income	---	all races
1939	S. H. Frankel and H. Herzfeld[4]	net domestic income	---	Europeans Non-Europeans
1946/47	F. S. Thirion[5]	net domestic income and net national income	work income and other income	all races
1956/57	A. J. Retief[6]	net domestic income and net national income	work income and other income; cash income and income in kind	all races
1959/60	P. A. Nel[7]	personal and disposable income and their components	work income and other personal income items; cash income and income in kind; urban and rural income;	all races
1960	J. J. Stadler[8]	gross domestic product	work income and other income	all races
1964) 1966)	Department of Statistics[9]	---	work income only	all races

1. R. A. Lehfeldt, The National Resources, ibid., p. 77.
2. Compare paragraph 10 below.
3. Department of Economics, Natal University College, The National Income and the Non-European, Handbook on Race Relations in South Africa, Edited by Ellen Hellmann, Oxford University Press, Cape Town, London, New York, 1949, pp. 306-347.
4. S. H. Frankel and H. Herzfeld, European Income Distribution, ibid., p. 128.
5. Francois Sarel Thirion, Die Indeling van die Volksinkome van die Unie volgens Rassegroepe vir die Jaar 1946/47 - 'n metodiese Studie, unpublished M-Com Thesis, Pretoria, 1955.
6. A. J. Retief, Die Verdeling van die Volksinkome van die Unie volgens Ras, 1956/57, unpublished M. Com. Thesis, Stellenbosch, November 1960.
7. Petrus Abel Nel, Metodes vir die Berekening van Markpotensiaale vir Verbruiksgoedere en die Ontwikkeling van Regionale Algemene Markpotensiaalindekse, unpublished D-Com Thesis, University of South Africa, Pretoria, 1968, (2 Volumes).
8. J. J. Stadler, Die Bruto Binnelandse Produk volgens Rassegroep, ibid.
9. Unpublished data, Department of Statistics, Pretoria.

In dealing with the calculation of income by race for the years prior to 1945, great difficulties are encountered, because the necessary secondary sources on wage and employment data are unavailable in many instances. Compared with the studies which refer to post-war years, little absolute accuracy can therefore be expected from research which refers to years prior to 1945.

The first study which promises to be fairly accurate is that submitted by F. S. Thirion in respect of the year 1946/7. Whereas subsequent studies by A. J. Retief, P. A. Nel, and J. J. Stadler, have been undertaken as private research projects, only the two latter estimates of the distribution of work income by race have been undertaken by the Department of Statistics and are therefore of an official nature. For these studies, it can be regarded as unlikely that the margin of error in the distribution of work income by race is significantly larger than the margin of error which is representative for national income estimates in general. [1]

2. Lehfeldt Estimate, 1917-18

R. A. Lehfeldt submitted the following distribution of income by race for the year ended 30th June, 1918. [2]

TABLE XI L: Estimate of the Distribution of the National Income by Race, 1917-18. £ millions

	Income of Non-Europeans	Income of Whites	Total Income
Farming	11.0	29.3	40.3
Mining	7.4	14.6	22.0
Manufacturing	3.2	19.0	22.2
Transport	0.7	5.3	6.0
Merchanting	-	15.0	15.0
Professions	-	2.4	2.4
Government Service	0.8	10.5	11.3
Domestic Service	5.0	-	5.0
Occupation of Houses	-	13.0	13.0
TOTAL	28.1	109.1	137.2

1. On the magnitude of errors of income estimates, compare Section I, para. 3 p. 3 ff above.

2. R. A. Lehfeldt, The National Resources ..., ibid., p. 77

Lehfeldt corrects his estimate somewhat by writing that "as the farming income of the coloured population does not allow for farms owned by them, outside native locations, the estimate is rather on the low side, and it may be taken, in round figures, that the income of the coloured population is thirty millions leaving one hundred and seven millions to the whites." (See Footnotes 1 and 2)

Using these figures, it is judged that 28 per cent of the total income was earned by Non-Europeans and 72 per cent by Europeans.

3. Department of Economics, Natal University College. Estimate for 1936.

In 1948, the Department of Economics of the Natal University College (in future referred to as "Department of Economics"), submitted an estimate of the national income of Non-Europeans for the year 1936.[3] They contrasted the income values estimated for the different Non-European races with the value of the total national income, as calculated by S. H. Frankel and H. Herzfeld. (See Footnotes 4 and 5)

3.1 The Income Concept

Both Frankel and Herzfeld, and the Department of Economics, based their income calculations on the concept of the net domestic product.[6]

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1. R. A. Lehfeldt, The National Resources ..., ibid., p. 77.
2. In Lehfeldt's terminology, the word "coloured" refers to all Non-Europeans.
3. Department of Economics, The National Income, ibid., p. 306.
4. ibid., p. 321.
5. S. H. Frankel and H. Herzfeld, "An Analysis of the Growth of the National Income of the Union in the Period of Prosperity Before the War", The South African Journal of Economics, Vol. 12, 1944, Appendix A.
6. The terminology was different during the 1940s compared with what it is today, in that both sources claim to calculate the value for the 'national income', but in fact each meant the 'domestic income' concept.
   Compare:
   S. H. Frankel and S. D. Neumark, "Note on the National Income of the Union of South Africa, 1927/28, 1932/33, 1934/35", The South African Journal of Economics, Vol. 8, March, 1940, p. 78.
   Department of Economics, The National Income, ibid., pp. 306, 7. and J. J. Stadler, Die Bruto Binnelandse Produk, ibid., p. 8. Footnote 20.

3.2 Tabulation of Income Data

Table XIIL lists the working population (Non-European races only) and the national income by race, as submitted by the Department of Economics. [1]

The following adjustments are incorporated:-

i. The income of Whites is calculated as a residual.

ii. £443,000 are deducted from the income earned in the sector 'Trade, Finance, Private Transport, and other Services', and added to 'Domestic Service'. This adjustment allows for domestics employed in the catering trade. [2]

iii. The value of food and quarters received by Africans in the mining sector is added to their cash income.

iv. The employment and income data for
(a) government employment schemes and semi-public bodies, and
(b) the value of food and quarters earned in the public sector, have been added to the sector 'Central Government'.

The figures referring to the adjustment of the national income for the contribution made by the rest of the world are taken from A. J. Retief's study. [3]

The reliability of the estimates can be regarded as high as far as the calculation of wage income is concerned, because accurate employment figures were available from the 1936 Occupational Census for all races.

Less reliability can be attached, however, to the distribution of 'other income' by race, which was based on "reasoned estimates". [4]

4. Frankel and Herzfeld Estimate, 1939

In their article entitled European Income Distribution in the Union of South Africa and the Effect Thereon of Income Taxation, S. H. Frankel and H. Herzfeld (as a side product of their investigations) submitted an

1. Department of Economics, ibid., p. 321.
2. ibid., Footnote ae (2), p. 323.
3. A. J. Retief, Die Verdeling..., ibid., p. 113, Ft. 2.
4. Department of Economics, ibid., p. 326.

estimate of the income earned by Non-Europeans during the year 1939/40.

They estimated that the income earned by Non-Europeans was £121,400,000 or 28 per cent of the national income, which was valued at £433,600,000. The income earned by Whites was correspondingly £312,200,000 or 72 per cent of the total national income.[1]

It is clear from their article that the authors possessed income data by race also for the years 1925/26, 1931/32, 1936/37, 1938/39, and 1940/41.[2] Unfortunately, they neither tabulated these estimates, nor did they indicate the method by which they arrived at their results.[3]

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1. S. H. Frankel and H. Herzfeld, European Income Distribution, ibid., p. 128.
2. ibid., p. 127, "B".
3. The writer wrote to Professor Frankel and asked whether he could be supplied with the calculations referred to above and with an indication about the methodology used. (Letter dated 1st May, 1969). In his reply, Professor Frankel remarked as follows:-
   "... You will appreciate that any arbitrary allocation of income to the different races of the joint product of their efforts is really begging the question at issue. The different races are jointly responsible for the net product, and all one can really attempt to do is to discover what the incomes are which they receive and this amount is not necessarily a correct measure of their contribution to the net product.

   ... As regards the original calculation sheets, these would not really help you for the reasons already indicated. Most of them were handed in to the Department of Census and Statistics in Pretoria."
   (Letter dated 19th May, 1969, Nuffield College, Oxford).
   In 1940, Frankel had written in similar terms:- "We have made no attempt to express the National Income produced in relation to particular sections of the community. Such a procedure would be both statistically and theoretically invalid. The National Income is the result of the efforts of all members of the economy. It cannot be defined or dissected on the basis of class, colour, or race."
   S. Herbert Frankel and S. D. Neumark, Note on the National Income ..., ibid., p. 80.
   It is difficult for one to accept the logic of these statements. The calculation of income received is an important and relevant indication of the command over income by different groups of the population.
   It appears that the 'correct measure' of the contribution to the net product by different races, is a question of the theory of income distribution. The marginal productivity theory of income distribution can be regarded as a theoretical tool to solve this issue.

TABLE XIIL: National Income by Race and Working Population 1936
£ thousands.

	Coloureds		Asiatics		Bantu		Whites	National
	number	income	number	income	number	income	income	Income
Farming and Fishing	96,262	3,273	18,056	722	3,096,436	22,369	18,836	45,200
Mining (including wages in kind)	3,370	169	862	42	393,020	17,130	52,559	69,900
Private Manufacturing	30,597	2,516	11,520	786	112,861	4,898	40,600	48,800
Domestic Service	67,270	2,859	6,005	477	353,567	10,807	-	14,143
Trade, Finance, Private Transport, Other Services	56,642	4,086	23,753	3,764	132,639	7,091	91,516	106,457
Total Private Sector	254,141	12,903	60,196	5,791	4,088,523	62,295	203,511	284,500
Local Government	8,210	575	2,500	138	41,348	1,324	6,163	8,200
Provincial Government	2,764	233	819	91	46,748	1,771	9,505	11,600
Central Government	4,407	252	157	15	9,126	1,765	13,668	15,700
SAR & H	7,354	512	534	37	36,645	1,393	26,958	28,900
Total Public Sector	22,735	1,572	4,010	281	133,867	6,253	56,294	64,400
Grand Total	276,876	14,475	64,206	6,072	4,222,390	68,548	259,805	348,900
- Rest of the World						- 7,509	-15,805	-23,314
Net National Income	276,876	14,475	64,206	6,072	4,222,390	61,039	244,000	325,586

5. Thirion Estimate, 1946/47

In 1955, F. S. Thirion presented a calculation of the national income by race for the year 1946/47.[1] He classified the total income in 'salaries and wages' and 'other income'. But for minor deviations his classification of economic activities corresponds closely with that of the Office of Census and Statistics.[2] One of these deviations is that he included domestic servants on farms under the sector 'private households' rather than under 'agriculture'.[3]

Table XIIIL shows Thirion's calculation of the national income by race for the year 1946/47.

6. Retief Estimate, 1956/57

A. J. Retief submitted a study of the distribution of income by race in respect of the year 1956/57 which is comparable in all important aspects of definition with Thirion's calculations. Table XIVL shows the distribution of income according to type of income, and Table XVL the distribution of cash income and income in kind.

7. Nel Estimates

P. A. Nel presented calculations on the distribution of personal income by race and magisterial district in respect of the year 1959/60.[4]

7.1 The Income Concept

Personal income is defined as income "from all sources",[5] "ingeslote oordragte vanaf regeringsliggame, besighede en persone woonagtig in ander gebiede maar uitgeslote oordragte tussen persone woonagtig in dieselfde gebied. Persoonlike besteebare inkome word verkry deur van persoonlike inkome verpligte betalings aan die staat soos inkomstebelasting en werknemers se bydraes tot maatskaplike beveiligingsfondse af te trek."[6]

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1. F. S. Thirion, Die Indeling ..., ibid.
2. For a discussion of Thirion's methods compare: A. J. Retief, Die Verdeling ..., ibid., p. viii.
3. ibid., pp. viii ff.
4. P. A. Nel, Metodes ..., ibid.
5. ibid., Vol. I., p. 95.
6. ibid., Vol. I., pp. 95, 6.

TABLE XIIIL: Net National Income of South Africa According to Race and Industry, 1946/47. Figures in £ thousands.

	Wages & Salaries					Other Income					Total Income				
	Whites	Coloureds	Asiatics	Bantu	Total	Whites	Coloureds	Asiatics	Bantu	Total	Whites	Coloureds	Asiatics	Bantu	Total
1. Agriculture, Forestry, and Fishing	4,637	5,431	258	20,512	30,838	54,417	338	501	15,589	70,845	59,054	5,769	759	36,101	101,683
2. Mining and Quarrying	29,972	195	56	26,048	56,271	36,218	-	-	10	36,228	66,190	195	56	26,058	92,499
3. Manufacturing	62,002	11,278	2,975	27,271	103,526	59,722	106	318	883	61,029	121,724	11,384	3,293	28,154	164,555
4. Trade	45,261	2,245	2,213	9,806	59,525	69,449	210	4,093	396	74,148	114,710	2,455	6,306	10,202	133,673
5. Transport	44,910	2,103	240	9,277	56,530	10,297	76	121	214	10,708	55,207	2,179	361	9,491	67,238
6. Financial Services	10,025	50	25	400	10,500	3,700	-	-	-	3,700	13,725	50	25	400	14,200
7. Fixed Property	-	-	-	-	-	18,706	1,080	834	1,605	22,225	18,706	1,080	834	1,605	22,225
8. Other Private Services	13,344	3,858	1,025	26,091	44,318	23,351	35	140	377	23,903	36,695	3,893	1,165	26,468	68,221
9. General Government	68,798	2,767	583	13,155	85,303	14,028	234	128	1,300	15,690	82,826	3,001	711	14,455	100,993
Net Domestic Product	278,949	27,927	7,375	132,560	446,811	289,888	2,079	6,135	20,374	318,476	568,837	30,006	13,510	152,934	765,287
Minus: Rest of the World	567	-	-	10,731	11,299	44,687	-	-	-	44,687	45,254	-	-	10,731	55,985
Net National Income	278,382	27,927	7,375	121,829	435,512	245,201	2,079	6,135	20,374	273,789	523,583	30,006	13,510	142,203	709,302

TABLE XIVL: Net National Income of South Africa According to Race and Industry, 1956/57, Figures in £ thousands

	Salaries & Wages					Other Income					Total Income				
	Whites	Coloureds	Asiatics	Bantu	Total	Whites	Coloureds	Asiatics	Bantu	Total	Whites	Coloureds	Asiatics	Bantu	Total
1. Agriculture, Forestry, and Fishing	7,994	11,239	1,317	49,701	70,251	183,488	564	540	18,197	202,789	191,482	11,803	1,857	67,898	273,040
2. Mining and Quarrying	70,709	543	105	43,341	114,698	132,622	7	3	-	132,632	203,331	550	108	43,341	247,330
3. Manufacturing	182,836	31,288	9,045	75,956	299,125	159,192	162	366	70	159,790	342,028	31,450	9,411	76,026	458,915
4. Trade	108,724	5,521	5,154	21,801	141,200	91,053	272	8,772	503	100,600	199,777	5,793	13,926	22,304	241,800
5. Transport	100,110	5,323	727	18,340	124,500	24,314	1,140	670	4,043	30,167	124,424	6,463	1,397	22,383	154,667
6. Financial Service	34,765	138	-	731	35,634	32,124	58	420	8	32,610	66,889	196	420	739	68,244
7. Fixed Property	106	1,212	113	5,812	7,243	35,490	1,273	1,113	2,970	40,846	35,596	2,485	1,226	8,782	48,089
8. Other Private Services	33,887	12,005	3,433	54,559	103,884	70,873	243	1,311	430	72,857	104,760	12,248	4,744	54,989	176,741
9. General Government	161,490	11,226	2,268	39,443	214,427	36,199	2,058	901	8,392	47,550	197,689	13,284	3,169	47,835	261,977
Net Domestic Product	700,621	78,495	22,162	309,684	1,110,962	765,355	5,777	14,096	34,613	819,841	1,465,976	84,272	36,258	344,297	1,930,803
Minus: Rest of the World	2,192	-	-	17,208	19,400	190,300	-	-	-	190,300	192,492	-	-	17,208	209,700
Net National Income	698,429	78,495	22,162	292,476	1,091,562	575,055	5,777	14,096	34,613	629,541	1,273,484	84,272	36,258	327,089	1,721,103

TABLE XVL: Distribution of Wages and Salaries, Income According to Type of Income Receipt, 1956/57, Figures in £ thousands

	Cash Income					Income in Kind					Total Wages and Salaries				
	Whites	Coloureds	Asiatics	Bantu	Total	Whites	Coloureds	Asiatics	Bantu	Total	Whites	Coloureds	Asiatics	Bantu	Total
1. Agriculture, Forestry, and Fishing	7,242	8,749	992	37,154	54,137	752	2,490	325	12,547	16,114	7,994	11,239	1,317	49,701	70,251
2. Mining and Quarrying	70,709	516	104	32,971	104,300	-	27	1	10,370	10,398	70,709	543	105	43,341	114,698
3. Manufacturing	181,373	30,819	8,910	73,676	294,778	1,463	469	135	2,280	4,347	182,836	31,288	9,045	75,956	299,125
4. Trade	108,475	5,475	5,077	21,297	140,324	249	46	77	504	876	108,724	5,521	5,154	21,801	141,200
5. Transport	99,691	5,122	708	16,933	122,454	419	201	19	1,407	2,046	100,110	5,323	727	18,340	124,500
6. Financial Services	34,765	138	-	731	35,634	-	-	-	-	-	34,765	138	-	731	35,634
7. Fixed Property	47	535	50	2,565	3,197	59	677	63	3,247	4,046	106	1,212	113	5,812	7,243
8. Other Private Services	32,579	7,008	2,819	30,502	72,908	1,308	4,997	614	24,057	30,976	33,887	12,005	3,433	54,559	103,884
9. General Government	161,490	10,507	2,097	36,808	210,902	-	719	171	2,635	3,525	161,490	11,226	2,268	39,443	214,427
Total: Salaries & Wages	696,371	68,869	20,757	252,637	1,038,634	4,250	9,626	1,405	57,047	72,328	700,621	78,495	22,162	309,684	1,110,962

Nel distinguished the four following components of income:-

i. Income from Employment

This includes cash income and income in kind,[1] prior to the deduction of taxes and employees' contributions to social insurance funds.[2]

ii. Income from Self-Employment (Proprietors' Incomes)

This comprises the net trading profit of unincorporated businesses, farming, and professional establishments.[3]

iii. Property Income

This consists of net rents, dividends, and interest. Rents originate from the ownership of fixed property and include imputed rents on owner-occupied houses. The rent is valued as gross rent less expenditures on maintenance and depreciation.[4]

iv. Transfer Incomes

These income items are derived from grants and other benefits to which individuals may be entitled.[5]

7.2 The Income Recipient Units

Three income recipient units are distinguished, viz., households, funds, and non-profit making organizations.[6]

The incomes of funds, which consist of long-term insurance, pension, trust and mutual assistance funds[7] are included in

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1. For a definition of 'income in kind', compare P.A. Nel, Metodes..., ibid., Vol. I, pp. 96, 7.
2. ibid., Vol. I, p. 103.
3. ibid., Vol. I, p. 104.
4. ibid., Vol. I, pp. 105, 6.
5. ibid., Vol. I, p. 101.
6. ibid., Vol. I, p. 100.
7. "Indien die fondse ook 'n aparte sektor sou verteenwoordig, beteken dit dat alle betalings deur huishoudings aan hierdie fondse van hulle inkome afgetrek sou moes word en uitbetalings uit die fondse aan huishoudings weer bygetel moet word. Dit sou tot gevolg hê dat die inkome van spaar- en sekuriteitsbewuste groepe sal verminder omdat hulle meer in dié fondse inbetaal as wat hulle daaruit ontvang. Dit sal nie korrek wees om byvoorbeeld die inkome van Blankes relatief te verlaag omdat hulle meer spaar- en sekuriteitsbewus as die nie-Blankes is nie."
ibid., Vol. I., p. 100 (no underlining in the original).

Nel's computations, whereas the income of non-profit making organisations is excluded because it was found impossible to distribute the income of these recipients by race.

7.3 Method and Sources

Nel used the 'direct method' for his computations. According to this method, the necessary information is obtained "from secondary (or even primary) statistical sources and calculated as the sum total of the current income of real individuals during a specific period."[1]

The regional distribution of net rents, dividends and interest was provided by the Secretary for Inland Revenue.[2]

7.4 Tabulation of Results

Tables XVIL to LII show certain of Nel's computations, together with a breakdown of the economically active population during 1960, which is derived from information provided by the Bureau of Statistics.[3] All extracts refer to the Republic of South Africa.

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1. P. A. Nel and C. de Coning, The Regional Distribution of Purchasing Power in the Republic of South Africa, Bureau of Market Research, Research Report No. 10, Pretoria 1965, pp. 20 ff.
2. P. A. Nel, Metodes, ibid., Vol. I, pp. 114, 5.
3. Sources to Tables XVIL to LII

Table XVIL	P. A. Nel, Metodes..., ibid., Vol. I, Tables L-LVII, pp. 352-359.
Table XVIIL	South African Statistics, 1968, ibid., H-8, 9.
Table XVIIIL	P. A. Nel, Metodes..., ibid., Vol. I, Tables LVIII-LXI, pp. 360-363.
Table IL	ibid., Vol. I, Table LXII, p. 365.
Table L	ibid., Vol. I, Table LXV, p. 369.
Table LI	ibid., Vol. 1, Table LXV, p. 369.
Table LII	ibid., Vol. 1, Table LXIV, p. 368.

TABLE XVIL: Work Income and Proprietors' Income by Race, 1959/60, Rand thousands

	Whites		Coloureds		Asiatics		Bantu	
	Work Income	Proprietors'Income	Work Income	Proprietors' Income	Work Income	Proprietors' Income	Work Income	Proprietors' Income
Agriculture, Forestry, Hunting & Fishing	20,680	312,928	26,119	5,876	1,508	2,635	83,888	93,494
Mining & Quarrying	150,935	2,852	1,739	21	738	70	119,988	-
Manufacturing, Construction, Electricity, Gas and Water	391,987	24,780	66,370	569	18,377	904	156,739	8,170
Transportation, Storage, and Communications	254,849	5,724	10,494	249	1,591	317	39,877	2,050
Wholesale and Retail Trade	254,272	57,666	16,067	938	10,692	11,353	56,050	9,489
Financial Institutions	92,297	7,263	1,137	-	152	-	2,833	-
Fixed Property	9,074	3,460	843	11	104	60	6,081	-
General Government Services	293,619	-	25,773	-	7,308	-	77,628	-
Other Services	119,648	98,498	28,711	2,261	6,170	1,481	135,950	31,684
Total	1,587,361	513,171	177,253	9,925	46,640	16,820	679,034	144,887

TABLE XVIIL: Economically Active Population by Race and Industry Divisions, 1960 [1]

	Whites	Coloureds	Asiatics	Bantu
1. Agriculture, Forestry, Fishing	119,312	120,258	10,847	1,438,835
2. Mining & Quarrying	61,748	4,489	595	548,317
3. Manufacturing, Construction, Electricity, Gas & Water	293,651	136,127	34,248	495,823
4. Transport, Storage & Communication	115,873	16,648	3,750	68,860
5. Wholesale & Retail Trade	194,690	41,079	28,383	166,377
6. Financial Institutions	52,257	2,039	363	6,262
7. Fixed Property	8,701	1,378	226	16,190
8. General Government Services	87,596	11,339	2,568	71,841
9. Other Services	172,685	132,935	20,924	749,311
10. Total	1,106,513	466,792	101,909	3,561,816
11. Unemployed and Unspecified	44,538	87,147	23,949	328,196
12. Economically Active Population	1,151,051	553,939	125,858	3,890,012

Line 5, 'Wholesale and Retail Trade', includes 'Motor Trade'.
Line 6, 'Financial Institutions', comprises 'Banks and 'FinancialInstitutions', 'Insurance', 'General 'FinancialAgencies', and 'Company Direction'.
Line 7, 'Fixed Property', comprises 'Real Estate Developers and Operators' and 'Estate Agencies'.
Line 8, 'General Government Services', comprises 'Government' only.
Line 9, 'Other Services' comprise all business, recreational and personal services, including education.
Line 12, South African statistics include 'Unemployed and Unspecified' persons in the 'Economically Active Population'.

1. South African Statistics, 1968, ibid., H-819.

TABLE XVIIIL: Personal Income According to Type of Income, 1959/60, R thousand

	Whites	Coloureds	Asiatics	Bantu
1. Work Income	1,587,361	177,253	46,640	679,034
2. Proprietors Income	513,171	9,925	16,820	144,887
3. Property Income	423,243	6,141	6,978	6,655
4. Employers' Contributions to Social Insurances	76,808	1,203	247	-
5. Transfer Payments	131,144	19,198	5,174	49,219
6. Interregional and -national Transfer Payments from & to Persons	- 1,200	-	-	- 14,300
7. Personal Income	2,730,527	213,720	75,859	865,495
8. Direct Taxation	- 142,970	- 1,615	-2,040	- 7,986
9. Personal Disposable Income	2,587,557	212,105	73,819	857,509

TABLE IL: Personal Income According to Cash Income and Income in Kind, 1959/60, R thousand

	Whites	Coloureds	Asiatics	Bantu
Cash Income	2,421,470	176,961	67,762	579,733
Income in Kind	309,057	36,759	8,097	285,762
Total Income	2,730,527	213,720	75,859	865,495

TABLE L: Personal Income According to Urban and Rural Districts, 1959/60, R thousand

	Whites	Coloureds	Asiatics	Bantu
Urban Income	2,309,201	179,320	70,468	593,575
Rural Income	421,326	34,400	5,391	271,920
Total Income	2,730,527	213,720	75,859	865,495

TABLE LI: Per Capita Personal Disposable Income According to Race and Urban and Rural Districts, 1959/60, Figures in Rand

	Whites	Coloureds	Asiatics	Bantu
Urban Districts	847.6	172.6	172.7	169.4
Rural Districts	787.9	71.4	65.6	36.1
Total	837.3	140.5	154.7	78.5

TABLE LII: Percentage Distribution of the Total Disposable Income by Race, 1959/60

	Per Cent of Total Disposable Income
Whites	69.3
Coloureds	5.7
Asiatics	2.0
Bantu	23.0
TOTAL	100.0

8. Stadler Estimate, 1960

Table LIII shows Stadler's estimate of the gross domestic product by race for the year 1960 in R thousand. [1]

9. Department of Statistics-Estimates for 1964 and 1966

For the years 1964 and 1966, the writer has been supplied with unpublished estimates of the wage income according to race and industry by the Department of Statistics, Pretoria. The valuations are comparable with the valuations furnished by Professor Stadler. (See Footnotes 2 and 3)

The data are shown in Table LIV.

1. Compare Section II, footnote 4, p. 28 above.
2. The writer gratefully acknowledges receipt of these unpublished statistics.
3. Letter received by Mr J. Moll, Assistant Director, Bureau of Statistics, dated 18th March, 1969.

TABLE LIII: The Gross Domestic Product of South Africa According to Economic Sectors and Race, Figures in R thousands , 1960

Economic Sector	Work Income					Other Income					Total				
	Whites	Coloureds	Asiatics	Bantu	Total	Whites	Coloureds	Asiatics	Bantu	Total	Whites	Coloureds	Asiatics	Bantu	Total
Agriculture, Forestry, Fishing	24, 174	26, 401	1, 386	95, 265	147, 226	383, 605	6, 173	3, 163	61, 010	453, 951	407, 779	32, 574	4, 549	156, 275	601, 177
Mining & Quarrying	164, 533	2, 333	314	123, 150	290, 330	364, 531	209	146	802	365, 688	529, 064	2, 542	460	123, 952	656, 018
Manufacturing	349, 129	56, 245	18, 434	134, 451	588, 259	353, 436	571	2, 177	7, 191	363, 375	702, 565	56, 816	20, 611	141, 642	921, 634
Construction	63, 892	14, 262	728	33, 071	111, 953	21, 784	554	164	278	22, 780	85, 676	14, 816	892	33, 349	134, 733
Electricity, Gas, & Water Supply	26, 315	1, 879	60	7, 103	35, 357	79, 994	1, 033	418	4, 400	85, 845	106, 309	2, 912	478	11, 503	121, 202
Transport, Storage, & Communication	273, 346	9, 635	1, 579	40, 225	324, 785	148, 257	3, 823	1, 964	14, 645	168, 689	421, 603	13, 458	3, 543	54, 870	493, 474
Trade	278, 161	16, 785	12, 136	59, 182	366, 264	247, 348	1, 462	16, 202	4, 376	269, 388	525, 509	18, 247	28, 338	63, 558	635, 652
Financial Services	108, 347	1, 266	186	3, 307	113, 106	62, 554	213	1, 556	44	64, 367	170, 901	1, 479	1, 742	3, 351	177, 473
Fixed Property	9, 074	761	112	6, 155	16, 102	179, 714	3, 359	3, 067	6, 168	192, 308	188, 788	4, 120	3, 179	12, 323	208, 410
General Government	292, 981	27, 282	6, 776	74, 286	401, 325	43, 070	2, 204	892	9, 395	55, 561	336, 051	29, 486	7, 668	83, 681	456, 886
Other Private Services	118, 653	27, 022	6, 271	146, 242	298, 188	143, 708	1, 757	2, 255	30, 483	178, 203	262, 361	28, 779	8, 526	176, 725	476, 391
Total	1, 708, 605	183, 871	47, 982	722, 437	2, 662, 895	2, 028, 001	21, 358	32, 004	138, 792	2, 220, 155	3, 736, 606	205, 229	79, 986	861, 229	4, 883, 050

TABLE LIV: Remuneration of Employees According to Race By Industry, R Million

	1964					1966				
	Whites	Coloureds	Asiatics	Bantu	Total	Whites	Coloureds	Asiatics	Bantu	Total
1. Agriculture, Forestry, Hunting & Fishing	21.6	29.2	1.7	103.1	155.6	22.2	30.5	1.7	108.4	162.8
2. Mining & Quarrying	187.1	3.1	0.5	145.6	336.3	214.0	3.9	0.5	161.5	379.9
3. Manufacturing	525.7	86.5	29.4	206.7	848.3	686.0	113.6	38.9	261.0	1,099.5
4. Construction	100.4	20.6	0.9	58.0	179.9	136.6	29.4	3.4	78.2	247.6
5. Electricity, Gas & Water Supply	32.8	2.7	0.1	9.8	45.4	40.5	3.1	0.1	13.5	57.2
6. Transport, Storage & Communication	361.5	12.9	2.1	57.4	433.9	435.9	16.2	2.6	72.3	527.0
7. Wholesale & Retail Trade	352.6	21.4	15.2	75.4	464.6	398.3	24.9	17.5	112.6	553.3
8. Financial Services	146.2	1.0	0.7	5.1	153.0	190.8	1.6	0.6	6.9	199.9
9. Fixed Property	15.4	1.0	0.2	9.1	25.7	14.4	1.1	0.2	11.0	26.7
10. Other Services	161.2	20.0	7.7	210.9	399.8	191.4	24.7	10.6	249.9	476.6
11. General Government	403.3	36.9	9.7	97.3	547.2	497.3	42.9	12.7	114.9	667.8
Total	2,307.8	235.3	68.2	978.4	3,589.7	2,827.4	291.9	88.8	1,190.2	4,398.3

10. Calculation of the Distribution of Income by Race: 1924-25

10.1 Introduction

The earliest well-documented estimate of the distribution of income by race and type of economic activity was submitted by the Department of Economics of the Natal University College, covering the year 1936. The accuracy of this estimate was enhanced by its reliance on the results of the 1936 Occupational Census.

Since this thesis deals with the long-term development of the South African economy, there was a clear need for more information on the distribution of income by race for a year earlier than 1936. Basically, a choice had to be taken between one of the following: -

i. to calculate the income by race for the year 1921, when an occupational census of all races was taken;

ii. to estimate the income distribution by race for the year 1924-25, when a large volume of information on wage rates was supplied by the Economic and Wage Commission, 1925. For the same year there exists also a tabulation of the number of farm labourers by race and magisterial district, submitted by the 8th Agricultural Census.

The decision to estimate the distribution of incomes by race for the year 1924/25 was based on the arguments

that (i) the time period between the years 1921 and 1936 (15 years) would have been too long to make a comparison of the distribution of income by race significantly meaningful; and (ii) 1921 was the immediate year before the great industrial unrest of 1922, and would therefore have been an unsuitable year on which to base a laborious calculation of the South African income by race.[1]

The year 1924-25, on the other hand, offers itself for analysis as a representative of the "good times 1924-1930." To quote Eric A. Walker: -

"Year after year the proceeds of the customs outran the sanguine estimates; the last of the good years yielded substantial surpluses both to the Treasury and the railways, and '... to-morrow shall be as this day, and much more abundant.' "[2]

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1. Wages and salaries, particularly of White mine workers, had risen phenominally by 1921 and had shrunk during the ensuing two or three years. C. W. de Kiewiet gives the following account of the situation: "... gold prices fell from 130s per ounce in February 1920 to 95s in December. And with the crisis in gold came depression and all its evils ... The expenditure of the Union and Provincial Governments had doubled since 1914. Commodity prices, wages, railway rates, and taxes had all risen. ... Retrenchment in the towns was matched by crop failure on the farms."
C. W. de Kiewiet, A History of South Africa, Social and Economic, Oxford University Press, London, 1957, pp. 169, 170.

2. Eric A. Walker, A History of Southern Africa, Longmans, London, New York, Toronto, 1957, p. 609.

TABLE LV: Union of South Africa, Gross Domestic Product by Type of Economic Activity and Type of Income, Year Ended 30th June, 1925, £1,000

	Wage Income	Other Income	Total Income
Agriculture and Forestry			
a. private	15,694	41,125	57,080
b. government forestry	261		
Fishery and Government Guano Islands			
a. fishery	278	55	333
b. gov. guano islands	23	28	51
Mining and Quarrying	22,549	23,178	45,727
Manufacturing			
a. private	10,280	9,183	19,463
b. public	184	76	260
Construction	3,344	1,135	4,479
Electricity, Gas, and Water			
a. private	521	378	899
b. public	835	1,616	2,451
Transport, Storage, and Communication			
a. SAR & H	14,158	7,537	21,695
b. Other public enterprises	484	125	609
c. Private Transport	1,203	723	1,926
d. Post, Telegraph, Telephone	2,340	916	3,256
Trade			
a. private	17,500	21,350	38,850
b. public	98	65	163
Financial Services and Fixed Property			
a. private	3,800	3,100	6,900
b. public	77	356	433
Imputed Rents			
a. private - urban areas		8,514	8,514
b. private - rural areas		4,450	4,450
c. rooms, etc.	145	707	852
Central Government	7,815	1,267	9,082
Provincial Administrations	6,352	780	7,132
Municipalities	3,559	287	3,846
Private Services:-			
a. Education	970	394	1,364
b. Medical Services	424	3,134	3,558
c. Other Public Services	1,254	784	2,038
d. Occupational Services	1,679	4,401	6,080
e. Recreational Services	826	495	1,321
f. Domestic Services	9,458		9,458
g. Hotels and Restaurants	2,685	2,334	5,019
h. Other Personal Services	484	271	755
	129,280	138,764	268,044

10.2 Availability of Information

The data provided by the 1921 Occupational Census for all races were, to a certain extent, extrapolated to the year 1924/25, whenever no alternative employment data were available. In the case of teachers, use was also made of the 1936 Occupational Census in order to estimate the number of teachers in 1924-25.

Frequent use was made of government reports, both of a regular nature (such as the Agricultural, and Industrial Censuses, the Government Mining Engineer's Reports, and various Estimates of Government Expenditure), and of an occasional nature (such as the Asiatic, Native, and Cape Coloured Inquiry Commissions prior to World War II).

A certain amou nt of primary data was secured through a study of the Archives of the Economic and Wage Commission at Pretoria. This Commission,which sat in 1925, collected primary data material on wage rates by addressing "a circular to the magistrates in a number of selected districts asking for particulars of wages paid in their districts." (See Footnotes 1 and 2) Over and above, the Commission examined numerous witnesses from many quarters of the population and minuted their evidences.

10.3 Value of Gross Domestic Product, Year Ended 30th June, 1925.

The calculation of the income by race for the year ended 30th June, 1925, was based on J. J. Stadler's estimate of the

1. U.G. 14-1926, Report of the Economic and Wage Commission 1925, para. 8, p. 10.
2. The circular letter asked for the following information:-
   1. Wage Rates:
      (a) European Males (13 occupations);
      (b) European Females (13 occupations);
      (c) Non-European Males and Females (13 occupations):-
         i. Natives;
         ii. Asiatics;
         iii. Mixed and Other Coloureds;
   2. Proportionate Numbers:
      An estimate of the extent to which occupations of various kinds, including those mentioned, are carried on by Europeans and by non-Europeans respectively in the magisterial district.
   3. Opportunities for Juveniles.
   4. Wage and Labour Conditions.

Source: Government Archives, Pretoria, Economic and Wage Commission 1925, Vol. 15, L.D. 1747/3.

gross domestic product for that year.

Table LV shows the distribution of the gross domestic product by type of economic activity and type of income, for the year ended 30th June, 1925, as submitted by J. J. Stadler. (See Footnotes 1 and 2)

10.4 Method of Calculating the Income by Race for the Year 1924-25

The income by race for the year 1924-25 was calculated sector by sector. In most cases only the incomes of the three non-European races were individually determined. The income of Whites was then the difference between the total income and that portion of income which was allocated to Non-Europeans. In the case of agriculture, the 'income-produced-method' of income calculation had to be used. For all other sectors, the 'income-received-method' was employed.

10.5 Submission of Calculations

10.5.1 Agriculture

10.5.1.1 Wage Income

The 8th Agricultural Census, 1924-25, enumerated the "number of regular workers on farms, including occupiers", as at 31st August, 1925.[3] The term 'occupier' was defined by the Census in order to include the holder or farmer and any relatives who were employed in actual farming operations. The definition of an 'occupier' did not cover domestic

1. J. J. Stadler, Die Bruto Binnelandse Produk van Suid-Afrika, 1911-1959, ibid.
   Table III, p. 178, for agriculture and forestry;
   Table IV, p. 194, for fishery and government guano islands;
   Table VII, p. 237, for mining and quarrying;
   Table VIII, p. 261, for manufacturing;
   Table X, p. 289, for construction;
   Table XI, p. 291, for electricity, gas, and water;
   Table XIII, p. 302, for transport, storage, and communication;
   Table XV, p. 354, for trade;
   Table XVII, p. 366, for financial services and fixed property;
   Table XIX, p. 391, for imputed rents;
   Table XX, p. 410, for central government;
   Table XXI, p. 435, for provincial administrations;
   Table XXIV, p. 456, for municipalities;
   Table XXVI, p. 476, for private services.
2. Table LV, p. 152 above.
3. U. G. No. 13-1927, Table 30, pp. 165-168.

servants,[1] bywoners,[2] and labour tenants.[3]

The employment data collected by the 8th Agricultural Census covered only workers on farms possessed by White, Coloured, or Asiatic persons. The number of workers on Bantu farms and on Bantu Reserves were not included in the Census.[4]

The number of regular farm labourers including occupiers, as at 31st August, 1925, was as follows:[5]

Whites:	Males	138,186
	Females	22,499
	Total	160,685
Asiatics:	Males	14,052
	Females	2,451
	Total	16,503
Coloureds:	Males	62,030
	Females	14,762
	Total	76,792
Natives:	Males	341,343
	Females	93,842
	Total	435,185
Total:	Males	555,611
	Females	133,554
Grand-Total		689,165

During the pre-World War II period, the diversity of wage rates in farming was extraordinary. It is reported that wage rates

1. Letter received by Mr Moll, Assistant Director, Department of Statistics, Pretoria, dated 13th February, 1970.
2. Although on the decline, the bywoner was still often found in 1924-25: -"He is the natural product of the increase of population in a self-contained, almost patriarchal, pastoral community. He finds support for himself in the produce he is enabled to raise with his patron's assistance on land assigned to him ... while... his patron ... secures a number of white assistants." (not underlined in the original), U.G. 14, 1926, ibid., para. 181,p.106.
3. Labour tenancy is a system "... the main feature of which ... is giving of services for a certain period in the year to the farmer by the Native and/or his family in return for the right to reside on the farmer's land, to cultivate a portion of land, and to graze his stock on the farm". U.G. No. 22-1932, Report of Native Economic Commission, 1930-1932, para. 355, p. 51. (The word "Native" is not underlined in the original).
   In the ensuing calculations, the incomes received by bywoners and labour tenants will be regarded as 'other income'.
4. Compare definitions given in Union Statistics for Fifty Years, Jubilee Issue, ibid., G-32.
5. U.G. 13-1927, ibid., Table 30, pp. 165-168.

often varied even between neighbouring farms.[1] The following causes of the diversity were observed by the Cape Coloured Commission Report in 1937:-

"Differences in the general economic position of the various types of farming ... influence the wages of the individual labourer; ... Closely connected with differences in the type of farming are regional differences. Related to regional differences are also variations in the distances from, and accessibility to, other types of employment, e.g., urban and industrial employment ... . Moreover, difficulties in the way of the labourer reaching and obtaining employment in other labour markets help to perpetuate traditional wage levels in parts of the country distant from those in which higher wage levels obtain." (See Footnotes 2 and 3)

In order to determine the total wage income earned in agriculture, the number of Native, Coloured, and Asiatic wage earners in particular magisterial districts, was multiplied by wage rates which were established from the evidence collected by the Economic and Wage Commission, 1925.[4] Regional differences in wage rates were thus taken into account. It was possible to determine, separately for males and females, 32 different wage rates for Native, 4 for Coloured, and 7 for Asiatic farm labourers. The location of magisterial districts for which such wage rates were available, were then marked on an agro-economic map of South Africa.[5] On the assumption that the type of farming - rather than the geographical vicinity - determined the character and value of

1. Sheila T. van der Horst, Labour, in : Handbook on Race Relations in South Africa, Edited by Ellen Hellmann, Oxford University Press, Cape Town, London, New York, 1949, p. 125.
2. U.G. 54-1937, Cape Coloured Commission of Inquiry Report, para. 423, p. 76.
3. Contrary to the above account, A. M. Keppel-Jones maintains that a certain element of constancy persisted in agricultural wage rates: "There remains the cash wage, which during the period 1913-39 seems to have remained fairly constant at a range of 10s to 15s per month for adult men and from 5s to 10s for women and boys."
A. M. Keppel-Jones, "The Economic Status of the Cape Province Farm Native", The South African Journal of Economics, Vol. 3, March 1935, p. 68.
4. U.G. No. 14-1926, ibid., pp. 13-16. The Commission collected evidence of farm wages in respect of 12 magisterial districts in the Cape Province, 7 in the Natal Province, 8 in the Orange Free State, and 8 in the Transvaal. Some of the evidence was tabulated in the final report, but a portion of it was found in the Archives to the Commission.
5. Department of Agriculture, Agro-Economic Survey of the Union, Economic Series No. 34, Survey Conducted and Data Compiled by the Division of Economics and Markets, the Government Printer, Pretoria, 1948, Plate VI, Agro-Economic Map of South Africa, 1:5,000,000.

wage payments, the wage rates available were regarded as representative for particular agro-economic regions, insofar as no direct information was available for such regions. Native wage rates were available for instance for Frankfort (which is situated in the Dryland and Dairy Farming Area) and Harrismith (which is situated in the Drakensberg Grazing Area). No information was available for the district Vrede, which, although situated in nearer vicinity to Frankfort than to Harrismith, shares with the latter district the same agro-economic use of the soil. It was therefore decided to take the wage rate persisting in Harrismith as representative for Vrede. This was done for all magisterial districts in the Union, separately for the three Non-European races.

The total wage income earned by Non-Europeans, excluding Bantu labour tenants, during the year 1924-25, was then as follows:

	£1000
Coloureds	2,692
Asiatics	386
Bantu	8,544
Total Non-Europeans	11,622

According to Stadler, the total wage income earned in agriculture was £15,694,000 which means that £4,072,000 were earned by White employees during the period under consideration.

10.5.1.2 Other Income

The calculation of 'other income' earned in agriculture was based on the 'income produced', rather than the 'income received', method.

(i) Other Income Earned by Bantu

The estimate of 'other income' that accrued to Natives during the year 1924-1925 is as follows:

	£
Income derived from agricultural crops	
- Cereal	4,373,713
- Non-cereal	236,728
Income derived from livestock	
- Slaughter stock	5,973,266
- Livestock losses	548,160
- Changes in stock	59,801
Income derived from pastoral products	
- Wool and mohair	1,185,192
- Hides and skins	75,373
- Milk	456,250
Income derived from poultry	
- Slaughtered poultry	161,681
- Eggs	793,108
Total	13,863,272

Sources

a) Cereal and non-cereal agricultural crops

Quantities produced:

U.G. No. 13-1927, 1924-25 Agricultural Census, Table 19, pp. 127-133 and Table 3, p. 105, for the production of maize, kaffir corn, tobacco, potatoes, ground nuts, and wheat.
Special Report No. 49, Office of Census and Statistics, Agricultural Census, 1925-26, Table III, pp. 4, 5, for oats, dried beans, and dried peas. All quantities were diminished by 10 per cent in order to provide for seed.

Prices:

Official Year Book of the Union and of Basutoland, Bechuanaland Protectorate and Swaziland, No. 11, 1928-29, p. 441.
These are wholesale or open market prices. All prices were reduced by 5 per cent to provide for the inferior quality of production undertaken by Africans, as well as for the cost of marketing.

b) Income derived from livestock

i. Slaughter Stock

There are no direct statistics available which refer to the quantity of slaughter stock, other than frequent accounts that Natives had the habit of conserving their stocks for religious reasons. *
It was therefore necessary to estimate the average life-time of stock ** and the weight of the carcases.** These data were then set in relation to the quantity of stock held by Natives. ***

* Compare U. G. No. 22-1932, Report of Native Economic Commission (Holloway Report), 1930-32, para. 92, p. 14.

** The writer is indebted to Dr S. H. Stampa for helpful advice and comment.

*** U.G. 13-1927, ibid., pp. 36, 7.

The prices for beef and mutton are the weighted average retail prices in nine towns, devalued by 33⅓ per cent for inferior quality and costs of marketing.
Pigs were valued at £1 per piece. Source: Official Year Book, No. 9, 1926-27, p. 261.

ii. Livestock Losses

This provides for the custom of Natives to consume the meat of livestock which died for one reason or another.
The quantity of livestock losses was taken from U.G. No. 13-1927, ibid., Table 15, p. 110.
The price was taken as 1/3 of the average price for beef and mutton.

(continued p. 157)

Sources (continued ...)

iii. Changes in Stock

Following a proposal made by J. J. Stadler, the physical changes in stock were valued according to the average prices ruling during the year.
J. J. Stadler, The Gross Domestic Product of South Africa, ibid., p. 189.
The livestock as at 31st August, 1924, was established from U. G. No. 4-1926, Table 5, p. 46, and Table 18, pp. 83-86.
The number of sheep and goats is reported in U. G. No. 31-1940, 18th Agricultural Census, Table ii, p. 17.

c) Income derived from Pastoral Products

i. Wool and Mohair
U. G. No. 13-1927, ibid., pp. 46, 7, and Table 15, p. 110.
Provision was made for the quantity of wool pulled from slaughtered or dead sheep.
The market price was reduced by 5 per cent.
Source: Official Year Book, No. 11, 1928-29, p. 652.

ii. Hides and Skins

Special Report No. 49, ibid., for quantity.
Official Year Book, No. 11, 1928, 29, p. 650, for prices.

iii. Milk
The estimate for quantity was based on the evidence given by Mr R. W. Thornton, the Director of Native Agriculture to the Native Economic Commission. His estimate was that 1/4 gallon milk was produced per family unit of 5 per day. 200,000 family units were assumed to have produced milk. The price of milk was taken as 6d per gallon.
Sources: U. G. 22-1932, ibid., para. 47, p. 8, para. 92, p. 14, and pp. 274-277 (Evidence by Thornton).

d) Poultry

Special Report No. 49, ibid., p. 8, for quantities.
As a price, 13d per lb of poultry was assumed (Estimate Dr Stampa).
Official Year Book, No. 9, 1926-7, ibid., p. 261, for the price of eggs.

(ii) Other Income Earned by Asiatics

In 1925, Asiatics held some 89, 960 acres of land in Natal and Zululand.[1] The total number of farms in the hands of Asiatics was 2, 546.[2]

After sugar growing, market gardening played the most important role in the production of income from agriculture.[3] For the year 1924/25, it is reported by the 8th Agricultural Census that Asiatic production of sugar can amounted to some 6 per cent of the total production. The latter was given as 1, 616, 210 tons.[4] This quantity was produced on 279, 972 acres under sugar.

The ruling price was £0. 875 per ton of sugar cane.[5] On the assumptions that

i. the productivity of sugar production undertaken by Europeans was equal to that undertaken by Asiatics, and

ii. that the land yield of all agriculture undertaken by Asiatics, was equal to the average land yield on sugar plantations,[6] it is estimated that the total other income earned by Asiatics in agriculture was £500, 000 during 1924/25.

(iii) Other Income Earned by Coloureds

In 1925, there were some 8, 000 Coloureds in Coloured Reserves who farmed in their own right under the control of mission stations.[7]

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1. Office of Census and Statistics, Special Report No. 39, The Indian Population of the Union, 1926, Pretoria 1926, p. 8.
2. ibid., p. 9
3. It is reported that "by 1904, it was estimated that there were 7, 000 gardeners cultivating 50, 000 acres, 20 per cent of their land being owned outright." Department of Economics of the University of Natal, Studies of Indian Employment in Natal, Natal Regional Survey, Vol. 11, Oxford University Press, Cape Town, London, New York, 1961, p. 13.
4. U. G. No. 13-1927, ibid., p. 33.
5. Official Year Book, No. 11, ibid., p. 441.
6. There is the following evidence on the interchangeability of land between vegetable and sugar production: "Originally they (i. e., the small Indian farmers) acquire waste land, and, after cultivating and developing it, they eventually dispose of it at a good price to European sugar planters..." U. G. No. 4-1921, Report of the Asiatic Inquiry Commission, (Lange Report), para. 156, p. 42.
7. U. G. No. 54-1937, Report of the Commission of Inquiry Regarding Cape Coloured Population of the Union, para. 410, p. 73, and para. 407, p. 72.

Their farms are reported to have been "small and poorly developed[1] ... and although there were ... a few comparatively well-to-do men on the Reserves, i.e., men owning some 500 head of stock, mostly sheep and goats, it appears that the inhabitants of the Reserves have been undergoing a process of gradual impoverishment during many years."[2]

On account of this evidence, it is estimated that the Coloured farmers earned 'other income' equivalent to the average income of Coloured farm workers, i.e., £34 p.a. This sums up to £272,000.

The total distribution of income by race in respect of agricultural activities can now be tabulated as follows: (figures in £ thousands):-

	Whites	Coloureds	Asiatics	Bantu	Total
Wage Income	4,072	2,692	386	8,544	15,694
Other Income	26,490	272	500	13,863	41,125
Total	30,562	2,964	886	22,407	56,819

10.5.2 Government Forestry

£261,000 was paid as wage income by government forestry during the year 1924/25.[3] Since no direct information could be found on the employment structure of this sector, it was decided to distribute the income earned by race in accordance with the wage income earned in agriculture. This yielded the following distribution (figures in £ thousands):-

Whites	68
Coloureds	45
Asiatics	6
Bantu	142
Total	261

1. U.G. No. 54-1937, Report of the Commission of Inquiry Regarding Cape Coloured Population of the Union, para. 390, p. 71.
2. ibid., paras. 419-422, pp. 75, 6.
3. See paragraph 10.5.9 below.

10.5.3 Fishery and Government Guano Islands

The total number of fishermen during the year 1924-25 is estimated:-

Whites	1,200[1]
Coloureds	2,500[2]
Asiatics	300[3]
Bantu	4,163[4]
Total	8,163

Taking the whaling industry as a model, it is assumed that the wage rates p.a. earned by different race groups in the fishing occupation were:[4]

	£ p.a.
Whites	123.1
Coloureds	37.7
Asiatics	43.2
Bantu	18.7

This yields the following distribution of total income (in £ thousands):-

Whites	148
Coloureds	94
Asiatics	13
Bantu	78
Total	333

1. Estimate based on U.G. 4-1931, 4th Census of the Population of the Union of South Africa, 4th May, 1926, (Enumeration of Europeans only), Report with Summaries and Analysis of Detailed Tables, Parts I to XI, p. 187.
2. Estimate based on U.G. 40-1924, 3rd Census of the Population of the Union of South Africa, enumerated 3rd May, 1921, Part VIII, Non-European Races, p. 148.
3. This estimate is based on information gathered in connection with the Coast Fisheries Act (Natal, No. 31 of 1906), collected for the last time in respect of 1922.* In Natal in 1922, there were 631 persons employed in fishing, "of which about 47 per cent (or 297 persons) were Asiatics, 23 per cent (or 145 persons) Europeans, and 30 per cent (or 189 persons) Africans." **
   * Quoted from: Department of Economics, University of Natal, Studies of Indian Employment in Natal, ibid., p. 71.
   ** ibid., p. 129.
4. The 1921 Occupational Census did not ask for the number of Native fishermen. It was therefore assumed that the employment structure of 'whaling' was representative for fishing in general. Of the total of 964 employed persons, 489 or 51 per cent were Natives.
   U.G. 41-1927, ibid., p. 40, Class XVII.

TABLE LVI a: Number of Employees and Total Work Income, Mining[1] and Quarrying, 1925. Figures in £

	Number of Employees					Salaries and Wages				
	Whites	Coloureds	Asiatics	Natives	Total	Whites	Coloureds	Asiatics	Natives	Total
1. Gold, Diamond, Coal, Other Mines	31,398	2,000	2,058	266,064	301,520	9,924,050	480,000	81,870	8,106,478	18,592,398
2. Power Supply Companies	711	-	1	1,387	2,099	262,949	-	120	52,163	315,232
3. Quarries	130	-	61	1,384	1,575	34,296	-	3,574	45,925	83,795
4. Lime Works	118	50	40	1,118	1,326	23,084	1,981	1,415	36,734	63,214
5. Salt Pans	170	114	-	520	804	18,837	4,508	-	16,074	39,419
6. Crushed Stones	45	-	-	745	790	13,417	-	-	33,688	47,105
7. Mine Workshops	5,065	71	97	10,860	16,093	1,642,978	5,243	4,078	448,062	2,100,361
Wages in Kind						8,762			1,298,714	1,307,476
Total	37,637	2,235	2,257	282,078	324,207	11,928,373	491.732	91,057	10,037,838	22,549,000

1. The salaries and wages of 36,563 alluvial diggers and prospectors are estimates, based on the average earning in the diamond concerns.
Compare: U.G. No. 37-1926, ibid., p. 24
Wages in kind earned by Natives are slightly adjusted so that balance with Stadler's figures was attained.

The income earned from fishing had to be supplemented by income earned on government guano islands, totalling £23,000 for wages and £28,000 for other income. Wage income was distributed by race in accordance with the income earned in fishing (excluding Asiatics). Other income was totally credited to Whites. The distribution of income by race is then as follows (figures in £ thousands):

	wage income	other income
Whites	10	28
Coloureds	7	
Bantu	6	

In summary, the distribution of income by race from fishery and government guano islands can be shown as (figures in £ thousands):

Whites	186
Coloureds	101
Asiatics	13
Bantu	84
Total	384

10.5.4 Mining and Quarrying

Employment and wage data for the following activities were taken from the Reports of the Secretary for Mines and the Government Mining Engineer: gold concerns, diamond concerns, coal mines and coal by-product works, other metals and minerals, power supply companies, quarries. [1]

The data are available for Whites, Asiatics, Bantu and Coloureds, the latter two being combined together. This made necessary a separate estimate of the number of Coloured mine workers, and of their incomes. Evidence given to the Economic and Wage Commission suggests that in 1925, 2,000 Coloureds were

1. The annual data for the years ended 31st December, 1924, and 1925 were averaged. U.G. Nos. 42-1925 and 37-1926, Annual Reports of the Secretary for Mines and Industries and the Government Mining Engineer.

employed on the mines, at an average wage of 8s per day.[1] According to Stadler's classification of industrial sectors, it is necessary to add to the mining sector the employment and wage data referring to lime works, salt pans, crushed stones, and mine workshops. The data for these activities were taken from the Industrial Census, 1924-25.[2]

Cash wages had to be augmented by wages in kind. The values for these were taken from the Government Mining Engineer's Reports.[3]

The number of employees in mining and quarrying, and their total wage income, is given in Table LVI a.

10.5.5 Industry, Construction, Electricity, Gas and Water

The main source for these industrial divisions is the 10th Industrial Census for the year 1924-25.[4] This Census covered the business year ended at any date not earlier than 1st July, 1924, and not later than 30th June, 1925.[5]

The coverage of the Census deviated in some respects from

1. Archives of the Economic and Wage Commission, Evidence No. 28. Meeting held at Johannesburg on Wednesday, 30th September, 1925, Witnesses Examined: Rev. J. A. Rogers, Minister of Coloured Congregational Church, and Messrs G. G. Growe, R. A. Goodman, J. W. Ontong, G. S. Rasdien, representing the Afrikaanse Nasionale Bond.
pp. 3175, 6.
Qu. 12766.
"Do many of the coloured men work on the mines? - Yes, there is a fair number of coloured men on the mines."
Qu. 12767.
"How many would you think roughly, in any capacity? - Roughly about 2,000."
Qu. 12775.
"What wages do they get for instance if they are waste packers and trammers underground? - I believe the waste packers on an average get 7/6d per day." ...
Qu. 12777.
"... The wages vary ... from 5/- to 10/- and up to 12/- per day."
2. U.G. No. 41-1927, Tenth Industrial Census for the Year 1924-25. Tables 15 and 16, pp. 36-43.
3. Store consumption figures indicate that £8,762 were incurred as wages in kind for Whites, and £1,474,130 for Natives. U.G. No. 37-1926, ibid., Table No. 9.
4. U.G. 41-1927, ibid.
5. ibid., Introductory Note.

what is at present subsumed by South African national accounts under these sectors. The major differences are:-

> The government mint, and industries which are run by educational, welfare, and therapeutical institutions, as well as those run by the Department of Defence, are not included in the Census. [1]
>
> Lime works, salt pans, crushed stones, and mine workshops are included in the census, but have to be allocated to the sector 'mining and quarrying'. [2]
>
> Whaling has to be included under 'Fishing', tramway and railway workshops under the sectors 'SAR & H' and 'Municipalities', [3] and Public Building and Contracting under 'General Government'. [4]

Only establishments "employing three or more hands, including the proprietor, manager or other person in charge", [5] were covered by the 1924-25 Census. In order to take account of the fact that small enterprises escaped the Census, the remuneration earned by non-Europeans in the private sector (other than those which have been excluded from the industrial sector above) have been increased by 3 per cent. This adjustment provides also for the fact that many small scale industries are run by Non-Europeans (home beer breweries, etc.). [6] Table LVIb shows the totals referring to the number of employees and the amount of salaries and wages paid, for the industrial census, 1924/25, together with the adjustment for activities which are not covered by the industrial census.

Little information is available on the distribution of 'other income' by race for the year 1924-25. [7]

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1. J. J. Stadler, Die Bruto Binnelandse Produk van Suid-Afrika, ibid., p. 244.
2. ibid., pp. 81 and 244.
3. ibid., p. 245
4. "Aangesien konstruksiebedrywighede van openbare owerhede in Suid-Afrika egter nie afsonderlik georganiseer word op 'n kommersiële grondslag te boek gestel word nie, moes dit noodwendig saam met alle ander algemene afdelings van openbare owerhede onder Algemene regeringsdienste ingesluit word." Stadler, ibid., p. 84. Compare also p. 89.
5. U. G. 41-1927, ibid., Introductory Note.
6. Information given by Mr F. S. Thirion, Dept. of Statistics, Pretoria.
7. Retief estimated for 1956/7 that the share of Non-Europeans in 'other income' was well below 4 per cent. A. J. Retief, Die Verdeling..., ibid., p. 33.

TABLE LVI b: Adjustment of Industrial Census Data, 1924/25, Figures in £ 1000

	SALARIES AND WAGES PAID				
CODE	Europeans	Bantu	Asiatics	Coloureds	Total
1	15,661	3,471	477	1,895	21,504
2	23	36	1	2	62
3	19	16	-	5	40
4	13	34	-	-	47
5	1,643	448	4	5	2,100
6	80	19	1	13	113
7	176	23	-	-	199
8	2,417	172	5	7	2,601
9	68	40	36	28	172
10	950	334	14	174	1,472
11	10,272	2,349	416	1,661	14,698
12	-	66	13	49	128
13	10,272	2,415	429	1,710	14,826

CODE:

1		Grand Total, Industrial Census, 1924-25
2	(-)	Lime Works
3	(-)	Salt Pans
4	(-)	Crushed Stones
5	(-)	Mine Workshops
6	(-)	Whaling
7	(-)	Tramway Workshops
8	(-)	Railway Workshops
9	(-)	Cleaning and Dyeing
10	(-)	Public Building and Contracting
11		Sub-Total
12	(+)	Adjustment for Small Firms
13	=	GRAND TOTAL, as Amended

As far as Natives are concerned, the Native Economic Commission Report, 1930-32, gives evidence about one single case when Natives had earned 'other income', i.e., through the production of baskets.[1]

The Report of the Asiatic Inquiry Commission remarks that Asiatics were to a certain extent engaged in furniture production,[2] and the making of clothes and cheap tinware,[3] but it notes that data about the size of such activities were lacking.

No evidence could be found about Coloureds having earned 'other income' during the year under review.

On account of the evidence quoted above, it was assumed that the 'other income' of the three Non-European races was negligible during 1924-25. A certain provision for 'other income' earned by them was made through the 3 per cent adjustment of wage incomes, which has been mentioned above.

According to the above estimate, the total income distribution by race for the sectors industry, construction, electricity, gas and water is as follows (figures in thousand £): -

	Work Income	Other Income	Total Income
Whites	10, 271	12, 388	22, 659
Coloureds	1, 711		1, 711
Asiatics	428		428
Bantu	2, 754 [4]		2, 754
Total	15, 164	12, 388	27, 552

10. 5. 6 South African Railways and Harbours and Other Public Transport.

The employment of Non-Europeans by the South African Railways and Harbours and other Public Transport, as at 31st March, 1926, was as follows:[5]

Coloured staff	4, 900
Indian staff	2, 026
Native staff	34, 742

Estimates of the wage rates commanded by different races were

1. U. G. No. 22-1932, ibid., para. 317, p. 45.
2. U. G. No. 4-1921, ibid., para. 174, p. 48. The articles produced by Asiatics are described as having been of "an inferior character, and such as are purchased only by the poorer class."
3. ibid., para. 175, quoted there from the Economic Commission, 1914.
4. Includes £340, 000 for wages in kind.
5. U. G. No. 42-1926, Report by the General Manager of the South African Railways and Harbours for the Year Ended 31st March, 1926, p. 190
and
Monthly Bulletin of Union Statistics, No. 46, October 1925, Table XXVII (for other public transportation).

based on the Estimates of Expenditure for the South African Railways and Harbours.[1] No information could be found on the employment structure of the private transport sector. It was therefore decided to distribute the work income of the private transport sector in the same relation as was representative for the public transport sector.

Whereas the total of 'other income', earned by the public transport sector, was attributed to Whites, 5 per cent of the 'other income' earned in the private transport sector has been credited to Asiatics. The latter are reported to have worked as "drivers and conductors of numerous Indian motor-buses which ply for hire".[2]

The total distribution of income by race, both in the public and private transport sectors, is as follows (figures in £ thousands):-

Whites	22,183
Coloureds	282
Asiatics	153
Bantu	1,612
Total	24,230

10.5.7 Trade, Financial Services, and Fixed Property

(i) Income earned by Coloureds:
During the year 1924-25, 6,019 Coloureds were employed in commercial occupations. Of these, 202 persons were clerks and 1,298 warehousemen, storekeepers, and packers.[3]

Evidence collected some 10 years later by the Cape Coloured Commission suggests that Coloureds had little success in commercial activities:- "Only in rare instances have Cape Coloureds, up to the present, achieved any marked degree of success in commercial activities. Few are shopkeepers, and their businesses

1. U.G. No. 9-1925, Estimates of Expenditure for the Financial Year Ending 31st March, 1926 - South African Railways and Harbours, First Print, pp. 51 ff.
2. Archives of the Economic and Wage Commission, Letter by the Provincial Administration of Natal, No. 7917, dated 30th October, 1925, Vol. 23, L.D. 1747/8.
3. U.G. No. 40-1924, 3rd Census of the Population of the Union of South Africa, 3rd May, 1921, Part VIII, pp. 148-152. The figures were adjusted for time coverage according to the population estimate given in Union Statistics for Fifty Years, Jubilee Issue, ibid., A-8. It had to be assumed, (i) that the occupational structure remained unchanged between 1921 and 1924-25, and (ii) that the relationship between the working and total population remained constant.

are, with few exceptions, small and struggling.[1] ... The majority of the Coloureds who obtain employment in commerce are to be found in minor capacities, for example, as storemen, drivers, packers, and messengers."[2]

On account of this evidence it is estimated that shop-keepers earned the same income as unskilled commercial workers.

Assuming furthermore that the average annual wage of Coloureds employed in trade, financial services, and fixed property, was £60, their total income amounted to £361,140.[3]

ii. Income earned by Asiatics:

For the 12,006 Asiatics who were in possession of trading licenses during 1925-26,[4] an annual income of £150 was assumed.[5] In respect of 504 Asiatic clerks and typists, and 349 warehousemen, it was estimated that the annual individual income was £60.[6] This gives a total income of £1,852,000.

iii. Income earned by Bantu:

13,093 Bantu shop assistants and 1,591 petty traders and hawkers are assumed for the year 1924/5.[7] Mr H.S. Cooke, ex-Director of Native Labour, gave the following evidence on the wellbeing of Natives in Commerce to the Native Economic Commission, 1930 - 1932:- "In urban areas in the Cape, Natal, and Transvaal, a number of Natives have established their own businesses, and though these are conducted on a small scale, the length of time that they have been in existence testifies to the fact that the owners have been able to make a living out of them" ... "The

1. U. G. 54-1937, ibid., para. 459, p. 80.
2. ibid., para. 460, p. 81.
3. ibid., p. 242, and Evidence given to the Economic and Wage Commission by J. H. Raynard, Letter dated 9th September, 1925, Vol. 23, File No. 1747/18, Archives, Pretoria.
4. Office of Census and Statistics, Special Report No. 39, ibid., p. 11.
5. Estimate.
6. Same estimate as for Coloureds. For employment data compare footnote 3, p. 169 above.
7. U. G. No. 40-1924, ibid., p. 143, adjusted for increase in population.

average trader seems to do reasonably well and few seem to fail to make a living. I know of none who can be regarded as prosperous."[1]

Assuming that Bantu shop assistants earned £50 p.a. on average and Bantu petty traders and hawkers, £70, it is estimated that the total income earned by Bantu during the year under consideration was £766,020.

(iv) The total distribution of income by race in the commercial sector is then as follows (figures in £ thousands):-

Whites	43,367
Coloureds	361
Asiatics	1,852
Bantu	766
	46,346

10.5.8 Imputed Net Rent

For the year 1924-25, the following computation of net-rent earned by Non-Europeans was undertaken (figures in £ thousands):-[2]

	Bantu	Coloureds	Asiatics
Gross rent, urban areas, 1921	73	853	115
- Costs of maintenance	7	85	11
= Net rent, urban areas	66	763	104
+ Net rent, rural areas	34	402	54
= Net rent, all areas, 1921	100	1,170	158
+ Adjustment for time coverage	9	111	12
= Net rent, all areas, 1924-1925	109	1,281	170

1. Quoted from U.G. No. 22-1932, ibid., paras. 950, 1, pp. 137/8.

2. As a basis of the computations was used U.G. 36-1922, 3rd Population Census, 3rd May, 1921, Part IX, Dwellings, All Races, Table XIV, p. 18.
10 per cent of the gross rent was deducted for repairs and maintenance.
The time coverage was adjusted according to estimate of population increase, compare footnote 3, p. 169 above.

This yields the following distribution of net rent for all races (figures in £ thousands):-

Whites	12,255
Coloureds	1,281
Asiatics	171
Bantu	109
Total	13,816

10.5.9 Central Government and Post, Telegraph and Telephone

The total income earned by Non-Europeans in this sector is composed as follows:

	Bantu	Coloureds	Asiatics
Total: Estimates of Expenditures[1]	519,439	70,535	23,582
+ Public Building and Contracting[2]	334,200	173,507	13,682
+ Wages in kind (10 per cent of work income earned in public building)	33,420	17,351	1,368
- Vote 30, Forestry (incl. wages in kind)[3]	2,607		
Total:	889,666	261,393	38,632

1. U.G. No. 31-1924, Second Print, Central Government, Estimates of the Expenditure to be Defrayed from Revenue Funds during the Year ended 31st March, 1925. There were 36 Votes in 1924-25. The income of the South African Police was estimated by race according to
U. G. No. 23-1926, Report of the Commission of Enquiry to Enquire into the Organisation of the South African Police Force, p. 9, Ann. 3, p. 84.
2. U. G. No. 41-1927, Census of Industrial Establishments, ibid.
3. U.G. 31-1924, ibid.
This is included under the section forestry, compare 10.5.2 above.

10. 5. 10 Provincial Administration, including Private Education

The estimation of the distribution of incomes of the three Non-European races is as follows (figures in £ thousands):-

	Bantu	Asiatics	Coloureds
General Administration[1]	1	-	-
Education[2]	263	50	159
Hospitals and connected Services[3]	54	11	2
Others[4]	3	-	2
Total	321	61	163

10. 5. 11 Municipalities

The structure of employment and remuneration for municipalities during the period under review was as follows:-[5]

	Number of Employees			Salaries & Wages £1000		
	Europeans	Others	Total	Europeans	Others	Total
Municipalities	12, 218	27, 622	39, 840	3, 184	1, 236	4, 420
Urban Authorities	347	711	1, 058	25	12	37
Divisional Councils (Cape)	1, 273	7, 057	8, 330	141	230	371

1. Sources: Estimates of Expenditures to be Defrayed from Revenue Funds:-
   Province of the Cape of Good Hope, C. P. 2-1925, First Print.
   Province of Natal, N. P. 4-1925, Final Print.
   Province of Transvaal, T. P. 4-1925, First Print.
   Province of the Orange Free State, P. C. -10a-1925, Final Print.
2. The number of Non-European teachers was based on the 1936 Occupational Census. In order to estimate the corresponding figure for 1924-25, the number of Non-European pupils between 1936 and 1925 was used as an index. It was assumed that the pupil/teacher ratio remained constant during the period under review.
   Union Statistics for Fifty Years, Jubilee Issue, ibid., A-31, 32, 33.
   Salaries of Non-European teachers, headmasters, and assistants were taken from N. P. 4-1925, p. 27.
3. As far as no tabulations by race were available, it was assumed that 1/10 of the grants-in-aid were spent on wages for Non-Europeans.
4. Includes the administration of roads, bridges, and local works, as well as the miscellaneous section.
5. Monthly Bulletin of Union Statistics,
   1924: - No. 44, August 1925, Table IV.
   1925: - No. 56, August 1926, Table XXVIII.

The work income earned by Non-Europeans was distributed by race according to the wages paid to employees (other than salaried staff) of government and local government undertakings and railway workshops, as supplied by the Census of Industrial Establishments, 1924-25.[1]

All calculations were undertaken separately for the different Provinces. The income distribution by race is as follows, (figures in £ thousands):-

Whites	2,470
Bantu	734
Coloureds	331
Asiatics	24
Total	3,559

10.5.12 Domestic Services

It is estimated that the number of Bantu domestic servants was 275,533 persons.[2] For Whites, Coloureds, and Asiatics, the 1921 Occupational Census did not count the number of domestic servants, but of "persons engaged in personal service (including hotels and catering, and excluding Government and local authority)".[3] It was assumed that in the case of Whites, one-third, and in the case of Coloureds and Asiatics, two-thirds of the total number enumerated under the above categories, were employed as domestic servants. After adjustment for time coverage the total number of domestic servants during 1924-25 was estimated as 3,035 Whites, 43,143 Coloureds, and 5,203 Asiatics.

Wages of Bantu domestic servants were taken as £27.5 p.a,[4] and wages earned by Coloureds and Asiatics as 30 per cent higher than this, i.e., £35.8 p.a. The average income of White domestic servants was assumed as £50 p.a.

The racial distribution of income in the domestic service was then as follows (figures in £ thousands):-

1. U.G. 41-1927, ibid., Table 10, pp. 25, 6.
2. U.G. 40-1924, ibid., p. 143, adjusted for time coverage.
3. ibid., p. 144 and p. 148.
4. This was based on the evidence given by Dr Loram to the Economic and Wage Commission:
"... In the Transvaal farms I suppose they would pay as much as £2 per month for a native servant, but if the native gets dwelling rights on the farm (that is, if he is a labour tenant), then the tendency is to pay him less. In the case of urban wages, the wage in Johannesburg for house servants would vary from about £2.10.0 to perhaps £3 per month, with food, ...good food too." Archives, Economic and Wage Commission, Evidence No. 17, Tuesday, 15th September, 1925. Questions 7262, p. 1626.

Whites	152
Coloureds	1,542
Asiatics	187
Bantu	7,577
Total	9,458

10.5.13 Professional Occupations (Excluding Private Education).

23,515 Coloured, 2,609 Asiatic and 5,852 Bantu persons were employed in various professions during the year 1924-25.[1]

As to the average income per head, it is assumed that £200 p.a. was the representative figure for Coloureds and Asiatics, and £80 for Bantu. These estimates are based on the salary scales of teaching headmasters.[2]

The distribution of incomes earned in professional occupations is then as follows (figures in £ thousands):-

Whites	22,536
Coloureds	4,703
Asiatics	522
Bantu	468
Total	28,229

1. U.G. 40-1924, ibid., pp. 143, 144-47, 148-52, for Natives, Asiatics and Coloureds, respectively. Estimates for persons employed in domestic service are deducted. The figures are adjusted for time coverage.

2. N.P. 4-1925, ibid., p. 27.

10.6 Summary: Income Distribution by Race, All Economic Sectors, 1924-25.

TABLE LVII: Income Distribution by Race, 1924-25, £ 1000

	Whites	Coloureds	Asiatics	Bantu	Total
1. Agriculture	30,562	2,964	886	22,407	56,819
2. Government Forestry	68	45	6	142	261
3. Fishery and Government Guano Islands	186	101	13	84	384
4. Mining and Quarrying	35,106	492	91	10,038	45,727
5. Manufacturing, Construction, Electricity, Gas, and Water	22,659	1,711	428	2,754	27,552
6. Transport and Storage excl. Post Office					
a. private	1,738	21	45	122	1,926
b. public	20,445	261	108	1,490	22,304
7. Trade and Financial Services	43,367	361	1,352	766	46,346
8. Imputed Rent	12,255	1,281	171	109	13,816
9. Central Government, Incl. Post Office	11,148	261	39	890	12,338
10. Provincial Administration incl. private teachers	7,951	163	61	321	8,496
11. Municipalities	2,757	331	24	734	3,846
12. Domestic Service	152	1,542	187	7,577	9,458
13. Other Service, excl. private teachers and domestic service	13,078	4,703	522	468	18,771
14. Gross Domestic Product	201,472	14,237	4,433	47,902	268,044
15. Percentage Distribution: Gross Domestic Product	75.2	5.3	1.6	17.9	100.0

10.7 Reliability of the Calculations

The total distribution of income by race for the year 1924-25 was determined by deducting, from the total income earned in each individual sector, the income earned by Non-Europeans. Only occasionally was it possible to distribute the total income earned by all four races, such as in the cases of mining, manufacturing, and domestic service.

In all cases other than mining and manufacturing, the estimates were based on average wage rates. These were estimated on the basis of what seemed the most reliable evidence.

Throughout, an attempt was made to consult the widest available evidence whenever estimates had to be made. It is believed that the greatest possible accuracy has been achieved within the given supply of material.

11. Sectoral Data on the Racial Distribution of Incomes in South Africa

Long term information on the distribution of income by racial divisions is available in South Africa for the sectors mining and quarrying, and manufacturing. When racial wage differentials are computed, no account can naturally be taken of changes in the relative skills commanded by different races, during different years. The results obtained are valuable as an index of the relative command over purchasing power by different races, without, however, giving an indication of the relative productive contribution performed by different sections of the population. [1]

11.1 Racial Wage Differentials in Mining and Quarrying

Table 43[2] illustrates the employment and wage structure in South Africa's mining and quarrying sectors.[3] The annual reports of the government engineer distinguish only three races, viz., 'Whites', 'Asiatics', and 'Bantu and Coloureds', the latter two being grouped together.[4]

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1. F. van den Bogaerde distinguishes between pure and general ethnic differentials in this respect. Pure differentials "measure the difference in wage caused by the specific dimension in question, i.e. race, and general differentials ... measure the difference in average labour income between units grouped according to a given criterion, e.g. race."
   F. van den Bogaerde, Die Loonstruktuur, 'n Ekonomiese ontleding van loonvorming en loondifferensiasie in die Metaalbedryf sedert 1924-25, unpublished D-Com. Thesis, University of Pretoria, Here quoted from J. A. Lombard, The Determination of Racial Income Differentials in South Africa, in: Problems of Transition, Proceedings of the Social Sciences Research Conference, 1962, Edited by J. F. Holleman and others, Natal University Press, Pietermaritzburg, 1964, p. 192.
2. See Appendix.
3. Annual Reports of the Government Mining Engineer.
4. Of these, Coloureds make up less than 1 per cent in any year.

Table 44 shows the following employment and wage differentials in the mining and quarrying sector:

i. Number of non-White workers per White worker;
ii. Average White wage rate in relation to average Asiatic wage rate;
iii. Average White wage rate in relation to average Coloured and Bantu wage rate;
iv. Average White wage rates in relation to average non-White wage rate;
v. Average Asiatic wage rate in relation to average Coloured and Bantu wage rate;

11.2 Racial Wage Differentials and Output Data for the Manufacturing Sector.

For the years 1917-1965, data referring to the employment, remuneration, output, and capital structure, have been collected from the annual census reports. The results are tabulated in Tables 45-47 of the Appendix.

There have been frequent changes in the coverage of industrial censuses during different years[1], but it can be assumed that most of these changes had little effect on the overall wage rate differentials.

Table 45 gives the employment, remuneration, output and capital structure for the years 1917-1965.[2] For the years 1919-1924, the census reports give data only for 'Europeans' and 'Non-Europeans', whereas the four different race groups are separately distinguished for 1917, 1918, and all years after 1925. In addition, the values for net output,[3] and the investments in land and buildings, machinery, plant, and tools,[4]

1. For a comprehensive description of the coverage and scope of South African industrial censuses, compare: J. J. Stadler, Die Bruto Binnelandse Produk, ibid., pp. 243-253.
2. Up to and including 1950, the Industrial Censuses were published in Union Government Blue Books. For the ensuing years, the following sources were used: 1950/1-1960/1. Report No. I.C.69, Bureau of Census and Statistics. 1961/2, Report No. 303. 1962/3, Report No. 302. 1965/6, Report No. 10-21-13.
3. For the years 1958 and 1959, a value of 1,000,000 R was estimated.
4. For the years 1963 and 1965, a value of 700,000 R was estimated.

are tabulated. Net output is defined as the difference between the gross value of output and the costs for material used, plus fuel, light, and power. Broadly, the value of net output represents salary and wages, plus overheads and profits.

Table 46 lists the following general wage differentials according to race:

E/B Europeans in terms of Bantu;
E/A Europeans in terms of Asiatics;
E/C Europeans in terms of Coloureds;
A/B Asiatics in terms of Bantu;
C/B Coloureds in terms of Bantu;
A/C Asiatics in terms of Coloureds;
E/TN Europeans in terms of total non-Europeans;
E/T Europeans in terms of Total.

Table 46 does not show racial wage differentials for the years 1917, 1918, and 1968. These are compiled in Table 46 a below.

TABLE 46a: General Wage Differentials, South African Manufacturing, 1917, 1918, and 1968.[1]

	E/B	E/A	E/C	A/B	C/B	A/C	E/TN
1917	5.4	6.5	3.6	0.8	1.5	0.6	4.9
1918	5.3	6.1	3.3	0.9	1.6	0.5	4.7
1968	5.5	3.6	3.6	1.5	1.5	1.0	4.8

Table 47 tabulates the share of wages in output (O) for the four different races (E/O, B/O, A/O, C/O), the share of total non-European wages in output (TN/O) and the share of total wages in output (T/O), for the manufacturing sector. The respective data for the years 1917 and 1918, are as follows:

TABLE 47a: Share of Wages in Output, Manufacturing Industry

	E/O	B/O	A/O	C/O	TN/O	T/O
1917	38.9	7.4	1.6	4.4	13.4	52.3
1918	37.6	7.3	1.5	4.5	13.3	50.9

1. U. G. Nos. 51-1918 and 17-1920 for 1917 and 1918. Department of Statistics, Bulletin of Statistics, Vol. 4, No. 2, June 1970, B-7 and B-24, for 1968.

Note that "1917" stands for "1916/17", etc.

Table 47b lists the average annual earnings of Whites and Bantu employed in private manufacturing and construction industries, at 1959-60 prices.[1] The employment figures exclude working proprietors. Average annual earnings include ordinary, incentive and overtime wages, holiday and other occasional bonuses and payment in kind, as well as the employers' contributions to holiday, pension, provident and medical funds, but exclude employers' contributions to Unemployment Insurance and Workmen's Compensation Funds.

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1. Sources

a. Period 1916/17 to 1934/35

average earnings at current prices:

1916/17	U.G.No. 51-1918
1917/18	U.G.No. 17-1920
1925/26 to 1934/35	Table 45,Statistical Appendix.

retail price index:

Union Statistics for 50 Years, Jubilee Issue, ibid., H-23.

b. Period 1935/36 to 1960/61

W. F. J. Steenkamp, "Bantu Wages in South Africa", The South African Journal of Economics. Vol. 30, 1962, p. 96.

c. Period 1961/62 to 1968/69

Figures for average earnings were kindly supplied to the writer by Mr van Tonder, Department of Statistics, Pretoria. The data are adjusted for differences in time coverage between Industrial Censuses and various Sample Surveys.

The consumer price index is taken from: South African Reserve Bank, Quarterly Bulletin, No. 97, September 1970, S-73.

Note that certain changes in the coverage of the Industrial Censuses were made in 1955/56. For comparative purposes, therefore, the 1954/55 averages are shown first on the basis of the coverage up to 1954/55, and then on the basis of the coverage for the years 1955/56 onwards. The manufacture of motor vehicle tyres, motor vehicle batteries and the assembly of motor vehicles are included for all years.

SECTION IV: STATISTICS ON ECONOMIC GROWTH

1. Definition of Economic Growth

Economic growth can be defined as the long-run (sustained) increase in the volume of produce, the provision of which is the rationale of economic activity.

2. Measurement of Economic Growth

Economic growth can be measured basically in three different ways:-

i. in money terms;
ii. in real terms at constant prices;
iii. in real terms per head of population.

The statistical measure most frequently used is that of economic growth in real terms. [1]

Both methods ii. and iii. face the following difficulties connected with the construction of price indices:-

(i) the goods and services produced during different time periods are not homogeneous;
(ii) people are likely to change their consumption structure between the base and the reference years. (See Footnotes 2 and 3)

Agreement exists in the literature that economic growth is a long-run concept. That means, economic growth ought to have to do with the volume of production after the elimination of

1. Compare: Committee of Economic Enquiry (Australia), Economic Growth in Australia and Its Measurement, in: Readings in the Concept and Measurement of Income, Edited by R. H. Parker and G. C. Harcourt, University Press, Cambridge, 1969, pp. 348, 9.
2. R. D. G. Allen expresses this dilemma as follows: "I do not believe that index numbers can serve over very long periods. If the same form is used throughout, the difficulty of shifts in the 'preference map' cannot be overcome. If the index is obtained by chaining together different forms, then a bias is to be expected, a bias which tends to be amplified over time."
R. D. G. Allen, "The Economic Theory of Index Numbers", Economica, N. S. Vol. XVI, 1949, p. 202.
The problem here considered is even more acute for capital goods which are frequently subjected to technological changes. Capital stock estimates at constant prices may be biased in a downward direction by an improved quality component, and biased in an upward direction by the reduction in the life time of newer assets.
3. For South Africa, compare:-
J. J. D. Willers and B. P. Groenewald, Problems Raised by the Calculation of Real National Income in South Africa, in:
L. H. Samuels, Editor, African Studies in Income and Wealth, ibid., pp. 182-205.

random,[1] seasonal,[2] and cyclical fluctuations. (See Footnotes 3 and 4) Whereas random fluctuations cannot be segregated at the present state of our statistical knowledge,[5] seasonal and cyclical fluctuations can be eliminated by means of choosing time periods long enough to prevent short-term fluctuations from disturbing the trend.[6]

3. Characteristics of Available Output Measures

The G. D. P. is a measure of the value of goods and services produced within the boundaries of a country during one year,[7] but not of goods and services available for use. The latter value can be derived from the former by deducting exports and adding imports.

The goods and services to be included in the G. D. P. are not defineable by a single test.[8] Broadly speaking, only that portion of the produce which is exchanged on markets is included in the G. D. P. value. In addition, the unexchanged portion of all primary

1. J. C. du Plessis defines random fluctuations as the "sudden whims and fancies of individuals, the extent to which supply or the factors involved in supply react to changes in demand, unforeseen circumstances of a technical, accidental or meteorological nature, etc." J. C. du Plessis, Economic Fluctuations in South Africa, 1910-1949, Bureau for Economic Research, University of Stellenbosch, Publication No. 2, p. 12.
2. The seasonal component results partly from weather conditions, and partly from fixed institutional practices.
3. A cycle is defined by Schumpeter to mean the following: "First, that sequences of values of economic quantities in historic time... do not display monotic increase or decrease, but (irregular) recurrence of either these values themselves or their first or their second time-derivatives; and secondly, that these 'fluctuations' do not occur independently in every such time series, but always display either instantaneous or lagged association with each other." Joseph A. Schumpeter, The Analysis of Economic Change, reprinted in: American Economic Association, Readings in Business Cycle Theory, George Allen and Unwin, London, 1961, p. 5.
4. On the statistical concept of economic growth, compare: George Jaszi, "The Measurement of Aggregate Economic Growth: A Review of Key Conceptual and Statistical Issues as Suggested by United States Experience," The Review of Economics and Statistics Vol. XLIII, November 1961, No. 4, p. 330, right column.
5. ibid., p. 331, left column.
6. According to Arthur F. Burns, "the secular trend ... may be considered as the persistent, underlying movement of its output over a period which is 'long' in relation to the changes associated with the 'business cycle'."
   Arthur F. Burns, Production Trends in the United States Since 1870, New York, 1934, p. 31.
7. Compare the definition of the term G. D. P., Section I, p. 1 above.
8. Compare J. J. Stadler's discussion of the "Produksiegrens", Die Bruto Binnelandse Produk, ibid., pp. 27-37.

production (agriculture, forestry, hunting, fishing, mining, and quarrying) is included in the value of total production. Moreover, the calculations include the value of the unexchanged part of the produce of non-primary producers if it forms part of their own trade.[1]

The exclusion of the unexchanged part of non-primary production is of little importance for the developed sector of the South African economy. In respect of the Bantu Reserves, the difference between the above mentioned 'conventional' method of income calculation, and a second 'comprehensive' method which attempts to include the value of activities which are not exchanged on markets, is substantial. For the year 1950/1, the Tomlinson Commission estimated that the latter approach resulted in a value of the Native Reserves' G.D.P. which was 2.8 times higher than the respective value which was calculated according to the conventional method. (See Footnotes 2 and 3)

For the year 1950/1, the difference between the two approaches would have been responsible for some 2 per cent only of the total South African G.D.P.

4. Valuation of Production

The values of the available G.D.P. series are calculated at factor costs, i.e. at market prices, plus subsidies minus indirect taxes.[4] This valuation makes the data free from influences of any changes in the structure of indirect taxes and subsidies that might have occurred over the past 60 years. From the income

1. United Nations, A System of National Accounts and Supporting Tables, Studies in Methods, Series F., No. 2, Rev. 1, New York, 1960, para. 30, p. 5.
2. Verslag van die Kommissie vir die Sosio-Ekonomiese Ontwikkeling van die Bantoegebiede Binne die Unie van Suid-Afrika, (Tomlinson Kommissie), typewritten, Vol. 4, Hoofstuk 24, p. 6, p. 38.
3. J. J. Stadler did not use the subsistence approach of income estimation for his calculations on the ground that it is "usually only applied in the case of relatively homogeneous backward economies mainly for the purpose of welfare comparisons." *
For an alternative approach compare the Central African Statistical Office which values the African subsistence income in 1946/7 at a nominal figure of £3 per family per year. ** Phyllis Deane suggests that it is "practical considerations, dominated by the type of material available, (which) determine the answers to many questions of this type". ***
* Stadler, The Gross Domestic Product..., ibid., p. 188.
** Economic and Statistical Bulletin of Southern Rhodesia, Vol. XX, No. 9, August 7, 1952, Central African Statistical Office, Salisbury, p. 17.
*** Phyllis Deane, The Measurement of Colonial Incomes: An Experiment, National Institute of Economic and Social Research, Cambridge 1948, p. 20.
4. Stadler, Die Bruto Binnelandse Produk ..., ibid., pp. 41, 2. For the valuation of unsold goods, services, and of inventory changes, see ibid., pp. 44-50.

side, the G. D. P. at factor costs equals the sum of work income, profit, interest, net rent, and depreciation.[1] Profits (or losses) made by State monopolies are treated as such, and not as direct taxes (or subsidies), as is often customary in other countries.[2]

5. Tabulations

The calculation of South Africa's G. D. P. at current prices, has been discussed before.[3] The data are listed in the Appendix, Tables 1 - 10.

Tables 48-51 list the following data referring to South Africa's real domestic product:-

Table 48

This table shows the G. D. P. for the years 1917-1965 in real terms, as calculated by C. J. du Piesanie.[4] The data are tabulated by four main economic sectors, viz., agriculture, mining, manufacturing, and services.

The data were extended up to the year 1968 by using information given in the Quarterly Bulletin of the South African Reserve Bank. Since the data for the years 1964 and 1965 do not entirely agree with du Piesanie's calculations, the extension of data beyond the year 1965 was not incorporated in Table 48, but shown separately in Table 48a.[5]

TABLE 48a: Gross Domestic Product, 1964-68, Figures in Rm, 1958 Prices

	Agriculture	Mining	Manufacturing	Services	Total
1964	652	816	1628	3033	6129
1965	646	853	1828	3167	6494
1966	687	887	1851	3309	6734
1967	840	883	1973	3569	7265
1968	731	911	2053	3807	7502

1. Stadler, Die Bruto Binnelandse Produk ..., ibid., p. 42.
2. ibid., pp. 42, 3.
3. Compare Section I, pp. 1 ff., above.
4. Cornelius Johannes du Piesanie, Die Bepaling en die Gebruik van Kapitaalopbrengsverhoudings, unpublished M. Com. Thesis, University of Pretoria, Pretoria, April 1968.
5. Source: South African Reserve Bank, Quarterly Bulletin, No. 97, September 1970.
The deflator was calculated on the basis of "gross domestic expenditure", at current and at 1958 prices, page S-64. The data for the gross domestic product by kind of economic activity are from p. S-65. Manufacturing comprises Manufacturing, Construction, and Electricity, Gas and Water Supply.

Table 49

For each of the four main sectors, the values of capital, investment, and depreciation, are listed on an annual basis.[1]

Table 50

This table submits estimates of private consumption expenditure in South Africa for the years 1947-69, both at 1958 prices and percentage-wise.[2] Consumption expenditure is classified according to the categories, 'durable', 'non-durable', and 'services'.

Table 51

Since the official estimates of the value of consumption extend back only up to 1947, it was necessary to calculate the value of consumption also for earlier years. This was done in Table 51 according to the following formula:-

Gross Domestic Product (GDP)
- Depreciation (DEPREC)
= Net Domestic Product (NDP)
- Foreign Contribution (FOR. CONTR.)
= Net National Product (NNP)
- Investment (INVEST)
= Consumption (CONS)

In order to compute the residual value of expenditure incurred on consumption in South Africa, it was necessary to transfer the domestic into a national income concept. This was done by subtracting from the domestic income concept, profit and wage income earned by non-residents in South Africa, and by adding profit and wage income earned by South Africans in other countries.

1. Cornelius Johannes du Piesanie, Die Bepaling en die Gebruik van Kapitaalopbrengsverhoudings, ibid.
2. The data are based on:-
Barend Petrus Groenewald, Die Reële Volksproduk en -Besteding van Suid-Afrika, 1946-1960, unpublished D-Com. Thesis, University of Pretoria, November 1964, and B. P. Groenewald and A. D. Kock, Private Consumption Expenditure in South Africa, 1947-1963, South African Reserve Bank, Quarterly Bulletin of Statistics, No. 74, December 1964, pp. xxix-xxx and p. xxxvi. The data for the years 1960-1969 were supplied to the writer by the Economics Department of the South African Reserve Bank, Pretoria.

The adjustment consisted of: -[1]

investment income receipts
- investment income payments
- foreign Natives factor payments

= foreign contribution

Moreover, Table 51 shows the percentage distribution of consumption and investment in relation to the net national product (CONS/NNP and INV/NNP).

Because of certain inconsistencies in the data, it was decided to tabulate the data for the years 1964 to 1968 separately, rather than incorporating them in the computer tabulation.[2]

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1. For the years 1910-1957, figures at current prices are available from J. C. du Plessis, The Measurement and Economic Significance of South Africa's Foreign Liabilities and Assets, unpublished D-Com. Thesis, University of Stellenbosch, December 1958, Statement 17.
   For later years, investment income payments and investment income receipts were extended according to the indices of foreign liabilities and assets.
   1958-1966: South African Statistics, 1968, ibid., Y-2, 3, and
   1967-68 : Quarterly Bulletin, South African Reserve Bank, No. 95, March 1970, S-58 ff.
   The income earned by foreign Natives after the year 1957 was estimated according to the "index of the number of contracted and assisted voluntary labourers, both engaged by the Native Recruiting Corporation and by the Mine Labour Organisations" (the latter only as from 1967).
   Source: Annual Reports and Notices to Members, Native Recruiting Corporation.
   The figures so obtained were deflated by an index which was obtained by comparing du Piesani's real domestic product values with Stadler's values at current prices.
2. See Table 51 a, p. 187 below.

TABLE 51 a: Gross and Net Domestic Product and Components, 1964-1968, at 1958 Prices[1]

Year	G. D. P.	Depr.	N. D. P.	F. C.[2]	N.D. P.	N. I.[3]	Cons.[4]
1964	6, 129	581	5548	154	5394	1002	4392
1965	6, 494	623	5871	167	5704	1399	4305
1966	6, 734	657	6077	175	5902	1131	4771
1167	7, 265	707	6558	177	6381	1541	4840
1968	7, 502	743	6759	189	6570	1087	5483

Table 52

This table shows the annual growth rate of the gross domestic product in real terms, subdivided into sigma (capital productivity) and delta (rate of investment). The equation was:

$$\frac{I}{Y_t} \cdot \frac{Y_t - Y_{t-1}}{I} = \frac{Y_t - Y_{t-1}}{Y_t}$$

rate of investment . capital productivity = rate of growth

1. Sources: South African Reserve Bank, Quarterly Bulletin, No. 97, September 1970.

   The deflater was calculated on the basis of "gross domestic expenditure", at current and at 1958 prices, page S-64.

   The G. D. P. value refers to the "Gross Domestic Product at Factor Cost", page S-65.

   Depreciation and investments are calculated from page S-69, "Gross Domestic Investment by Type of Asset".

   For the calculation of the foreign contribution compare Footnote 1, p. 186 above.

2. F. C. = Foreign Contribution.
3. N. I. = Net Investment.
4. Cons. = Consumption.

Table 53 lists the Expenditure on Gross Domestic Product at 1958 prices in R millions, for the years 1946-1969.

Sources:

1946-1959: B.P. Groenewald, Die Reële Volksproduk, ibid., Table 66.

1960 : South African Reserve Bank, Quarterly Bulletin, No. 90, December 1968, S-64.

1961 : South African Reserve Bank, Quarterly Bulletin, No. 92, June 1969, S-64.

1962-1969: South African Reserve Bank, Quarterly Bulletin, No. 96, June 1970, S-64.

Table 54 shows the average capital-output ratios for the total South African economy and for four main economic sectors, 1911-1965.

Source: C. J. du Piesanie, Die Bepaling..., ibid., Table V. I. p. 74.

Table 55 gives the incremental capital output ratios for the total economy in 5 year intervals.

Source: C. J. du Piesanie, Die Bepaling ..., ibid., Table V. II. p. 92.

Table 56 lists the incremental capital-output ratios for the total economy and for four main economic sectors, 10 year intervals.

Source: C. J. du Piesanie, Die Bepaling..., ibid., Table V. IV. p. 97.

Table 57 shows the economically active population in South Africa by race and sex, for the census years 1921, 1936, 1946, 1951 and 1960.

Sources:

Union Statistics for Fifty Years, Jubilee Issue, ibid., G-2, for 1921.
South African Statistics, 1968, H-7, for 1936, 1946, 1951, 1960.
U.G. No. 40-1924, 3rd Population Census, 3rd May 1921, Part VIII, Non-European Races, p. 143, Table 24.

The definition of sectors is as follows:-

Agriculture:

consists of agriculture, forestry, hunting, and fishing. Bantu peasants in Bantu homelands are excluded from the number of Bantu employed in agriculture, because of the discrepancies in coverage which make comparisons impossible. The following two changes in classification occurred during the period under review:-

"... In 1921 and 1936 all Bantu women in the reserves were classified as peasants under the group 'Agriculture'. In 1946 only those who were returned as peasants were classified as such, all

others being classified as 'dependants under the not economically active group.' In 1951, only those who returned themselves as farmers were classified as peasants, the remainder being classified as dependants."

Union Statistics for Fifty Years, Jubilee Issue, ibid., A-43.

On the statistics of the Bantu labour force in agriculture, compare: Simon Streicher Brand, The Contributions of Agriculture to the Economic Development of South Africa Since 1910, D. Sc. Agric. Thesis, University of Pretoria, Pretoria, 1969, pp. 107-132.

Manufacturing:
consists of manufacturing, construction, electricity, gas, water, and sanitary services.
For the years 1921 and 1936, the number of Bantu employed by the sector manufacturing was estimated on the basis of Industrial Census Reports. For the year 1921, the employment figures for non-Europeans were used as an index.

Services:
consists of commerce and finance, transport, storage and communication, and services.
The employment figures for Bantu in the Service Sector for the years 1921 and 1936 were derived as residuals, i.e., by deducting from the total actively employed population the number of Bantu who were employed in agriculture, mining and manufacturing.

Unemployed and unspecified:
these categories have not been taken into account.

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STATISTICAL APPENDIX

TABLE 1, WORK INCOME BY TYPE OF ECONOMIC ACTIVITY STADLER ESTIMATE
FIGURES IN RM

YEAR	AGRIC	MINING	MANUF	CONSTRUC	EL,G,W	TR.& COM	TRADE	FIN.S.	DWELLINGS	GEN.GOV.	PRIV.S.	TOTAL
1911	20.3	43.1	7.5	1.8	1.1	16.0	17.3	5.6	0.8	18.3	15.2	147.0
1912	21.5	43.1	7.9	1.9	1.2	17.1	18.4	5.7	0.8	19.1	15.9	152.6
1913	21.8	42.6	8.3	2.0	1.2	17.2	18.8	5.8	0.8	19.9	16.9	155.3
1914	21.8	37.6	8.7	2.1	1.2	17.9	18.0	6.0	0.9	20.3	22.3	156.8
1915	22.7	36.0	9.1	2.2	1.3	18.4	17.5	6.9	0.9	21.0	27.1	163.1
1916	24.4	40.2	10.2	2.4	1.4	19.6	19.8	8.0	1.0	21.9	25.9	174.8
1917	26.1	42.0	12.2	2.9	1.6	21.7	22.6	9.3	1.2	24.6	26.7	190.9
1918	27.7	43.2	14.7	3.5	1.8	25.5	26.6	9.8	1.2	27.5	26.6	208.1
1919	31.0	47.4	18.2	4.3	2.1	31.9	33.7	10.0	1.3	30.1	27.5	237.5
1920	32.1	58.3	21.6	5.6	2.5	42.8	39.1	10.1	1.3	35.8	34.6	283.8
1921	29.6	50.7	21.5	6.1	2.7	40.7	34.2	9.1	1.3	34.6	36.4	266.9
1922	29.9	36.4	19.9	5.8	2.6	34.9	27.8	8.3	1.3	31.3	33.8	232.0
1923	30.6	42.4	19.7	6.2	2.5	34.5	28.5	8.5	1.3	32.8	33.4	240.4
1924	31.3	44.8	20.4	6.8	2.6	36.0	32.3	8.6	1.4	34.9	35.3	254.4
1925	31.3	45.4	22.0	7.5	2.8	39.4	35.7	8.7	1.4	37.1	36.7	268.0
1926	31.6	49.2	23.8	8.4	2.9	41.6	36.9	9.0	1.5	38.3	37.6	280.8
1927	32.5	50.4	25.5	8.9	3.1	42.6	39.0	9.3	1.6	40.7	38.8	292.4
1928	32.3	51.1	27.1	9.1	3.3	43.3	41.2	9.8	1.7	40.9	40.4	300.2
1229	31.7	51.2	28.7	9.6	3.5	44.2	41.7	10.3	1.8	41.5	41.4	305.6
1930	29.4	50.0	27.4	8.4	3.6	43.2	37.4	9.7	1.7	40.8	43.0	294.6
1931	27.2	47.0	23.8	6.1	3.7	39.6	31.4	9.4	1.7	38.1	42.5	270.5
1932	25.8	44.7	23.8	4.4	3.9	34.7	26.7	8.8	1.7	35.6	40.3	250.4
1933	27.6	47.2	28.0	5.4	4.1	35.3	28.0	8.3	1.8	36.2	41.5	263.4
1934	31.5	54.2	33.6	8.8	4.3	38.5	35.2	9.1	2.1	42.9	43.5	303.7
1935	32.8	61.3	39.1	12.7	4.9	42.4	41.7	9.5	2.3	46.0	46.2	338.9
1936	34.8	69.0	44.5	16.2	5.5	46.0	47.9	10.1	2.6	50.0	50.4	377.0
1937	36.2	73.9	48.7	18.1	6.0	51.1	53.2	11.7	2.8	54.7	54.7	411.1
1938	36.7	80.8	51.3	18.0	6.4	55.6	55.7	13.2	2.9	56.5	59.5	436.6
1939	37.8	82.5	53.8	16.5	6.8	57.4	57.4	14.6	2.9	58.5	65.5	453.7
1940	39.3	88.3	59.9	15.7	6.9	59.0	62.0	16.2	2.9	60.1	96.1	506.4
1941	41.3	93.1	71.1	17.6	7.2	62.7	68.4	17.7	3.7	64.7	135.1	582.6
1942	44.8	96.9	85.7	18.8	7.9	69.7	72.8	19.1	4.2	71.2	169.6	660.7
1943	47.8	96.3	101.6	17.7	8.6	79.5	76.7	20.6	5.0	77.9	192.2	723.9
1944	49.0	100.9	119.9	19.6	9.5	92.2	83.2	22.0	5.4	86.6	208.2	796.5
1945	56.5	106.1	136.8	23.8	10.7	109.1	93.4	21.5	5.5	95.5	228.4	887.3
1946	67.6	113.5	152.2	31.4	12.0	130.6	118.1	26.3	7.4	106.3	178.6	944.0
1947	75.8	117.0	174.2	42.4	13.0	146.2	142.8	28.7	8.2	118.7	151.5	1018.5
1948	82.2	121.3	201.1	55.8	14.4	163.5	156.9	33.1	8.9	131.4	160.6	1129.2
1949	89.8	134.8	223.8	59.3	17.7	175.7	171.4	41.1	7.4	145.3	173.5	1239.8
1950	98.4	157.4	247.4	64.2	18.4	178.9	186.4	49.3	8.2	157.7	184.6	1350.9
1951	107.2	171.8	284.0	70.7	20.4	200.8	208.5	57.0	9.0	173.3	204.3	1507.0
1952	120.2	190.6	323.7	84.3	23.1	229.3	236.4	68.4	9.5	191.5	235.4	1712.4
1953	132.2	201.8	356.7	81.9	26.3	245.4	258.3	67.2	10.6	205.0	255.7	1841.1
1954	137.9	216.3	390.4	83.8	28.5	254.0	274.1	68.7	12.1	218.6	270.9	1955.3
1955	134.6	234.3	423.7	88.6	31.0	270.0	291.5	76.0	13.2	233.7	287.6	2084.2
1956	133.7	251.2	453.7	100.2	32.3	296.0	307.9	84.0	12.8	247.7	314.0	2233.5
1957	138.6	261.0	478.2	106.6	33.6	314.5	327.4	90.7	13.8	262.7	338.8	2365.9
1958	148.1	267.0	497.3	114.6	33.8	334.4	344.0	99.8	14.2	275.7	362.7	2491.6
1959	152.9	280.8	517.8	116.3	33.9	334.8	356.5	107.7	14.8	289.9	388.7	2594.1
1960	153.6	298.4	562.5	117.7	35.7	335.2	374.9	113.2	16.2	306.2	409.5	2723.1
1961	158.8	308.9	605.6	123.1	37.7	352.0	393.0	118.2	16.1	328.7	437.6	2879.7
1962	162.3	319.6	649.8	126.6	39.9	374.3	410.6	129.9	17.6	350.1	468.3	3049.0
1963	161.2	330.7	748.5	143.3	43.2	414.3	431.2	137.5	20.3	376.2	514.0	3320.4
1964	164.6	350.9	854.6	183.8	45.8	446.5	470.7	153.0	25.8	410.4	558.9	3665.0
1965	170.2	376.4	996.9	232.1	51.2	478.8	519.8	175.7	26.1	448.3	603.6	4079.1
1966	177.0	392.0	1105.0	253.0	58.0	542.0	561.0	205.0	28.0	489.0	691.0	4501.0
1967	184.0	416.0	1208.0	274.0	65.0	548.0	609.0	217.0	32.0	545.0	757.0	4855.0
1968	188.0	438.0	1315.0	313.0	72.0	616.0	681.0	245.0	37.0	606.0	839.0	5350.0

TABLE 2. OTHER INCOME BY TYPE OF ECONOMIC ACTIVITY

YEAR	AGRIC	MINING	MANUF	CONSTRUC	EL,G,W	TR.& COM	TRADE	FIN.S.	DWELLINGS	GEN.GOV.	PRIV.S.	TOTAL
1911	43.0	39.6	4.0	0.4	1.6	13.2	21.1	2.3	14.9	10.7	2.1	152.9
1912	45.8	44.3	5.3	0.5	1.7	12.5	22.4	2.3	15.4	11.2	2.2	163.6
1913	38.7	48.3	6.6	0.7	1.9	11.1	23.0	2.5	16.0	11.6	2.5	162.9
1914	30.9	39.3	7.3	0.7	1.9	10.4	22.0	2.6	16.4	12.0	2.7	146.2
1915	34.3	31.6	8.2	0.8	2.0	10.9	21.3	2.9	16.3	12.5	3.0	143.8
1916	39.8	42.2	10.3	1.1	2.1	12.0	24.1	3.4	16.6	13.0	3.4	168.0
1917	50.1	38.3	12.4	1.1	2.5	12.1	27.5	3.9	17.3	14.4	4.0	183.6
1918	70.6	31.5	14.5	1.6	2.9	10.2	32.4	4.1	18.3	16.8	4.8	207.7
1919	103.3	39.9	18.7	1.9	3.2	11.6	42.1	4.0	19.6	19.7	5.1	269.1
1920	91.7	44.2	19.4	2.5	3.5	11.3	47.9	4.1	22.4	21.9	5.4	274.3
1921	57.9	37.4	15.5	2.5	3.6	11.0	41.5	3.9	23.4	21.7	5.3	223.7
1922	54.7	30.4	15.2	2.4	3.6	13.5	33.7	3.9	24.3	20.8	4.6	207.1
1923	63.8	41.0	17.4	2.5	3.7	17.8	34.6	4.7	25.8	21.0	4.2	236.5
1924	74.4	41.7	18.6	2.4	3.9	18.9	39.4	4.8	27.9	22.2	4.1	258.3
1925	76.6	41.3	19.6	2.1	4.1	19.9	43.7	5.1	29.2	23.2	4.0	268.8
1926	73.6	44.1	21.1	1.7	4.7	18.8	45.0	5.1	31.3	24.8	4.0	274.2
1927	76.7	46.1	23.0	1.9	5.5	19.6	47.6	5.1	32.4	26.2	4.0	288.1
1928	81.0	43.6	25.0	2.0	6.5	21.0	50.3	6.1	33.6	27.6	3.9	300.6
1229	65.4	48.4	25.6	2.0	7.3	21.3	50.9	5.8	35.2	27.5	4.0	293.4
1930	49.0	35.9	24.0	2.0	7.9	20.7	45.7	4.3	36.3	26.2	4.1	256.1
1931	39.2	31.0	21.7	1.3	7.7	19.9	38.3	2.8	37.2	23.7	4.2	227.0
1932	35.8	32.8	22.4	1.0	8.5	18.8	32.5	3.6	34.8	21.2	4.1	215.5
1933	42.3	66.0	25.9	1.2	8.8	22.9	34.0	5.6	34.6	22.4	4.0	267.7
1934	42.0	70.7	29.3	1.4	8.9	27.5	42.8	8.8	36.1	25.7	4.1	297.3
1935	64.0	73.8	34.5	1.8	9.9	31.8	50.6	10.7	37.7	29.5	4.5	348.8
1936	76.6	75.3	39.9	1.2	11.1	34.9	58.3	12.7	40.5	34.3	4.6	389.4
1937	69.8	76.8	44.2	1.7	12.2	34.8	64.9	13.1	42.6	37.2	5.2	402.5
1938	72.8	73.3	47.4	3.4	13.5	30.2	67.7	10.7	44.1	38.5	5.9	407.5
1939	83.3	81.0	52.8	3.2	15.1	31.5	69.8	10.7	45.4	38.6	6.6	438.0
1940	85.6	97.1	62.6	2.8	16.5	35.7	75.4	11.2	46.6	39.0	7.6	480.1
1941	93.9	107.5	72.0	2.4	17.4	41.9	83.4	11.3	51.5	41.8	8.7	531.8
1942	126.0	103.6	77.8	1.5	18.1	41.6	88.7	11.4	53.7	43.3	9.5	575.2
1943	148.7	93.9	81.1	1.6	18.0	38.5	93.6	12.0	56.0	43.9	10.6	597.9
1944	145.3	84.0	87.4	2.2	17.9	36.7	100.5	13.8	60.4	46.0	11.4	605.6
1945	132.0	91.6	95.4	2.7	18.4	33.3	113.0	13.5	63.3	52.1	12.1	627.4
1946	144.7	81.8	100.2	4.1	20.2	31.7	135.8	17.6	68.5	59.8	12.9	677.3
1947	213.2	75.0	107.8	6.6	20.6	36.7	153.4	21.7	71.8	66.3	14.5	787.6
1948	258.3	84.5	118.0	10.4	22.3	36.1	159.9	22.2	75.5	71.2	16.6	875.0
1949	224.7	123.4	144.4	11.9	24.2	34.7	176.2	23.2	77.4	77.6	18.8	936.5
1950	353.7	186.4	171.7	15.5	25.1	60.9	169.1	24.5	85.2	85.4	21.0	1198.5
1951	441.9	205.0	171.9	18.9	26.7	69.1	153.1	27.5	92.1	92.0	24.3	1322.5
1952	362.6	186.6	191.6	30.2	28.2	56.2	173.7	32.6	101.9	97.2	28.7	1289.5
1953	456.5	174.9	272.4	29.5	35.2	43.1	244.2	34.0	113.9	103.2	33.2	1560.1
1954	478.6	195.0	286.6	20.9	42.2	95.2	263.6	35.9	127.8	109.6	34.7	1690.1
1955	462.2	252.4	282.9	19.2	52.2	104.7	261.7	38.7	139.4	115.9	37.3	1766.6
1956	192.6	297.8	310.1	22.4	57.2	94.0	281.4	41.1	147.2	120.0	40.6	1604.4
1957	508.3	328.6	315.8	26.1	63.4	101.8	286.4	41.2	163.6	130.4	44.3	2009.9
1958	422.4	321.0	330.7	33.5	71.3	100.3	281.0	39.5	172.1	136.5	48.0	1956.3
1959	445.6	364.6	338.7	37.6	80.5	132.8	273.3	45.4	182.4	141.8	52.4	2095.1
1960	457.1	405.6	365.7	26.7	86.9	170.3	272.7	64.4	192.7	150.3	58.0	2250.4
1961	504.7	424.1	391.6	27.6	96.7	160.3	275.4	76.1	201.6	159.4	62.8	2380.3
1962	508.0	444.8	452.0	28.0	103.7	179.3	321.8	64.7	212.0	172.4	68.4	2555.1
1963	584.8	482.4	507.2	34.7	113.5	198.5	410.6	76.8	223.3	189.2	72.8	2893.8
1964	566.5	564.2	574.0	44.1	122.7	230.3	468.1	100.0	240.0	212.9	81.6	3204.4
1965	576.5	610.6	647.3	56.0	131.4	231.6	497.8	109.1	256.0	228.8	89.2	3434.3
1966	657.0	686.0	632.0	60.0	141.0	217.0	537.0	120.0	276.0	251.0	102.0	3679.0
1967	862.0	685.0	680.0	66.0	164.0	313.0	604.0	128.0	305.0	271.0	116.0	4194.0
1968	751.0	733.0	685.0	73.0	182.0	293.0	668.0	135.0	344.0	299.0	129.0	4292.0

TABLE 3, TOTAL INCOME BY TYPE OF ECONOMIC ACTIVITY

YEAR	AGRIC	MINING	MANUF	CONSTRUC	EL,G,W	TR,& COM	TRADE	FIN.S.	DWELLINGS	GEN.GOV.	PRIV.S.	TOTAL
1911	63.3	82.7	11.5	2.2	2.7	29.2	38.4	7.9	15.7	29.0	17.3	299.9
1912	67.3	87.4	13.2	2.4	2.9	29.6	40.8	8.0	16.2	30.3	18.1	316.2
1913	60.5	90.9	14.9	2.7	3.1	28.3	41.8	8.3	16.8	31.5	19.4	318.2
1914	52.7	76.9	16.0	2.8	3.1	28.3	40.0	8.6	17.3	32.3	25.0	303.0
1915	57.0	67.6	17.3	3.0	3.3	29.3	38.8	9.8	17.2	33.5	30.1	306.9
1916	64.2	82.4	20.5	3.5	3.5	31.6	43.9	11.4	17.6	34.9	29.3	342.8
1917	76.2	80.3	24.6	4.0	4.1	33.8	50.1	13.2	18.5	39.0	30.7	374.5
1918	98.3	74.7	29.2	5.1	4.7	35.7	59.0	13.9	19.5	44.3	31.4	415.8
1919	134.3	87.3	36.9	6.2	5.3	43.5	75.8	14.0	20.9	49.8	32.6	506.6
1920	123.8	102.5	41.0	8.1	6.0	54.1	87.0	14.2	23.7	57.7	40.0	558.1
1921	87.5	88.1	37.0	8.6	6.3	51.7	75.7	13.0	24.7	56.3	41.7	490.6
1922	84.6	66.8	35.1	8.2	6.2	48.4	61.5	12.2	25.6	52.1	38.4	439.1
1923	94.4	83.4	37.1	8.7	6.2	52.3	63.1	13.2	27.1	53.8	37.6	476.9
1924	105.7	86.5	39.0	9.2	6.5	54.9	71.7	13.4	29.3	57.1	39.4	512.7
1925	107.9	86.7	41.6	9.6	6.9	59.3	79.4	13.8	30.6	60.3	40.7	536.8
1926	105.2	93.3	44.9	10.1	7.6	60.4	81.9	14.1	32.8	63.1	41.6	555.0
1927	109.2	96.5	48.5	10.8	8.6	62.2	86.6	14.4	34.0	66.9	42.8	580.5
1928	113.3	94.7	52.1	11.1	9.8	64.3	91.5	15.9	35.3	68.5	44.3	600.8
1229	97.1	99.6	54.3	11.6	10.8	65.5	92.6	16.1	37.0	69.0	45.4	599.0
1930	78.4	85.9	51.4	10.4	11.5	63.9	83.1	14.0	38.0	67.0	47.1	550.7
1931	66.4	78.0	45.5	7.4	11.4	59.5	69.7	12.2	38.9	61.8	46.7	497.5
1932	61.6	77.5	46.2	5.4	12.4	53.5	59.2	12.4	36.5	56.8	44.4	465.9
1933	69.9	113.2	53.9	6.6	12.9	58.2	62.0	13.9	36.4	58.6	45.5	531.1
1934	73.5	124.9	62.9	10.2	13.2	66.0	78.0	17.9	38.2	68.6	47.6	601.0
1935	96.8	135.1	73.6	14.5	14.8	74.2	92.3	20.2	40.0	75.5	50.7	687.7
1936	111.4	144.3	84.4	17.4	16.6	80.9	106.2	22.8	43.1	84.3	55.0	766.4
1937	106.0	150.7	92.9	19.8	18.2	85.9	118.1	24.8	45.4	91.9	59.9	813.6
1938	109.5	154.1	98.7	21.4	19.9	85.8	123.4	23.9	47.0	95.0	65.4	844.1
1939	121.1	163.5	106.6	19.7	21.9	88.9	127.2	25.3	48.3	97.1	72.1	891.7
1940	124.9	185.4	122.5	18.5	23.4	94.7	137.4	27.4	49.5	99.1	103.7	986.5
1941	135.2	200.6	143.1	20.0	24.6	104.6	151.8	29.0	55.2	106.5	143.8	1114.4
1942	170.8	200.5	163.5	20.3	26.0	111.3	161.5	30.5	57.9	114.5	179.1	1235.9
1943	196.5	190.2	182.7	19.3	26.6	118.0	170.3	32.6	61.0	121.8	202.8	1321.8
1944	194.3	184.9	207.3	21.8	27.4	128.9	183.7	35.8	65.8	132.6	219.6	1402.1
1945	188.5	197.7	232.2	26.5	29.1	142.4	206.4	35.0	68.8	147.6	240.5	1514.7
1946	212.3	195.3	252.4	35.5	32.2	162.3	253.9	43.9	75.9	166.1	191.5	1621.3
1947	289.0	192.0	282.0	49.0	33.6	182.9	296.2	50.4	80.0	185.0	166.0	1806.1
1948	340.5	205.8	319.1	66.2	36.7	199.6	316.8	55.3	84.4	202.6	177.2	2004.2
1949	314.5	258.2	368.2	71.2	41.9	210.4	347.6	64.3	84.8	222.9	192.3	2176.3
1950	452.1	343.8	419.1	79.7	43.5	239.8	355.5	73.8	93.4	243.1	205.6	2549.4
1951	549.1	376.8	455.9	89.6	47.1	269.9	361.6	84.5	101.1	265.3	228.6	2829.5
1952	482.8	377.2	515.3	114.5	51.3	285.5	410.1	101.0	111.4	288.7	264.1	3001.9
1953	588.7	376.7	629.1	111.4	61.5	308.5	502.5	101.2	124.5	308.2	288.9	3401.2
1954	616.5	411.3	677.0	104.7	70.7	349.2	537.7	104.6	139.9	328.2	305.6	3645.4
1955	596.8	486.7	706.6	107.8	83.2	374.7	553.2	114.7	152.6	349.6	324.9	3850.8
1956	326.3	549.0	763.8	122.6	89.5	390.0	589.3	125.1	160.0	367.7	354.6	3837.9
1957	646.9	589.6	794.0	132.7	97.0	416.3	613.8	131.9	177.4	393.1	383.1	4375.8
1958	570.5	588.0	828.0	148.1	105.1	434.7	625.0	139.3	186.3	412.2	410.7	4447.9
1959	598.5	645.4	856.5	153.9	114.4	467.6	629.8	153.1	197.2	431.7	441.1	4689.2
1960	610.7	704.0	928.2	144.4	122.6	505.5	647.6	177.6	208.9	456.5	467.5	4973.5
1961	663.5	733.0	997.2	150.7	134.4	512.3	668.4	194.3	217.7	488.1	500.4	5260.0
1962	670.3	764.4	1101.8	154.6	143.6	553.6	732.4	194.6	229.6	522.5	536.7	5604.1
1963	746.0	813.1	1255.7	178.0	156.7	612.8	841.8	214.3	243.6	565.4	586.8	6214.2
1964	731.1	915.1	1428.6	227.9	168.5	676.8	938.8	253.0	265.8	623.3	640.5	6869.4
1965	746.7	987.0	1644.2	288.1	182.6	710.4	1017.6	284.8	282.1	677.1	692.8	7513.4
1966	834.0	1078.0	1737.0	313.0	199.0	759.0	1098.0	325.0	304.0	740.0	793.0	8180.0
1967	1046.0	1101.0	1888.0	340.0	229.0	861.0	1213.0	345.0	337.0	816.0	873.0	9049.0
1968	939.0	1171.0	2000.0	386.0	254.0	909.0	1349.0	380.0	381.0	905.0	968.0	9642.0

TABLE 4 PERCENT DISTRIBUTION OF WORK INCOME

YEAR	AGRIC	MINING	MANUF	CONSTRUC	EL,G,W	TR.& COM	TRADE	FIN.S.	DWELLINGS	GEN.GOV.	PRIV.S.	TOTAL
1911	13.81	29.32	5.10	1.22	0.75	10.88	11.77	3.81	0.54	12.45	10.34	100.00
1912	14.09	28.24	5.18	1.25	0.79	11.21	12.06	3.74	0.52	12.52	10.42	100.00
1913	14.04	27.43	5.34	1.29	0.77	11.08	12.11	3.73	0.52	12.81	10.88	100.00
1914	13.90	23.98	5.55	1.34	0.77	11.42	11.48	3.83	0.57	12.95	14.22	100.00
1915	13.92	22.07	5.58	1.35	0.80	11.28	10.73	4.23	0.55	12.88	16.62	100.00
1916	13.96	23.00	5.84	1.37	0.80	11.21	11.33	4.58	0.57	12.53	14.82	100.00
1917	13.67	22.00	6.39	1.52	0.84	11.37	11.84	4.87	0.63	12.89	13.99	100.00
1918	13.31	20.76	7.06	1.68	0.86	12.25	12.78	4.71	0.58	13.21	12.78	100.00
1919	13.05	19.96	7.66	1.81	0.88	13.43	14.19	4.21	0.55	12.67	11.58	100.00
1920	11.31	20.54	7.61	1.97	0.88	15.08	13.78	3.56	0.46	12.61	12.19	100.00
1921	11.09	19.00	8.06	2.29	1.01	15.25	12.81	3.41	0.49	12.96	13.64	100.00
1922	12.89	15.69	8.58	2.50	1.12	15.04	11.98	3.58	0.56	13.49	14.57	100.00
1923	12.73	17.64	8.19	2.58	1.04	14.35	11.86	3.54	0.54	13.64	13.89	100.00
1924	12.30	17.61	8.02	2.67	1.02	14.15	12.70	3.38	0.55	13.72	13.88	100.00
1925	11.68	16.94	8.21	2.80	1.04	14.70	13.32	3.25	0.52	13.84	13.69	100.00
1926	11.25	17.52	8.48	2.99	1.03	14.81	13.14	3.21	0.53	13.64	13.39	100.00
1927	11.11	17.24	8.72	3.04	1.06	14.57	13.34	3.18	0.55	13.92	13.27	100.00
1928	10.76	17.02	9.03	3.03	1.10	14.42	13.72	3.26	0.57	13.62	13.46	100.00
1229	10.37	16.75	9.39	3.14	1.15	14.46	13.65	3.37	0.59	13.58	13.55	100.00
1930	9.98	16.97	9.30	2.85	1.22	14.66	12.70	3.29	0.58	13.85	14.60	100.00
1931	10.06	17.38	8.80	2.26	1.37	14.64	11.61	3.48	0.63	14.09	15.71	100.00
1932	10.30	17.85	9.50	1.76	1.56	13.86	10.66	3.51	0.68	14.22	16.09	100.00
1933	10.48	17.92	10.63	2.05	1.56	13.40	10.63	3.15	0.68	13.74	15.76	100.00
1934	10.37	17.85	11.06	2.90	1.42	12.68	11.59	3.00	0.69	14.13	14.32	100.00
1935	9.68	18.09	11.54	3.75	1.45	12.51	12.30	2.80	0.68	13.57	13.63	100.00
1936	9.23	18.30	11.80	4.30	1.46	12.20	12.71	2.68	0.69	13.26	13.37	100.00
1937	8.81	17.98	11.85	4.40	1.46	12.43	12.94	2.85	0.68	13.31	13.31	100.00
1938	8.41	18.51	11.75	4.12	1.47	12.73	12.76	3.02	0.66	12.94	13.63	100.00
1939	8.33	18.18	11.86	3.64	1.50	12.65	12.65	3.22	0.64	12.89	14.44	100.00
1940	7.76	17.44	11.83	3.10	1.36	11.65	12.24	3.20	0.57	11.87	18.98	100.00
1941	7.09	15.98	12.20	3.02	1.24	10.76	11.74	3.04	0.64	11.11	23.19	100.00
1942	6.78	14.67	12.97	2.85	1.20	10.55	11.02	2.89	0.64	10.78	25.67	100.00
1943	6.60	13.30	14.04	2.45	1.19	10.98	10.60	2.85	0.69	10.76	26.55	100.00
1944	6.15	12.67	15.05	2.46	1.19	11.58	10.45	2.76	0.68	10.87	26.14	100.00
1945	6.37	11.96	15.42	2.68	1.21	12.30	10.53	2.42	0.62	10.76	25.74	100.00
1946	7.16	12.02	16.12	3.33	1.27	13.83	12.51	2.79	0.78	11.26	18.92	100.00
1947	7.44	11.49	17.10	4.16	1.28	14.35	14.02	2.82	0.81	11.65	14.87	100.00
1948	7.28	10.74	17.81	4.94	1.28	14.48	13.89	2.93	0.79	11.64	14.22	100.00
1949	7.24	10.87	18.05	4.78	1.43	14.17	13.82	3.32	0.60	11.72	13.99	100.00
1950	7.28	11.65	18.31	4.75	1.36	13.24	13.80	3.65	0.61	11.67	13.66	100.00
1951	7.11	11.40	18.85	4.69	1.35	13.32	13.84	3.78	0.60	11.50	13.56	100.00
1952	7.02	11.13	18.90	4.92	1.35	13.39	13.81	3.99	0.55	11.18	13.75	100.00
1953	7.18	10.96	19.37	4.45	1.43	13.33	14.03	3.65	0.58	11.13	13.89	100.00
1954	7.05	11.06	19.97	4.29	1.46	12.99	14.02	3.51	0.62	11.18	13.85	100.00
1955	6.46	11.24	20.33	4.25	1.49	12.95	13.99	3.65	0.63	11.21	13.80	100.00
1956	5.99	11.25	20.31	4.49	1.45	13.25	13.79	3.76	0.57	11.09	14.06	100.00
1957	5.86	11.03	20.21	4.51	1.42	13.29	13.84	3.83	0.58	11.10	14.32	100.00
1958	5.94	10.72	19.96	4.60	1.36	13.42	13.81	4.01	0.57	11.07	14.56	100.00
1959	5.89	10.82	19.96	4.48	1.31	12.91	13.74	4.15	0.57	11.18	14.98	100.00
1960	5.64	10.96	20.66	4.32	1.31	12.31	13.77	4.16	0.59	11.24	15.04	100.00
1961	5.51	10.73	21.03	4.27	1.31	12.22	13.65	4.10	0.56	11.41	15.20	100.00
1962	5.32	10.48	21.31	4.15	1.31	12.28	13.47	4.26	0.58	11.48	15.36	100.00
1963	4.85	9.96	22.54	4.32	1.30	12.48	12.99	4.14	0.61	11.33	15.48	100.00
1964	4.49	9.57	23.32	5.02	1.25	12.18	12.84	4.17	0.70	11.20	15.25	100.00
1965	4.17	9.23	24.44	5.69	1.26	11.74	12.74	4.31	0.64	10.99	14.80	100.00
1966	3.93	8.71	24.55	5.62	1.29	12.04	12.46	4.55	0.62	10.86	15.35	100.00
1967	3.79	8.57	24.88	5.64	1.34	11.29	12.54	4.47	0.66	11.23	15.59	100.00
1968	3.51	8.19	24.58	5.85	1.35	11.51	12.73	4.58	0.69	11.33	15.68	100.00

TABLE5 PERCENT DISTRIBUTION OF OTHER INCOME

YEAR	AGRIC	MINING	MANUF	CONSTRUC	EL,G,W	TR,& COM	TRADE	FIN,S,	DWELLINGS	GEN,GOV,	PRIV,S,	TOTAL
1911	28.12	25.90	2.62	0.26	1.05	8.63	13.80	1.50	9.74	7.00	1.37	100.00
1912	28.00	27.08	3.24	0.31	1.04	7.64	13.69	1.41	9.41	6.85	1.34	100.00
1913	23.76	29.65	4.05	0.43	1.17	6.81	14.12	1.53	9.82	7.12	1.53	100.00
1914	21.14	26.88	4.99	0.48	1.30	7.11	15.05	1.78	11.22	8.21	1.85	100.00
1915	23.85	21.97	5.70	0.56	1.39	7.58	14.81	2.02	11.34	8.69	2.09	100.00
1916	23.69	25.12	6.13	0.65	1.25	7.14	14.35	2.02	9.88	7.74	2.02	100.00
1917	27.29	20.86	6.75	0.60	1.36	6.59	14.98	2.12	9.42	7.84	2.18	100.00
1918	33.99	15.17	6.98	0.77	1.40	4.91	15.60	1.97	8.81	8.09	2.31	100.00
1919	38.39	14.83	6.95	0.71	1.19	4.31	15.64	1.49	7.28	7.32	1.90	100.00
1920	33.43	16.11	7.07	0.91	1.28	4.12	17.46	1.49	8.17	7.98	1.97	100.00
1921	25.88	16.72	6.93	1.12	1.61	4.92	18.55	1.74	10.46	9.70	2.37	100.00
1922	26.41	14.68	7.34	1.16	1.74	6.52	16.27	1.88	11.73	10.04	2.22	100.00
1923	26.98	17.34	7.36	1.06	1.56	7.53	14.63	1.99	10.91	8.88	1.78	100.00
1924	28.80	16.14	7.20	0.93	1.51	7.32	15.25	1.86	10.80	8.59	1.59	100.00
1925	28.50	15.36	7.29	0.78	1.53	7.40	16.26	1.90	10.86	8.63	1.49	100.00
1926	26.84	16.08	7.70	0.62	1.71	6.86	16.41	1.86	11.42	9.04	1.46	100.00
1927	26.62	16.00	7.98	0.66	1.91	6.80	16.52	1.77	11.25	9.09	1.39	100.00
1928	26.95	14.50	8.32	0.67	2.16	6.99	16.73	2.03	11.18	9.18	1.30	100.00
1229	22.29	16.50	8.73	0.68	2.49	7.26	17.35	1.98	12.00	9.37	1.36	100.00
1930	19.13	14.02	9.37	0.78	3.08	8.08	17.84	1.68	14.17	10.23	1.60	100.00
1931	17.27	13.66	9.56	0.57	3.39	8.77	16.87	1.23	16.39	10.44	1.85	100.00
1932	16.61	15.22	10.39	0.46	3.94	8.72	15.08	1.67	16.15	9.84	1.90	100.00
1933	15.80	24.65	9.68	0.45	3.29	8.55	12.70	2.09	12.92	8.37	1.49	100.00
1934	14.13	23.78	9.86	0.47	2.99	9.25	14.40	2.96	12.14	8.64	1.38	100.00
1935	18.35	21.16	9.89	0.52	2.84	9.12	14.51	3.07	10.81	8.46	1.29	100.00
1936	19.67	19.34	10.25	0.31	2.85	8.96	14.97	3.26	10.40	8.81	1.18	100.00
1937	17.34	19.08	10.98	0.42	3.03	8.65	16.12	3.25	10.58	9.24	1.29	100.00
1938	17.87	17.99	11.63	0.83	3.31	7.41	16.61	2.63	10.82	9.45	1.45	100.00
1939	19.02	18.49	12.05	0.73	3.45	7.19	15.94	2.44	10.37	8.81	1.51	100.00
1940	17.83	20.22	13.04	0.58	3.44	7.44	15.71	2.33	9.71	8.12	1.58	100.00
1941	17.66	20.21	13.54	0.45	3.27	7.88	15.68	2.12	9.68	7.86	1.64	100.00
1942	21.91	18.01	13.53	0.26	3.15	7.23	15.42	1.98	9.34	7.53	1.65	100.00
1943	24.87	15.70	13.56	0.27	3.01	6.44	15.65	2.01	9.37	7.34	1.77	100.00
1944	23.99	13.87	14.43	0.36	2.96	6.06	16.60	2.28	9.97	7.60	1.88	100.00
1945	21.04	14.60	15.21	0.43	2.93	5.31	18.01	2.15	10.09	8.30	1.93	100.00
1946	21.36	12.08	14.79	0.61	2.98	4.68	20.05	2.60	10.11	8.83	1.90	100.00
1947	27.07	9.52	13.69	0.84	2.62	4.66	19.48	2.76	9.12	8.42	1.84	100.00
1948	29.52	9.66	13.49	1.19	2.55	4.13	18.27	2.54	8.63	8.14	1.90	100.00
1949	23.99	13.18	15.42	1.27	2.58	3.71	18.81	2.48	8.26	8.29	2.01	100.00
1950	29.51	15.55	14.33	1.29	2.09	5.08	14.11	2.04	7.11	7.13	1.75	100.00
1951	33.41	15.50	13.00	1.43	2.02	5.22	11.58	2.08	6.96	6.96	1.84	100.00
1952	28.12	14.47	14.86	2.34	2.19	4.36	13.47	2.53	7.90	7.54	2.23	100.00
1953	29.26	11.21	17.46	1.89	2.26	4.04	15.65	2.18	7.30	6.61	2.13	100.00
1954	28.32	11.54	16.96	1.24	2.50	5.63	15.60	2.12	7.56	6.48	2.05	100.00
1955	26.16	14.29	16.01	1.09	2.95	5.93	14.81	2.19	7.89	6.56	2.11	100.00
1956	12.00	18.56	19.33	1.40	3.57	5.86	17.54	2.56	9.17	7.48	2.53	100.00
1957	25.29	16.35	15.71	1.30	3.15	5.06	14.25	2.05	8.14	6.49	2.20	100.00
1958	21.59	16.41	16.90	1.71	3.64	5.13	14.36	2.02	8.80	6.98	2.45	100.00
1959	21.27	17.40	16.17	1.79	3.84	6.34	13.04	2.17	8.71	6.77	2.50	100.00
1960	20.31	18.02	16.25	1.19	3.86	7.57	12.12	2.86	8.56	6.68	2.58	100.00
1961	21.20	17.82	16.45	1.16	4.06	6.73	11.57	3.20	8.47	6.70	2.64	100.00
1962	19.88	17.41	17.69	1.10	4.06	7.02	12.59	2.53	8.30	6.75	2.68	100.00
1963	20.21	16.67	17.53	1.20	3.92	6.86	14.19	2.65	7.72	6.54	2.52	100.00
1964	17.68	17.61	17.91	1.38	3.83	7.19	14.61	3.12	7.49	6.64	2.55	100.00
1965	16.79	17.78	18.85	1.63	3.83	6.74	14.49	3.18	7.45	6.66	2.60	100.00
1966	17.86	18.65	17.18	1.63	3.83	5.90	14.60	3.26	7.50	6.82	2.77	100.00
1967	20.55	16.33	16.21	1.57	3.91	7.46	14.40	3.05	7.27	6.46	2.77	100.00
1968	17.50	17.08	15.96	1.70	4.24	6.83	15.56	3.15	8.01	6.97	3.01	100.00

TABLE6 PERCENT DISTRIBUTION OF TOTAL INCOME

YEAR	AGRIC	MINING	MANUF	CONSTRUC	EL,G,W	TR,& COM	TRADE	FIN.S.	DWELLINGS	GEN.GOV.	PRIV.S.	TOTAL
1911	21.11	27.58	3.83	0.73	0.90	9.74	12.80	2.63	5.24	9.67	5.77	100.00
1912	21.28	27.64	4.17	0.76	0.92	9.36	12.90	2.53	5.12	9.58	5.72	100.00
1913	19.01	28.57	4.68	0.85	0.97	8.89	13.14	2.61	5.28	9.90	6.10	100.00
1914	17.39	25.38	5.28	0.92	1.02	9.34	13.20	2.84	5.71	10.66	8.25	100.00
1915	18.57	22.03	5.64	0.98	1.08	9.55	12.64	3.19	5.60	10.92	9.81	100.00
1916	18.73	24.04	5.98	1.02	1.02	9.22	12.81	3.33	5.13	10.18	8.55	100.00
1917	20.35	21.44	6.57	1.07	1.09	9.03	13.38	3.52	4.94	10.41	8.20	100.00
1918	23.64	17.97	7.02	1.23	1.13	8.59	14.19	3.34	4.69	10.65	7.55	100.00
1919	26.51	17.23	7.28	1.22	1.05	8.59	14.96	2.76	4.13	9.83	6.44	100.00
1920	22.18	18.37	7.35	1.45	1.08	9.69	15.59	2.54	4.25	10.34	7.17	100.00
1921	17.84	17.96	7.54	1.75	1.28	10.54	15.43	2.65	5.03	11.48	8.50	100.00
1922	19.27	15.21	7.99	1.87	1.41	11.02	14.01	2.78	5.83	11.87	8.75	100.00
1923	19.79	17.49	7.78	1.82	1.30	10.97	13.23	2.77	5.68	11.28	7.88	100.00
1924	20.62	16.87	7.61	1.79	1.27	10.71	13.98	2.61	5.71	11.14	7.68	100.00
1925	20.10	16.15	7.75	1.79	1.29	11.05	14.79	2.57	5.70	11.23	7.58	100.00
1926	18.95	16.81	8.09	1.82	1.37	10.88	14.76	2.54	5.91	11.37	7.50	100.00
1927	18.81	16.62	8.35	1.86	1.48	10.71	14.92	2.48	5.86	11.52	7.37	100.00
1928	18.86	15.76	8.67	1.85	1.63	10.70	15.23	2.65	5.88	11.40	7.37	100.00
1229	16.21	16.63	9.07	1.94	1.80	10.93	15.46	2.69	6.18	11.52	7.58	100.00
1930	14.24	15.60	9.33	1.89	2.09	11.60	15.09	2.54	6.90	12.17	8.55	100.00
1931	13.35	15.68	9.15	1.49	2.29	11.96	14.01	2.45	7.82	12.42	9.39	100.00
1932	13.22	16.63	9.92	1.16	2.66	11.48	12.71	2.66	7.83	12.19	9.53	100.00
1933	13.16	21.31	10.15	1.24	2.43	10.96	11.67	2.62	6.85	11.03	8.57	100.00
1934	12.23	20.78	10.47	1.70	2.20	10.98	12.98	2.98	6.36	11.41	7.92	100.00
1935	14.08	19.65	10.70	2.11	2.15	10.79	13.42	2.94	5.82	10.98	7.37	100.00
1936	14.54	18.83	11.01	2.27	2.17	10.56	13.86	2.97	5.62	11.00	7.18	100.00
1937	13.03	18.52	11.42	2.43	2.24	10.56	14.52	3.05	5.58	11.30	7.36	100.00
1938	12.97	18.26	11.69	2.54	2.36	10.16	14.62	2.83	5.57	11.25	7.75	100.00
1939	13.58	18.34	11.95	2.21	2.46	9.97	14.26	2.84	5.42	10.89	8.09	100.00
1940	12.66	18.79	12.42	1.88	2.37	9.60	13.93	2.78	5.02	10.05	10.51	100.00
1941	12.13	18.00	12.84	1.79	2.21	9.39	13.62	2.60	4.95	9.56	12.90	100.00
1942	13.82	16.22	13.23	1.64	2.10	9.01	13.07	2.47	4.68	9.26	14.49	100.00
1943	14.87	14.39	13.82	1.46	2.01	8.93	12.88	2.47	4.61	9.21	15.34	100.00
1944	13.86	13.19	14.78	1.55	1.95	9.19	13.10	2.55	4.69	9.46	15.66	100.00
1945	12.44	13.05	15.33	1.75	1.92	9.40	13.63	2.31	4.54	9.74	15.88	100.00
1946	13.09	12.05	15.57	2.19	1.99	10.01	15.66	2.71	4.68	10.24	11.81	100.00
1947	16.00	10.63	15.61	2.71	1.86	10.13	16.40	2.79	4.43	10.24	9.19	100.00
1948	16.99	10.27	15.92	3.30	1.83	9.96	15.81	2.76	4.21	10.11	8.84	100.00
1949	14.45	11.86	16.92	3.27	1.93	9.67	15.97	2.95	3.90	10.24	8.84	100.00
1950	17.73	13.49	16.44	3.13	1.71	9.41	13.94	2.89	3.66	9.54	8.06	100.00
1951	19.41	13.32	16.11	3.17	1.66	9.54	12.78	2.99	3.57	9.38	8.08	100.00
1952	16.08	12.57	17.17	3.81	1.71	9.51	13.66	3.36	3.71	9.62	8.80	100.00
1953	17.31	11.08	18.50	3.28	1.81	9.07	14.77	2.98	3.66	9.06	8.49	100.00
1954	16.91	11.28	18.57	2.87	1.94	9.58	14.75	2.87	3.84	9.00	8.38	100.00
1955	15.50	12.64	18.35	2.80	2.16	9.73	14.37	2.98	3.96	9.08	8.44	100.00
1956	8.50	14.30	19.90	3.19	2.33	10.16	15.35	3.26	4.17	9.58	9.24	100.00
1957	14.78	13.47	18.15	3.03	2.22	9.51	14.03	3.01	4.05	8.98	8.75	100.00
1958	12.83	13.22	18.62	3.33	2.36	9.77	14.05	3.13	4.19	9.27	9.23	100.00
1959	12.76	13.76	18.27	3.28	2.44	9.97	13.43	3.26	4.21	9.21	9.41	100.00
1960	12.28	14.16	18.66	2.90	2.47	10.16	13.02	3.57	4.20	9.18	9.40	100.00
1961	12.61	13.94	18.96	2.87	2.56	9.74	12.71	3.69	4.14	9.28	9.51	100.00
1962	11.96	13.64	19.66	2.76	2.56	9.88	13.07	3.47	4.10	9.32	9.58	100.00
1963	12.00	13.08	20.21	2.86	2.52	9.86	13.55	3.45	3.92	9.10	9.44	100.00
1964	10.64	13.32	20.80	3.32	2.45	9.85	13.67	3.68	3.87	9.07	9.32	100.00
1965	9.94	13.14	21.88	3.83	2.43	9.46	13.54	3.79	3.75	9.01	9.22	100.00
1966	10.20	13.18	21.23	3.83	2.43	9.28	13.42	3.97	3.72	9.05	9.69	100.00
1967	11.56	12.17	20.86	3.76	2.53	9.51	13.40	3.81	3.72	9.02	9.65	100.00
1968	9.74	12.14	20.74	4.00	2.63	9.43	13.99	3.94	3.95	9.39	10.04	100.00

TABLE7, WORK INCOME AS PERCENT OF TOTAL INCOME

YEAR	AGRIC	MINING	MANUF	CONSTRUC	EL,G,W	TR.& COM	TRADE	FIN,S,	DWELLINGS	GEN,GOV,	PRIV.S.	TOTAL
1911	32.07	52.12	65.22	81.82	40.74	54.79	45.05	70,89	5.10	63,10	87,86	49,02
1912	31.95	49.31	59.85	79,17	41.38	57.77	45.10	71,25	4.94	63,04	87.85	48.26
1913	36.03	46.86	55.70	74,07	38.71	60.78	44.98	69,88	4.76	63,17	87.11	48,81
1914	41.37	48.89	54.37	75.00	38.71	63,25	45.00	69.77	5.20	62.85	89.20	51.75
1915	39.82	53.25	52.60	73.33	39.39	62.80	45.10	70,41	5.23	62.69	90.03	53.14
1916	38.01	48.79	49.76	68,57	40.00	62,03	45.10	70,18	5.68	62,75	88.40	50.99
1917	34.25	52.30	49.59	72.50	39.02	64.20	45.11	70.45	6.49	63.08	86.97	50.97
1918	28.18	57.83	50.34	68.63	38.30	71.43	45.08	70.50	6.15	62.08	84.71	50.05
1919	23.08	54.30	49.32	69.35	39.62	73.33	44.46	71.43	6.22	60.44	84.36	46.88
1920	25.93	56.88	52.68	69.14	41.67	79.11	44.94	71.13	5.49	62.05	86.50	50.85
1921	33.83	57.55	58.11	70.93	42.86	78.72	45.18	70.00	5.26	61.46	87.29	54.40
1922	35.34	54.49	56.70	70.73	41.94	72.11	45.20	68.03	5.08	60.08	88.02	52.84
1923	32.42	50.84	53.10	71.26	40.32	65.97	45.17	64.39	4.80	60.97	88.83	50.41
1924	29.61	51.79	52.31	73.91	40.00	65.57	45.05	64.18	4.78	61.12	89.59	49.62
1925	29.01	52.36	52.88	78.13	40.58	66.44	44.96	63.04	4.58	61.53	90.17	49.93
1926	30.04	52.73	53.01	83.17	38.16	68.87	45.05	63.83	4.57	60.70	90.38	50.59
1927	29.76	52.23	52.58	82.41	36.05	68.49	45.03	64.58	4.71	60.84	90.65	50.37
1928	28.51	53.96	52.02	81,98	33.67	67.34	45.03	61.64	4.82	59.71	91.20	49.97
1229	32.65	51.41	52.85	82.76	32.41	67.48	45.03	63.98	4.86	60.14	91.19	51.02
1930	37.50	58.21	53.31	80.77	31.30	67.61	45.01	69.29	4.47	60.90	91.30	53.50
1931	40.96	60.26	52.31	82.43	32.46	66.55	45.05	77.05	4.37	61.65	91.01	54.37
1932	41.88	57.68	51.52	81.48	31.45	64.86	45.10	70.97	4.66	62.68	90.77	53.75
1933	39.48	41.70	51.95	81.82	31.78	60.65	45.16	59.71	4.95	61.77	91.21	49.60
1934	42.86	43.39	53.42	86.27	32.58	58.33	45.13	50.84	5.50	62.54	91.39	50.53
1935	33.88	45.37	53.13	87.59	33.11	57.14	45.18	47,03	5.75	60.93	91.12	49.28
1936	31.24	47.82	52.73	93.10	33.13	56.86	45.10	44.30	6.03	59.31	91.64	49.19
1937	34.15	49.04	52.42	91.41	32.97	59.49	45.05	47.18	6.17	59.52	91.32	50.53
1938	33.52	52.43	51.98	84.11	32.16	64.80	45.14	55.23	6.17	59.47	90.98	51.72
1939	31.21	50.46	50.47	83.76	31.05	64.57	45.13	57.71	6.00	60.25	90.85	50.88
1940	31.47	47.63	48.90	84.86	29.49	62.30	45.12	59.12	5.86	60.65	92.67	51.33
1941	30.55	46.41	49.69	88.00	29.27	59.94	45.06	61.03	6.70	60.75	93.95	52.28
1942	26.23	48.33	52.42	92.61	30.38	62.62	45.08	62.62	7.25	62.18	94.70	53.46
1943	24.33	50.63	55.61	91.71	32.33	67.37	45.04	63.19	8.20	63.96	94.77	54.77
1944	25.22	54.57	57.84	89.91	34.67	71.53	45.29	61.45	8.21	65.31	94.81	56.81
1945	29.97	53.67	58.91	89.81	36.77	76.62	45.25	61.43	7.99	64.70	94.97	58.58
1946	31.84	58.12	60.30	88.45	37.27	80.47	46.51	59.91	9.75	64.00	93.26	58.22
1947	26.23	60.94	61.77	86.53	38.69	79.93	48.21	56.94	10.25	64.16	91.27	56.39
1948	24.14	58.94	63.02	84.29	39.24	81.91	49.53	59.86	10.55	64.86	90.63	56.34
1949	28.55	52.21	60.78	83.29	42.24	83.51	49.31	63.92	8.73	65.19	90.22	56.97
1950	21.77	45.78	59.03	80.55	42.30	74.60	52.43	66.80	8.78	64.87	89.79	52.99
1951	19.52	45.59	62.29	78.91	43.31	74.40	57.66	67.46	8.90	65.32	89.37	53.26
1952	24.90	50.53	62.82	73.62	45.03	80.32	57.64	67.72	8.53	66.33	89.13	57.04
1953	22.46	53.57	56.70	73.52	42.76	79.55	51.40	66.40	8.51	66.52	88.51	54.13
1954	22.37	52.59	57.67	80.04	40.31	77.74	50.98	65.68	8.65	66.61	88.65	53.64
1955	22.55	48.14	59.96	82.19	37.26	72.06	52.69	66.26	8.65	66.85	88.52	54.12
1956	40.97	45.76	59.40	81.73	36.09	75.90	52.25	67.15	8.00	67.36	88.55	58.20
1957	21.43	44.27	60.23	80.33	34.64	75.55	53.34	68.76	7.78	66.83	88.44	54.07
1958	25.96	45.41	60.06	77.38	32.16	76.93	55.04	71.64	7.62	66.89	88.31	56.02
1959	25.55	43.51	60.46	75.57	29.63	71.60	56.61	70.35	7.51	67.15	88.12	55.32
1960	25.15	42.39	60.60	81.51	29.12	66.31	57.89	63.74	7.75	67.08	87.59	54.75
1961	23.93	42.14	60.73	81.69	28.05	68.71	58.80	60.83	7.40	67.34	87.45	54.75
1962	24.21	41.81	58.98	81.89	27.79	67.61	56.06	66.75	7.67	67.00	87.26	54.41
1963	21.61	40.67	59.61	80.51	27.57	67.61	51.22	64.16	8.33	66.54	87.59	53.43
1964	22.51	38.35	59.82	80.65	27.18	65.97	50.14	60.47	9.71	65.84	87.26	53.35
1965	22.79	38.14	60.63	80.56	28.04	67.40	51.08	61.69	9.25	66.21	87.12	54.29
1966	21.22	36.36	63.62	80.83	29.15	71.41	51.09	63.08	9.21	66.08	87.14	55.02
1967	17.59	37.78	63.98	80.59	28.38	63.65	50.21	62.90	9.50	66.79	86.71	53.65
1968	20.02	37.40	65.75	81.09	28.35	67.77	50.48	64.47	9.71	66.96	86.67	55.49

TABLE8 WEIGHTED WORK INCOME AS PERCENT OF TOTAL INCOME

YEAR	AGRIC	MINING	MANUF	CONSTRUC	EL,G,W	TR,& COM	TRADE	FIN.S.	DWELLINGS	GEN.GOV.	PRIV.S.	TOTAL
1911	6.77	14.37	2.50	0.60	0.37	5.34	5.77	1.87	0.27	6.10	5.07	49.02
1912	6.80	13.63	2.50	0.60	0.38	5.41	5.82	1.80	0.25	6.04	5.03	48.26
1913	6.85	13.39	2.61	0.63	0.38	5.41	5.91	1.82	0.25	6.25	5.31	48.81
1914	7.19	12.41	2.87	0.69	0.40	5.91	5.94	1.98	0.30	6.70	7.36	51.75
1915	7.40	11.73	2.97	0.72	0.42	6.00	5.70	2.25	0.29	6.84	8.83	53.14
1916	7.12	11.73	2.98	0.70	0.41	5.72	5.78	2.33	0.29	6.39	7.56	50.99
1917	6.97	11.21	3.26	0.77	0.43	5.79	6.03	2.48	0.32	6.57	7.13	50.97
1918	6.66	10.39	3.54	0.84	0.43	6.13	6.40	2.36	0.29	6.61	6.40	50.05
1919	6.12	9.36	3.59	0.85	0.41	6.30	6.65	1.97	0.26	5.94	5.43	46.88
1920	5.75	10.45	3.87	1.00	0.45	7.67	7.01	1.81	0.23	6.41	6.20	50.85
1921	6.03	10.33	4.38	1.24	0.55	8.30	6.97	1.85	0.26	7.05	7.42	54.40
1922	6.81	8.29	4.53	1.32	0.59	7.95	6.33	1.89	0.30	7.13	7.70	52.84
1923	6.42	8.89	4.13	1.30	0.52	7.23	5.98	1.78	0.27	6.88	7.00	50.41
1924	6.10	8.74	3.98	1.33	0.51	7.02	6.30	1.68	0.27	6.81	6.89	49.62
1925	5.83	8.46	4.10	1.40	0.52	7.34	6.65	1.62	0.26	6.91	6.84	49.93
1926	5.69	8.86	4.29	1.51	0.52	7.50	6.65	1.62	0.27	6.90	6.77	50.59
1927	5.60	8.68	4.39	1.53	0.53	7.34	6.72	1.60	0.28	7.01	6.68	50.37
1928	5.38	8.51	4.51	1.51	0.55	7.21	6.86	1.63	0.28	6.81	6.72	49.97
1229	5.29	8.55	4.79	1.60	0.58	7.38	6.96	1.72	0.30	6.93	6.91	51.02
1930	5.34	9.08	4.98	1.53	0.65	7.84	6.79	1.76	0.31	7.41	7.81	53.50
1931	5.47	9.45	4.78	1.23	0.74	7.96	6.31	1.89	0.34	7.66	8.54	54.37
1932	5.54	9.59	5.11	0.94	0.84	7.45	5.73	1.89	0.36	7.64	8.65	53.75
1933	5.20	8.89	5.27	1.02	0.77	6.65	5.27	1.56	0.34	6.82	7.81	49.60
1934	5.24	9.02	5.59	1.46	0.72	6.41	5.86	1.51	0.35	7.14	7.24	50.53
1935	4.77	8.91	5.69	1.85	0.71	6.17	6.06	1.38	0.33	6.69	6.72	49.28
1936	4.54	9.00	5.81	2.11	0.72	6.00	6.25	1.32	0.34	6.52	6.58	49.19
1937	4.45	9.08	5.99	2.22	0.74	6.28	6.54	1.44	0.34	6.72	6.72	50.53
1938	4.35	9.57	6.08	2.13	0.76	6.59	6.60	1.56	0.34	6.69	7.05	51.72
1939	4.24	9.25	6.03	1.85	0.76	6.44	6.44	1.64	0.33	6.56	7.35	50.88
1940	3.98	8.95	6.07	1.59	0.70	5.98	6.28	1.64	0.29	6.09	9.74	51.33
1941	3.71	8.35	6.38	1.58	0.65	5.63	6.14	1.59	0.33	5.81	12.12	52.28
1942	3.62	7.84	6.93	1.52	0.64	5.64	5.89	1.55	0.34	5.76	13.72	53.46
1943	3.62	7.29	7.69	1.34	0.65	6.01	5.80	1.56	0.38	5.89	14.54	54.77
1944	3.49	7.20	8.55	1.40	0.68	6.58	5.93	1.57	0.39	6.18	14.85	56.81
1945	3.73	7.00	9.03	1.57	0.71	7.20	6.17	1.42	0.36	6.30	15.08	58.58
1946	4.17	7.00	9.39	1.94	0.74	8.06	7.28	1.62	0.46	6.56	11.02	58.22
1947	4.20	6.48	9.65	2.35	0.72	8.09	7.91	1.59	0.45	6.57	8.39	56.39
1948	4.10	6.05	10.03	2.78	0.72	8.16	7.83	1.65	0.44	6.56	8.01	56.34
1949	4.13	6.19	10.28	2.72	0.81	8.07	7.88	1.89	0.34	6.68	7.97	56.97
1950	3.86	6.17	9.70	2.52	0.72	7.02	7.31	1.93	0.32	6.19	7.24	52.99
1951	3.79	6.07	10.04	2.50	0.72	7.10	7.37	2.01	0.32	6.12	7.22	53.26
1952	4.00	6.35	10.78	2.81	0.77	7.64	7.88	2.28	0.32	6.38	7.84	57.04
1953	3.89	5.93	10.49	2.41	0.77	7.22	7.59	1.98	0.31	6.03	7.52	54.13
1954	3.78	5.93	10.71	2.30	0.78	6.97	7.52	1.88	0.33	6.00	7.43	53.64
1955	3.50	6.08	11.00	2.30	0.81	7.01	7.57	1.97	0.34	6.07	7.47	54.12
1956	3.48	6.55	11.82	2.61	0.84	7.71	8.02	2.19	0.33	6.45	8.18	58.20
1957	3.17	5.96	10.93	2.44	0.77	7.19	7.48	2.07	0.32	6.00	7.74	54.07
1958	3.33	6.00	11.18	2.58	0.76	7.52	7.73	2.24	0.32	6.20	8.15	56.02
1959	3.26	5.99	11.04	2.48	0.72	7.14	7.60	2.30	0.32	6.18	8.29	55.32
1960	3.09	6.00	11.31	2.37	0.72	6.74	7.54	2.28	0.33	6.16	8.23	54.75
1961	3.02	5.87	11.51	2.34	0.72	6.69	7.47	2.25	0.31	6.25	8.32	54.75
1962	2.90	5.70	11.60	2.26	0.71	6.68	7.33	2.32	0.31	6.25	8.36	54.41
1963	2.59	5.32	12.04	2.31	0.70	6.67	6.94	2.21	0.33	6.05	8.27	53.43
1964	2.40	5.11	12.44	2.68	0.67	6.50	6.85	2.23	0.38	5.97	8.14	53.35
1965	2.27	5.01	13.27	3.09	0.68	6.37	6.92	2.34	0.35	5.97	8.03	54.29
1966	2.16	4.79	13.51	3.09	0.71	6.63	6.86	2.51	0.34	5.98	8.45	55.02
1967	2.03	4.60	13.35	3.03	0.72	6.06	6.73	2.40	0.35	6.02	8.37	53.65
1968	1.95	4.54	13.64	3.25	0.75	6.39	7.06	2.54	0.38	6.29	8.70	55.49

TABLE9 OTHER INCOME AS PERCENT OF TOTAL INCOME

YEAR	AGRIC	MINING	MANUF	CONSTRUC	EL,G,W	TR,& COM	TRADE	FIN.S.	DWELLINGS	GEN.GOV.	PRIV.S.	TOTAL
1911	67.93	47.88	34.78	18.18	59.26	45.21	54.95	29.11	94.90	36.90	12.14	50.98
1912	68.05	50.69	40.15	20.83	58.62	42.23	54.90	28.75	95.06	36.96	12.15	51.74
1913	63.97	53.14	44.30	25.93	61.29	39.22	55.02	30.12	95.24	36.83	12.89	51.19
1914	58.63	51.11	45.63	25.00	61.29	36.75	55.00	30.23	94.80	37.15	10.80	48.25
1915	60.18	46.75	47.40	26.67	60.61	37.20	54.90	29.59	94.77	37.31	9.97	46.86
1916	61.99	51.21	50.24	31.43	60.00	37.97	54.90	29.82	94.32	37.25	11.60	49.01
1917	65.75	47.70	50.41	27.50	60.98	35.80	54.89	29.55	93.51	36.92	13.03	49.03
1918	71.82	42.17	49.66	31.37	61.70	28.57	54.92	29.50	93.85	37.92	15.29	49.95
1919	76.92	45.70	50.68	30.65	60.38	26.67	55.54	28.57	93.78	39.56	15.64	53.12
1920	74.07	43.12	47.32	30.86	58.33	20.89	55.06	28.87	94.51	37.95	13.50	49.15
1921	66.17	42.45	41.89	29.07	57.14	21.28	54.82	30.00	94.74	38.54	12.71	45.60
1922	64.66	45.51	43.30	29.27	58.06	27.89	54.80	31.97	94.92	39.92	11.98	47.16
1923	67.58	49.16	46.90	28.74	59.68	34.03	54.83	35.61	95.20	39.03	11.17	49.59
1924	70.39	48.21	47.69	26.09	60.00	34.43	54.95	35.82	95.22	38.88	10.41	50.38
1925	70.99	47.64	47.12	21.88	59.42	33.56	55.04	36.96	95.42	38.47	9.83	50.07
1926	69.96	47.27	46.99	16.83	61.84	31.13	54.95	36.17	95.43	39.30	9.62	49.41
1927	70.24	47.77	47.42	17.59	63.95	31.51	54.97	35.42	95.29	39.16	9.35	49.63
1928	71.49	46.04	47.98	18.02	66.33	32.66	54.97	38.36	95.18	40.29	8.80	50.03
1229	67.35	48.59	47.15	17.24	67.59	32.52	54.97	36.02	95.14	39.86	8.81	48.98
1930	62.50	41.79	46.69	19.23	68.70	32.39	54.99	30.71	95.53	39.10	8.70	46.50
1931	59.04	39.74	47.69	17.57	67.54	33.45	54.95	22.95	95.63	38.35	8.99	45.63
1932	58.12	42.32	48.48	18.52	68.55	35.14	54.90	29.03	95.34	37.32	9.23	46.25
1933	60.52	58.30	48.05	18.18	68.22	39.35	54.84	40.29	95.05	38.23	8.79	50.40
1934	57.14	56.61	46.58	13.73	67.42	41.67	54.87	49.16	94.50	37.46	8.61	49.47
1935	66.12	54.63	46.88	12.41	66.89	42.86	54.82	52.97	94.25	39.07	8.88	50.72
1936	68.76	52.18	47.27	6.90	66.87	43.14	54.90	55.70	93.97	40.69	8.36	50.81
1937	65.85	50.96	47.58	8.59	67.03	40.51	54.95	52.82	93.83	40.48	8.68	49.47
1938	66.48	47.57	48.02	15.89	67.84	35.20	54.86	44.77	93.83	40.53	9.02	48.28
1939	68.79	49.54	49.53	16.24	68.95	35.43	54.87	42.29	94.00	39.75	9.15	49.12
1940	68.53	52.37	51.10	15.14	70.51	37.70	54.88	40.88	94.14	39.35	7.33	48.67
1941	69.45	53.59	50.31	12.00	70.73	40.06	54.94	38.97	93.30	39.25	6.05	47.72
1942	73.77	51.67	47.58	7.39	69.62	37.38	54.92	37.38	92.75	37.82	5.30	46.54
1943	75.67	49.37	44.39	8.29	67.67	32.63	54.96	36.81	91.80	36.04	5.23	45.23
1944	74.78	45.43	42.16	10.09	65.33	28.47	54.71	38.55	91.79	34.69	5.19	43.19
1945	70.03	46.33	41.09	10.19	63.23	23.38	54.75	38.57	92.01	35.30	5.03	41.42
1946	68.16	41.88	39.70	11.55	62.73	19.53	53.49	40.09	90.25	36.00	6.74	41.78
1947	73.77	39.06	38.23	13.47	61.31	20.07	51.79	43.06	89.75	35.84	8.73	43.61
1948	75.86	41.06	36.98	15.71	60.76	18.09	50.47	40.14	89.45	35.14	9.37	43.66
1949	71.45	47.79	39.22	16.71	57.76	16.49	50.69	36.08	91.27	34.81	9.78	43.03
1950	78.23	54.22	40.97	19.45	57.70	25.40	47.57	33.20	91.22	35.13	10.21	47.01
1951	80.48	54.41	37.71	21.09	56.69	25.60	42.34	32.54	91.10	34.68	10.63	46.74
1952	75.10	49.47	37.18	26.38	54.97	19.68	42.36	32.28	91.47	33.67	10.87	42.96
1953	77.54	46.43	43.30	26.48	57.24	20.45	48.60	33.60	91.49	33.48	11.49	45.87
1954	77.63	47.41	42.33	19.96	59.69	27.26	49.02	34.32	91.35	33.39	11.35	46.36
1955	77.45	51.86	40.04	17.81	62.74	27.94	47.31	33.74	91.35	33.15	11.48	45.88
1956	59.03	54.24	40.60	18.27	63.91	24.10	47.75	32.85	92.00	32.64	11.45	41.80
1957	78.57	55.73	39.77	19.67	65.36	24.45	46.66	31.24	92.22	33.17	11.56	45.93
1958	74.04	54.59	39.94	22.62	67.84	23.07	44.96	28.36	92.38	33.11	11.69	43.98
1959	74.45	56.49	39.54	24.43	70.37	28.40	43.39	29.65	92.49	32.85	11.88	44.68
1960	74.85	57.61	39.40	18.49	70.88	33.69	42.11	36.26	92.25	32.92	12.41	45.25
1961	76.07	57.86	39.27	18.31	71.95	31.29	41.20	39.17	92.60	32.66	12.55	45.25
1962	75.79	58.19	41.02	18.11	72.21	32.39	43.94	33.25	92.33	33.00	12.74	45.59
1963	78.39	59.33	40.39	19.49	72.43	32.39	48.78	35.84	91.67	33.46	12.41	46.57
1964	77.49	61.65	40.18	19.35	72.82	34.03	49.86	39.53	90.29	34.16	12.74	46.65
1965	77.21	61.86	39.37	19.44	71.96	32.60	48.92	38.31	90.75	33.79	12.88	45.71
1966	78.78	63.64	36.38	19.17	70.85	28.59	48.91	36.92	90.79	33.92	12.86	44.98
1967	82.41	62.22	36.02	19.41	71.62	36.35	49.79	37.10	90.50	33.21	13.29	46.35
1968	79.98	62.60	34.25	18.91	71.65	32.23	49.52	35.53	90.29	33.04	13.33	44.51

TABLE 10, WEIGHTED OTHER INCOME AS PERCENT OF TOTAL INCOME

YEAR	AGRIC	MINING	MANUF	CONSTRUC	EL,G,W	TR.& COM	TRADE	FIN.S.	DWELLINGS	GEN.GOV.	PRIV.S.	TOTAL
1911	14.34	13.20	1.33	0.13	0.53	4.40	7.04	0.77	4.97	3.57	0.70	50.98
1912	14.48	14.01	1.68	0.16	0.54	3.95	7.08	0.73	4.87	3.54	0.70	51.74
1913	12.16	15.18	2.07	0.22	0.60	3.49	7.23	0.79	5.03	3.65	0.79	51.19
1914	10.20	12.97	2.41	0.23	0.63	3.43	7.26	0.86	5.41	3.96	0.89	48.25
1915	11.18	10.30	2.67	0.26	0.65	3.55	6.94	0.94	5.31	4.07	0.98	46.86
1916	11.61	12.31	3.00	0.32	0.61	3.50	7.03	0.99	4.84	3.79	0.99	49.01
1917	13.38	10.23	3.31	0.29	0.67	3.23	7.34	1.04	4.62	3.85	1.07	49.03
1918	16.98	7.58	3.49	0.38	0.70	2.45	7.79	0.99	4.40	4.04	1.15	49.95
1919	20.39	7.88	3.69	0.38	0.63	2.29	8.31	0.79	3.87	3.89	1.01	53.12
1920	16.43	7.92	3.48	0.45	0.63	2.02	8.58	0.73	4.01	3.92	0.97	49.15
1921	11.80	7.62	3.16	0.51	0.73	2.24	8.46	0.79	4.77	4.42	1.08	45.60
1922	12.46	6.92	3.46	0.55	0.82	3.07	7.67	0.89	5.53	4.74	1.05	47.16
1923	13.38	8.60	3.65	0.52	0.78	3.73	7.26	0.99	5.41	4.40	0.88	49.59
1924	14.51	8.13	3.63	0.47	0.76	3.69	7.68	0.94	5.44	4.33	0.80	50.38
1925	14.27	7.69	3.65	0.39	0.76	3.71	8.14	0.95	5.44	4.32	0.75	50.07
1926	13.26	7.95	3.80	0.31	0.85	3.39	8.11	0.92	5.64	4.47	0.72	49.41
1927	13.21	7.94	3.96	0.33	0.95	3.38	8.20	0.88	5.58	4.51	0.69	49.63
1928	13.48	7.26	4.16	0.33	1.08	3.50	8.37	1.02	5.59	4.59	0.65	50.03
1229	10.92	8.08	4.27	0.33	1.22	3.56	8.50	0.97	5.88	4.59	0.67	48.98
1930	8.90	6.52	4.36	0.36	1.43	3.76	8.30	0.78	6.59	4.76	0.74	46.50
1931	7.88	6.23	4.36	0.26	1.55	4.00	7.70	0.56	7.48	4.76	0.84	45.63
1932	7.68	7.04	4.81	0.21	1.82	4.04	6.98	0.77	7.47	4.55	0.88	46.25
1933	7.96	12.43	4.88	0.23	1.66	4.31	6.40	1.05	6.51	4.22	0.75	50.40
1934	6.99	11.76	4.88	0.23	1.48	4.58	7.12	1.46	6.01	4.28	0.68	49.47
1935	9.31	10.73	5.02	0.26	1.44	4.62	7.36	1.56	5.48	4.29	0.65	50.72
1936	9.99	9.83	5.21	0.16	1.45	4.55	7.61	1.66	5.28	4.48	0.60	50.81
1937	8.58	9.44	5.43	0.21	1.50	4.28	7.98	1.61	5.24	4.57	0.64	49.47
1938	8.62	8.68	5.62	0.40	1.60	3.58	8.02	1.27	5.22	4.56	0.70	48.28
1939	9.34	9.08	5.92	0.36	1.69	3.53	7.83	1.20	5.09	4.33	0.74	49.12
1940	8.68	9.84	6.35	0.28	1.67	3.62	7.64	1.14	4.72	3.95	0.77	48.67
1941	8.43	9.65	6.46	0.22	1.56	3.76	7.48	1.01	4.62	3.75	0.78	47.72
1942	10.19	8.38	6.30	0.12	1.46	3.37	7.18	0.92	4.35	3.50	0.77	46.54
1943	11.25	7.10	6.14	0.12	1.36	2.91	7.08	0.91	4.24	3.32	0.80	45.23
1944	10.36	5.99	6.23	0.16	1.28	2.62	7.17	0.98	4.31	3.28	0.81	43.19
1945	8.71	6.05	6.30	0.18	1.21	2.20	7.46	0.89	4.18	3.44	0.80	41.42
1946	8.92	5.05	6.18	0.25	1.25	1.96	8.38	1.09	4.23	3.69	0.80	41.78
1947	11.80	4.15	5.97	0.37	1.14	2.03	8.49	1.20	3.98	3.67	0.80	43.61
1948	12.89	4.22	5.89	0.52	1.11	1.80	7.98	1.11	3.77	3.55	0.83	43.66
1949	10.32	5.67	6.64	0.55	1.11	1.59	8.10	1.07	3.56	3.57	0.86	43.03
1950	13.87	7.31	6.73	0.61	0.98	2.39	6.63	0.96	3.34	3.35	0.82	47.01
1951	15.62	7.25	6.08	0.67	0.94	2.44	5.41	0.97	3.25	3.25	0.86	46.74
1952	12.08	6.22	6.38	1.01	0.94	1.87	5.79	1.09	3.39	3.24	0.96	42.96
1953	13.42	5.14	8.01	0.87	1.03	1.86	7.18	1.00	3.35	3.03	0.98	45.87
1954	13.13	5.35	7.86	0.57	1.16	2.61	7.23	0.98	3.51	3.01	0.95	46.36
1955	12.00	6.55	7.35	0.50	1.36	2.72	6.80	1.00	3.62	3.01	0.97	45.88
1956	5.02	7.76	8.08	0.58	1.49	2.45	7.33	1.07	3.84	3.13	1.06	41.80
1957	11.62	7.51	7.22	0.60	1.45	2.33	6.55	0.94	3.74	2.98	1.01	45.93
1958	9.50	7.22	7.43	0.75	1.60	2.25	6.32	0.89	3.87	3.07	1.08	43.98
1959	9.50	7.78	7.22	0.80	1.72	2.83	5.83	0.97	3.89	3.02	1.12	44.68
1960	9.19	8.16	7.35	0.54	1.75	3.42	5.48	1.29	3.87	3.02	1.17	45.25
1961	9.60	8.06	7.44	0.52	1.84	3.05	5.24	1.45	3.83	3.03	1.19	45.25
1962	9.06	7.94	8.07	0.50	1.85	3.20	5.74	1.15	3.78	3.08	1.22	45.59
1963	9.41	7.76	8.16	0.56	1.83	3.19	6.61	1.24	3.59	3.04	1.17	46.57
1964	8.25	8.21	8.36	0.64	1.79	3.35	6.81	1.46	3.49	3.10	1.19	46.65
1965	7.67	8.13	8.62	0.75	1.75	3.08	6.63	1.45	3.41	3.05	1.19	45.71
1966	8.03	8.39	7.73	0.73	1.72	2.65	6.56	1.47	3.37	3.07	1.25	44.98
1967	9.53	7.57	7.51	0.73	1.81	3.46	6.67	1.41	3.37	2.99	1.28	46.35
1968	7.79	7.60	7.10	0.76	1.89	3.04	6.93	1.40	3.57	3.10	1.34	44.51

TABLE 43 , EMPLOYMENT AND WAGE STRUCTURE IN MINING AND QUARRYING
VALUES IN R MILLIONS THOUSANDS.

	EMPLOYMENT				SALARIES AND WAGES			
YEAR	WHITES	ASIATICS	COL.,BANTU	TOTAL	WHITES	ASIATICS	COL.,BANTU	TOTAL
1911	37544	4407	283868	325819	20868	158	16086	37112
1912	36612	4629	290474	331715	20298	182	16670	37150
1913	36575	4652	284649	325876	20012	260	16004	36276
1914	31120	4400	247633	283153	17768	264	14346	32378
1915	28034	4006	244422	276462	17106	252	13780	31138
1916	30406	3936	273495	307837	18844	268	15302	34414
1917	32149	3770	269530	305449	20596	260	14842	35698
1918	31877	3200	256834	291911	21858	224	14398	36480
1919	34566	2950	252042	289558	23558	218	14744	38520
1920	38032	2897	266497	307426	28642	234	16272	45148
1921	30930	2572	243303	276805	25872	222	15010	41104
1922	23712	2305	228043	254060	14398	200	13548	28146
1923	30011	2102	257410	289523	17198	170	15912	33280
1924	31263	2059	270792	304114	18384	142	16366	34892
1925	31791	1875	268406	302072	18904	158	16268	35330
1926	38258	1671	302208	342137	19610	142	17330	37082
1927	39156	1532	310626	351314	20450	132	17486	38068
1928	37317	1441	319537	358295	21144	128	18034	39306
1929	37795	1366	308197	347356	21538	126	18144	39808
1930	35772	1217	313370	350359	21350	116	18164	39630
1931	33743	996	295776	330515	20718	92	17416	38226
1932	31258	834	276059	308151	20360	78	16772	37210
1933	34786	733	296616	332135	21544	76	17542	39162
1934	38980	801	324337	364118	25078	76	19326	44480
1935	42506	831	358500	401837	28928	82	21794	50804
1936	45856	837	390853	437546	32502	84	24694	57280
1937	48902	836	399236	448974	36028	84	25698	61810
1938	51773	814	417703	470290	39150	86	27454	66690
1939	53558	827	421495	475880	41056	88	27956	69100
1940	55519	815	456071	512405	43480	90	30388	73958
1941	56205	808	474803	531816	45606	90	31932	77628
1942	56270	823	469898	526991	47494	92	31930	79516
1943	55167	807	418283	474257	47762	92	29226	77080
1944	53397	690	410447	464534	48214	94	33126	81434
1945	51564	559	420907	473030	51360	94	35584	87038
1946	51347	590	423758	475695	54088	98	36266	90452
1947	50425	568	418057	469050	55838	98	36172	92108
1948	50479	564	398425	449468	59306	102	35908	95316
1949	51720	586	427663	479969	67312	112	39906	107330
1950	55906	652	446710	503268	79842	136	45460	125438
1951	57894	661	446730	505285	88614	152	47760	136526
1952	59215	664	458586	518465	97980	176	50670	148826
1953	60229	626	444991	505846	104302	178	52498	156978
1954	62760	599	467675	531040	111460	180	57580	169220
1955	65301	542	474043	539886	122312	182	61242	183736
1956	66243	524	487196	553963	130264	194	64096	194554
1957	65902	561	496046	562509	134890	204	66632	201726
1958	64555	570	498657	563782	135164	236	72398	207798
1959	66898	584	541761	609243	146856	262	75382	222500
1960	67691	535	551855	620081	156564	300	83034	239898
1961	67734	677	567749	636160	159641	341	83546	243528
1962	67436	704	564016	632156	163329	402	85161	248892
1963	66675	689	548496	615860	168853	419	86184	255456
1964	66176	684	555574	622434	180043	436	93144	273623
1965	65837	683	561828	628348	191542	450	101184	293176

TABLE 44: Employment and Wage Differentials in Mining and Quarrying

Year	Employment: Non-Whites / Whites	Income Differentials		
		Whites / Asiatics	Whites / Bantu	Asiatics / Bantu
1911	7.7	15.5	9.8	0.6
1912	8.1	14.1	9.7	0.7
1913	7.9	9.8	9.7	1.0
1914	8.1	9.5	9.9	1.0
1915	8.9	9.7	10.8	1.1
1916	9.1	9.1	11.1	1.2
1917	8.5	9.3	11.6	1.3
1918	8.2	9.8	12.2	1.2
1919	7.4	9.2	11.7	1.3
1920	7.1	9.3	12.3	1.3
1921	7.9	9.7	13.6	1.4
1922	9.7	7.0	10.2	1.5
1923	8.6	7.1	9.3	1.3
1924	8.7	8.5	9.7	1.1
1925	8.5	7.1	9.8	1.4
1926	7.9	6.0	8.9	1.5
1927	8.0	6.1	9.3	1.5
1928	8.6	6.4	10.0	1.6
1929	8.2	6.2	9.7	1.6
1930	8.8	6.3	10.3	1.6
1931	8.8	6.6	10.4	1.6
1932	8.9	7.0	10.7	1.5
1933	8.5	6.0	10.5	1.8
1934	8.3	6.8	10.8	1.6
1935	8.5	6.9	11.2	1.6
1936	8.5	7.1	11.2	1.6
1937	8.2	7.3	11.4	1.6
1938	8.1	7.1	11.5	1.6
1939	7.9	7.2	11.6	1.6
1940	8.2	7.1	11.8	1.7
1941	8.5	7.3	12.1	1.7
1942	8.4	7.6	12.4	1.6
1943	7.6	7.6	12.4	1.6
1944	7.7	6.6	11.2	1.7
1945	8.2	5.9	11.8	2.0
1946	8.3	6.3	12.3	1.9
1947	8.3	6.4	12.8	2.0
1948	7.9	6.5	13.0	2.0
1949	8.3	6.8	13.9	2.0
1950	8.0	6.8	14.0	2.0
1951	7.7	6.7	14.3	2.2
1952	7.8	6.2	15.0	2.4
1953	7.4	6.1	14.7	2.4
1954	7.5	5.9	14.4	2.4
1955	7.3	5.6	14.5	2.6
1956	7.4	5.3	14.9	2.8
1957	7.5	5.6	15.2	2.7
1958	7.7	5.1	14.4	2.9
1959	8.1	4.9	15.8	3.2
1960	8.2	4.1	15.4	3.7
1961	8.4	4.7	16.0	3.4
1962	8.4	4.2	16.0	3.8
1963	8.2	4.2	16.1	3.9
1964	8.4	4.3	16.2	3.8
1965	8.5	4.4	16.2	3.7

TABLE 45 INDUSTRIAL CENSUSES VALUES IN R1000
EMPLOYMENT, REMUNERATION, OUTPUT & CAPITAL STRUCTURE
1917-1924: PRIVATE AND PUBLIC MANUFACTURING 1925-1965: PRIVATE MANUFACTURING ONLY

YEAR	NUMBER OF EMPLOYEES			SALARIES & WAGES, R1000			NET	LAND	MACH.PLANT
	EUROP	NON-EUROP	TOTAL	EUROP	NON-EUROP	TOTAL	OUTPUT	& BLDGS	& TOOLS
17	46100	77742	123842	15522	5350	20872	39894	27846	35758
18	49918	84293	134211	18044	6412	24456	47966	30462	39804
19	53598	89490	143088	21424	7526	28950	55700	32552	41960
20	62483	113037	175520	27844	10394	38238	73132	37126	46980
21	62962	116857	179819	32166	11648	43814	75114	37406	51240
22	59995	110956	170951	29554	10706	40260	67510	40016	55722
23	61296	110751	172047	27808	10564	38372	68776	41346	59176
24	66189	116688	182877	29858	11152	41010	74518	41932	60864

YEAR	NUMBER OF EMPLOYEES					SALARIES & WAGES, R1000					NET	LAND	MACH.PLANT
	EUROP	BANTU	ASIATIC	COLOUR.	TOTAL	EUROP	BANTU	ASIATIC	COLOUR.	TOTAL	OUTPUT	& BLDGS	& TOOLS
25	53450	66503	9367	23427	152747	21676	5464	900	3294	31334	62138	36364	44986
26	57405	70819	9499	24139	161862	23528	5918	974	3624	34044	66978	35818	45574
27	61412	74615	9347	25038	170412	25210	6306	990	3872	36378	72008	37270	49468
28	64923	77570	9166	24522	176181	27110	6628	1008	4180	38926	79180	40352	52748
29	68393	81366	9542	25576	184877	28598	7064	1104	4398	41164	84364	44664	56400
30	69757	81233	9528	24946	185464	30098	7228	1170	4464	42960	86114	45788	57104
33	68981	66751	8296	20762	164790	25692	5320	874	3020	34906	74632	45688	56432
34	83461	84501	9234	23965	201161	31820	6728	1002	3608	43158	88708	50590	62322
35	93592	102815	10048	25840	234295	38598	8440	1120	4042	52200	105810	54698	67956
36	106413	122357	10996	29410	269176	44898	10310	1288	4648	61144	123312	62644	78728
37	115227	134233	12265	31930	293655	50516	11924	1520	5244	69204	140422	70742	83762
38	117237	142447	12657	33113	305454	53512	13070	1638	5722	73942	152052	76206	88768
39	117097	141950	13256	34766	307069	54276	13320	1792	5986	75374	159870	80858	92454
40	115292	147399	14233	37564	314488	55740	14102	1954	6552	78348	173410	83592	98610
41	118571	166464	16008	42316	343359	60462	16984	2444	7838	87728	200018	87112	103222
42	119518	182363	16605	45672	364158	70034	21928	3022	10344	105328	226852	93436	109126
43	119040	193708	16587	47070	376405	76404	27274	3606	11908	119192	245512	98058	114076
44	124707	206444	17238	50103	398492	84704	33290	4412	13592	135998	275150	107858	123220
45	133518	224541	18014	55329	431402	97706	41154	5194	16588	160642	316020	121100	145762
46	144065	235974	18095	58812	456946	109626	45422	5560	18666	179274	349616	134824	163572
47	157016	251125	17620	63231	488992	127414	50350	5842	21206	204812	402098	151872	180878
48	170875	279203	18598	70259	538935	149728	58398	6444	25086	239656	466320	186870	218758
49	185387	309222	19977	76310	590896	174388	68054	7322	28898	278662	531314	204412	273130
50	191291	325351	21549	79988	618179	189778	72208	8172	30396	300554	590932	235924	318702
51	168570	288673	19621	75608	552472	371540	137956	16214	59914	585624	1259492	554936	493212
52	174391	312433	20811	78488	586123	434684	160578	18250	66344	679856	1415938	612234	555548
53	178789	323007	22796	80737	605329	484684	175854	21798	73456	755792	1569116	687740	578744
54	183856	338239	23357	85707	631159	522920	191284	23590	80822	818616	1738462	757554	677694
55	186567	361864	25239	88533	662203	569728	212060	26256	86420	894464	1813666	605734	863128
56	162190	341567	26916	87086	617759	264451	104734	14333	44153	427671	950000	301260	452752
57	167799	346975	27303	91111	633188	285349	109460	14982	46135	455926	971916	322546	487302
58	170550	354210	28352	94003	647115	298738	113668	15855	48353	476614	1000000	331947	517924
59	170623	353012	28573	94785	646993	289606	112044	15889	46485	464024	1000000	329973	543138
60	171017	346407	29443	91424	638291	323542	122169	17498	51907	515116	1110695	375783	605394
61	174964	354675	31672	97548	658859	349108	133775	19217	56607	558707	1210230	386706	635688
62	177877	364333	33482	101809	677501	368387	144158	20361	60517	593423	1306852	397958	652885
63	192682	397667	38093	117844	746286	398889	158717	21876	67781	647263	1424914	400000	700000
65	213882	461825	44741	138627	859075	536519	220958	28608	89119	875204	1857354	400000	700000

TABLE 46 RACIAL WAGE DIFFERENTIALS

E=EUROPEANS
B=BANTU
A=ASIATICS
C=COLOUREDS
TN=TOTAL, NON-EUROPEANS
T=TOTAL

YEAR	E/B	E/A	E/C	A/B	C/B	[illegible]		E/T
17							4.89	2.00
18							4.75	1.98
19							4.75	1.98
20							4.85	2.05
21							5.13	2.10
22							5.11	2.09
23							4.76	2.03
24							4.72	2.01
25	4.94	4.22	2.88	1.17	1.71	0.68	4.17	1.98
26	4.90	4.00	2.73	1.23	1.80	0.68	4.07	1.95
27	4.86	3.88	2.65	1.25	1.83	0.68	4.01	1.92
28	4.89	3.80	2.45	1.29	1.99	0.65	3.93	1.89
29	4.82	3.61	2.43	1.33	1.98	0.67	3.88	1.88
30	4.85	3.51	2.41	1.38	2.01	0.69	3.88	1.86
33	4.67	3.54	2.56	1.32	1.83	0.72	3.87	1.76
34	4.79	3.51	2.53	1.36	1.89	0.72	3.96	1.78
35	4.92	3.62	2.58	1.36	1.91	0.71	4.12	1.81
36	5.01	3.60	2.67	1.39	1.88	0.74	4.23	1.86
37	4.94	3.54	2.67	1.40	1.85	0.75	4.19	1.86
38	4.97	3.53	2.64	1.41	1.88	0.75	4.21	1.89
39	4.94	3.43	2.69	1.44	1.83	0.79	4.17	1.89
40	5.05	3.52	2.77	1.43	1.82	0.79	4.26	1.94
41	5.00	3.34	2.75	1.50	1.82	0.82	4.20	2.00
42	4.87	3.22	2.59	1.51	1.88	0.80	4.06	2.03
43	4.56	2.95	2.54	1.54	1.80	0.86	3.86	2.03
44	4.21	2.65	2.50	1.59	1.68	0.94	3.63	1.99
45	3.99	2.54	2.44	1.57	1.64	0.96	3.46	1.97
46	3.95	2.48	2.40	1.60	1.65	0.97	3.42	1.94
47	4.05	2.45	2.42	1.65	1.67	0.99	3.48	1.94
48	4.19	2.53	2.45	1.66	1.71	0.97	3.59	1.97
49	4.27	2.57	2.48	1.67	1.72	0.97	3.66	1.99
50	4.47	2.62	2.61	1.71	1.71	1.00	3.82	2.04
51	4.61	2.67	2.78	1.73	1.66	1.04	3.95	2.08
52	4.85	2.84	2.95	1.71	1.64	1.04	4.19	2.15
53	4.98	2.84	2.98	1.76	1.67	1.05	4.27	2.17
54	5.03	2.82	3.02	1.79	1.67	1.07	4.30	2.19
55	5.21	2.94	3.13	1.78	1.67	1.07	4.47	2.26
56	5.32	3.06	3.22	1.74	1.65	1.05	4.55	2.36
57	5.39	3.10	3.36	1.74	1.61	1.08	4.64	2.36
58	5.46	3.13	3.41	1.74	1.60	1.09	4.69	2.38
59	5.35	3.05	3.46	1.75	1.55	1.13	4.64	2.37
60	5.36	3.18	3.33	1.69	1.61	1.05	4.61	2.34
61	5.29	3.29	3.44	1.61	1.54	1.05	4.61	2.35
62	5.23	3.41	3.48	1.54	1.50	1.02	4.60	2.36
63	5.19	3.60	3.60	1.44	1.44	1.00	4.61	2.39
65	5.24	3.92	3.90	1.34	1.34	0.99	4.78	2.46

TABLE 47 SHARE OF WAGES IN NET OUTPUT

E/O = SHARE OF EUR. WAGES IN OUTPUT, ETC.

YEAR	E/O	B/O	A/O	C/O	TN/O	T/O
17	38.91				13.41	52.32
18	37.62				13.37	50.99
19	38.46				13.51	51.97
20	38.07				14.21	52.29
21	42.82				15.51	58.33
22	43.78				15.86	59.64
23	40.43				15.36	55.79
24	40.07				14.97	55.03
25	34.88	8.79	1.45	5.30	15.54	50.43
26	35.13	8.84	1.45	5.41	15.70	50.83
27	35.01	8.76	1.37	5.38	15.51	50.52
28	34.24	8.37	1.27	5.28	14.92	49.16
29	33.90	8.37	1.31	5.21	14.89	48.79
30	34.95	8.39	1.36	5.18	14.94	49.89
33	34.42	7.13	1.17	4.05	12.35	46.77
34	35.87	7.58	1.13	4.07	12.78	48.65
35	36.48	7.98	1.06	3.82	12.86	49.33
36	36.41	8.36	1.04	3.77	13.17	49.58
37	35.97	8.49	1.08	3.73	13.31	49.28
38	35.19	8.60	1.08	3.76	13.44	48.63
39	33.95	8.33	1.12	3.74	13.20	47.15
40	32.14	8.13	1.13	3.78	13.04	45.18
41	30.23	8.49	1.22	3.92	13.63	43.86
42	30.87	9.67	1.33	4.56	15.56	46.43
43	31.12	11.11	1.47	4.85	17.43	48.55
44	30.78	12.10	1.60	4.94	18.64	49.43
45	30.92	13.02	1.64	5.25	19.92	50.83
46	31.36	12.99	1.59	5.34	19.92	51.28
47	31.69	12.52	1.45	5.27	19.25	50.94
48	32.11	12.52	1.38	5.38	19.28	51.39
49	32.82	12.81	1.38	5.44	19.63	52.45
50	32.12	12.22	1.38	5.14	18.75	50.86
51	29.50	10.95	1.29	4.76	17.00	46.50
52	30.70	11.34	1.29	4.69	17.32	48.01
53	30.89	11.21	1.39	4.68	17.28	48.17
54	30.08	11.00	1.36	4.65	17.01	47.09
55	31.41	11.69	1.45	4.76	17.90	49.32
56	27.84	11.02	1.51	4.65	17.18	45.02
57	29.36	11.26	1.54	4.75	17.55	46.91
58	29.87	11.37	1.59	4.84	17.79	47.66
59	28.96	11.20	1.59	4.65	17.44	46.40
60	29.13	11.00	1.58	4.67	17.25	46.38
61	28.85	11.05	1.59	4.68	17.32	46.17
62	28.19	11.03	1.56	4.63	17.22	45.41
63	27.99	11.14	1.54	4.76	17.43	45.42
65	28.89	11.90	1.54	4.80	18.23	47.12

TABLE 47 b: Average Annual Earning of Whites and Bantu Employed in Private Manufacturing and Construction Industries, Earnings at 1959-1960 Prices, 1916/17 to 1968/69[1]
Figures in Rand

Year	Average Annual Earnings at 1959/60 Prices		Percentage Increase Over Previous Year	
	Whites	Bantu	Whites	Bantu
1916-17	794	146	.	.
1917-18	788	149	.	.
1924-25	903	171	.	.
1925-26	926	178	2.6	4.0
1926-27	921	180	-0.5	1.1
1927-28	939	180	2.0	-
1928-29	942	184	0.3	2.2
1929-30	993	191	5.4	3.8
1930-31	957	193	-3.6	1.0
1933-34	968	191	1.1	-1.0
1934-35	1,031	195	6.5	2.0
1935-36	1,074	200	4.2	2.6
1936-37	1,101	207	2.5	3.5
1937-38	1,097	208	-0.4	0.5
1938-39	1,101	210	0.4	1.0
1939-40	1,130	212	2.6	1.0
1940-41	1,140	216	0.9	1.9
1941-42	1,222	238	7.2	10.2
1942-43	1,241	258	1.6	8.4
1943-44	1,255	285	1.1	10.5
1944-45	1,313	315	4.6	10.5
1945-46	1,337	322	1.8	2.2
1946-47	1,393	328	4.2	1.9
1947-48	1,437	329	3.2	0.3
1948-49	1,444	324	0.5	-1.5
1949-50	1,486	319	2.9	-1.5
1950-51	1,499	317	0.9	-0.6
1951-52	1,559	316	4.0	-0.3
1952-53	1,588	313	1.9	-0.9
1953-54	1,634	320	2.9	2.2
1954-55	1,709	323	4.6	0.9
1954-55	1,725	327	-	-
1955-56	1,774	328	2.8	0.3
1956-57	1,817	331	2.4	0.9
1957-58	1,817	326	-	-1.5
1958-59	1,836	333	1.0	2.1
1959-60	1,872	348	2.0	4.5
1960-61	1,907	365	1.9	4.9
1961-62	2,005	381	5.1	0.8
1962-63	2,059	411	2.7	6.5
1063-64	2,243	468	8.9	11.2
1964-65	2,405	495	7.2	2.1
1965-66	2,509	517	4.3	0.9
1966-67	2,534	534	1.0	-0.3
1967-68	2,620	558	3.4	2.7
1968-69	2,784	591	6.3	3.0

TABLE 48 GROSS DOMESTIC PRODUCT DU PIESANIE ESTIMATES, FIGURES IN RM, 1958 PRICES

YEAR	AGRICULTURE	MINING	MANUFACTURING	SERVICES	TOTAL
1917	199.0	214.6	65.7	389.1	868.4
1918	239.2	195.5	74.6	401.0	910.3
1919	200.2	193.4	84.2	400.8	878.6
1920	199.7	189.6	87.1	400.0	876.4
1921	216.4	165.6	87.5	426.2	895.7
1922	229.5	142.2	89.4	445.7	906.8
1923	266.8	204.8	95.5	472.1	1039.2
1924	182.5	215.7	102.0	492.9	993.1
1925	315.9	216.8	111.7	531.4	1175.8
1926	196.8	234.2	120.2	547.5	1098.7
1927	269.8	256.0	129.1	575.8	1230.7
1928	260.9	256.6	139.5	601.5	1258.5
1929	270.1	251.1	147.8	623.6	1292.6
1930	344.4	250.6	143.7	619.4	1358.1
1931	277.4	236.9	127.2	580.1	1221.6
1932	345.8	229.3	127.6	568.4	1271.1
1933	208.1	217.9	152.0	586.7	1164.7
1934	366.0	210.8	186.2	680.8	1443.8
1935	341.1	222.2	221.7	734.0	1519.0
1936	360.9	235.9	258.8	824.0	1679.6
1937	427.9	256.0	283.0	888.5	1855.4
1938	345.0	264.7	301.3	905.1	1816.1
1939	452.9	275.1	314.4	939.0	1981.4
1940	419.9	291.4	328.2	1016.0	2055.5
1941	422.1	296.9	347.0	1118.0	2184.0
1942	362.7	296.3	348.0	1156.3	2163.3
1943	459.1	269.6	357.0	1195.1	2280.8
1944	412.9	266.9	385.6	1241.3	2306.7
1945	389.3	270.2	416.3	1307.9	2383.7
1946	354.8	270.2	457.9	1340.2	2423.1
1947	397.6	261.5	508.9	1369.1	2537.1
1948	429.0	282.2	572.2	1457.6	2741.0
1949	377.6	306.1	613.4	1510.0	2807.1
1950	436.8	323.0	660.1	1546.6	2968.5
1951	476.2	332.3	704.3	1606.8	3119.6
1952	471.3	344.3	760.5	1652.1	3228.2
1953	514.1	342.6	803.9	1737.7	3398.3
1954	536.3	390.5	859.9	1830.0	3616.7
1955	544.4	437.9	917.1	1907.2	3806.6
1956	587.2	483.7	955.0	1985.6	4011.5
1957	563.4	536.0	1008.1	2080.6	4188.1
1958	541.7	544.7	1050.6	2160.9	4297.9
1959	589.9	610.1	1087.9	2209.1	4497.0
1960	601.8	657.5	1131.1	2297.1	4687.5
1961	661.9	697.2	1190.5	2407.1	4956.7
1962	698.5	749.5	1265.9	2504.0	5217.9
1963	685.4	787.6	1427.9	2684.2	5585.1
1964	685.9	837.7	1639.7	2936.2	6099.5
1965	693.9	867.2	1761.7	3121.4	6444.2

TABLE 50: Private Consumption Expenditure in South Africa, R millions, 1958 prices. 1947-1969

	Private Cons. Expenditure, 1958 Prices				Percentage Distribution			
	Durable	Non-Durable	Services	Total	Durable	Non-Durable	Services	Total
1947	252	1,279	604	2,135	11.8	59.9	28.3	100.0
1948	342	1,320	618	2,280	15.0	57.9	27.1	100.0
1949	299	1,405	650	2,354	12.7	59.7	27.6	100.0
1950	275	1,467	691	2,433	11.3	60.3	28.4	100.0
1951	328	1,482	677	2,487	13.2	59.6	27.2	100.0
1952	294	1,558	681	2,533	11.6	61.5	26.9	100.0
1953	314	1,635	710	2,659	11.8	61.5	26.7	100.0
1954	337	1,676	752	2,765	12.2	60.6	27.2	100.0
1955	379	1,708	784	2,871	13.2	59.5	27.3	100.0
1956	373	1,769	821	2,963	12.6	59.7	27.7	100.0
1957	418	1,818	861	3,097	13.5	58.7	27.8	100.0
1958	451	1,856	893	3,200	14.1	58.0	27.9	100.0
1959	437	1,896	925	3,258	13.4	58.2	28.4	100.0
1960	445	1,932	955	3,332	13.4	57.9	28.7	100.0
1961	415	1,984	983	3,382	12.3	58.6	29.1	100.0
1962	427	2,082	1,014	3,523	12.1	59.1	28.8	100.0
1963	517	2,187	1,057	3,761	13.7	58.2	28.1	100.0
1964	641	2,374	1,111	4,126	15.5	57.6	26.9	100.0
1965	646	2,526	1,165	4,337	14.9	58.2	26.9	100.0
1966	687	2,682	1,201	4,570	15.0	58.7	26.3	100.0
1967	716	2,782	1,251	4,749	15.1	58.6	26.3	100.0
1968	820	2,999	1,314	5,133	16.0	58.4	25.6	100.0
1969	873	3,217	1,379	5,469	16.0	58.8	25.2	100.0

TABLE 51 GROSS AND NET DOMESTIC PRODUCT, GROSS DOM. EXPENDITURE, NET INV., CONSUMPTION

YEAR	GDP	DEPREC	NNP	FOR.CONTR.	NDP	CONS	INVEST	CONS/NDP	INV/NDP
1917	868.4	92.7	775.7	82.1	693.6	716.5	-22.9	103.30	-3.30
1918	910.3	90.0	820.3	71.4	748.9	773.7	-24.8	103.31	-3.31
1919	878.6	86.7	791.9	63.8	728.1	722.5	5.6	99.23	0.77
1920	876.4	86.2	790.2	64.1	726.1	688.9	37.2	94.88	5.12
1921	895.7	86.7	809.0	55.5	753.5	705.6	47.9	93.64	6.36
1922	906.8	88.2	818.6	58.6	760.0	716.7	43.3	94.30	5.70
1923	1039.2	89.2	950.0	78.0	872.0	804.1	67.9	92.21	7.79
1924	993.1	92.0	901.1	75.2	825.9	719.5	106.4	87.12	12.88
1925	1175.8	95.5	1080.3	78.9	1001.4	904.4	97.0	90.31	9.69
1926	1098.7	101.2	997.5	76.4	921.1	809.7	111.4	87.91	12.09
1927	1230.7	105.6	1125.1	78.4	1046.7	941.9	104.8	89.99	10.01
1928	1258.5	112.7	1145.8	75.0	1070.8	954.0	116.8	89.09	10.91
1929	1292.6	119.8	1172.8	77.3	1095.5	969.5	126.0	88.50	11.50
1930	1358.1	122.1	1236.0	84.8	1151.2	1061.3	89.9	92.19	7.81
1931	1221.6	122.2	1099.4	78.6	1020.8	972.2	48.6	95.24	4.76
1932	1271.1	123.8	1147.3	79.1	1068.2	1047.1	21.1	98.02	1.98
1933	1164.7	122.4	1042.3	83.3	959.0	931.9	27.1	97.17	2.83
1934	1443.8	129.6	1314.2	93.7	1220.5	1096.0	124.5	89.80	10.20
1935	1519.0	138.0	1381.0	94.1	1286.9	1089.3	197.6	84.65	15.35
1936	1679.6	149.3	1530.3	106.9	1423.4	1165.0	258.4	81.85	18.15
1937	1855.4	159.4	1696.0	108.6	1587.4	1312.1	275.3	82.66	17.34
1938	1816.1	170.7	1645.4	92.9	1552.5	1257.5	295.0	81.00	19.00
1939	1981.4	179.5	1801.9	114.7	1687.2	1436.8	250.4	85.16	14.84
1940	2055.5	185.2	1870.3	110.0	1760.3	1638.0	122.3	93.05	6.95
1941	2184.0	190.9	1993.1	101.1	1892.0	1820.5	71.5	96.22	3.78
1942	2163.3	193.7	1969.6	86.5	1883.1	1877.4	5.7	99.70	0.30
1943	2280.8	194.0	2086.8	80.1	2006.7	2013.3	-6.6	100.33	-0.33
1944	2306.7	195.8	2110.9	78.6	2032.3	1969.0	63.3	96.89	3.11
1945	2383.7	202.0	2181.7	76.8	2104.9	1971.0	133.9	93.64	6.36
1946	2423.1	211.5	2211.6	71.7	2139.9	1909.1	230.8	89.21	10.79
1947	2537.1	223.8	2313.3	67.4	2245.9	1905.4	340.5	84.84	15.16
1948	2741.0	247.5	2493.5	76.6	2416.9	1969.4	447.5	81.48	18.52
1949	2807.1	273.3	2533.8	90.3	2443.5	1956.2	487.3	80.06	19.94
1950	2968.5	295.9	2672.6	116.4	2556.2	2169.3	386.9	84.86	15.14
1951	3119.6	320.2	2799.4	132.3	2667.1	2292.5	374.6	85.95	14.05
1952	3228.2	344.7	2883.5	133.3	2750.2	2315.0	435.2	84.18	15.82
1953	3398.3	374.1	3024.2	127.9	2896.3	2388.9	507.4	82.48	17.52
1954	3616.7	405.6	3211.1	138.9	3072.2	2564.5	507.7	83.47	16.53
1955	3806.6	433.4	3373.2	146.3	3226.9	2789.8	437.1	86.45	13.55
1956	4011.5	455.5	3556.0	163.1	3392.9	2990.7	402.2	88.15	11.85
1957	4188.1	472.2	3715.9	160.8	3555.1	3110.5	444.6	87.49	12.51
1958	4297.9	488.6	3809.3	173.0	3636.3	3110.7	525.6	85.55	14.45
1959	4497.0	508.9	3988.1	171.5	3816.6	3352.0	464.6	87.83	12.17
1960	4687.5	532.8	4154.7	172.5	3982.2	3545.7	436.5	89.04	10.96
1961	4956.7	554.4	4402.3	166.0	4236.3	3814.8	421.5	90.05	9.95
1962	5217.9	573.8	4644.1	156.4	4487.7	4125.9	361.8	91.94	8.06
1963	5585.1	598.9	4986.2	149.2	4837.0	4343.3	493.7	89.79	10.21
1964	6099.5	641.1	5458.4	153.6	5304.8	4631.7	673.1	87.31	12.69
1965	6444.2	692.0	5752.2	167.4	5584.8	4705.1	879.7	84.25	15.75

TABLE 52: Rates of Growth, Sigma and Delta

Sigma = Capital Productivity, Delta = Rate of Investment
Capital Productivity is Change in Income Over Investment
Growth is (Y(T) - Y(T-1))/Y(T)

	VALUES ON ANNUAL BASIS		
	SIGMA	DELTA	GROWTH RATE
1918	-1.7984	-0.0302	0.0544
1919	-5.0714	0.0071	-0.0359
1920	-0.0457	0.0471	-0.0022
1921	0.3925	0.0592	0.0232
1922	0.2217	0.0529	0.0117
1923	1.9352	0.0715	0.1383
1924	-0.4596	0.1181	-0.0543
1925	1.8474	0.0898	0.1659
1926	-0.7433	0.1117	-0.0830
1927	1.2176	0.0931	0.1134
1928	0.1772	0.1019	0.0181
1929	0.2143	0.1074	0.0230
1930	0.7030	0.0727	0.0511
1931	-2.8107	0.0442	-0.1242
1932	2.2701	0.0184	0.0418
1933	-3.8745	0.0260	-0.1007
1934	2.1839	0.0947	0.2069
1935	0.3381	0.1431	0.0484
1936	0.5778	0.1689	0.0976
1937	0.6019	0.1623	0.0977
1938	-0.1715	0.1793	-0.0308
1939	0.6250	0.1390	0.0869
1940	0.5593	0.0654	0.0366
1941	1.7175	0.0359	0.0616
1942	-4.1228	0.0029	-0.0119
1943	-17.7576	-0.0032	0.0562
1944	0.3807	0.0300	0.0114
1945	0.5288	0.0614	0.0325
1946	0.1295	0.1044	0.0135
1947	0.2987	0.1472	0.0440
1948	0.4027	0.1795	0.0723
1949	0.0827	0.1923	0.0159
1950	0.3587	0.1448	0.0519
1951	0.3385	0.1338	0.0453
1952	0.1932	0.1509	0.0292
1953	0.2773	0.1678	0.0465
1954	0.3681	0.1581	0.0582
1955	0.3709	0.1296	0.0481
1956	0.4545	0.1131	0.0514
1957	0.3596	0.1196	0.0430
1958	0.1777	0.1380	0.0245
1959	0.3848	0.1165	0.0448
1960	0.3817	0.1051	0.0401
1961	0.5874	0.0957	0.0562
1962	0.6683	0.0779	0.0521
1963	0.6929	0.0990	0.0686
1964	0.7015	0.1233	0.0865
1965	0.3340	0.1529	0.0511

TABLE 53: Expenditure on Gross Domestic Product at 1958 Prices, R millions

PRODUCT	1946	1947	1948	1949	1950	1951	1952	1953	1954	1955	1956	1957	1958	1959	1960	1961	1962	1963	1964	1965	1966	1967	1968	1969
EXPENDITURE																								
1. Private Consumption Expenditure	. ...	1,423	1,609	1,687	1,787	2,009	2,224	2,416	2,577	2,766	2,883	3,069	3,222	3,331	3,332	3,382	3,523	3,761	4,126	4,337	4,570	4,749	5,133	5,469
2. Current Expenditure by General Government	254	240	233	252	270	315	358	387	394	421	474	495	530	558	489	523	605	644	692	771	825	840	903	994
3. Gross Domestic Fixed Investment (including changes in inventories)	406	513	559	529	554	797	673	866	950	980	991	1,066	1,105	958	1,152	1,122	1,092	1,322	1,605	2,052	1,806	2,317	1,858	2,229
4. Residual item		30	24	21	44	- 7	47	14	- 25	- 62	2	- 15	13	20	- 63	- 86	- 52	99	74	- 92	- 112	- 102	-	54
5. GROSS DOMESTIC EXPENDITURE	1,892	2,206	2,425	2,489	2,655	3,114	3,302	3,683	3,896	4,105	4,350	4,615	4,870	4,867	4,910	4,941	5,168	5,826	6,497	7,068	7,089	7,804	7,894	8,746
6. Exports of Goods & Non-factor services	408	458	550	588	801	959	972	992	1,089	1,210	1,341	1,464	1,332	1,501	1,574	1,656	1,755	1,851	2,016	1,946	2,051	2,251	2,456	2,484
7. Less Imports of Goods and Non-factor Services	511	706	829	743	722	1,090	1,003	1,020	1,050	1,150	1,172	1,307	1,318	1,167	1,345	1,246	1,260	1,534	1,854	2,017	1,796	2,150	2,187	2,462
8. EXPENDITURE ON GROSS DOMESTIC PRODUCT	1,789	1,958	2,146	2,334	2,734	2,983	3,271	3,655	3,935	4,165	4,519	4,772	4,884	5,201	5,139	5,351	5,663	6,143	6,659	6,997	7,344	7,905	8,163	8,768

TABLE 54: Average Capital-Output Ratios, Total Economy and Four Main Economic Sectors

Year	Total	Agriculture	Mining	Manufacturing	Services
1911		1.70	1.57		
1912		1.69	1.49		
1913		1.65	1.52		
1914		1.67	1.75		
1915		1.52	1.88		
1916		1.75	1.53		
1917	2.30	1.57	1.45	1.93	3.20
1918	2.17	1.31	1.50	1.68	3.09
1919	2.25	1.59	1.43	1.53	3.12
1920	2.30	1.68	1.40	1.54	3.20
1921	2.30	1.60	1.57	1.59	3.09
1922	2.32	1.54	1.76	1.67	3.03
1923	2.09	1.38	1.21	1.66	2.96
1924	2.30	2.13	1.21	1.64	2.96
1925	2.02	1.31	1.21	1.63	2.86
1926	2.26	2.21	1.12	1.65	2.91
1927	2.11	1.68	1.03	1.69	2.88
1928	2.15	1.83	1.04	1.68	2.88
1929	2.19	1.89	1.06	1.67	2.91
1930	2.15	1.51	1.07	1.75	3.05
1931	2.43	1.87	1.14	1.93	3.34
1932	2.36	1.49	1.16	1.94	3.46
1933	2.59	2.46	1.23	1.66	3.39
1934	2.18	1.43	1.39	1.44	3.03
1935	2.20	1.57	1.49	1.39	2.96
1936	2.14	1.53	1.60	1.38	2.81
1937	2.09	1.34	1.66	1.40	2.79
1938	2.30	1.72	1.78	1.44	2.96
1939	2.23	1.35	1.81	1.46	3.04
1940	2.21	1.48	1.73	1.43	2.91
1941	2.11	1.49	1.70	1.35	2.69
1942	2.14	1.74	1.65	1.35	2.62
1943	2.02	1.37	1.74	1.32	2.55
1944	2.03	1.54	1.71	1.27	2.50
1945	2.02	1.68	1.65	1.25	2.44
1946	2.08	1.92	1.66	1.23	2.49
1947	2.12	1.83	1.78	1.24	2.60
1948	2.13	1.87	1.74	1.26	2.62
1949	2.25	2.30	1.73	1.36	2.71
1950	2.26	2.07	1.80	1.40	2.78
1951	2.27	2.03	1.91	1.42	2.79
1952	2.33	2.13	2.08	1.41	2.86
1953	2.36	2.02	2.32	1.47	2.88
1954	2.36	2.02	2.24	1.50	2.89
1955	2.36	2.05	2.12	1.49	2.92
1956	2.34	1.94	1.99	1.48	2.95
1957	2.28	2.07	1.84	1.46	2.98
1958	2.41	2.19	1.85	1.47	3.05
1959	2.40	2.05	1.68	1.50	3.14
1960	2.40	2.03	1.62	1.49	3.17
1961	2.35	1.87	1.59	1.45	3.15
1962	2.30	1.80	1.50	1.41	3.14
1963	2.24	1.85	1.43	1.34	3.06
1964	2.16	1.87	1.38	1.29	2.94
1965	2.18	1.86	1.37	1.36	2.95

Table 55 : Incremental Capital-Output Ratios, Figures on Capital Formation and Domestic Product in R millions.

Periods	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
1917-21	985.9		795.4						
22-26	1,142.7	156.8	949.5	154.1	745.0	302.7	4.75	1.96	1.93
27-31	1,272.3	229.6	1,155.8	206.3	1,090.8	556.0	4.75	2.70	2.42
32-36	1,415.6	143.3	1,283.0	127.2	931.3	311.2	6.50	2.45	2.17
37-41	1,978.5	562.9	1,801.3	518.3	2,073.6	1,276.7	3.68	2.46	2.27
42-46	2,311.5	333.0	2,112.1	310.8	1,215.8	256.2	3.65	.82	.77
47-51	2,834.7	523.2	2,562.5	450.4	2,798.1	1,640.0	5.35	3.64	3.13
52-56	3,612.3	777.6	3,209.6	647.1	3,952.3	2,211.8	5.08	3.42	2.84
57-61	4,525.4	913.1	4,014.1	804.5	4,632.7	2,274.1	5.07	2.83	2.49
62-66	6,036.8	1,511.4	5,388.2	1,374.1	5,287.6	2,386.6	3.50	1.74	1.58

1. Average annual value of Gross Domestic Product;
2. Increase in 1 (total period);
3. Average annual value of Net Domestic Product;
4. Increase in 3 (total period);
5. Gross fixed capital formation between mid-point of previous period and mid-point of reference period;
6. As (5), except that net fixed capital formation is here considered;
7. (5) ÷ (2) GROSS ICOR;
8. (6) ÷ (4) NET ICOR;
9. (6) ÷ (2) NET /GROSS ICOR.

TABLE 56: ICOR for the Total Economy and for the Four Main Economic Sectors. Calculation on the Basis of Decades (9 years for 1957-65). Calculations are Based on Net Capital Formation and Gross Domestic Product Values

Year	Total	Agriculture	Mining	Manufacturing	Services
1922 - 31	-	2.03	-	-	-
27 - 36	2.62	2.09	.33	1.43	3.28
32 - 41	2.38	1.11	5.86	1.28	2.79
37 - 46	1.95	1.12	5.88	1.17	2.27
42 - 51	1.62	3.45	1.47	.88	1.93
47 - 56	2.48	4.91	2.38	1.48	2.87
52 - 61	2.93	2.96	2.38	1.79	4.87
57 - 65	2.32	1.59	1.25	1.27	3.60

TABLE 57: Economically Active Population (Excluding Unemployed and Unspecified), and Total Population, Census Years, Four Main Economic Sectors, 1921-51: 15 Years and Over, 1960: No Distinction According to Age. Figures for Agriculture Exclude Bantu Peasants.

	WHITES					COLOUREDS				
	1921	1936	1946	1951	1960	1921	1936	1946	1951	1960
1. Agriculture	170,394	181,409	167,822	145,424	119,312	77,886	96,262	97,453	97,674	120,258
2. Mining	33,771	46,936	53,557	56,959	61,748	2,783	3,370	2,724	3,800	4,489
3. Manufacturing	65,325	131,598	187,110	256,848	293,651	28,897	45,714	74,306	110,547	136,127
4. Services	230,403	355,301	440,285	496,309	631,802	87,120	114,426	130,155	150,659	205,918
5. Total 1-4	499,893	715,244	848,774	955,540	1,106,513	196,686	259,772	304,638	362,680	466,792
6. Total Population	1,521,343	2,003,334	2,372,044	2,641,689	3,080,159	545,181	769,241	928,062	1,103,016	1,509,053
7. 5 as per cent of 6	32.9	35.7	35.8	36.2	35.9	36.1	33.8	32.8	32.9	30.9

	ASIATICS					BANTU				
	1921	1936	1946	1951	1960	1921	1936	1946	1951	1960
1. Agriculture	21,731	18,056	13,691	12,928	10,847	368,122	667,818	802,370	990,630	1,103,431
2. Mining	2,664	862	602	542	595	235,665	393,020	441,443	448,790	548,317
3. Manufacturing	8,759	10,190	18,299	24,470	34,248	154,402	235,685	245,676	375,754	495,823
4. Services	27,632	31,860	34,477	42,424	56,219	346,998	620,073	812,907	914,718	1,078,841
5. Total 1-4	60,786	60,968	67,069	80,364	101,909	1,105,187	1,916,596	2,302,396	2,729,892	3,226,412
6. Total Population	163,594	219,691	285,260	366,664	477,047	4,697,285	6,595,597	7,830,559	8,560,083	10,927,922
7. 5 as per cent of 6	37.2	27.8	23.5	21.9	21.4	23.5	29.1	29.4	31.9	29.5