ECONOMIC DUALISM AND LABOUR RE-ALLOCATION IN SOUTH AFRICA, 1917-1970.

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CONTENTS

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LIST OF ABBREVIATIONS

A.E.R.	American Economic Review
E.J.	Economic Journal
G.P.	Government Printer (South Africa)
I.L.O.	International Labour Office, Geneva
J.D.S.	Journal of Development Studies
O.E.P.	Oxford Economic Papers
O.U.P.	Oxford University Press
R.P.	Republican Government Publications (South Africa)
S.A.I.R.R.	South African Institute of Race Relations
S.A.J.E.	South African Journal of Economics
S.E.P.C.	Social and Economic Planning Council (South Africa)
S.P.R.O.C.A.S.	Study Project on Christianity in Apartheid Society
T.G.	Transvaal Government Publication
U.G.	Union Government Publication (South Africa)

LIST OF TABLES

Appendix

A.1. South Africa - Mining, 1910-1970.
(Contains Estimates of Employment and Capital Stock).

A.2. South Africa - Manufacturing, 1916-1970.
(Contains Estimates of Employment and Capital Stock).

A.3. Average Real Earnings of White and Black Labour in South African Mining Industries, 1916-1970.

A.4. Average Real Earnings of White and Black Labour in South African Manufacturing Industries, 1916-1970.

A.5. South Africa - Industry (Du Plessanic's Figures), 1916-1955. (Includes Employment and Capital Stock Data).

A.6. South Africa - S.A.R. & H., 1910-1955.
(Includes Employment and Capital Stock Data).

A.7. Alternative Population Estimates.

A.8. South African Exports - Contributions of Major Sectors, 1921-1969.

CHAPTER 1.

INTRODUCTION

1.1. Aims and Methods

The central concern of this study is to analyse how the pattern of development in South Africa has influenced the long term growth of productive employment in the economy. The approach adopted is to apply a model of economic dualism to the South African case. This has a number of repercussions on the way the analysis proceeds. First, the discussion is framed in terms of an assessment of the model of dualism in the light of the South African experience. This means that a good deal of attention is given to the characteristics of the model itself; its major assumptions and hypotheses, while the analysis of factors affecting employment in the South African case emerge only as a result of contrasting South Africa's concrete historical experience with this theoretical construct. The second important repercussion is that the central theoretical and substantive problem becomes that of the re-allocation of labour from the "subsistence" to the "capitalist" sector of the economy. Formulating the problem this way, rather than dealing with the growth of productive employment as such, makes it possible to grasp the interrelationships between the economically advanced and backward sectors of the economy, and thus assess the effects of growth of employment in the one, on conditions in the other. In other words it enables us to analyse aspects of the interaction between the so-called traditional, or African, and the modern, or capitalist,

systems in South Africa, within a single unified conceptual framework.

One of the reasons for selecting this model as a framework for analysis is that the concept "economic dualism" still has considerable currency in the literature on the South African economy.[1] The model also underlies a good deal of theoretical and empirical work being done elsewhere in the underdeveloped countries.[2] This work continues despite mounting criticism of the model from within the liberal economic tradition;[3] criticism which reflects in part the failure of policies based on this model to deal with chronic unemployment in so-called labour-surplus economies. Experience in the underdeveloped countries since the Second World War shows that in many instances rapid economic growth has actually been accompanied by sharpened differences between their "subsistence" and "capitalist" sectors.[4] The model has been attacked even more vigorously from the

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1. Two recent examples are D. Hobart-Houghton, The South African Economy, (3rd ed.) Cape Town, O.U.P., 1973, (especially chapters 1 and 4) and R.T. Bell, Industrial Decentralisation in South Africa, Cape Town O.U.P., 1973 (especially chapter 2).

2. A recent example is in the work of J.C.H. Fei and G. Ranis, "Development and Employment in the Open Dualistic Economy", Malayan Economic Review, Vol. 16, 1971.

3. Articles contributing to the debate in the applicability of the model are noted in Chapter 2 and listed fully in the bibliography.

4. See for example articles in Development in a Divided World, eds. D. Seers and L. Joy. Harmondsworth, Penguin, 1970 and in Underdevelopment and Development, ed. H. Bernstein, Harmondsworth, Penguin, 1973, (especially Part One).

perspective of other approaches, including those of some neo-Marxist writers.[1] In view of these criticisms both from within and outside the conventional bounds of the discipline it is important to make clear what the uses and limitations of the model in general are and to assess its predictive and explanatory power in the particular historical circumstances of specific countries. It is argued in this study that the model fails to grasp some of the essential features of South Africa's development pattern and that if crudely applied it may result in misleading interpretations of the origins and reasons for the persistence of low levels of productivity, chronic unemployment and other aspects of dualism. If it is strictly applied the model has little predictive value, except perhaps for a brief period in the two decades leading up to the Second World War. However, it is also argued that as an explanatory device the model does provide a useful starting point to the analysis of South Africa's development pattern, if some of its assumptions are modified, if its treatment is sufficiently flexible and if some of its categories are disaggregated.

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1. An early contending approach to the explanation of the effects of capitalist expansion in the underdeveloped countries is that of Paul Baran in, for example, The Political Economy of Growth, Harmondsworth, Penguin, 1973 (first published in 1957). More recent criticism has come, for example, from A.G. Frank in Capitalism and Underdevelopment in Latin America, (2nd ed.) Monthly Review Press, New York, 1969. See also (for the Rhodesian case) G. Arrighi, 'Labour Supplies in Historical Perspective: A Study of the Proletarianization of the African Peasantry in Rhodesia," J.D.S., Vol. 6, 1970.

It can be argued that there are, in a fundamental sense, two possible ways of dealing with a theoretical construct of this kind. One is to question its underlying methodological presuppositions and the other is to accept these, for purposes of analysis and attempt to validate or refute the model in its own terms. This involves, amongst other things, the application of empirical tests. This study takes the latter approach. However, within this constraint, two quite distinct methods of assessing the model are applied. The first is a purely statistical exercise in which the major hypotheses of the model are tested, using aggregated time series data on a number of key variables. This takes up the first part of the study and includes chapter 2 and the Statistical Appendix. In the second, the model, and in particular some assumptions on which it is based, is compared with much more disaggregated and descriptive historical and institutional information. What we attempt to do in this part of the study, the third and fourth chapters, is to elaborate aspects of the model which are only implicit, or highly condensed in the second chapter. These aspects are then compared with features of the South African economic system at different stages of its historical development.

In principle it would have been possible to present either the statistical tests or the historical/institutional work as self-contained bases for assessment of the model. But it seems useful to bring the two methods together in order to penetrate more deeply the employment issue in South

Africa. With a primarily descriptive approach one is likely to forgo the advantages of statistical rigour, while with a purely statistical approach it is possible to lose much of the substance of the problem, which often eludes statistical representation.[1]

The final chapter, chapter 5, gives an overall assessment of the model in terms both of its predictive power and explanatory value in the South African case.

1.2. Notes on Terminology and Reliability of Statistics

Before entering into the body of the work it is necessary to clarify certain terms which may otherwise lead to confusion. The first arises out of the choice of the model. The statistical sections and much of the rest of the work attempt an application and assessment of the Fei-Ranis version of the model of dualism.[2] In this version it is assumed, for statistical convenience, that the "subsistence" and 'capitalist" sectors are equivalent to the agricultural and non-agricultural sectors of an economy respectively. This simplification of the original model developed by

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1. Previous work on dualism in South Africa has either been primarily descriptive or has dealt with other aspects of the model. The two most important contributions are J.B. Knight, op. cit. and S.S. Brand, The Contributions of Agriculture to the Economic Development of South Africa since 1910, (unpublished D.Sc. Agric. thesis), University of Pretoria, 1969.

2. See J.C.H. Fei and G. Ranis, Development of the Labour Surplus Economy : Theory and Policy, Homewood, Illinois, Richard D. Urwin, 1964.

Arthur Lewis[1] creates problems of interpretation which are dealt with later, in chapter 5. However the distinction between these two pairs of concepts, each of which are defined at the beginning of chapter 2, should be borne in mind. In the final chapter there is a comparison and assessment of the Lewis and Fei-Ranis versions of the model.

In chapter 2 the catagory "Industry" is used as a proxy for non-agricultural activities. It includes, in the major tables and tests, only those mining and manufacturing activities which are recorded in the official censuses. Elsewhere in the study the term industry is used loosely to refer to all non-agricultural activities.

Another important distinction is between "White agriculture" and "African agriculture". As is well known, many Africans work on white farms and, in some parts of the country, have traditionally been given access to arable land for their own cultivation and to grazing for their own livestock. These activities are not included in our definition, which incorporates only African agricultural activities in the so-called reserves or homelands.

Finally, the term "Black" is used here to refer to African, Coloured and Asian people, or, in other words, those people not defined as "White" in the official statistical

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1. W.A. Lewis, "Economic Development with Unlimited Supplies of Labour," The Manchester School of Economic and Social Studies, Vol. 22, 1954. Reprinted in The Economics of Underdevelopment, eds. A. N. Agarwala and S.P. Singh, London, O.U.P., 1970. All references in this study will be to the reprinted version.

reports of the South African Department of Statistics.[1]

It also seems appropriate in this introduction to strike a note of caution about the statistical material used in the study. Although the intertemporal and cross-sectional coverage of South African economic statistics is relatively comprehensive when compared to some underdeveloped countries, there are considerable problems of reliability and comparability of data, some of which seriously affect the scope and accuracy of the statistical section of this study. Where possible, attempts have been made to check a particular set of data by comparing it with alternative series and estimates. These checks have been fully recorded in the Statistical Appendix.

In order to facilitate the reading of this study only the aggregated data and an accompanying summary of the main points regarding their reliability and comparability have been presented in the body of the work. Sources, methods of calculation and a detailed commentary on these have been fully documented in the Statistical Appendix.

A final point about statistical coverage is that the study deals with the period 1917 to 1970. Due to data limitations at the time of research no attempt was made to cover events that have occured since 1970. Since the model we have chosen deals primarily with the process of transition

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1. See, for example, South African Statistics, 1972, Department of Statistics, Republic of South Africa, Pretoria, G.P.

from a labour-surplus to a labour-scarce condition over the long run, events in the last three years are unlikely to alter the main conclusions of the study, insofar as they are directed at the applicability of the model of economic dualism.

CHAPTER 2.

AN OUTLINE AND STATISTICAL TESTS OF THE MODEL

2.1. The Basic Theoretical Framework

Perhaps the best known analysis to do with labour reallocation in underdeveloped countries appears in Arthur Lewis' article on "Economic Development with Unlimited Supplies of Labour," which first appeared in 1954.[1] Lewis' basic model assumes a closed economy[2] with two sectors, referred to as the "capitalist" and "subsistence" sectors. Although later writers have tended to equate "capitalist" with "industrial" and "subsistence" with "agricultural", Lewis was careful to define the former as "that part of the economy which uses reproducible capital" and the latter simply as "that part of the economy which is not using reproducible capital".[3] An important feature of the economy is that a large part of it comprises economic activities in which the marginal productivity of labour is very low. There is also a small but

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1. W.A. Lewis, Manchester School of Economic and Social Studies, Vol. 22, 1954. This is reprinted in The Economics of Underdevelopment, edited by A.N. Agarwala and S.P. Singh, London, O.U.P., 1958, (reprinted 1970). In this study all references will be to the latter source.

   The origins of the Lewis model are in the writings of the classical economists, particularly Ricardo. These links are brought out clearly in the article mentioned above and also in a later article by Lewis: ..., "Unlimited Labour, Further Notes," The Manchester School of Economic and Social Studies, Vol. 26, 1958.

2. Although his main concern is with the internal determinants of industrial development, Lewis does deal with the implications of international commodity trade and factor movements.

3. W.A. Lewis, op. cit., p. 407.

expanding sector in which the marginal productivity of labour is considerably higher. Following from this, unskilled labour supplies to the capitalist sector are perfectly elastic at a wage "tied" to earnings in the subsistence sector.[1] The demand for labour, on the other hand, is a function of its marginal physical productivity.

Expansion in the high productivity sector depends on the size and use made of the difference between the value of total physical product and total wages (the capitalist surplus). Lewis makes the usual assumption that the entire surplus is reinvested in reproducible capital. Over time, capital accumulation increases the marginal physical productivity of labour, thereby creating a greater demand for labour and larger surpluses over succeeding periods. Ultimately enough labour is transferred from the subsistence to the capitalist sector for the marginal physical productivity of labour in the former to approach that in the latter and thus for the labour surplus condition to come to an end. After this "turning point", the wage rate in the capitalist sector is expected to rise.

Lewis' model was modified, converted into mathematical terms and subjected to empirical tests by John Fei and Gustav Ranis. The burden of their work was conveyed in two articles[2] which appeared in 1961 and 1963. These were

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1. W.A. Lewis, ibid, pp. 409-412. We return to a closer inspection of these ideas in Chapter 5.

2. J.C.H. Fei and G. Ranis, "A Theory of Economic Development," A.E.R. Vol. 51, 1961 and "Innovation, Capital Accumulation and Economic Development," A.E.R. Vol. 53, 1963.

brought together a year later in a monograph entitled Development of the Labour Surplus Economy: Theory and Policy.[1]

Fei and Ranis made three important contributions. They clarified the potential role of agriculture in development, extended the analysis of the determinants of the demand for labour in industry and introduced three means of testing the model. Each of these contributions will be discussed in turn, after which an attempt will be made to apply their tests to the South African data.

Fei and Ranis simplified Lewis' distinction between sectors in the dual economy by dealing only with the division "agriculture" and "industry" and assuming that these correspond to the division "subsistence" and "capitalist".[2] This enabled them to investigate agriculture's potential role more closely.

Whereas Lewis had concerned himself primarily with agriculture's role as a source of industrial labour (and industrial labour's food requirements), Fei and Ranis analysed this sector's additional potential as a source of investment funds for industrial expansion.[3] They argued that

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1. J.C.H. Fei and G. Ranis, Development of the Labour Surplus Economy.

2. The problems raised by this oversimplification are discussed in the last section of this chapter and also in Chapter 5.

3. The idea originates in Nurkse's Problems of Capital Formation in Underdeveloped Areas, New York, O.U.P., 1953.

as labour began to transfer to industry a surplus over and above the subsistence needs of agricultural and industrial labour would begin to emerge. The owners of the surplus could increase the consumption or reinvest the surplus in industry or agriculture. They argued that if reinvested in industry this surplus could contribute substantially to industrial development. During the early stages of development its role in this regard might be made as important as that of industrial profits.[1]

Their second important departure from Lewis concerns the role of technological change. Lewis had little to say about the effects of technological change on the demand for labour and was content with the assumption that "the growth of productive capital and the growth of technical knowledge can be treated as a single phenomenon".[2] In contrast Fei and Ranis made this a central theoretical issue and also the cornerstone of their empirical tests.

Following Hicks[3] they distinguished between "neutral" and "factor biased" innovations. Neutral innovations cause a parallel outward shift of the marginal physical productivity of labour function, thereby raising the production isoquant without affecting factor proportions in the

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1. Fei and Ranis, Development of the Labour Surplus Economy, Chapters 2, 5 and 25.

2. W.A. Lewis, "Economic Development with Unlimited Supplies of Labour," p. 413.

3. J. R. Hicks, The Theory of Wages, New York, Macmillan, 1963, Chapter 6, Part III.

productive process. Factor biased innovations are those which cause an outward shift of this curve but at the same time bias it in favour of the use of either capital or labour. A special case of factor-biased innovations are those which are "very labour-saving". These bias the marginal physical productivity of labour curve in favour of capital to such an extent that the absolute level of employment falls as a result of their application. There are therefore two conceptually distinct consequences of the application of an innovation. One is the output-raising effect caused by a shift in the production isoquant, called the "intensity of innovation", and the other is the effect on the relative absorption of factors of production, called the "factor bias".

Two effects of innovational change on labour absorption are also distinguishable. The first is the "horizontal effect", or labour absorption which occurs as a function of the passage of a unit of time only. The second is the "radial effect" or labour absorption which results from capital accumulation accompanying the application of an innovation. This can be shown graphically. In diagram 2.1. capital and labour are represented on the vertical and horizontal axes respectively. The functions Q_1 and Q_2 are production isoquants.

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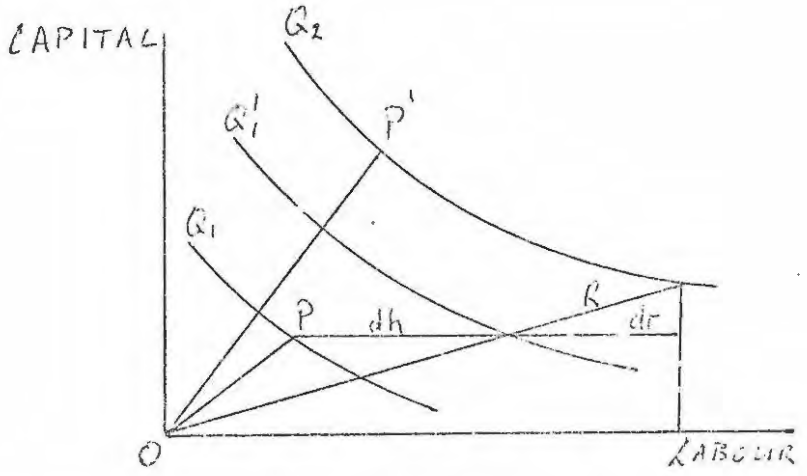
1. This diagram is taken, with adaptations, from Fei and Ranis, Development of the Labor Surplus Economy, p. 98, diagram 8. See also diagrams 7a and 7b on page 93.

DIAGRAM 2.1.



It is assumed that the initial factor combination is given at point P. With the application of an innovation in the next time period the isoquant shifts to Q^2. The effect of this movement on labour absorption can be broken down into two components: The "horizontal effect", which results from the innovation as a function of time only, is measured by the distance dh. This is illustrated by the movement Q_1^1 of the production isoquant. The "radial effect", which results from capital accumulation associated with the innovation, is represented by a movement along the line R. The labour absorbing effect of this capital accumulation is dr, which is the horizontal projection of the distance R. The total increase in the use of labour is the sum of dh and dr.

From this it can be seen that with a constant industrial wage, all innovations, with the exception of those which are very labour-saving (i.e. those resulting in a negative dh) will cause a fall in the capital-labour ratio.

On the other hand with a rising industrial wage, the ratio of the price of labour to the price of capital may increase. In this event the factor combination in the second time period may be represented, for example, by the point P^1. In this case the capital-labour ratio will have increased even in the absence of a very labour-saving innovation, due to the substitution of capital for labour along the isoquant Q^2.

Using the concepts of neutral and factor biased innovations, Fei and Ranis were able to take the analysis of industrial labour absorption a step further than Lewis. This they did by separating the effects of capital accumulation and technological change. Their results are summarised in an adapted equation for the rate of growth of the marginal physical productivity of labour,[1] which is given below:

$$\frac{\eta_w}{\epsilon_{LL}} + \eta_L = \eta_K + \frac{B_L + J}{\epsilon_{LL}} \qquad (\eta_w = 0)$$

Where:- η_w is the rate of growth of the marginal physical productivity of labour, or under competitive conditions, of wages, ϵ_{LL} is the elasticity of the marginal physical productivity of labour curve,

η_L is the rate of growth of the industrial labour force or the absorption rate,

η_K is the rate of growth of capital,

B_L is the degree of labour-using bias of an innovation and

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1. This is developed in the appendix on pages 101 to 110. Fei and Ranis, op. cit.

J is the intensity of innovation or the output raising strength of an innovation.[1]

From this equation it can immediately be seen that when wages are constant, η_w and the expression η_w / ϵ_{LL} reduce to zero. The rate of industrial labour absorption, η_L now becomes a function of capital accumulation, η_K, as well as the degree of labour-using bias, B_L, the intensity of innovation, J, and the elasticity of the marginal physical productivity of labour curve, ϵ_{LL}.

Having briefly outlined the model in the form developed by Fei and Ranis, we turn next to their statistical tests.

Fei and Ranis' three tests derive from their "critical minimum effort criterion" (CMEC), "input ratio analysis" and "decomposition analysis".[2]

The CMEC can be applied either as an assessment of agriculture's progress towards commercialization, or of industry's capacity for labour absorption. In both cases the assessment is made against the background of the country's population growth. Due to a lack of reliable agricultural statistics this study concentrates on the latter assessment. In this form, the CMEC is said to have been met if the rate of increase in the industrial labour force, η_L, exceeds the rate of increase in the total labour force, or, under the usual assumption of a close correspondence between them, of

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1. The connection between $\frac{B_L + J}{\epsilon_{LL}}$ and the horizontal and radial effects is made more explicit in the following section.

2. Fei and Ranis, ibid., Chapter 4, Chapter 6, Section 8, and the Appendix to Chapter 8.

population,[1] η_p. This condition may be express symbolically as

$$(\eta_p) < \eta_L = \eta_K + \frac{B_L + J}{\epsilon_{LL}}$$

This suggests that as a basic pre-requisite for successful industrial development the forces of capital accumulation, the degree of labour-bias and the intensity of innovation, acting together, must exceed the rate of population growth.

The "input ratio analysis" tests movements of the capital-shallowing is expected to take place so long as the industrial wage remains constant, or, in other words, which comes to the same thing, while there is a labour surplus. Once industrial expansion has exhausted the pool of surplus labour, labour supplies become less elastic and the industrial wages rises. Capital-shallowing switches to capital-deepending, inaugurating a new phase in the development process. This becomes clear with the aid of a reformulated labour absorption equation expressed in terms of the rate of change of the capital-labour ratio, $\eta_{K/L}$ or η_q

$$(\eta_q) = \eta_{K/L} = -\left(\frac{B_L + J}{\epsilon_{LL}}\right) \qquad (\eta_w = 0)$$

The equation indicates that capital-shallowing will take place while the degree of labour-using bias, B_L, and the intensity of innovation, J, remain positive.[2] Once wage increases occur, their effect on the choice of factor

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1. The assumption is questioned in Chapter 5.

2. ϵ_{LL} is always positive, and assumed to remain more or less constant. Fei and Ranis, ibid, pp. 97-9.

proportions will counteract the capital-shallowing effect described above.

The point at which capital-shallowing gives way to capital-deepending, and the industrial wage begins to rise, is known as the "turning point". This turning point in industry is matched by the simultaneous attainment of the "commercialization point" in agriculture. A rising industrial wage, in this model, corresponds to the exhaustion of labour surpluses in agriculture and thus marks the point where agriculture and industry come into competition on the labour market for the first time.

The decomposition analysis provides a statistical test of the effects of capital accumulation (the radial effect) and innovation (the horizontal effect) on labour reallocation. Fei and Ranis derive these simply by making the radial effect (called η_r)[1] identical to the rate of growth of capital, η_K, and the horizontal effect (called η_h) identical to the difference between this and the rate of industrial labour absorption, η_L. η_h is thus a residual. These identities are summarised below:[2]

$$\eta_r \equiv \eta_K$$

$$\eta_h \equiv \eta_L - r = \frac{B_L + J}{\epsilon_{LL}}$$

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1. The writer was unable to establish the connection between this growth expression, which is given in equation 4.3(a) on page 125 and the expression η_r in equation 3.19 in Table 1 on page 75, Fei and Ranis, ibid. It is supposed that there is no intended connection between these two equations.

2. Fei and Ranis, ibid., p. 125.

As explained above, the horizontal effect, η_h, is expected to remain positive during the labour surplus stage and then to take on negative values thereafter.

We now turn to an application of these tests to the South African case.

2.2. Testing the Model

Before looking at the results of the tests, some general comments about the reliability and arrangement of data in this study should be made. A full statement of sources, methods, of calculation and reliability is given in the Appendix.

In this study time series data are, broadly speaking, divided into two overlapping statistical periods: 1910 to 1955 and 1946 to 1970. This division was necessitated by changes in the comparability of official statistics. Furthermore, the lack of comprehensive labour statistics has confined the bulk of statistical tests to two sectors; mining and manufacturing.[1] For the period 1953 to 1970, for which labour statistics for all Non-Agricultural sectors are available, a more comprehensive analysis has been possible.

The absence of the service sector is not as serious a weakness as might appear at first sight. It is in this sector that low productivity urban occupations are most common.

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1. Incidently, Fei and Ranis' tests of the Indian economy cover much the same catagories, namely, "large-scale manufacturing and mining and ... small scale or cottage industries". Fei and Ranis, Development of the Labor Surplus Economy, p. 149.

These should strictly speaking be excluded from the category "capitalist" if Lewis' definition is to be adhered to.[1] The other major component in the service sector is made up of public services. Part of these services comprise very capital intensive projects where labour costs may form a relatively unimportant component.

Although the sector is not included in the main tables, it has been possible to check the likely effect of its inclusion by referring to census data.[2]

Some idea of the relative importance of mining and manufacturing industries in the total non-agricultural sector can be obtained by looking at output and employment figures. Mining and manufacturing together, form 36 per cent of its Gross Domestic Product in 1918 and 37 per cent in 1959.[3] In 1959, 48 per cent of all workers engaged in non-agricultural activities were employed either in mining or manufacturing.[4]

In order to distinguish between the two major sets of data, the terms "Industry" and "Non-Agriculture" will refer to mining plus manufacturing activities and all non-agricultural activities respectively.[5]

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1. This point is raised again in Chapter 5.

2. There is an additional check in the form of data which combines manufacturing and certain private service industries. See Table A.5. in the Statistical Appendix.

3. J.J. Stadler, Die Bruto Binnelandse Produk van Suid-Afrika, 1911-1922, unpublished D.Com. thesis, University of Pretoria, Pretoria, 1962, Table XXIX, p. 505.

4. Supplement to the S.A.R.B. Quarterly Bulletin, September 1971, Table 5, p. 29.

5. This convention applies to Chapter 2 only.

Time series data for Industry over the periods 1916 to 1955 and 1946 to 1970 are presented in Table 2.1, columns 1 to 4 refer to the CNEC analysis. Column 1 shows total population (foreign and local),[1] column 2 the industrial labour force, and columns 3 and 4 the rates of increase in population and the industrial labour force.

Columns 5 to 7 refer to the input ratio analysis and give, in order, capital stock (K), the ratio of capital to labour (K/L) and the rate of increase in the capital labour ratio, η_q. Column 7b gives five year moving averages of 7a.[2]

Data applicable to the decomposition analysis are given in columns 8 to 10. Here the rate of increase in industrial labour, η_L, is again given, along with the radial effect, η_r, and the horizontal effect, η_h. Column 9b gives five year moving averages of the results in Column 5a.

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1. There is reason to believe that considerable underenumeration is reflected in this population series in all years prior to 1970. This has been shown by Sadie, whose adjusted estimates of population (local) are presented in Table A.7. in the Statistical Appendix. See. J.L. Sadie, "Population and Economic Development in South Africa," S.A.J.E. Vol. 39, 1973. Since there is no reason to believe the underenumeration prior to the 1970 census was inconsistent, the official census results and intercensal mid-year estimates have been retained here. It should be noted, however, that as a consequence, the estimated increase between 1969 and 1970 is too high. See also J.L. Sadie, "Labour Supply in South Africa," Finance and Trade Review, Vol. 9, 1970/71.

2. The use of five year moving averages is supported by evidence that business cycles in South Africa have occurred over periods of between seven and five years. The duration of the cycles appears to have diminished over time. See C.G.W. Schumann, Structural Changes and Business Cycles in South Africa, 1[illegible]-1[illegible], New York, Staples Press Ltd., and D.J. Kuit and B.J. van der Walt, "Business Cycles in South Africa during the Post-War Period, 1945 to 1968," S.A.R.B. Quarterly Bulletin September, 1969.

TABLE 2.1.

SOUTH AFRICA - INDUSTRY, 1916-1970

YEAR	CRITICAL MINIMUM EFFORT ANALYSIS					INPUT RATIO ANALYSIS				DECOMPOSITION ANALYSIS			
	Total Population	Labour	η_P	η_L		Capital Stock	K/L	$\eta_{K/L}$		η_L	η_r		η_h
	1	2	3	4a	4b	5	6	7a	7b	8	9a	9b	10
	1000	1000				R1000000							
1916	6547	384	-	-		194	505	-	-	-		-	-
7	6658	396	1.7	3.1		194	490	-3.1	-	-	0.0	-	-
8	6759	392	1.7	-1.0		190	485	-1.0	-	-	-2.1	-	-
9	6727	384	-0.6	-2.1	0.0	188	490	1.0	-0.6	0.0	-1.1	-0.2	0.2
20	6838	414	1.7	7.8	-2.1	186	449	-9.1	1.5	-2.1	1.1	-0.2	-1.9
1	6957	384	1.7	-7.2	0.1	188	490	9.1	0.2	0.1	1.1	0.6	-0.5
2	7128	375	2.5	-7.6	1.4	188	527	7.6	-0.8	1.4	0.0	1.7	-0.3
3	7310	393	2.6	10.1	0.1	192	498	-7.8	1.8	0.1	2.1	1.9	-1.8
4	7489	410	2.4	4.3	3.9	200	488	-0.2	-1.8	3.9	4.2	2.1	1.8
5	7664	417	2.3	1.7	6.1	204	489	0.2	-3.2	6.1	2.9	2.8	3.3
6	7841	463	2.3	11.0	4.5	208	449	-8.9	-1.4	4.5	2.0	3.1	1.4
7	8014	478	2.2	3.2	3.6	216	452	0.7	-0.6	3.6	3.8	2.8	0.8
8	8190	490	2.2	2.5	3.4	224	457	1.1	-0.6	3.4	3.7	2.8	0.6
9	8364	486	2.1	-0.4	0.3	230	471	3.1	2.5	0.3	2.7	2.7	-2.4
30	8540	492	2.1	0.8	-1.5	234	476	1.1	4.1	-1.5	1.7	2.5	-4.0
1	8717	470	2.1	-4.7	-1.1	238	506	6.3	3.5	-1.1	1.7	2.4	-3.5
2	8898	444	2.1	-5.9	1.5	244	550	8.7	1.7	1.5	2.5	3.1	-1.6
3	9074	465	2.0	4.7	3.7	252	542	-1.5	1.9	3.7	3.3	5.4	-1.7
4	9254	524	2.0	12.7	6.7	268	511	-6.1	1.0	6.7	6.3	7.6	-0.9
5	9435	584	2.0	11.5	8.7	304	521	2.0	0.0	8.7	13.4	8.7	0.0
6	9618	644	1.9	10.3	8.7	342	531	1.9	0.9	8.7	12.5	9.6	-0.9
7	9802	673	1.9	4.5	6.4	370	550	3.6	2.5	6.4	8.2	9.0	-2.6
8	9986	702	1.9	4.3	5.4	398	567	3.1	1.2	5.4	7.6	6.7	-1.3
9	10170	711	1.8	1.3	4.6	412	579	2.1	-0.5	4.6	3.5	4.2	0.4
40	10353	757	1.8	6.5	4.0	418	552	-4.9	-1.7	4.0	1.5	2.3	1.7
1	10536	806	1.8	6.5	2.3	418	519	-6.4	-1.8	2.3	0.0	0.5	1.8
2	10716	818	1.7	1.5	2.4	414	505	-2.6	-2.4	2.4	-1.0	0.0	2.4
3	10899	782	1.7	-4.5	2.0	408	521	3.0	-1.9	2.0	-1.5	0.1	1.9
4	11081	798	1.7	1.9	1.2	416	518	-1.0	-0.6	1.2	1.0	0.7	0.5
5	11265	834	1.7	4.5	1.1	420	504	-2.4	0.6	1.1	1.9	1.8	-0.7
6	11449	855	1.7	2.5	2.4	432	505	0.2	1.1	2.4	2.9	3.6	-1.2
7	11634	866	2.1	1.3	3.6	452	522	3.4	1.7	3.6	4.6	5.4	-1.6
8	11957	883	2.2	2.0	3.7	486	550	5.4	2.8	3.7	7.5	6.7	-3.0
9	12212	953	2.1	7.9	4.2	534	560	1.8	3.4	4.2	9.9	7.6	-3.4
50	12458	1001	2.0	5.0	4.8	580	579	3.4	3.5	4.8	8.6	8.4	-3.6
1	12716	1048	2.1	4.7	4.5	624	595	2.8	4.5	4.5	7.6	9.1	-4.6
2	13040	1094	2.5	4.4	3.9	676	618	3.9	5.2	3.9	8.3	9.2	-5.3
3	13376	1102	2.6	0.7	3.6	752	682	10.4	5.0	3.6	11.2	8.7	-5.1
4	13717	1154	2.5	4.7	-	830	719	5.4	-	-	10.4	-	-
5	14067	1192	2.6	3.3	-	880	738	2.6	-	-	6.9	-	-
1946	11449	921	-	-	-	489	531	-	-	-	-	-	-
7	11634	923	2.1	0.2	-	505	547	3.0	-	-	3.3	-	-
8	11957	910	2.2	-1.4	-	539	592	8.2	-	-	6.7	-	-
9	12212	971	2.1	6.7	2.5	597	615	3.9	4.0	2.8	10.8	6.9	-4.1
50	12458	1023	2.0	5.4	3.5	642	625	2.1	3.9	3.5	7.5	7.5	-4.0
1	12716	1055	2.1	3.1	3.4	682	646	2.9	4.2	3.4	6.2	7.6	-4.2
2	13040	1045	2.5	-3.8	2.7	725	662	2.5	4.6	2.7	6.3	7.3	-4.6
3	13376	1072	2.6	2.1	2.0	778	726	4.7	4.4	2.0	7.3	6.5	-4.5
4	13717	1106	2.5	3.2	2.0	861	769	5.9	3.7	2.0	9.4	5.8	-3.8
5	14067	1120	2.6	2.2	1.6	877	776	0.9	3.4	1.6	3.1	5.0	-3.4
6	14421	1164	2.5	3.0	2.3	901	774	-0.3	1.9	2.3	2.7	4.3	-2.0
7	14786	1155	2.5	1.8	2.1	924	780	0.8	1.0	2.1	2.6	3.2	-1.1
8	15160	1199	2.5	1.2	2.1	957	798	2.3	1.2	2.1	3.6	3.3	-1.2
9	15546	1229	2.5	2.5	2.2	995	810	1.5	1.3	2.2	4.0	3.5	-1.3
60	15925	1251	2.4	1.8	2.2	1029	823	1.6	1.4	2.2	3.4	3.6	-1.4
1	16369	1295	2.8	3.5	2.4	1068	825	0.2	1.2	2.4	3.8	3.7	-1.3
2	16847	1318	2.9	1.8	3.2	1100	835	1.2	1.9	3.2	3.0	5.2	-2.0
3	17352	1352	3.0	2.6	4.1	1145	847	1.4	1.9	4.1	4.1	6.2	-2.1
4	17591	1435	3.1	6.1	4.1	1279	891	5.2	2.6	4.1	11.7	6.8	-2.7
5	18131	1529	3.0	6.6	4.0	1384	905	1.6	3.0	4.0	8.2	7.1	-3.1
6	18928	1578	3.1	3.2	4.0	1478	937	3.5	3.4	4.0	6.8	7.5	-3.5
7	19576	1602	3.1	1.5	3.9	1551	968	3.3	2.3	3.5	4.9	5.9	-2.4
8	20161	1640	3.0	2.4	3.3	1643	1002	3.5	1.8	3.3	5.9	5.2	-1.9
9	20771	1704	3.0	3.9	-	1701	998	-0.4	-	-	3.5	-	-
70	21416	1801	3.3	5.7	-	1795	996	-0.2	-	-	4.8	-	-

Source: STATISTICAL APPENDIX, SECTION A.1.

In determining the radial effect[1] Fei and Ranis used incremental ratios of regression values of capital over time. In all the applicable tables presented in this study actual incremental ratios of capital and labour have been used.[2] A quadratic regression line covering the period 1916 to 1955 was, however, estimated,[3] and was found to be:

$$K = -99.689 + 0.709L + 0.0000199L^2$$

$$\text{And } R^2 = 0.956$$

In what follows we turn to a description of these results in terms of the tests outlined in the previous section.

South Africa's Industrial growth path is illustrated in Diagram 2.2.[4] Casual observation suggests that two periods may be distinguished, 1916 to 1945 and 1945 to 1970. The slope of the curve in the latter period appears to be significantly greater than that in the former period. There are, however, signs of a marked upturn between 1934 and 1939, which should not be ignored.

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1. The formula used in obtaining Δr, from which η_r is derived, is $\Delta r = \eta_r \cdot L_1$ where L_1 is the size of the labour force in the initial year of each pair of years between which η_r occurs. The writer wishes to thank Mr. Roelandt Fick of Grahamstown for pointing this out.

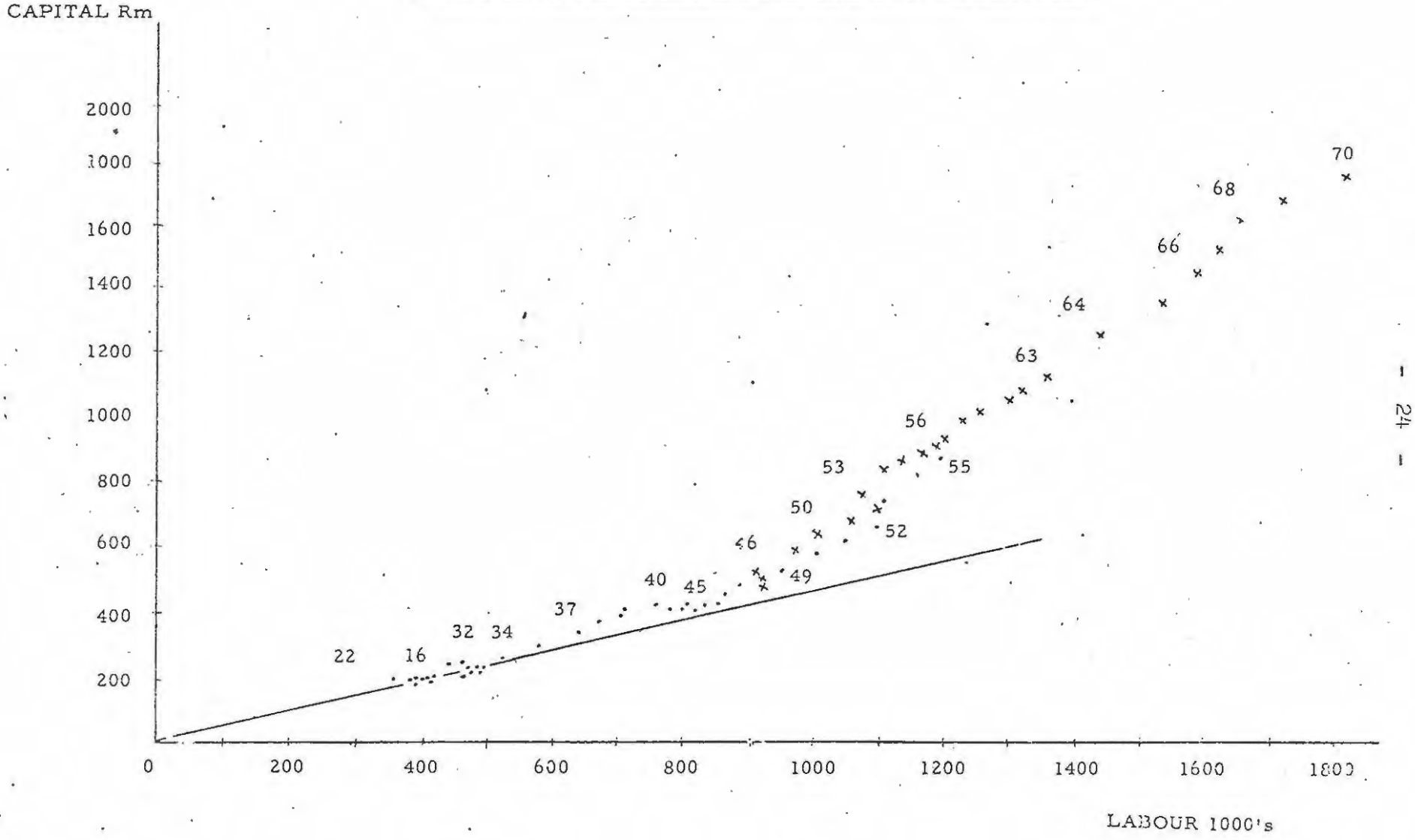
2. See also H.J. Choo, "On the Empirical Relevancy of the Ranis-Fei Model of Economic Development: Comment," A.E.R. Vol. 61, 1971.

3. This regression analysis was done by Mr. Roelandt Fick. The writer wishes to convey his sincere thanks for this assistance.

4. The two data series, 1916 to 1955 and 1946 to 1970, are represented, respectively, by dots and crosses. There appears to be sufficient coincidence in the over-lapping years to take the second series as a reasonably accurate continuation of the first. The line drawn from the origin is a guide line.

DIAGRAM 2.2.

SOUTH AFRICA - INDUSTRY, GROWTH PATH, 1916-1970



The results of the input ratio analysis reflect the same tendencies. In column 7b (table 2.1.) there is (broken) evidence of capital shallowing between 1919 and 1928 (negative values of η_q). This is followed by capital deepening until 1938. After a 6 year period of capital shallowing during World War II a period of sustained capital deepening appears to set in. It should be noted, however, that values of η_q do not fall continuously over this last period.

The CMEC (Critical Minimum Effort Criteria) analysis is presented in diagram 2.3. Population estimates of the Department of Statistics, along with mid-year estimates for intercensal years, are represented by the broken line, η_p,[1] while η_L represents rates of increase in industrial labour. From this it appears that the CMEC has not been met continuously in the Industrial sector. There are two periods prior to 1945 in which the rate of increase in industrial labour was significantly greater than that of population. After 1945 there is one period in which the opposite was true.

The results of the decomposition analysis are illustrated in Diagram 2.4. This presentation, it should be recalled, is intended to reveal the path of technological change. There appears to be some evidence of the adoption of labour-using techniques until the end of the Second World War, although the low values of η_h during and after the

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1. This may be compared with Sadic's estimates in Table A.7. in the Statistical Appendix.

DIAGRAM 2.3.

SOUTH AFRICA INDUSTRY, CMEC ANALYSIS, 1916-1970

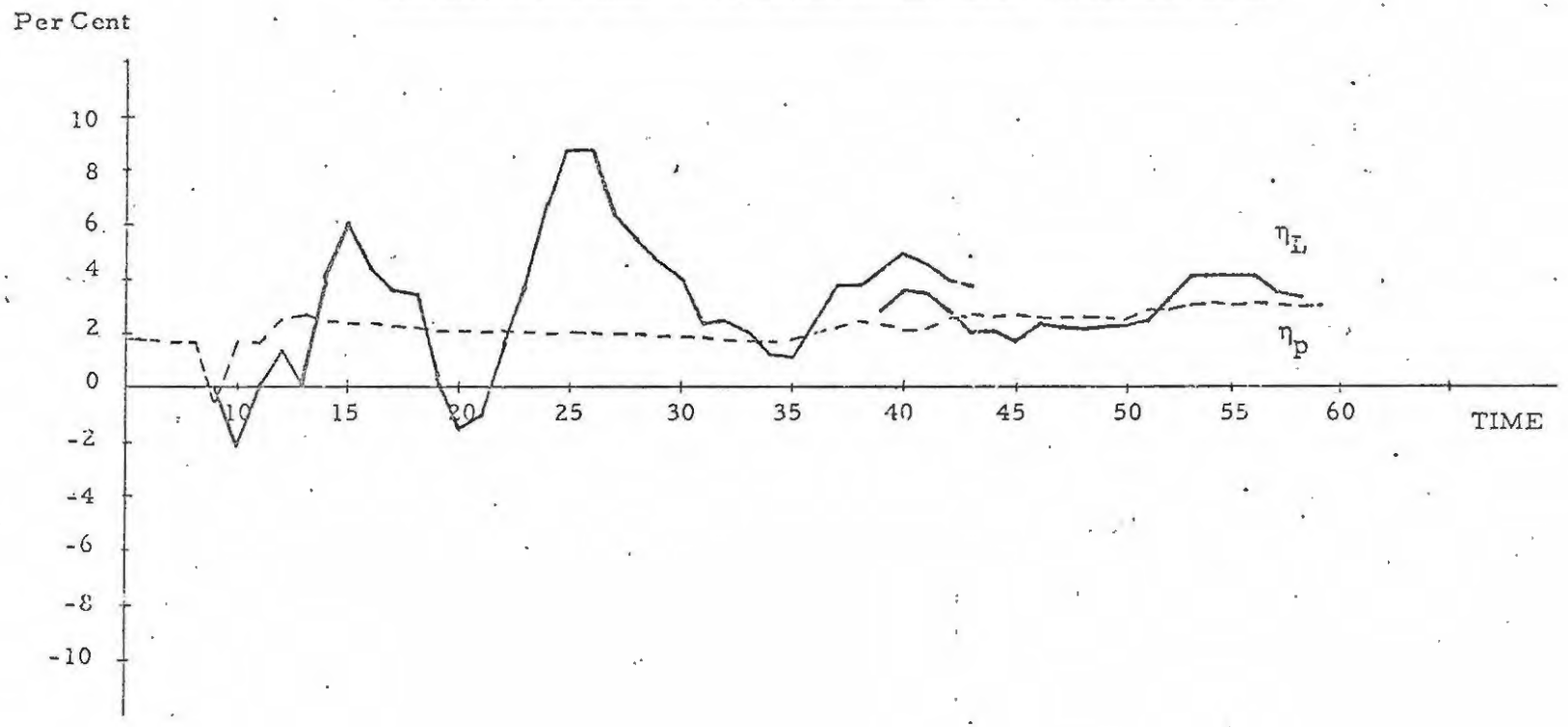
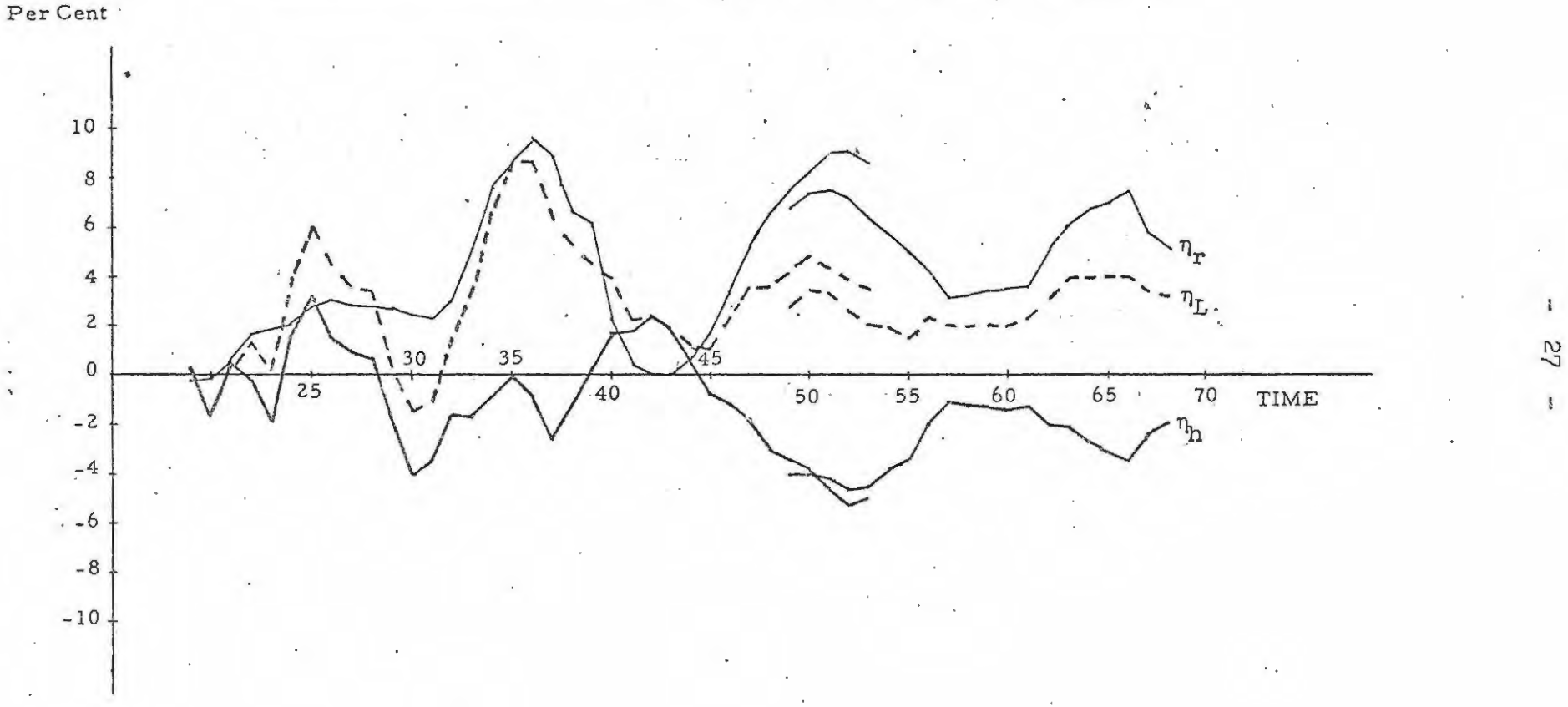


DIAGRAM 2.4.

SOUTH AFRICA - INDUSTRY, DECOMPOSITION ANALYSIS, 1916-1970



Great Depression represent a deviation from this tendency. The period of pronounced capital deepening after 1945 is not sustained beyond the mid 1950's.[1]

Let us now turn to changes in wage-rates between 1917 and 1970. Table 2.2. assembles employment and wage data covering Whites, Blacks and All Races in Industry. In order to compare movements in wages-rates and capital-labour ratios the estimates of wage-rates of All Races and capital-labour ratios have been plotted against time in Diagram 2.5.[2] Diagram 2.6. shows wage-rates of White and Black workers separately. By comparing these two diagrams, it can immediately be seen that the aggregate wage-rates shown in Diagram 2.5. obscure the difference in the association between movements in the capital-labour ratio and wage-rates of Black and White workers. The close positive association occurs with White, but not Black wage-rates. This is contrary to what the model predicts. From the model, we might expect a close positive relationship between capital-labour ratios and wage-rates of Black workers, who are for the most part unskilled, than between capital-labour ratios and wage-rates of White workers, who are for the most part skilled. Since these relationships have a crucial bearing on the acceptance or

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1. Almost identical results were obtained from data based on a different capital stock series. See Table A.5. and Diagram A.7. in the Statistical Appendix. Disaggregated data for mining and manufacturing industries are given in Tables A.1. and A.2. and illustrated in Diagrams A.1. to A.4. in the Statistical Appendix.

2. For a similar representation see Fei and Ranis, "On the Empirical Relevancy of the Ranis - Fei Model of Economic Development : Reply," A.E.R., Vol. 61, Figure 1, p. 705.

TABLE 2.2.

AVERAGE REAL EARNINGS OF WHITE AND BLACK WORKERS IN MINING AND MANUFACTURING INDUSTRIES COMBINED, 1916-70

YEAR	WHITES			BLACKS			ALL WORKERS		
	Total Real Earnings of Whites 1938 Prices	Employment White Workers	Per Capita Earnings of White Workers	Total Real Earnings of Black Workers 1938 Prices	Employment Black Workers	Per Capita Earnings of Black Workers	Total Real Earnings - All Workers 1938 Prices	Employment All Workers	Per Capita Earnings of All Workers
	R1000		R	R1000		R	R1000		R
1916	29801	58533	509	20792	326465	64	50792	385338	132
7	30093	64073	470	19429	334735	58	49521	398826	124
8	30727	66584	459	18132	327377	56	49210	3[illegible]281	125
9	28807	68115	423	17131	317621	54	45938	385736	119
20	28605	75397	379	15970	340592	47	44495	416291	107
1	30985	67971	456	17132	318540	54	48117	386511	124
2	24745	59255	418	19781	299630	66	44526	358885	124
3	28532	65813	434	21302	328505	65	49834	394318	126
4	29764	68976	432	21702	343546	63	51373	412522	125
5	31244	72582	430	22000	344366	64	53243	416948	128
6	33532	82202	408	23559	390363	63	57390	453065	124
7	35347	86321	409	24270	391915	62	59518	478236	125
8	37503	87745	427	25243	402734	63	62750	490479	128
9	39211	91491	429	26073	395554	66	65232	488045	134
30	41147	90581	452	26899	401394	67	66046	491975	135
1	41336	89319	463	26317	379645	69	67619	468101	144
2	41932	87612	479	25980	375971	69	67903	463172	[illegible]
3	43316	91833	477	26564	372305	72	70080	464638	152
4	51704	107687	480	29960	416032	72	81664	523719	156
5	60095	118652	507	34333	463940	74	95031	582592	163
6	68592	130769	525	37298	513207	77	107890	643976	168
7	74837	140277	533	41196	532711	77	116033	672988	172
8	77800	144448	539	42786	557628	77	120586	702276	172
9	83779	152012	551	44142	565891	78	127921	717903	175
40	82271	148064	556	46404	603793	76	128675	751862	171
1	84632	152745	554	49854	653063	76	134486	805808	167
2	86373	153703	562	51333	664536	77	137707	818239	168
3	87555	154292	567	51983	625542	83	139538	779834	179
4	90741	157961	576	59988	632101	94	150928	790062	191
5	99702	163783	607	68032	670251	102	167734	834034	201
6	107366	171828	625	71670	682359	105	179036	854717	209
7	114033	180111	633	72416	685679	106	186453	865790	215
8	121954	190976	639	74729	692248	108	196654	883224	223
9	135690	204126	665	82022	745215	110	217713	949342	228
50	145871	213035	685	86598	785120	110	232463	1001155	232
1	154442	226139	683	90580	822309	110	245031	1048537	234
2	162426	232691	698	95075	861640	108	256502	1094331	234
3	172110	236076	729	97908	863625	113	271376	1101701	246
4	183583	245907	747	105064	907315	116	288649	1153222	250
5	194174	249635	778	110908	942365	118	305080	1192021	256
6	189058	225039	840	109092	939616	116	298149	1164645	256
7	199517	234161	852	110517	957576	115	310128	1193757	260
8	199577	235053	845	112748	973485	116	312407	1208558	258
9	202435	231600	874	115004	1016304	113	323539	1254904	258
60	215745	232286	932	120146	1017325	118	337432	1250611	269
1	223143	243264	917	125575	1040325	120	348694	1283589	271
2	232071	248061	935	133378	1062379	125	365449	1310440	279
3	240197	256694	937	141722	1124973	125	381862	1381667	276
4	271036	284977	951	156698	1177247	133	427728	1462224	292
5	292410	299737	976	180014	1258111	143	472424	1557848	303
6	319571	312871	1021	192251	1284118	150	511823	1596989	320
7	339237	318358	1066	200176	1304257	153	539413	1622615	332
8	360293	322307	1118	212026	1337556	159	572320	1659863	344
9	393722	332691	1183	229719	1392072	165	623441	1724763	362
70	425683	339535	1254	251874	1481377	170	677505	1820913	372

Source: STATISTICAL APPENDIX, SECTION 2.

DIAGRAM 2.5.

SOUTH AFRICAN - INDUSTRY,

CAPITAL-LABOUR RATIOS AND WAGES, 1916-70

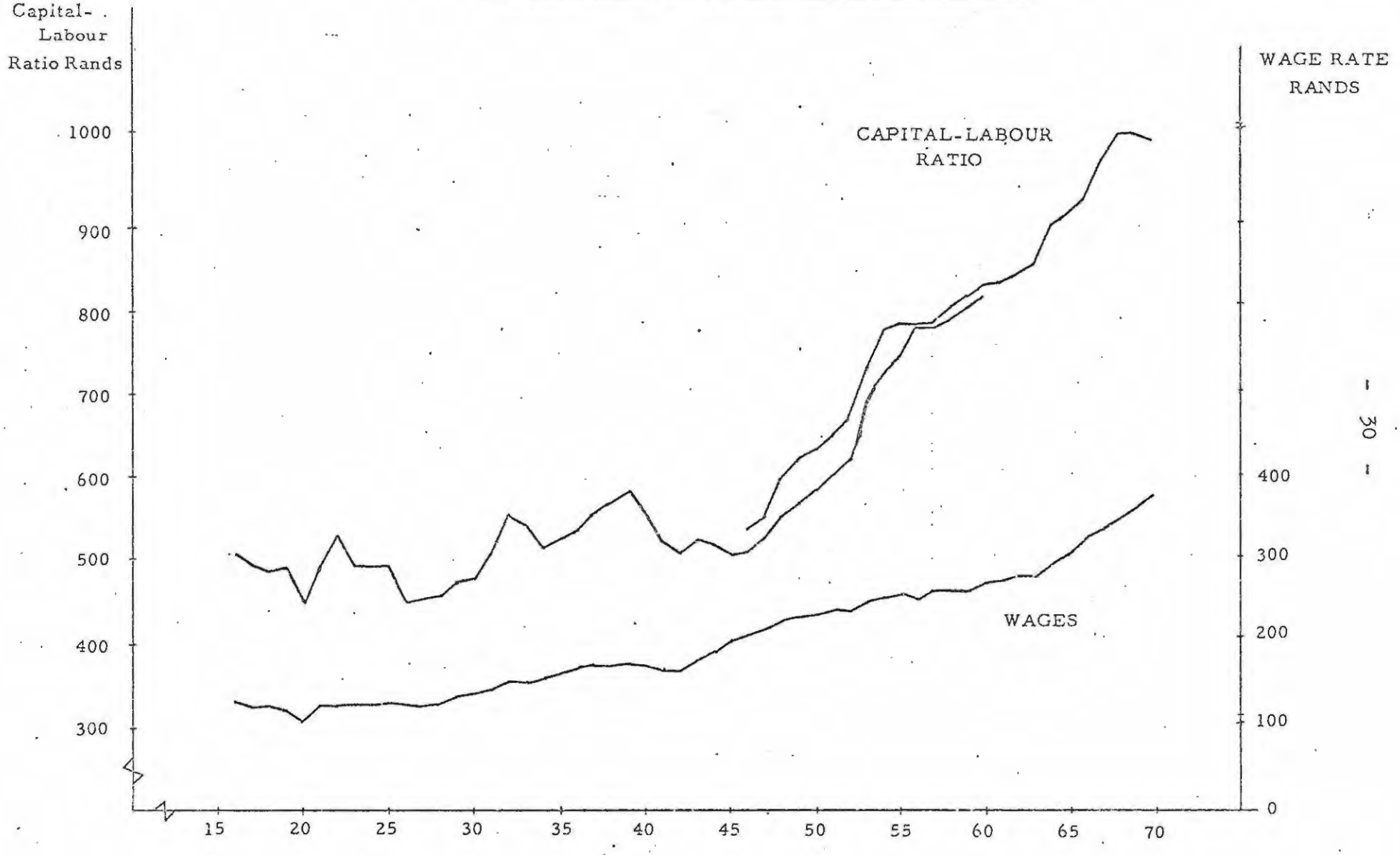
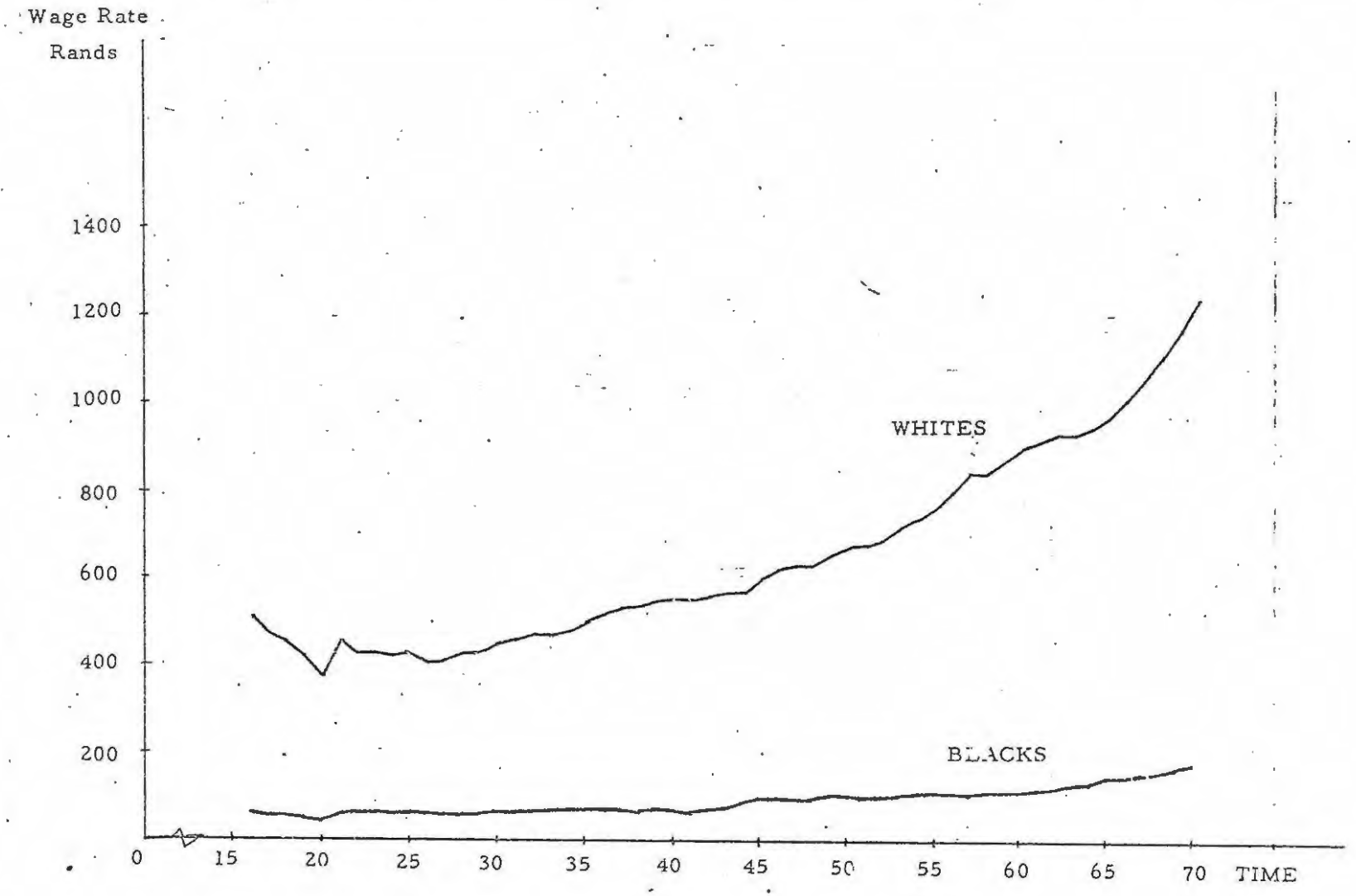


DIAGRAM 2.6.

SOUTH AFRICA - INDUSTRY, WAGES OF BLACKS AND WHITES, 1910-1970



rejection of the model in the South African case we need a more accurate estimation of them than can be obtained from our diagrammatic representations, which rely on the use of different scales on the vertical axes. To obtain this we hypothesise that capital-labour ratios are determined by real wage-rates of Black and White workers.

To test the hypothesis we fit the data for the period 1916 to 1955[1] to an equation of the general form

$$Z = Bo + B_1Y + B_2X$$

where Z = capital-labour ratios, Y = real wage-rates of Black workers and X = real wage-rates of White workers. The estimated regression line, standard error of coefficients,[2] and coefficient of multiple determination, R^2, are as follows:

$$Z = 215.81 - \underset{(4.92)}{1.98Y} + \underset{(9.40)}{0.89X}$$

$$R^2 = 0.74$$

The first things to notice are the magnitude and sign of the coefficients B_1 and B_2. These suggest that there is a relatively strong negative relationship between wage-rates of Black workers and capital-labour ratios and a relatively weak but positive relationship between wage-rates of White workers and capital-labour ratios. A t test showed that both B_1 and B_2 are significant at the 95 per cent level, and

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1. Only the period 1916 to 1955 was included in the regression, due to the break in coverage.

2. Given in parenthesis below the coefficients of Y and X.

an F test indicated that the coefficient of multiple determination, R^2, which suggests that the independant variables, Y and X explain 74 per cent of the variation in Z, was also significant at the 95 per cent level.[1] These results had to be qualified by a test for serial correlation. A Durbin-Watson test gave the statistic d = .00164, indicating that there was positive autocorrelation. This means that it is not possible to establish how much of the variation in the capital-labour ratio is due to changes in wage-rates of Black and White workers. The values of B_1 and B_2 remain the same but their statistical significance is reduced by an unknown amount. It follows from this that although it is not possible to reject or accept our hypothesis without further analysis, it can be concluded with certainty that insofar as there is a relationship between wage-rates and capital-labour ratios, this relationship is negative in the case of Black wage-rates and positive in the case of White wage-rates. This quite clearly contradicts the basic contention in the model that it is unskilled wage-rates which influence the degree of capital-intensity directly.

As mentioned earlier, it has been possible to include a more comprehensive analysis for Non-Agriculture for the period 1946 to 1970. The available data are assembled in Table 2.3. The presentation here differs from that in Table 2.1. only in that rates of increase in variables are given

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1. Simple correlations between Z and Y and Z and X were 0.75 and 0.84 respectively.

in parenthesis within the same column as the base variables. The results of the tests are represented in diagrams 2.7, 2.8 and 2.9.

Our first CUSC analysis (Table 2.1 and Diagram 2.3) is confirmed by the results in Diagram 2.8 for the years 1961 to 1968. As in our first test, the increase in industrial labour outstrips the increase in population after 1962.

Similar confirmation is obtained from the other tests. It is significant, though, that the absolute values of capital-labour ratios in this series are much higher than those for "Industry" for all comparable years. This results, as expected, from the inclusion of the relatively capital intensive private and public services such as residential buildings, transport, communication, and power supplies.[1]

Two additional sets of data lead us to the conclusion that the inclusion of the service sector would be unlikely to substantially alter the results, apart from raising the absolute level of the capital labour ratio. The first set is given in Table 2.4. This shows capital-labour ratios in the four main sectors of the South African economy in each census year from 1921 to 1960. The slow rate of increase in the capital-labour ratio prior to 1946 and the more rapid increase thereafter is reflected in all the sectors (including White agriculture). The second set of data is given in Table A.6. in the Statistical Appendix. This presents time

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1. These capital-labour ratios are slightly inflated by an underenumeration of the total non-agricultural labour force of about 5 per cent. See notes on this table in the Statistical Appendix, Section A.3.

TABLE 2.3.

SOUTH AFRICA - NON-AGRICULTURE, 1946-1970

YEAR	TOTAL POPU-LATION	NON-AGRI-CULTURAL LABOUR FORCE	CAPITAL STOCK (η_K)	K/L (η_q)	$\Delta L/\Delta t$ (η_L)	$\Delta r/\Delta t$ (η_r)	$\Delta n/\Delta t$ (η_h)
	1000	1000	R1000000		1000	1000	1000
	1	2	3	4	5	6	7
1946	11449		2131			-	
	(2.1)		(5.6)			(-)	
7	11694		2251			-	
	(2.2)		(7.4)			(-)	
8	11957		2418			-	
	(2.1)		(7.1)			(6.2)	
9	12212		2589			-	
	(2.0)		(5.9)			(6.3)	
50	12458		2742			-	
	(2.1)		(5.2)			(6.1)	
1	12716		2883			-	
	(2.5)		(5.8)			(5.8)	
2	13040		3051			-	
	(2.6)		(6.3)			(5.6)	
3	13376		3243			-	
	(2.5)		(5.7)			(5.4)	
4	13717		3428			-	
	(2.6)		(4.8)			(5.2)	
5	14067		3593			-	
	(2.5)		(4.5)			(5.0)	
6	14421		3756			-	
	(2.5)		(4.6)			(5.5)	
7	14786		3929			-	
	(2.5)		(5.5)			(6.0)	
8	15160	2703	4143	1553		-	
	(2.5)	(1.3)	(8.0)	(6.7)	(-)	(5.9)	(-)
9	15546	2739	4476	1634		216	
	(2.4)	(1.4)	(7.5)	(6.0)	(-)	(5.6)	(-)
60	15925	2778	4811	1732		205	
	(2.8)	(2.3)	(3.7)	(1.4)	(2.2)	(6.1)	(3.9)
1	16396	2841	4988	1756	63	102	-39
	(2.9)	(2.2)	(3.4)	(0.6)	(2.4)	5.6	(-2.7)
2	16847	2904	5159	1776	63	96	-33
	3.0	(3.5)	(7.8)	(4.1)	(3.9)	(5.5)	(-1.6)
3	17352	3007	5560	1849	102	226	-124
	3.1	(4.9)	(5.6)	(0.6)	(4.2)	(6.0)	(-1.8)
4	17891	3154	5869	1861	147	167	-20
	3.0	(6.6)	(6.8)	(0.2)	(4.1)	(6.5)	(-2.4)
5	18431	3361	6269	1865	207	214	-7
	3.1	(3.6)	(6.4)	(2.7)	(4.0)	(6.1)	(-2.1)
6	18998	3482	6667	1915	120	223	-103
	3.1	(2.08)	(6.1)	(4.0)	(3.9)	(6.3)	(-2.4)
7	19576	3554	7076	1991	72	213	-141
	3.0	(3.05)	(5.9)	(2.7)	(3.5)	(6.3)	(-2.8)
8	20161	3662	7489	2045	108	198	-90
	3.0	(4.19)	(6.3)	(2.0)			
9	20771	3815	7962	2087	153	231	-78
		(4.81)	(7.0)	(2.1)			
70		3999	8519	2130	183	267	-84

Source: APPENDIX SECTION 1.3.

DIAGRAM 2.7.

SOUTH AFRICA - NON-AGRICULTURE, GROWTH PATH, 1958-1970

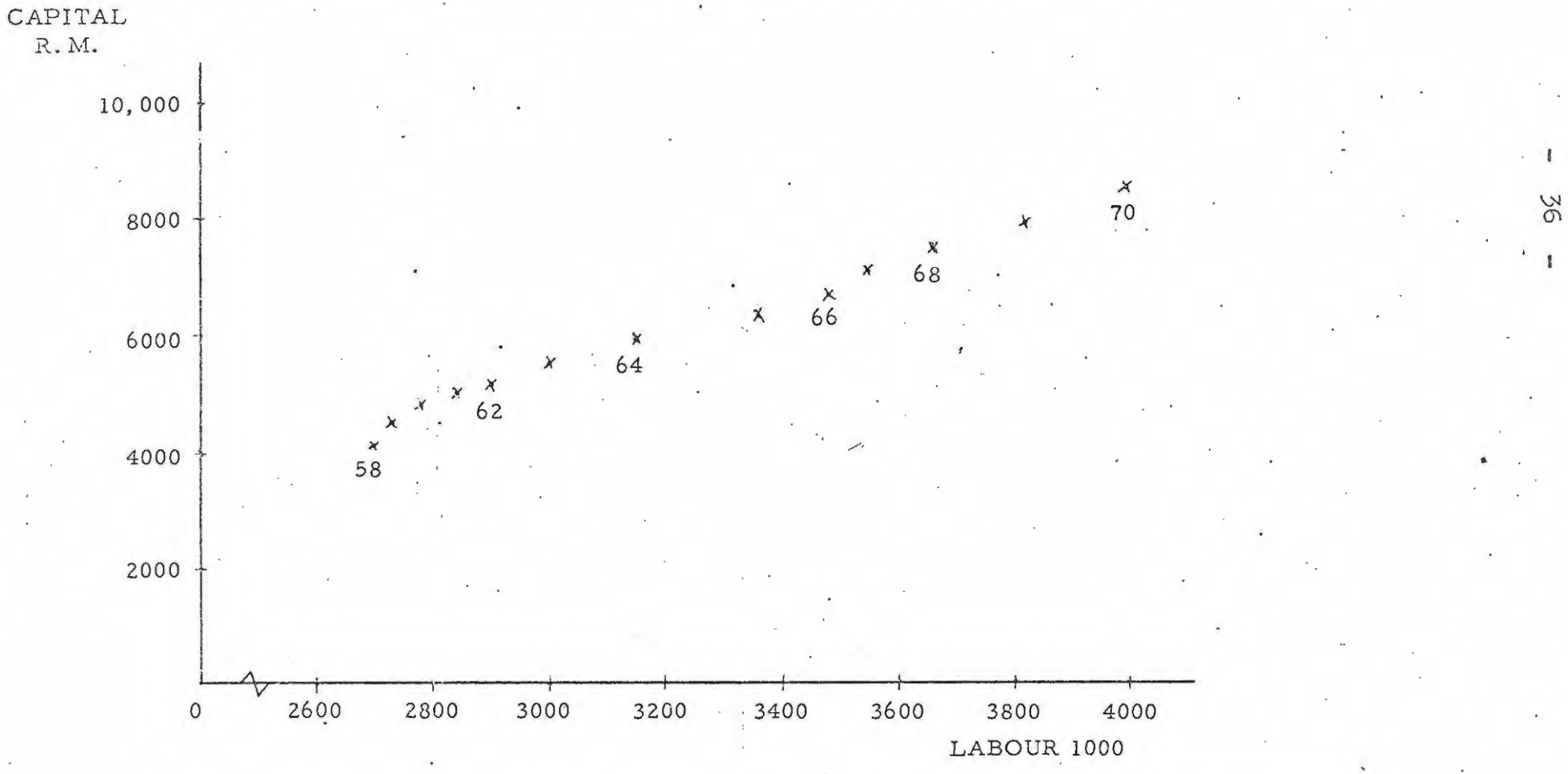

DIAGRAM 2.8.

SOUTH AFRICA NON-AGRICULTURE

CMEC 1960-1970

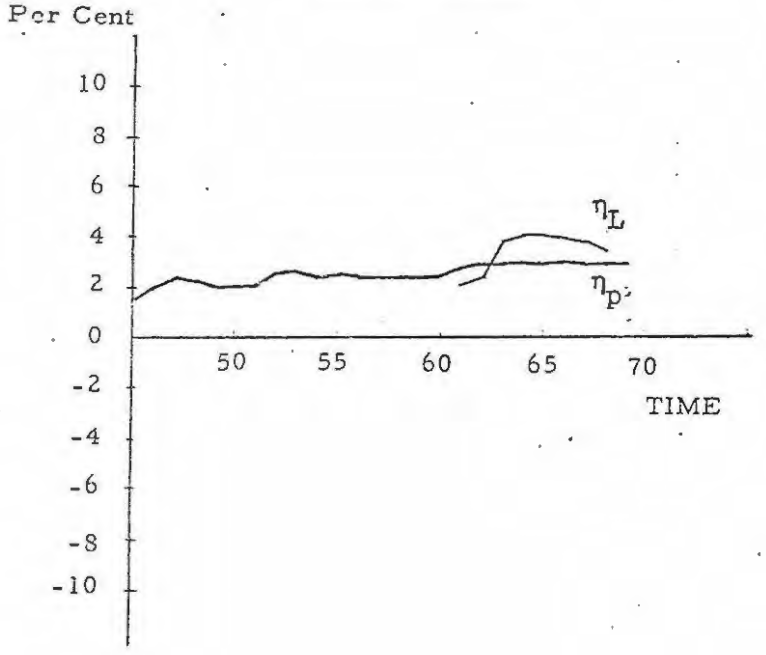

DIAGRAM 2.9.

SOUTH AFRICA NON-AGRICULTURE

DECOMPOSITION ANALYSIS, 1958-70

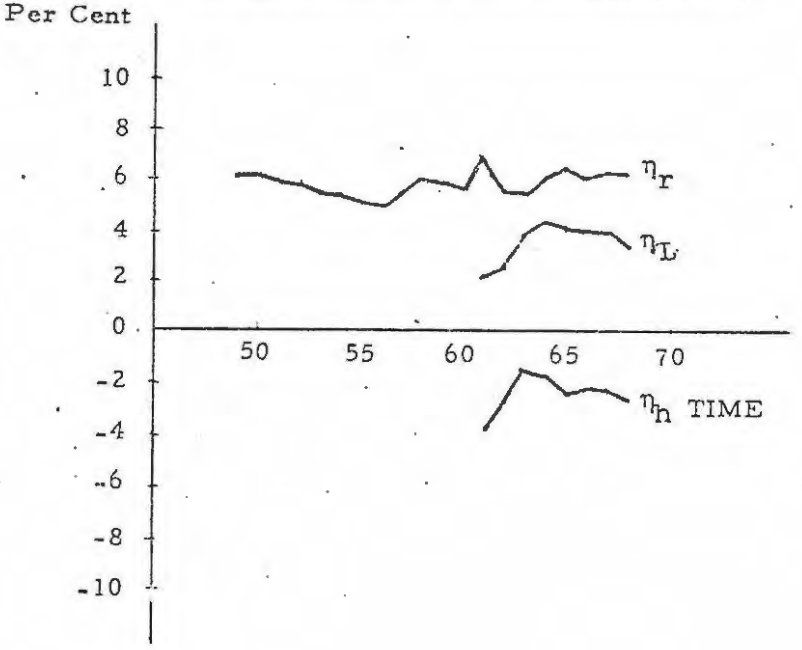

TABLE 2.4.

CAPITAL-LABOUR RATIOS IN THE FOUR MAIN SECTORS

CENSUS YEARS, 1921-1970.

WHITE AGRICULTURE

Year	Total Labour Force	Capital Stock	K/L	η_q
1921	638133	157.0	246.0	-
1936	963545	250.1	359.6	0.3
1946	1081336	308.1	284.9	0.9
1951	1246710	453.5	350.9	4.2
1960	1353848	552.8	408.3	1.6

MINING

1921	432238	117.4	271.6	-
1936	444188	170.1	382.9	2.3
1946	498326	202.6	406.5	0.6
1951	510091	286.9	562.4	5.7
1960	655558	481.6	734.6	2.9

MANUFACTURING

1921	257383	62.9	244.4	-
1936	423187	161.3	381.2	3.0
1946	525391	255.2	485.7	2.4
1951	737619	451.2	588.6	3.9
1960	959849	759.9	791.7	3.2

SERVICES

1921	692153	594.7	859.1	-
1936	1121660	1046.9	933.3	0.6
1946	1417824	1514.1	1067.9	1.4
1951	1604110	2024.5	1262.1	3.4
1960	1972780	3287.0	1666.2	3.0

Source: STATISTICAL APPENDIX, SECTION 1.4.

series data for the South African Railways and Harbours, an important part of the public service sector. The pattern here is not unlike that of the sector "Industry", although a sharper upturn in the growth path after 1936 is indicated (see Diagram A.9. in the Statistical Appendix). It is not unlikely that high values of η_h over most of the period reflect high initial capital outlays in this sector rather than a strong labour-using bias (see Diagram A.10, in the Statistical Appendix). The inclusion of this sector in the total would have raised the absolute level of the capital-labour ratio without appreciably altering its path of change over time.

What additional evidence there is does seem to suggest that the exclusion of the service sectors from the main statistical tables and tests is unlikely to have altered the reliability of the data in this respect.

2.3. Some Points on Reliability and Conclusions

Two sorts of questions may be asked about the reliability of the data in this study. What errors are likely to have been introduced due to methods of data collection on the part of official data collecting institutions? How accurately do the data represent the concepts and categories of the model?

The first of these questions is dealt with insofar as this is possible, in the Statistical Appendix. All that needs stating here is that although detailed conclusions cannot reliably be drawn from the data, there appears to be sufficient confirmation from alternative sources to accept its reliability as a reflection of long run trends in the economy.

The second question is more intractible. In using national accounting statistics, particularly aggregated, secular data, many questionable assumptions are often made.[1] One danger lies in the possibility of recurring errors entering into the calculations.[2] This can happen particularly when estimates are based on investment figures, as has partly been the case in this study.[3]

Problems also exist with the definition of labour. In our tables employment figures have been used as a proxy for labour. Strictly speaking homogeneous units of labour-time should be used, but these are difficult to estimate. Reubens has raised a number of important points in this regard. In criticising Fei and Ranis' analysis of Japan and India, he refers to the fact that they have been "unable to adjust the labour input for the gradual decline of man-hours per worker, nor conversely for the gradual rise in the quality of workers as industrialization advanced".[4] Although these two factors tend, to some extent, to balance each other out, the criticism seems important and applies equally well to the data

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1. See, for example, D.G. Franzen and J.J.D. Willers, "Capital Accumulation and Economic Growth," p. 300, in The Measurement of National Wealth, (Income and Wealth Series VIII), edited by R. Goldsmith and C. Saunders, London, Bowes and Bowes, 1959.

2. Possible sources of this type of error have been documented in the Statistical Appendix.

3. See, E.P. Reubens, "Capital-Labor Ratios in Theory and in History: Comment," A.E.R. Vol. 54, 1964, p. 1054.

4. E.P. Reubens, op. cit., p. 1054.

used in this study. Our data do allow for a reasonably effective check against distortions of the second kind arising. This stems from the fact that the data are separated into the categories "White" and "Black". These categories conform fairly accurately to the distinction between skilled and unskilled, for at least the pre-World War II period. Furthermore, since it is known in which sector and at which times vertical Black labour mobility is likely to have taken place, it is possible to qualify an assessment of the labour-absorption rate accordingly.[1]

Reuben's second important criticism is that Fei and Ranis' aggregate employment data for the Japanese economy include an unknown number of individuals employed in the urban, low productivity sector. This, he correctly shows, reduces the accuracy of their measure of labour-absorption into the high productivity sectors.[2] As we have already shown, our main data series are compiled from census records which are likely to include few, if any, low productivity activities. This criticism would therefore not be as important in our case. An issue it does raise, though, is that regarding the meaningfulness of excluding "informal" activities from our definition of productive employment. There is some evidence that

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1. This question is discussed in more detail in Chapter 5.
2. Reubens, ibid., p. 1055.

the so-called "informal" sector of underdeveloped countries could in itself play a more important role in development strategy than it has in the past.[1]

Bearing in mind our doubts about the statistical material, what conclusions can be drawn from the results of the statistical tests? The results of the tests based on heavily aggregated data seem open to alternative interpretation; no hard and fast conclusions can be drawn either in favour of or against the major hypotheses which arise out of the model. On the one hand there is some evidence of a change in the pattern of development after what appears to be a period of transition during the 1920's and 1930's. On the other hand, as soon as we disaggregate wage-rates the results appear to contradict an important hypothesis in the model. Before we can confidently interpret the meaning of these statistical trends it is necessary both to disaggregate the data, more thoroughly, and look into trends within sub-sectors of the economy, and to supplement our figures with historical information on the structure and changes in South Africa's economic institutions. In chapter 3 we break down the category "agriculture" and consider in turn the roles of White and African agriculture. Similarly in chapter 4 we look at differences in conditions in the mining and other non-agricultural sectors of the economy.

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1. See I.L.O., Employment Incomes and Inequality, A Strategy For Increasing Productive Employment in Kenya, International Labour Office, Geneva, 1972.

CHAPTER 3.

SOME ASPECTS OF AGRICULTURAL DEVELOPMENT

3.1. Introduction

Let us reconsider for a moment some of the assumptions underlying the Fei-Ranis version of the model, which refer to agriculture. According to Fei and Ranis, agriculture's contribution to industrial development depends on both factor endowments and the social arrangements governing production and distribution in this sector. Unhindered industrial expansion is expected to go hand in hand with commercialization in agriculture only if there are appropriate arrangements for the expropriation and reinvestment of agricultural surpluses. In their absense, an increase in agricultural output may result in a prenature exhaustion of labour supplies in industry. In this chapter we investigate conditions in South African agriculture with a view to analysing what mechanisms have come into operation in this case.

Section 2 gives a brief background to the period of expansion prior to 1916. Here we describe the emergence of advanced and backward areas in South African agriculture. This is followed in sections 3 to 7 by a description of conditions in these two parts of agriculture and their significance for the re-allocation of labour from low to high productivity sectors of the economy.

3.2. Origins of Dualism in Agriculture

Industrial expansion in the late nineteenth century took place in a predominantly non-market oriented[1] agricultural environment in which labour supplies were characteristically scarce. This is indicated, for example, by the fact that even prior to the opening of diamond and gold mines in the interior of the country[2] White farmers had attempted by various means to increase the supply of African farm labour or restrict its movement off their farms. In 1860, for example, indentured Indian labour was recruited to work on the cane-fields of Natal, and it was only in 1911 that this practice was discontinued largely for political reasons.[3]

Mining expansion in the 1860s created even greater strains on the labour market and resulted in increased attempts on the part of White farmers to restrict the mobility

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1. There was some external trade in wool, hides and a few other agricultural products and a limited internal trade in grain and meat. Despite these exceptions and a long-standing tradition of commercial production in some coastal areas, the overwhelming bulk of African and White agriculture was subsistence oriented. See D.W. de Kiewiet, A History of South Africa, Social and Economic, Oxford, O.U.P., 1963, p. 167, and F. Wilson, "Farming 1866-1966", in The Oxford History of South Africa, Vol. II, edited by M. Wilson and L. Thompson, Oxford at the Clarendon Press, 1971, p. 107.

2. See D. Hobart Houghton, The South African Economy, London, O.U.P., second edition, 1967, p. 100.

3. S.T. van der Horst, Native Labour in South Africa, London, Frank Cass, 1971, pp. 110-112. D. Hobart Houghton, op. cit., p. 130.

of farm labour.[1] Indeed, there is evidence which suggests that there were relatively limited labour supplied in White agriculture well into the first decade of the twentieth century.[2] This is very clearly not the situation envisaged by Fei and Ranis, who, as we have shown, assume that in the first historical phase there are very high man/land ratios in agriculture which result in marginal productivities being below average consumption levels, and in turn make the supply of labour to industry perfectly elastic at a subsistence wage.

Mining expansion in the last decades of the nineteenth century helped to bring about profound changes in agriculture both in South Africa and the neighbouring British Protectorates.[3] There is much evidence of increased investment in agriculture, and the use of more modern techniques. Agricultural production changed from its subsistence orientation to production for the commercial market. Methods of

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1. The system of pass laws and other measures has been fully documented elsewhere. See, for example, Report of the Native Farm Labour Committee, 1937-39, (Herbst), Pretoria, G.P. 1939, Ch. 3. Report of the Native Laws Commission, 1946-48 (Fagan) Pretoria, G.P. U.G. 28 '48. Hellman, (assisted by L. Abrahams), Handbook of Race Relations in South Africa, Cape Town, O.U.P. 1949, Ch. 12.

2. S.T. van der Horst, Native Labour in South Africa, London, Frank Cass, 1971, pp. 97-109; F. Wilson, op. cit., pp. 117-120. Labour "shortages" on the mines led to the importation of Chinese workers in 1904. See S.T. van der Horst, op. cit., pp. 168-172.

3. Then Basutoland (Lesotho), Bechuanaland (Botswana) and Swaziland.

production appear to have become more capital-intensive, and output on both an absolute and per capita basis seems to have risen.[1] Incomes of White and African land-owners, and some African tenant farmers, appear to have increased, although what happened to incomes of farm labourers is less certain.[2]

Despite the existence of a good deal of fragmentary evidence on increased market participation by both Blacks and Whites, the relative importance of each group's contribution to the commercial market in this period has not been clearly established. One view is that only White farmers were able to respond rapidly and efficiently to the increased demand for agricultural products. This, some argue, was due to the greater receptivity of Whites to market incentives and their advantage of an inherited cultural background suited to the application of modern techniques of production and management.[3] Africans, on the other hand, are believed by these writers, to have been slow to respond to these incentives largely due to cultural factors, including their system of

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1. See H.M. Robertson, "150 Years of Economic Contact between Black and White", S.A.J.E. Vols. 2 and 3, 1934 and 1935, pp. 403-425 and 3-29 respectively. C.W. de Kiewiet, op. cit., Ch. VIII, M. Wilson, "The Growth of Peasant Communities", in The Oxford History of South Africa, Vol. II, pp. 49-101. C.J. Bundy, "The Emergence and Decline of a South African Peasantry", African Affairs, Vol. 71, p. 369-388.

2. M. Wilson, op. cit., pp. 160-161, Table 6, C.J. Bundy, op. cit., pp. 376-380.

3. See, for example, J.S. Brand, The Contributions of Agriculture to the Economic Development of South Africa since 1910, unpublished D.Sc. Agric. thesis, Pretoria, University of Pretoria, 1969, p. 200, pp. 222-226.

communal land tenure and cattle-keeping customs.[1] Population expansion in the face of a closing frontier is also cited as an important factor.

Others have questioned the argument that African participation was limited, and have produced evidence of commercial production by large absolute numbers of Blacks in the "reserves" and neighbouring territories. African tenants on White farms and crown lands are also believed to have made a significant contribution in the commercial market.[2] Although the precise quantitative significance of African agricultural participation has not yet been decisively established, there seems to be enough evidence to treat their contribution as important in the early stages of commercialization prior to Union (1910).

By the turn of the century signs of deterioration in parts of agriculture were already clearly evident. Difficulties were being experienced by both the African and White farming communities. They shared recurrent droughts, stock diseases, severely fluctuating commodity prices[3] and the

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1. See, for example, Summary of the Report of the Commission for the Socio-Economic Development of the Bantu Areas within the Union of South Africa, Pretoria, G.P., U.G., 61 '55, pp. 72-75. Hereafter referred to as the Tomlinson Commission Summary Report.

2. See H.M. Robertson, op. cit., Vols. 2 and 3, pp. 103-425. C.W. de Kiewiet, op. cit., Ch. VIII. F. Wilson, op. cit., pp. 49 and C.J. Bundy, op. cit., pp. 369-388.

3. See C.W. de Kiewiet, op. cit., Ch. 8. F. Wilson, op. cit., pp. 123-125.

dislocation of several civil wars.[1] In addition population increases and the system of communal land tenure[2] and the Roman-Dutch laws of inheritance[3] were ill-suited to the constraint of closing frontiers. Farming was also made difficult by sharply rising prices of land in the Transvaal and elsewhere, where large tracts had been bought up by speculators to be left idle or be farmed by Africans as cash paying tenants or share-croppers.[4]

Despite these shared difficulties a noticeable difference between conditions in African and White agriculture had emerged by the turn of the century and by the 1920s and 1930s there was a sharp division between these groups.[5] If we consider the entire period from the end of the nineteenth to the end of the third decade of the twentieth century, the outstanding feature in agriculture was the relative advancement of the White and deterioration of the Black farming. Hardships were experienced by both communities, although in the case of the Whites these extended primarily to squatters

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1. C.W. de Kiewiet, op. cit., p. 283.

2. This was, with exceptions, the norm in African agriculture. For a classification of areas in which the various systems operated see the Tomlinson Commission Summary Report, pp. 64-72.

3. These made it compulsory for a man to share his land amongst all his children. In the Transvaal in particular this lead to very high man-land ratios in some areas. See Report of the Transvaal Indigency Commission, 1906-1908, T.G. 15'08, p. 69. C.W. de Kiewiet, op. cit., p. 191.

4. F. Wilson, op. cit., p. 129; C.J. Bundy, op. cit., pp. 372-376.

5. Despite this the so-called "poor white problem" remained a reality, particularly in the towns, well into the 1930s. C.W. de Kiewiet, op. cit., Ch. 8.

and other landless workers. The outstanding difference between White and African agriculture was in terms of the productivity and the nature of market participation. By the 1920s there was virtually no African participation on the commodity markets.

An explanation of this division must take into consideration not only conditions within agricultural itself, but also the changing circumstances of both Blacks and Whites on the mines and in other non-agricultural sectors.

In agriculture the effects of land appropriation in the nineteenth century, and the eviction of large numbers of Africans from White farms and crown lands in the early part of the twentieth century, appear to have been decisive factors. One immediate consequence of, for example, the Land Act of 1913 was the reduction of African competition in the commodity markets as a result of the dislocation of an important part of the tenant and share-cropping class of Africans.[1] Another was an increase in man/land ratios in the African areas.

Although the eviction of Africans from White farms decreased the white farmers' rental earnings from squatters, tenants and share-croppers, it tended to increase this sector's supply of wage labour, while at the same time improving conditions of supply from the point of view of mine owners and others in non-agricultural sector.

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1. F. Wilson, op. cit., pp. 129-131. C.J. Rundy, op. cit., pp. 371-375.

Given the confinement of Africans to relatively restricted land areas, another important factor in the decline of African agriculture was their increase in number. Comparable estimates of the African population prior to 1904 are not available.[1] Between 1904 and 1911 their rate of increase in the country as a whole was 2 per cent per annum. In the following period, 1911 to 1921, it fell to 1.6 per cent per annum.[2] This falling rate is largely due to the 1918 influenza which claimed the lives of many Africans, particularly in the urban areas.

With the penetration of capitalism in the late nineteenth century, the balance between traditional rights and obligations in African society was often severely disrupted. In some cases this resulted in heavy consumption expenditure on the part of traditional elites who no longer found it necessary to channel back the agricultural surpluses over which they still had considerable control. This type of action, which would have met with strong resistence in pre-colonial times, became possible once recourse could be had to a higher political body, willing to bolster up the traditional authority. In this way a potential African entrepreneurial class may have been suppressed and mobilization

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1. Some estimates for individual provinces do exist but changes in classification make it impossible to estimate meaningful rates of increase prior to 1904. See Population Census, 1960, R.P. 32'63, pp. 2-3, and notes.

2. Source: Population Census, 1960, R.P. 62'63, p.3, Table 1.

of agriculture delayed.[1]

In a similar manner, the system of temporary migration may partially reflect externally imposed constraints on societies attempting to adjust to changing circumstances, rather than the "inadequacy" of their own internal organisation in the face of modernisation. In this case two important factors have been the barriers to permanent settlement in the urban areas and legislative measures which have lowered the incentive to engage in agricultural production. We refer to these later.

Another important factor in the relative decline of black agriculture has been the low level of state expenditure on this sector compared to White agriculture. First, infrastructural expenditure has benefited White agriculture overproportionately. The main lines of communication from the ports into the interior passed through areas taken over by the Whites. Also of important long run significance was the concentration of educational expenditure on the White and, to a lesser extent, Coloured populations. Per capita expenditure on the African population has been, and remains, a small fraction of that on the Whites, with Coloureds and Asians taking an intermediate position.[2]

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1. I wish to thank Mr. J.A.G. Ferry for discussions on this and related issues.

2. F. Wilson, op. cit., p. 124-5. This is not to ignore the long tradition of missionary education amongst Blacks in South Africa. See, M. Wilson, "The Growth of Peasant Communities," The Oxford History of South Africa, Vol.II, Section 3, pp. 72-34.

After the 1920s more substantial and direct state expenditure began to benefit the White farming community. Part of this was in the form of infrastructural expenditure, including research, communication and dam construction, and part in the form of subsidies, easy credit facilities, price and marketing controls and tariff protection. As we argue in a later section, African agriculture was able to benefit from these protective measures to a relatively small degree only.[1]

Africans as a group suffered the disadvantages of barriers to permanent migration, or in the case of people on White farms, of severe restrictions on all movement. African labourers, but not African households, were welcomed on the mines. Access to other industrial occupations was limited by urban influx control measures, particularly after the 1930s. On the other hand Whites who were unable to make a living in agriculture faced fewer obstacles in the urban areas, and after the mid 1920s these Whites began to benefit from the protection brought about by the "civilized labour policy"[2] in mining, manufacturing and the public sector.

All these factors must have acted as a powerful deterrent to development in African agriculture. By the late 1930s the line drawn between White and Black agriculture also

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1. See Sections 3.5 and 3.6.

2. These aspects of industrial development we discussed in Chapter 4.

distinguished, with few exceptions, the "progressive" from the "backward" agricultural areas in the country. In the former, productivity was increasing, modern methods of production were adopted and output increased rapidly on an absolute and per capita basis. In all these terms, African agriculture experienced either stagnation or an absolute decline.[1] White agriculture was almost fully commercialized,[2] and provided the major part of industrial requirements of agricultural products.

Two matters of very great importance arise out of this historical experience. The first is that it is not possible to assume, as is done in the Lei-Lewis model, that labour-surplus existed prior to industrial expansion in South Africa. The existence of surplus labour cannot be treated as a given. Its appearance with the early expansion of industry must itself be explained. The second point is that it is not meaningful to treat agriculture as a single homogeneous sector. A full understanding of the process of

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1. See, for example, "The Future of Farming in South Africa", Report No. 4 of the Social and Economic Planning Council (S.E.P.C.), Pretoria, G.P., U.G. 10'45, pp. 8-9.

2. This needs to be qualified by the observation that large numbers of Africans were still living as tenants on White farms, working for various lengths of time for wages and payment in kind. See Report of the Native Economic Commission, 1930-32 (Holloway), Pretoria, G.P., 22'32. There were also a few districts in which White farms were producing more or less along subsistence lines. See D. Hobart Houghton (editor) Economic Development in a Plural Society, Cape Town, O.U.P. pp. 59-65. However, by the 1950's only 5 per cent of the gross value of farm production on the average White farm was being consumed by its household. See S.S. Brand, op. cit., p. 217.

labour supply becomes possible only once this sector has been disaggregated and the relations between White and Black agriculture and between these two sub-sectors and industry as a whole are made clear. In order to do this we now turn to a more detailed discussion of conditions within these parts of agriculture, from the second decade of the twentieth century onwards.

3.3. Development of White Agriculture

Although the Land Act of 1913 helped to precipitate the breakdown of 'share-cropping', tenancy and squatting on White farms, these practices remained an important feature of social organisation on White farms well into the 1930s and remnants of the system continued to exist until well after the Second World War. The Holloway Commission reported that there was a widespread incidence of these practices throughout the country in the early 1930s, although it detected signs of their gradual breakdown and replacement with forms of quasi wage-labour.[1] In more recent times payment in kind still constituted the largest part of most farm labourers' incomes, although at least part payment in cash was still the norm.[2] However the trend is clearly for wage-labour to replace other forms.

Both settled and casual African farm labour has always

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1. Report of the Native Economic Commission, 1930-32, pp. 51-4.

2. A Survey of Race Relations, Johannesburg, S.A.I.R.R., 1972, p. 228.

been important on White farms,[1] and in some areas migratory labour and the accompanying compound system appear to have been on the increase during the 1960's.[2]

How does this picture compare with that drawn by Fei and Ranis? In a very general way their vision of a process of transition from landlord-tenant relationships, with the payment of a "constant institutional wage" above the marginal product of labour, to capitalist-wage-labour relationships, with a fully proletarianised labour force, appears to be confirmed. However the role of agriculture during this phase of transition is in certain respects very different to the role their model suggests. These differences become clear when we describe factor endowments in White agriculture and inter-sectoral flows of capital and labour over time.

In 1921 White-owned farms[3] comprised 85 per cent of the total occupied agricultural area of South Africa compared to 87 per cent in 1960.[4] It has been estimated that these areas

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1. The ratio of settled to casual African labour in 1939 was 1.3:1. South African Statistics, 1970, R-46.

2. F. Wilson, Migrant Labour in South Africa, Johannesburg, Spro-cas, 1972, pp. 15-22.

3. As a matter of convenience Whites, Coloureds and Asian land-owners are grouped together in this definition. This is the convention followed in most statistical reports and conforms fairly accurately to a distinction between modern and more traditional agricultural practices.

4. Source: Abstract of Agricultural Statistics, 1973, p. 5. Table B.

represented a slightly smaller percentage, namely 81 per cent, of the country's agricultural resource potential.[1]

Population density on White farms has always been considerably lower than that of the African areas.[2] This difference is even sharper in the case of land/man ratios, if one includes the large number of able-bodied African males who are temporarily absent from the reserves.[3]

An important feature of the development of White agriculture is that it has drawn in more labour from the rest of agriculture than it has released to other sectors in the period under consideration. The census data in Table 3.1 clearly indicate that the absolute numbers of economically active Asians and Whites in agriculture began to fall after 1921 and 1936 respectively. These figures also suggest that the absolute numbers of Coloureds and Africans in this part of agriculture were still increasing at the time of the 1970 census. As we shall see, this is not necessarily an accurate reflection of the actual position in recent times.[4] Although these figures clarify certain labour trends in White

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1. Tomlinson Commission Summary Report, p. 117.

2. Tomlinson Commission Summary Report, p. 49.

3. The land/worker ratio on White farms was 80.9/and in the African areas 47.3/. The latter figure seriously overestimates the true ratio since it excludes the important category of female African workers in these areas. See S.S. Brand, op. cit., p. 206.

4. It should be recalled that these figures include casual farm labour, and thus inter-temporal comparisons, may be unreliable. See footnotes to table 3.1.

agriculture, they do not show what intersectoral movements have taken place. Estimates of this kind have been made by Brand, who suggests that during the thirty year period, 1921 to 1951, White agriculture absorbed African labour continuously from African areas, except for the decade 1936 to 1946.[1] This inflow of Africans appears to have been sufficiently strong to exceed the number of Whites, Coloureds, Asians and other Africans leaving White agriculture. There has been considerable substitution of Black for White labour in this sector - something that was prevented elsewhere by powerful legislative measures as well as other factors.

TABLE 3.1.

ECONOMICALLY ACTIVE POPULATION IN "WHITE" AGRICULTURE

CENSUS DATA, 1921 to 1970

Year	Whites	Coloureds	Asians	Africans	TOTAL
1921	170394	77886	21731	368122	638133
1936	181409	96262	18056	667818	963545
1946	167822	97453	13691	802370	1081336
1951	145424	97674	12928	990650	1246656
1960	119312	120258	10847	1103431	1353848
1970	113500	133000	8800	1257000	1512300

Source: See Table 2.4. and the Statistical Appendix Section A.7. The 1970 figures are not strictly comparable with those for earlier years.

1. S.S. Brand, op. cit., p. 116.

After 1951 white agriculture stopped absorbing African labour from other areas and it is probable that there was a net outflow of labour from this part of agriculture in the ensuing years.[1] Agricultural census data assembled in Table 3.2. tend to support this view. They indicate an occasionally interrupted decline in the number of African workers employed on white farms after 1950.

TABLE 3.2.

AFRICAN WORKERS (EXCLUDING CASUAL EMPLOYEES) ON "WHITE" FARMS, AGRICULTURAL CENSUS DATA, 1918-1969

Year	Workers	Year	Workers	Year	Workers	Year	Workers
1918	359000	1950	867400	1957	702200	1963	667200
1925	435200	1952	801200*	1958	703200	1964	634700
1930	475900	1953	822000*	1959	748000	1965	708400
1937	658900	1954	710500	1960	739800	1969	709600
1946	711500+	1955	729500	1961	781400		
1947	831000	1956	737600	1962	748900		

Sources: (1) 1918-37, Union Statistics for 50 years, G-3. (2) 1946, 1947 and 1950, S.S. Brand, op. cit., p. 237, Table 7-11. (3) 1951-1959, Union Statistics for 50 years, G.3. (4) 1960-1969, South African Statistics, 1970, K-46. See also (5) Abstract of Agricultural Statistics, 1973, p. 4, Table 4.

Notes: (1) Censuses have been taken in different months in the various years. This introduces seasonal fluctuations into the figures but should not affect numbers of permanent employees.

(2) In years marked with an asterisk domestic servants were included. In the year marked with a cross, Coloureds and Asians were included.

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1. S.S. Brand, op. cit., p. 118.

Since these figures exclude casual employees, they probably represent a more accurate reflection of the true position than the figures in Table 3.1. A difficulty in this interpretation should be noted. The census data do not distinguish between seasonal and other temporary labour. It is possible that there continued to be a net inflow of labour after 1951 but on the basis of temporary, non-seasonal migration.

It is important to be clear about our interpretation of these estimates of labour flows between sectors, since the question of labour re-allocation from agriculture to industry is crucial to the model. Strictly speaking we are concerned with units of average labour time and their transfer. Although the number of workers moving into White agriculture has been greater than the number leaving this sector, there may, for two reasons, nevertheless be a net outflow of labour time. This might be the case if (a) workers entering White agriculture from other sectors spent less time annually in work than those who left and (b) if those entering were on average less skilled than those departing from this sector. There is reason to believe that the second condition has held, namely relatively skilled White and Coloured workers in the White agricultural sector have been replaced by unskilled African workers. The net effect of this on labour time transferred to White agriculture is unknown. However, bearing in mind that in addition to the net intake of workers, the African population on White farms increased steadily throughout most of the period, it is clear that there must have been substantial secular increases in labour time being

applied in White agriculture over most of the period. White agriculture was able to absorb both the natural increase in the labour force in this sector and take in labourers from elsewhere.

White agriculture also appears to have benefitted from net inflows of capital over the entire period under consideration. Brand puts forward three explanations for this. First, state expenditure on White agriculture has consistently been in excess of state revenue from this sector. Second, private savings in agriculture have been less than gross fixed capital formation except for a short period during the First World War. It may be added here that White farmers in South Africa have traditionally tended to re-invest in agriculture.[1] These factors, as well as the capital-intensive (capital-output ratios) path of White agricultural development, and its relatively small contribution to the gross domestic product, lead Brand to the view that "agriculture has been the beneficiary of a net inflow of capital from the rest of the economy".[2]

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1. Report of the Commission of Enquiry into Agriculture (Reynders), Pretoria, G.P., R.P. 19/72, p. 8.

2. S.S. Brand, ibid., p. 160. High capital-output ratios in agriculture (relative to mining and manufacturing) have been matched by high capital-labour ratios in this sector. Estimates of capital-labour ratios in agriculture between 1921 and 1960 are presented in Table 2.4., in Chapter 2. For estimates of capital-output ratios in agriculture see C.J. du Plessis, Die Bepaling en die Gebruik van Kapitaalcoëfisiënte-verhoudinge, p. 74-79, Table V.I.

What bearing does the evidence presented in this section have on the applicability of the Fei-Ranis model? Two important points emerge. The first is that commercialization in one part of agriculture, White agriculture, did not result in a release of so-called labour-surpluses to industry, as the model anticipates. Secondly, White agriculture was the net recipient of capital from other sectors which suggests that the sector failed to play the role of providing surpluses for industrial expansion in the early phase of mining and industrial expansion. Strictly speaking, though, it is not possible to deduce from capital flows alone what agriculture's role in this respect has been, since "disguized" surpluses to industry could materialise through a transfer of agricultural commodities at low relative prices. Even so, the sequence in the South African case is, as it were, wrong since a heavy transfer of resources from mining to agriculture (in the 1930's) preceeded the phase of rapid expansion of physical agricultural output and low agricultural prices rather than vice versa.[1]

That White agriculture was both a net recipient of unskilled labour and also almost the sole internal contributor of food and agricultural raw materials to industry in South Africa is both unexpected from the point of view of the Fei-Ranis model, and crucial to our understanding of the pattern of labour supply and employment established in this country.

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1. For a discussion of the excess costs of assistance to agriculture see section 5.5. below.

this pattern only becomes clear once we have described conditions in the rest of agriculture (African agriculture) and the relations between the rest of agriculture and other sectors in the economy. Before doing this, however, we assemble and interpret data on wages in white agriculture and the effects of institutional factors on the agricultural labour market.

3.4. Wages in Agriculture and the Urban/Rural Differential

Evidence on wages in the pre-World War II years is difficult to obtain and often of little comparative value. Francis Wilson, who has attempted to assemble wage data for the century 1866 to 1965, concludes tentatively that "it is likely that through much of the country the standard of living of farm employees rose very little, if at all, in the century".[1]

Real urban-rural wage differentials are also difficult to estimate.[2] If we compare estimates of earnings of African farm labourers in 1928-29 reproduced by the Holloway Commission we find that they varied between 20 per cent and 85 per cent of Black wages in the mining and manufacturing sectors.[3] These comparisons have little significance if only to the wide degree of regional fluctuation reflected, and the

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1. F. Wilson, Farming; 1866-1966, in The Oxford History of South Africa, Vol. II, p. 131. S.T. van der Horst, op. cit., p. 287.

2. S.T. van der Horst, pp. 284-5.

3. Sources: (1) Report of the Native Economic Commission, 1930-32, p. 516, Table M.E.3. (2) [illegible], Table 2.B.3. and 2.B.4.

fact that different living costs in town and country have not been taken into consideration. Similar difficulties are presented by estimates made by the Native Farm Labour Committee in 1937-39.[1]

Agricultural wage data for the post World War II period are more abundant, and reasonably comparable estimates for the period 1946/47 to 1968/69 are assembled in Table 3.3. As a note of caution in interpreting the data, it should be mentioned that although agricultural wage data include payments in kind, differences in rural and urban living costs have not been taken into consideration. Higher urban living costs are, however, counteracted to some extent by the fact that the industrial wage data exclude payments in kind. These make up a fairly important part of African mining wages in particular.[2]

From table 3.4. it emerges that real wages of White workers in agriculture rose steadily over most of the period, while those of Blacks fell between 1946/47 and 1951/52. After this Black wages began to rise and reached their highest point in 1968/69. Furthermore, while the agricultural/industrial wage differential for Whites narrowed between 1946/47 and 1968/69, it was much larger and remained

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1. Report of the Native Farm Labour Committee, 1937-39, op. cit., pp. 29-44 and Appendix A.2. 6 (b).

2. See, for example, Report of the Secretary for Mines and Industries and the Government Mining Engineer, Pretoria, G.P., U.G. 57'28.

TABLE 3.3.

AVERAGE ANNUAL EARNINGS, INCLUDING PAYMENTS IN KIND, AND AGRICULTURAL-INDUSTRIAL DIFFERENTIALS (WHITE AGRICULTURE), VARIOUS YEARS, 1946/47 - 1968/69 (1938 PRICES)

YEAR	WHITES			BLACKS		
	Agric.	Industry	Agric/ Industry	Agric.	Industry	Agric/ Industry
	Rands	Rands		Rands	Rands	
1946/47	280	663	0.42	41	106	0.39
1949/50	281	685	0.41	39	110	0.35
1951/52	334	698	0.48	38	108	0.35
1952/53	371	729	0.51	42	113	0.37
1953/54	383	747	0.51	44	116	0.38
1954/55	396	778	0.51	43	118	0.36
1955/56	358	840	0.43	45	116	0.39
1956/57	468	852	0.55	44	115	0.38
1958/59	517	874	0.59	44	113	0.39
1960/61	667	917	0.73	46	120	0.38
1968/69	661	1135	0.58	54	158	0.34

Sources: (1) 1946/47-1960/61, J.R. Hudson "The Effects on Agriculture of the Growth and Prosperity of the South African Economy," Annals Univ. van Stellenbosch, Vol. 41, 1966, p. 327, Table 2.8. Hudson unfortunately failed to give details on his sources and methods of calculation, which makes it uncertain whether the 1968/69 estimates are strictly comparable with those for other years. (2) 1968/69 Report on Agricultural and Pastoral Production, No. 06-01-06, Agricultural Census, 1968/69, p. 42, p. 114, Table 3.2.1, and p. 125, Table 4.1.1. (3) Industry wage data from Table 2.2, Chapter 2.

Notes: (1) Agricultural wage data refer only to permanent labour. For the years 1951/52 to 1967/68 estimates of either earnings or employment of permanent labour were not given separately. It was therefore not possible to construct satisfactory wage estimates for this period.

(2) Industry refers to mining and manufacturing industries.

(3) It should be recalled that mining and manufacturing wage data do not include payments in kind - a fairly important element in wages of African mine workers.

almost constant for Blacks. In order to compare wage differentials between agriculture and the mining and manufacturing sectors, separate ratios have been calculated in Table 3.5. This indicates that for White workers the differential between agricultural and mining wages narrowed over the post war period. This was also true, but less pronounced, in the case of the agriculture/manufacturing differential. Turning to Blacks we find a sharp contrast between the absolute size of the two differentials. Agricultural earnings appear to have represented between 60 and 70 per cent of earnings on the mines but only 23 to 26 per cent of earnings in manufacturing. Over time there is a far less pronounced tendency for the differentials to narrow than in the case of Whites, and the gap between agricultural and mining wages appears to have narrowed to a greater degree than that between agriculture and manufacturing.

TABLE 3.4.

RATIOS OF AGRICULTURAL EARNINGS TO EARNINGS IN MINING AND MANUFACTURING, SELECTED YEARS 1946/47 to 1968/69

YEAR	Agriculture/ Mining		Agriculture/ Manufacturing	
	Whites	Blacks	Whites	Blacks
1946/47	0.35	0.66	0.49	0.24
1949/50	0.31	0.61	0.46	0.23
1951/52	0.38	0.63	0.52	0.23
1952/53	0.41	0.69	0.55	0.25
1953/54	0.43	0.70	0.55	0.26
1954/55	0.43	0.67	0.55	0.25
1955/56	0.39	0.70	0.45	0.26
1956/57	0.48	0.70	0.53	0.26
1958/59	0.52	0.70	0.62	0.26
1960/61	0.65	0.72	0.76	0.25
1968/69	0.49	0.72	0.58	0.24

Sources: (1) Table 3.4. above. (2) Tables A.3 and A.4 in the Statistical Appendix.

Do these results confirm the Lewis-Ranis model? Again, no unambiguous answer can be given. Recall for a moment the results of the input ratio analysis in chapter 2. We found that in industry there was a sharp rise in the capital-labour ratio after the second World War. From this we should expect wages in agriculture to show a similar rising trend. Our data indicates that the wage-rate of Black workers actually fell between 1947 and 1952, and even by 1959 it had only increased very slightly. Wage-rates of White workers on the other hand do lend support to the model, although these probably represent to some extent the earnings of skilled rather than unskilled workers and are therefore not strictly representative.

Another important feature is that agricultural wage-rates are not significantly less than those in mining and the gap between the two sectors has narrowed considerably in the post war period. The gap between agricultural wages and wages in the manufacturing sector, on the other hand, is very much wider and has altered little over the same period. This suggests very different labour market conditions in the two sectors, an aspect which we touch on in the remaining sections of this chapter and consider more fully in chapter 4.

3.5. The Role of the State in White Agriculture

As we have already seen, direct State intervention in White agriculture prior to the 1920s was directed largely at the African population and had, amongst other things, the effect of curtailing the mobility of African farm labour and dislocating an important class of tenants-cum-sharecroppers.

Labour legislation of this kind was not relaxed after the 1920's, but the state, in addition to this repressive role, began to penetrate other spheres of agriculture, including research and marketing.

In this section we look first at some aspects of state aid and controls in White agriculture, after which we consider more recent labour legislation. With this institutional background we hope to gain a clearer understanding of the dichotomy between White and Black agriculture, which in turn throws light on the pattern of labour supply.

By the late 1920s some of the foundations of the coming pattern of state assistance and control in agriculture had already been laid. As early as 1912 a Land Bank had been established to help provide White farmers with credit facilities. Railway rebates for agricultural products were also one of the earliest concessions to White farmers. The research branch of the Department of Agriculture had been in operation for some time to give information and assistance to White farmers. A number of cooperatives were recognized in the Cooperatives Act of 1922 and a few marketing control boards were already in operation. Finally, a limited number of producers had benefitted from tariff protection by this time.[1]

As in many other primary producing countries, widespread agriculture protection in South Africa became a really important feature of economic policy only after 1930. During and

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1. See B. Wilson, op. cit., pp. 136-137.

after the Great Depression tariff protection was extended to a large number of products; particularly those produced for the local market. One consequence of this was increased stability in producers' prices, particularly of staple products. On the whole the benefits of price stabilization under the extreme conditions of depression probably exceeded by far the losses sustained through short run increases in consumer prices.

Less obvious than these effects was the shift from labour to more capital-intensive methods in agriculture and elsewhere. This was a consequence not only of the capital-bias of methods of grain production, but also of the fact that rising internal food prices increased the costs of labour relative to capital. Added to this was the structure of tariff protection, which in attempting to bring about substitution of local for foreign production, promoted high agricultural commodity prices but low prices for machinery and related non-labour inputs, at least in the short run, namely the pre-second World War years.[1]

Internal tariff barriers were accompanied by internal price and marketing controls. The latter were administered by quasi-state, producer-oriented marketing control boards. One objective of these boards was to control the severe internal price fluctuations to which South African agriculture

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1. Report of the Commission of Enquiry into Policy Relating to the Protection of Manufactures (Viljoen), Pretoria, G.P. U.G. 20'58, p. 18. Report of the Commission of Enquiry into Agriculture (Du Plessis), Pretoria, G.P., G.P. 1972, p. 114.

was prone. They were also given wide powers over aspects of marketing and distribution, including the right to establish quotas, demarcate production districts, store produce and regulate its flow into local and foreign markets.

Another less obvious role of the marketing control boards was that of reducing competition from Black agriculture. Their power in this regard have been described by Sheila van der Horst who says: "The Marketing Act of 1937 provides the means for carrying out the policy of preventing Native farmers from competing with Europeans. It provides the framework within which the control boards for the different farm products function, and it is significant that no person other than a European may vote on any proposed scheme of control, although such a scheme may control the production, sale and processing of all producers, including Natives. At the same time different provisions may be applied to different areas in order to discourage or encourage different types of production. It is possible for European control boards representing the supposed interests of European farmers to determine the prices at which Native farmers may sell their products, and the amount they may sell at those prices."[1]

The degree to which such measures have been applied in South Africa is unknown. In view of the low per capita product of the African areas, it might have been supposed competition did present a potential threat to White agriculture.

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1. S.T. van der Horst, Native Labour in South Africa, p. 311.

There is fragmentary evidence that where sectional White agricultural interests have felt threatened, these measures have been put into effect.[1] However, the extent to which this suppressed the mobilization of African agriculture by suppressing African entrepreneurs is difficult to estimate.

The economic costs of protection of White agriculture prior to the Second World War appear to have been considerable. Between 1933 and 1937 expenditure on White agriculture was approximately 34 times the amount of revenue received from this sector.[2] In 1933 and 1940 two estimates of the excess costs of assistance to agriculture, including tariff protection, subsidies and other measures were made, and in both cases costs were found to be substantial.[3]

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1. An instance of opposition to advancement in African agriculture occurred in 1970 "when black peasants on an irrigration scheme produced and sold tomatoes at competitive prices". See Merle Lipton, "The South African Census and Bantustan Policy", The World Today, London, Chatham House, June 1972, p. 257.

2. See S.S. Brand, op. cit., p. 155, table 1-4.

3. C.S. Richards, "Subsidies, quotas and tariffs and the excess cost of agriculture", S.A.J.E., Vol., 35, pp. 365-403. Report of the Industrial and Agricultural Requirements Commission (Van Zyl), Pretoria, G.P., U.G. 40'41. See also S.B.P.C. Report No. 4, "The Future of Farming in South Africa," U.G. 10'45. These writings form part of the heated debate on state intervention in agriculture, which took place during the 1930s and 1940s. Other references include the following: R. Leslie, L.M. Hutt, et. al., "Economists' Protest, 1937 Marketing Act," S.A.J.E., Vol., 6, 1938; J.R. McLoughlin, "A Defence of Control in the Marketing of Agricultural Products", S.A.J.E., Vol. 6, 1938; Report of the Reconstruction Committee of the Department of Agriculture and Forestry, "Reconstruction of Agriculture", Pretoria, G.P. 1944-5; C.S. Richards, "New Despotism in Agriculture", S.A.J.E., Vol. 4, 1936; J.H. Wilney, "Control of Agriculture in South Africa", S.A.J.E. Vol. 8, 1940; T.... van Haasdijk, "Agricultural Prices and Price Policy, 1933-1953, Vol. 22, 1954.

State assistance to white agriculture after the war concentrated less on tariff protection and more on the less regressive measures of price subsidization,[1] railway rebates on agricultural commodities and equipment and subsidization of certain agricultural inputs.[2]

The quantitative impact of the factors discussed above is difficult to assess and requires independent research in its own right. Here it will only be possible to make a few tentative suggestions as to the direction of the effects of these measures.

There seems little doubt that the rapid growth in agricultural output after the mid 1930s was at least in part a response to tariff protection, increased price stability, guaranteed markets and the various forms of direct state aid. However, increases in the pre-Second World War period disguise an important structural shift from production for foreign to production for local markets. The costs of this change are difficult to assess, but are undoubtedly substantial both in terms of overall output and the growth of

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1. See R.L. Shrollfell, "The Relative Merits of Tariffs and Subsidies as Methods of Protection," S.A.J.E., Vol. 15, 1945.

2. For an indication of this change in emphasis, see S.S. Brand, op. cit., p. 155, Table 5-4. This relevant column is that indicating expenditure through the Department of Agricultural Economics and Marketing. The average for the five year period centered on 1935, expenditure through this department, the bulk of which includes commodity and input subsidies and railway rebates, was £4.3 million. The averages for the five year periods centered on 1940 and 1945 were £13.8 and £29.9 million respectively.

employment in the economy. Post-war agricultural expansion was far more pronounced, and involved an improved performance on the export market.[1] In this period the burden of protection of agriculture probably shifted to some degree from the lower to the higher income groups due to the partial substitution of price subsidies for tariff protection.

Protection of White agriculture has also involved the substitution of capital for labour in this sector. This has been due not only to the structure of tariff protection but also to measures of direct aid which favour the use of capital. These include subsidization of non-labour inputs, such as machinery and fuels, as well as easy credit facilities and various tax concessions.

These important considerations should not, however be allowed to obscure the fact that the scale of expansion in White agriculture has been great enough to bring about a net absorption of labour into this sector up until the 1950s. The point is not that the factors described above have reduced the absolute level of expansion of employment but that the demand for labour would probably have been greater if they had not operated to lower the price of capital and raise that of labour on White farms.

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1. Agricultural export estimates appear in the following series:
   (a) 1915-1923 Union Statistics for 50 years, K-4, Cols. 55-59.
   (b) 1924-1958 Union Statistics for 50 years, K-4, Cols. 50-55.
   (c) 1957-1970 Abstract of Agricultural Statistics, p. 54, table 46.

Our discussion above has focused on the effects of state intervention on the demand for labour in White agriculture. In the next sub-section we look more closely at the effects of state intervention on labour supplies to this sector.

Apart from population increase, the major factors governing the supply of labour in White agriculture have been employment opportunities in the industrial sector (agriculture's major competitor for labour) and conditions in the Black areas, including neighbouring territories[1]. With some important qualifications, labour policy in South Africa has generally favoured White agricultural interests.

In the last section, we briefly mentioned the effects of the 1913 Land Act in this regard. The significance of this measure was that it severely limited the number of African tenants allowed on White farms, thereby reducing competition in the commodity market. At the same time it tended to increase supplies of wage labour. Even prior to 1913 there existed a network of legislation, including the long-established Masters and Servants Act and various pass law systems which helped prevent labour from moving out of agriculture. In addition to this, until 1925 African workers were given an incentive to stay on white farms by being exempted from certain taxes while employed in this way.[2]

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1. Agriculture is one of the few spheres in which substitution of Black for White labour on a wide scale has been unopposed by the state. This sector has also been one of the few excluded from all industrial and wage legislation.

2. S.T. van der Horst, op. cit., p. 190.

In 1936, control over the movement of farm labour was increased by clauses in the Native Service and Contract Act, which bound all members of a family to the terms of the male heads' contract.

Despite the controls embodied in the 1913 Land Act and the 1932 Native Service and Contract Act, the legislation was only partially effective in reducing the incidence of labour tenancy, squatting and related systems on White farms, and in 1936 the important Native Land and Trust Act was passed in an effort to eliminate these practices. Under this legislation the country was divided up into areas in which only one race group could acquire land. At the same time more stringent controls were placed on labour tenancy and squatting.

To some extent this legislation also appears to have limited the supply of African labour by making more land available to Africans. However in most cases land made over for African occupancy was already heavily settled by these people. The other effect, like that of previous legislation, was to decrease the number of African tenants and squatters on White farms and increase the supply of wage-earning labourers. It also helped to increase the number of migratory workers in the economy by extending the mine labour system to some farming areas.[1]

During the 1960's renewed efforts were made to reduce the number of African tenants, and in some areas no African

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1. African women and children had to move in large numbers to the already crowded African rural areas, to quasi-urban resettlement camps, or (illegally) to African townships on the periphery of the "White" towns. These movements will be discussed in more detail in the next chapter.

households at all were permitted to remain on White farms. African men could find work in these areas only on a temporary basis.[1]

The other important source of labour for White agriculture was neighbouring countries. Up until 1958 workers from the ex-High Commission territories (Lesotho, Botswana and Swaziland) were given the same rights as local rural Africans. There also appears to have been considerable use of foreign labour from Mozambique and elsewhere on White farms, particularly in the North and North-Eastern parts of the country, despite its illegality. But from 1958 it became more difficult for White farmers to obtain foreign labour due to changed immigration laws and more stringent border controls.[2] Some of the more recent legislation is considered in more detail in the next chapter.

Some general points arise out of our discussion of state intervention in agriculture. Most important for the interpretation of the Wei-Nanis model is that the role of the State, particularly during the 1930's was to protect White agriculture's commodity markets. Over much of the time measures were also established to ensure that there would be a cheap and abundant supply of African labour. However it is clear that there have been in this respect, potential conflicts between the interests of white farmers and other sections of the owners of means of production. A good deal of

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1. F. Wilson, Migrant Labour In South Africa, pp. 15-27.

2. W.J. Breytenbach, Migratory Labour Arrangements in Southern Africa, Pretoria. African Institute of South Africa, 1972, Chs. 3-5.

labour legislation fulfilled the needs more of mining than of White agricultural interests. This does not alter the point that labour, in at least this part of agriculture, was regarded as scarce rather than abundant. In addition, for a certain period, expansion here was financed by surpluses from the mines rather than vice versa. Both these considerations call into question basic assumptions underlying the Fei-Ranis model.

The final point arising out of this section is that State intervention in agriculture has helped to deepen the contrast between the White and African owned areas. The relative impact in the two parts of agriculture is brought out more clearly in the next section.

3.3. African Agriculture and Other Sources of Labour

It has already been suggested that it was White agriculture that increasingly took on the role of providing agricultural requirements, food and raw materials, for industrial expansion in South Africa. Black farming areas on the other hand came to provide only labour for the expanding sectors. This separation of functions in agricultural has been a crucial factor in South African development. One of its most important implications was that the relationship between investment in agriculture and labour supplies posited by Fei and Ranis did not hold. Whereas in the Fei-Ranis model increases in productivity in agriculture enable more workers to be released for industrial employment, the opposite relationship between productivity and labour supply has existed with respect to African agriculture both in the short

and long run. This fact stems from the non-capitalist system of production and distribution in the reserves. In this section we will discuss how this has affected the role of African agriculture in the South African economy.

A few words about how the entity "African agriculture" will be treated in this section need to be said first. Our attention will be focused mainly on agricultural activites in African areas within the boundaries of South Africa. This delimitation is necessitated in part by the availability of statistical material. Theoretically, it would be preferable to include a discussion of conditions in agriculture in all areas from which labour is drawn to South African industry, but this is beyond the scope of our study. However, the omission need not be a serious one. Conditions in agriculture are qualitatively much the same in most of the neighbouring territories. This is particularly true of Botswana and Lesotho; two important sources of labour. Since labourers from these two countries as well as Swaziland were given the same privileges as workers from local African areas until 1958, we have another reason for assuming that local conditions are fairly representative. It would also be preferable to make a clear distinction between agricultural and non-agricultural activities within the African areas, but this has not always been possible due to inadequacies in the data.

African agriculture comprised 13.4 per cent of the total occupied agricultural area of South Africa in 1960, and 17.6

per cent in 1913.[1] Its share of the agricultural potential was somewhat greater than this. The Tomlinson Commission estimated that this share would constitute 25.2 per cent of the total potential once the full quota of land had been made over to Africans in accordance with the Native Trust and Land Act of 1936.[2]

Despite these estimates, the "geographical agricultural product" of the African areas was only 3.8 per cent of agricultural product of the country as a whole in 1966/67.[3] Of this a very high proportion was consumed by the producers; "some 95 per cent of the agricultural, and 60 per cent of the live-stock products".[4] Furthermore, in that year agricultural production by Africans in these areas comprised about 58 per cent of their total geographical product, which in turn contributed only 2 per cent to the Gross Domestic Product of South Africa in 1966/67.[5]

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1. Sources: 1960; S.S. Brand, op. cit., p. 231, Table 7-9. 1965: Abstract of Agricultural Statistics, 1972, p. 5, Table 5.1. The increase between 1960 and 1965 is due to the addition of areas "released" from the provisions of the 1913 Land Act as well as additional "quota" land. For an explanation of these terms see the Tomlinson Commission Summary Report, pp. 44-46.

2. Tomlinson Commission Summary Report, p. 117.

3. This includes subsistence production. Sources: J.J. Stadler, "The Economic and Demographic Characteristics of the South African Bantu Areas", Agrekon, Vol. 9, 1970/71, p. 29, Table 8; Abstract of Agricultural Statistics, p. 81, Table 79.

4. This estimate refers to 1950/51, but is unlikely to have been very different in 1966/67. See the Tomlinson Commission Summary Report, p. 85.

5. Source: 1966/67 estimates: J.J. Stadler, op. cit., pp. 24. The figure 1/58 per cent refers to the Transkei.

As had been mentioned, population density in the African areas was higher than that in other rural areas. In the Transkei, Ciskei and Natal it was over three times that in the Republic as a whole in 1960.[1] As well as sheer density it is important to know the age and sex structure of this population. In 1960 only 36 per cent of the de facto population of these areas was male and a large proportion of this number comprised old men and juveniles.[2]

As is well known the peculiar age and sex structure of the African population in the reserves is largely the result of the system of temporary migration. The causes of temporary migration are complex, and we leave an assessment of the effects of this syten on labour reallocation to the final chapter. It is sufficient here to mention that with the barriers to permanent African settlement in White areas in South Africa worsening conditions in African agriculture have helped perpetuate this system. This is not to deny that the attraction of higher incomes outside the sector and the consequent absence of adult males has itself had a negative effect on productivity in African agriculture. What must be emphasised here is that African rural households have become highly dependant on wage-earnings outside African agriculture because of this system. Stadler writes that "In 1966/67

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1. J.J. Stadler, ibid., p. 23, Table 4.

2. See, for example, J.J. Stadler, ibid., p. 23, Table 5.

the income generated by the homelands, ..., constituted 59.2 per cent of the total income of the "normal" inhabitants of the homelands as against 45.2 per cent in 1950/51 and 54.7 per cent in 1950/51".[1] Since these figures are based on estimates of the total geographical output of the African areas, the per capita agricultural product must have been even lower. A further indication of this dependence is that for every six de facto members of the reserve population in 1960 there was one temporary absentee, or an average of about one person per family.[2]

Although a cursory comparison of the performances of White and African agriculture may leave an impression of stagnation in the latter, it is clear that conditions in the African areas have been far from static in the past half century. In this time the position in African communities has severely deteriorated. Although it is unlikely, as we shall see, that the marginal product of labour in African agriculture has ever been zero or even negligible, increasing population in these areas and the barriers to permanent migration elsewhere, as well as repressive labour legislation, have resulted in a long term decline in the sector's per capita agricultural production.

Let us consider what fragmentary data there is on the matter.[3] In terms of the physical volume of livestock and

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1. J.J. Stadler, ibid., p. 23.

2. Source: J.J. Stadler, op. cit., p. 22, Table 3. See also the Tomlinson Commission summary report, p. 55.

3. See also E.I.R.C. Report No. 4, pp. 89.

crop production, the indications are that African agriculture remained virtually unchanged at least up until the late 1960s despite increases in the reserve population.[1] Even between 1950/51 and 1966/67, there seems to have been little or no improvement in terms of absolute physical output. In this period the contribution of African agriculture to the gross geographical product of the African areas fell from R56.2 million to R45.85 million.[2]

In Table 3.5. we present the geographical product of the African areas for certain years between 1936 and 1966/67. Although the gross geographical product in current prices rose from a value of R49.2 million in 1936 to R160.0 million in 1966/67, the difference between the real value in the former and latter years has been estimated as a mere R7.0 million. The real value of per capita geographical product according to one estimate, which is somewhat suspect, fell from R17.4 to R8.5 per annum in the same period.[3]

Information on the use of capital and labour over time in the reserves is also difficult to obtain. The available data suggest that there has been a small but steady increase in the use of moveable capital, although much of this has been

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1. S.S. Brand, op. cit., p. 229, Table 7-8.

2. Sources: (1) 1950/51: Tomlinson Commission Summary Report, p. 99. (2) 1966/67. J.A. Lombard and F.J. van der Merwe, "Central Problems of the Economic Development of Bantu Homelands", Finance and Trade Review, Vol. X, 1972, pp. 35-56, Tables 10 and 11.

3. The very low value of R8.5 per annum probably results in part from changes in the de-limitation of African areas, which have taken place in the late 1960s. We look more closely at these in our interpretation of population data below.

of a low capacity, animal-drawn type. Since the 1950s there have also been some increases in fixed capital formation, particularly fencing, dam construction irrigation works and contour banking.[1]

TABLE 3.5.

TOTAL AND PER CAPITA GEOGRAPHICAL PRODUCT OF THE AFRICAN AREAS, CERTAIN YEARS 1936-1966/67

Year	Gross Product Current Prices	Gross Product 1938 Prices	De Facto African Pop. in African Areas	Real Product/ Capita
	Rm.	Rm.		R
1936	49.2	52.2	2 962 432	17.6
1946/47	79.7	57.1	3 267 185	17.5
1950/51	93.8	54.9	3 307 234	12.6
1960/61	118.0	51.1	4 107 954	12.4
1966/67	160.0	59.2	6 994 179	8.5

Sources: (1) Geographical Product: J.J. Stadler, op. cit. p. 25, Table 9. (2) Retail Price Index (All Items): Union Statistics for 50 Years, M-23 Supplement to the S.A.R.B. Quarterly Bulletin, September 1971, Table 7. (3) Population: Appendix 3.B, Table 3.B.

Labour statistics for the African areas are also scarce. However, if due regard is taken of trends in labour migration, an idea of the size of the labour force can be obtained from population census data. In Table 3.6. we present estimates of the African population in these areas and their share in the total African population in the census years from 1918 to 1970.

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1. S.S. Brand, op. cit., pp. 234-5, Tables 7-10.

TABLE 3.6.

ESTIMATES OF THE AFRICAN POPULATION IN SOUTH AFRICA INCLUDING THE AFRICAN AREAS. CENSUS YEARS, 1916-1970.

Year	Total African Population	% Increase per annum	African Population in African Areas	% Increase per annum	Reserve Population as % Total African Population
1916	4 297 348		2 269 000		52.8
1936	6 595 689	1.7	2 962 432	1.4	44.9
1946	7 830 559	1.7	3 267 185	0.9	41.7
1951	8 560 083	1.8	3 639 000	2.1	38.6
1960	10 927 922	2.8	4 107 954	1.3	37.5
1970	15 057 952	3.2	6 994 179	5.4	46.4

Sources: (1) Population Census, 1936 p. xviii. (2) Population Census 1951, U.G. 42'55, p. 94, Table 11 (a). (3) Tomlinson Commission Summary Report, p. 39. (4) Bulletin of Statistics, June 1972, p. 2, Tables A.1.0 and A.1.1. (5) The estimate for 1916 was kindly given to the writer by Professor R.F. Dell.

Note: The second colum (Total African Population) includes foreign born and local Africans.

These estimates should be treated with a good deal of caution. Between 1916 and 1936 there appears to have been a fairly substantial increase in the reserve population; an average of 1.4 per cent per annum as against 1.7 per cent for the African population as a whole. Part of this can be attributed to removals from White farms after application of the 1913 Land Act. In the decade 1936 and 1946 the rate of increase fell to 0.9 per cent per annum. This relatively low rate was followed by a rate of 2.1. per cent per annum between 1946 and 1951. The comparatively high rate between

1946 and 1951 is probably due to the application of the 1936 Natives Trust and Land Act, which resulted in the "release" of substantial areas of land for African occupancy, after the Second World War.[1]

The very sharp rise in the rate of increase in these areas after 1960 is probably also due to the official redefinition of areas in South Africa. It may in part also be a response to the increased intensity of application of the pass laws during the 1960s.[2] In a recent article on the 1970 South African census figures, Merle Lipton has suggested that three additional factors must be taken into account when assessing the 1970 census data: (1) "While both the 1960 and 1970 Censuses suffered from considerable underenumeration of Blacks in White areas; the enumeration of Blacks in the 'homelands' was much fuller in 1970." (2) "In the 1970 Census a number of Black commuter townships, previously counted as being part of the neighbouring White town, were simply reclassified and counted as part of the homelands ..." (3) "Any shift of Blacks that took place into the Bantustans was, ..., from the 'White' rural areas."[3]

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1. See Tomlinson Commission Summary Report, p. 41 and p. 55. It should be noted that the estimate of 3 693 000 Africans in the African areas in 1951 is taken from the Tomlinson Commission Summary Report, p. 55. The 1951 census figure of 3 307 237 yields rates of increase of 0.2 per cent and 2.4 per cent per annum in the periods 1946 to 1951 and 1951 to 1960 respectively. These rates would be difficult to explain in the light of our knowledge about the allocation of land under the 1936 Natives Land and Trust Act. See the Tomlinson Commission Summary Report, p. 55, Section 1.

2. See F. Wilson, Migrant Labour in South Africa, p. 142, which gives a diagrammatical representation of numbers of pass law contraventions between 1920 and 1970. See also Appendix II, p. 232-239.

3. Merle Lipton, ibid., pp. 259-261.

It follows from these qualifications that a part of the recorded increase in population in these areas is due to special circumstances. In terms of population density in agricultural areas as such this increase seriously overstates the effective increase likely to have taken place. Increases in agricultural labour, as opposed to population in general, are likely to have been even smaller. First, the inclusion of urban commuters implies no increase at all in agricultural labour. Second, of the section of the population moving off White farms a part is likely to have moved into quasi-urban or urban townships.[1] Finally, of the unknown number of Africans absorbed into the African areas, a large proportion are likely to be old men, women and children who contribute less labour on average than would adult males, to agricultural production.

To meaningfully interpret the data in Table 3.6. we also need some information on temporary migration. Unfortunately it has only been possible to obtain three estimates of numbers of temporary absentees. There are 569 000 in 1951, 651 000 in 1960 and 691 200 in 1970. This represents an average annual increase of 1.4 per cent between 1951 and 1960 which is approximately the same rate of increase as that of population (natural) in these areas. This indicates that the ratio of absentees to the de facto population of the African areas remained 1:6 throughout these years.[2] In view

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1. See F. Wilson, op. cit., especially Ch. 3, 455.

2. It was not possible to obtain a meaningful ratio for 1970 due to the changes in classification discussed above. The representativeness of the 1970 estimate of temporary absentees is itself probably unreliable.

of these qualifications, we must conclude that population density and also the ratio of male workers to land increased only slowly between 1936 and 1960.

The upshot of this for our analysis is that the pattern of development in African agriculture is the very opposite of that expected in the Fei-Ranis model. Expansion of industry, including mining and manufacturing has not brought with it rising levels of agricultural production, but has been accompanied by their decline or, at best, stagnation. Thinking back to the results of the tests in chapter 2 we may note that this has occurred despite rising capital-labour ratios in mining and manufacturing and rising real wages-rates in the manufacturing sector.

3.7. The State and African Agriculture

Since state intervention has played an important part in the development of White agriculture, it is instructive to consider its role in African agriculture as well.

Broadly speaking it is possible to identify two phases of intervention. The first of these, which has already been discussed, involved the use of land and labour legislation (and in earlier times a discriminatory tax system) to foster White interests in agriculture. By forcing Africans off White lands this served to reduce per capita production in African agriculture and also increased the supply of African wage-labour for White agriculture as well as industry. By the third decade of the twentieth century, population expansion and a falling per capita output in African agriculture had, with increased foreign labour supplies, had rendered these measures largely unnecessary.

Despite the realization at this time that conditions in African agriculture were even more serious than those elsewhere, only a very small proportion of state expenditure in agriculture in general was diverted to the African areas. Although evidence on this matter is difficult to obtain, what there is suggests that expenditure on White agriculture has outweighed by far that on African agriculture in terms either of population size or agricultural potential. This was true in the period prior to the Second World War and remains true up to the present time, despite relative increases during and after the 1950s.[1] An idea of the relative amounts of state expenditure on White and African agriculture in 1932 may be obtained from estimates presented by the Holloway Commission. The total amount allocated to the Department of Native Affairs was £743,078. An unknown but presumably substantial part of this would have been spent on agriculture. In the same year the amount spent on White agriculture, including agricultural education and irrigation was £2 440 604, or 3.3 times the amount allocated for all forms of state expenditure through the Department of Native Affairs.[2] It

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1. It should also be noted that all private White investment in the African areas has been prohibited up until recent times. See R.H. Bell, Industrial Decentralization in South Africa, Cape Town, O.U.P., 1973, p. 3. To the writer's knowledge private White investment in African agriculture, as distinct from non-agricultural activities in African areas, is still prohibited.

2. Report of the Native Economic Commission 1930-32, p. 195. It should be noted that the commission estimated that expenditure on White agriculture benefitted African agriculture indirectly to an extent of £100,000. All other categories were assumed to have no direct benefits for Africans.

may also be mentioned that in the same year just under one per cent of total educational expenditure in the Union was channelled to the African population as a whole, whereas the African population at this time comprised in the region of 69 per cent of the total.[1] Unfortunately, other comparable estimates of infrastructural expenditure in this period are unobtainable.

In 1929 a branch of the Department of Native Affairs was set up to provide agricultural services, but due to delays and a shortage of funds this was only in operation after the Second World War. In 1945 this branch was allocated R100 000 as against the R5 871 000 allocated to its counterpart in the 'White' department of Agriculture in the same year.[2] Expenditure through the latter was 22 times than that on the former. However, by 1955 expenditure on technical services in White Agriculture was only 3 times as great as that in African agriculture. It is also likely that some of the benefits of research expenditure intended primarily for factor conditions and methods on White farms were transferred to the African sector.

Although the differential between expenditure on technical services in the two parts of agriculture appears to have narrowed after the 1950s the overall differential has

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1. Sources: Educational expenditure, *Report of the Native Economic Commission 1930-32*, p. 165. Population: *South African Statistics*, 1974; 1-10. This percentage is calculated from population estimates in 1936.

2. Sources: *Tomlinson Commission Summary Report*, p. 74. S.S. Brand, op. cit., p. 155, Table 5-4. The last figure is an average for the five year period centred on 1945.

not necessarily done so. This is due to the sharp increase in expenditure through the Department of Agricultural Economics and Marketing after the 1950's. In 1955 expenditure through the latter department was 3.6 times greater than that in the "White" Department of Agricultural Technical Services.[1] This expenditure, which was largely on agricultural price subsidies, railway rebates, and subsidies on certain agricultural inputs, was, as we have seen, of little service to Africans as agricultural producers.

Despite the considerably increased attention given to problems of agricultural development in African areas after the findings of the Tomlinson Commission Report in 1951, state expenditure here remained relatively low. In 1968/69 total expenditure on agriculture and forestry in the African areas amounted to R5.3 million. Expenditure in White agriculture on economic services other than price stabilisation was ten times this amount. If we include expenditure on price stabilisation, the benefits of which do not all accrue to White farmers, this figure becomes just over 20 times the amount spent in African agriculture or R107.8 million.[2]

3.8. Conclusions

In this chapter we have tried to show how experience in South Africa's agricultural sector differs from that anticipated in the Fei-Ranis model and at the same time have

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1. Source: D.A. Brand, ibid., p. 155, Table 5-4. The 1955 figures are averages for the 5 year period centred on 1955.

2. Expenditure on African Agriculture: J.A. Lombard and P.J. van der Merwe, op. cit., p. 30, Table 1. Expenditure on White agriculture: Report of the Commission of Enquiry into Agriculture (1972), p. 112, Table 5.12.

established some of the underlying causes of the emerging pattern of labour supply in South Africa. In comparing model and ongoing experience two outstanding differences have been brought out which we believe are crucial to an understanding of South Africa's development pattern. The first is that surplus labour supplies were not a feature of the economy inherited from the pre-industrial era and then eliminated steadily by industrial expansion. On the contrary labour-surpluses, and the rural impoverishment that underlies this phenomenon, came into existence only after industrial expansion was well under way. The second is that two distinct sectors within agriculture came into being, the one characterised by modern, relatively capital-intensive techniques and by steady expansion in per capita output and the other characterized by falling productivity or, at best, stagnation.

These differences have an important bearing on the workings of the model. For example there was in reality a negative relationship between productivity in agriculture and labour supplies for industry. In the case of white agriculture increases in investment resulted in an increase in the scale of operations and thus a net intake of workers from other sectors (although it released White and Coloured workers to industry). The same inverse relationship applied to African agriculture, but in this case for different reasons. Here it was declining productivity that resulted in a release of workers to industry. Short term increases in per capita production resulted in temporary shortages in labour supply from these areas for industry.

Our discussion of conditions in agriculture has hopefully clarified one aspect of the general pattern of South African development, namely dualism within agriculture. In order to present the system as an integrated whole we need also to investigate differences in conditions within industry and how its sub-sectors interrelate with agriculture. For the purposes of this study this involves emphasis on the labour market in the sub-sectors.

In chapter 4 we consider first conditions in mining and then in manufacturing industries. In addition to this we look briefly at the consequences of protection, by means of tariffs, of manufacturing industries for employment generation and labour re-allocation in the economy as a whole.

CHAPTER 4.

SOME ASPECTS OF INDUSTRIAL DEVELOPMENT

4.1. Introduction

Before we enter directly into the question of the pattern of industrial expansion in South Africa, let us recall what major assumptions and predictions Fei and Ranis make about development in a dual economy. The major assumption they make that concerns us here is that in a labour-surplus economy successful industrial development will be "largely a domestic matter;" or, in other words, that foreign trade is likely to be of only secondary importance in determining the rate of re-allocation of labour from agriculture to industry.[1] This is an assumption of which we need to be particularly critical in the South African case in view of the importance of foreign investment and trade throughout the period under consideration. The issues this raises are dealt with in the section, in this chapter, on Tariff Protection and Capital Intensity.

The crucial prediction that Fei and Ranis make is that there will be capital-intensive industrial expansion so long as the wage-rate for unskilled labour remains constant. It will be around this prediction that most of the discussion in this chapter will centre. Is it the wage-rate of unskilled workers that has had the dominant effect on the intensity of capital in industry or have other factors also

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1. J.C.H. Fei and G. Ranis, Development of the Labour Surplus Economy, p. 290.

intervened.

To clarify South Africa's experience in these two respects it has been necessary to disaggregate and study conditions of demand for and supply of labour in each major sector separately. Although mining and manufacturing industries do not form entirely independent labour markets, either of one another or of agriculture, there are important differences between them which call for separate treatment in this study.

4.2. Labour in the Mining Sector

Shortages of skilled labour for mining during the nineteenth and early twentieth century as well as the need to attract skilled workers from Western Europe and America led to the establishment of a wide gap between the wages of skilled and unskilled labour in this sector. This differential was later entrenched and perpetuated along racial lines long after the original conditions of its appearance had fallen away.

Behind the establishment of the so-called "colour bar" in the mines is a complex set of historical factors which came to a head during the period of rapid urbanization in the early part of this century. The more immediate forces behind this system, which brought about the setting aside of skilled posts for White workers, were White trade unions and, after 1924, successive governments representing the interests of White labour.[1]

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1. For a comprehensive discussion of this see W.H. Hutt, The Economics of the Colour Bar: A Study in the Economic Origins and Consequences of Racial Segregation in South Africa, London, Deutsch, 1964.

The first statutory support for the colour bar occurred in 1904, at which time, as a result of the relative scarcity of unskilled labour on the Transvaal gold mines, it had been decided to introduce unskilled Chinese workers. Opposition from White labour on the mines led to the passing of the Transvaal Labour Importation Ordinance No. 17 of 1904, which relegated Chinese workers "to such labour as is normally performed in mines in the Witwatersrand district by persons belonging to the aboriginal races or tribes of Africa south of the Equator."[1] This provision not only protected White workers from Chinese competition but laid down what was to become, over the years, the official definition of the roles of White and Black men in most branches of industry.

Most of the Chinese were sent home after 1907, but they left behind them a permanent problem of labour stratification on the mines. This was re-inforced in the next few years by the action of both skilled White artisans and, particularly after 1924, a state policy intent on uplifting the "poor White" population which was drifting from the impoverished rural areas to the towns.

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1. S.T. van der Horst, Native Labour in South Africa, p. 171. Much of the discussion in this section on mining is drawn from this book and from Francis Wilson's Labour in the South African Gold Mines. Most of the comments in this section refer to conditions in the South African gold and coal mines which make up by far the largest part of the mining industry in South Africa.

The Mines and Works Act of 1911 consolidated the position of White workers by explicitly reserving certain categories of work for them, thereby excluding Coloureds and Asians as well as Africans.[1] This act, along with subsequent amendments, laid a solid foundation of official approval of the colour bar in mining and was later adapted for use in manufacturing industry as well.

Despite this legislation White labour continued to be rendered insecure by the indirect competition of Black labour. This was due to efforts on the part of management to fragment skilled work and substitute semi- or unskilled Black for White labour in an effort to lower working costs on the mines.

In response to this threat the first White trade union, the Mineworker's Union, was established in 1911. After a series of strikes over the next few years the Mineworkers Union reached an agreement with the Chamber of Mines[2] whereby a fixed ratio of Black to White workers would in future be employed. Apart from a brief period between 1922 and 1924,[3]

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1. Mines and Works Act, No. 12 and 15, 1911.

2. This was a coordinating employer's association referred to as the Witwatersrand Chamber of Mines until 1900. See S.T. van der Horst, op. cit., p. 124.

3. This period began with the so called Rand Rebellion, the most serious strike in South African history. This strike by White mineworkers came about after an attempt on the part of the Chamber of Mines to break the Status Quo Agreement and substitute Black for White workers. The strike was forcefully put down and for a brief period the ratio of Blacks to Whites increased, White wages fell, mining costs fell, and production on the mines increased. For a description of the events surrounding the Rand Rebellion see E.A. Walker, A History of Southern Africa, pp. 590-600.

this "Status Quo" Agreement was retained with very few modifications until 1970.[1]

From the late 1920s onwards the colour bar on the mines remained substantially unaltered despite efforts on the part of the Chamber of Mines to reduce costs by employing more Black labour. Black trade union power was weak and after a certain amount of unrest and strike action, which culminated in the 1946 strike of African workers, their movement was put down and Blacks were left with little power and few rights.[2]

In the late 1960s renewed attempts were made by the Chamber of Mines to have the colour bar relaxed to allow Africans to perform certain jobs which had "traditionally" been done by Whites. Ultimately some concessions were made and a number of jobs were 'released" on condition that any resulting increases in productivity would be absorbed in increased White wages.

The two most noticeable consequences of the colour bar on the mines were the rigid maintenance of a fixed ratio between Black and White employment and the growing gap between the level of Black and White wages. Ratios of the number of Black to White employees in the mining sector are given in Table 4.1. These varied only from 9.7:1 (in 1922) and 6.9:1 (in 1954). As may be expected from earlier comments, there

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1. Excluding 1922-24, the ratio of Black to White workers on the South African gold mines fluctuated between 6.4:1 and 6.3:1 over the period 1910 to 1970. Sources: (1) F. Wilson, op. cit., pp. 157-158, Appendix 3. (2) For 1970 see Bulletin of Statistics, June 1972, p. 17, Table B-3.

2. F. Wilson, op. cit., pp. 77-78.

are signs of an increasing ratio in the late 1960s. Wage data for the mining sector are presented in Table A.3. and illustrated in Diagram A.3. in the Statistical Appendix.

The existence of a fixed employment ratio has meant that the costs of unskilled labour - whose real wages have remained almost constant over the entire 60 year period - have been artificially linked to White wages. Rather than each factor being employed up to the point where its marginal contribution was equal to the wage rate, the contribution of unskilled labour has been assessed in conjunction with that of White labour and consequently employment levels have fallen short of those which would otherwise have been attained.

In these circumstances it is not surprising to find that, in contradistinction to the Fei-Ranis prediction, capital-labour ratios have been closely associated with changes in the level of skilled (White) and not unskilled (Black) wages. As we did in the case of "Industry" in general in chapter 2, we again attempt to establish the precise relationship between real wage-rates of White and Black workers and capital-labour ratios in the mining sector. Again, it was only possible to cover the period 1916 to 1955. The estimated regression line, standard error of coefficients and coefficient of multiple determination are as follows:

$$Z = 314.86 - \underset{(2.88)}{4.21Y} + \underset{(3.47)}{0.66X}$$

$$R^2 = 0.63$$

Where Z = capital labour ratio, Y = real wage-rates of Black workers and X = real wage-rates of White workers. The signs

and magnitudes of the coefficients of Y and X, B_1 and B_2 respectively, suggests that there is a strong negative relationship between wage-rates of Black workers and capital-labour ratios and a weak but positive relationship between wage-rates of White workers and capital labour ratios. Both B_1 and B_2 as well as R^2, are significant at the 95 per cent level. The Durbin-Watson statistic, d, is 0.034, indicating positive autocorrelation. As in the case of "Industry" as a whole, these results strongly suggest that the predicted positive relationship between wage-rates of unskilled workers and capital-labour ratios does not hold in the case of mining in South Africa.

Due to the relatively fixed price of gold, and gold's predominance in the mining sector, this sector has been peculiarly sensitive to the rising cost of labour. For this reason it is interesting to compare trends in money wages and capital-labour ratios. These are illustrated in diagram 4.1. below. In this case there appears to be an even closer association in the movements of White money wage-rates and capital-labour ratios although, as mentioned previously, this form of presentation can only give a rough indication of the relationship between the two variables as the axes have not been reduced to a standard unit.

TABLE 4.1.

RATIO OF EMPLOYMENT OF WHITES TO BLACKS IN THE SOUTH AFRICAN MINES: 1916-1970

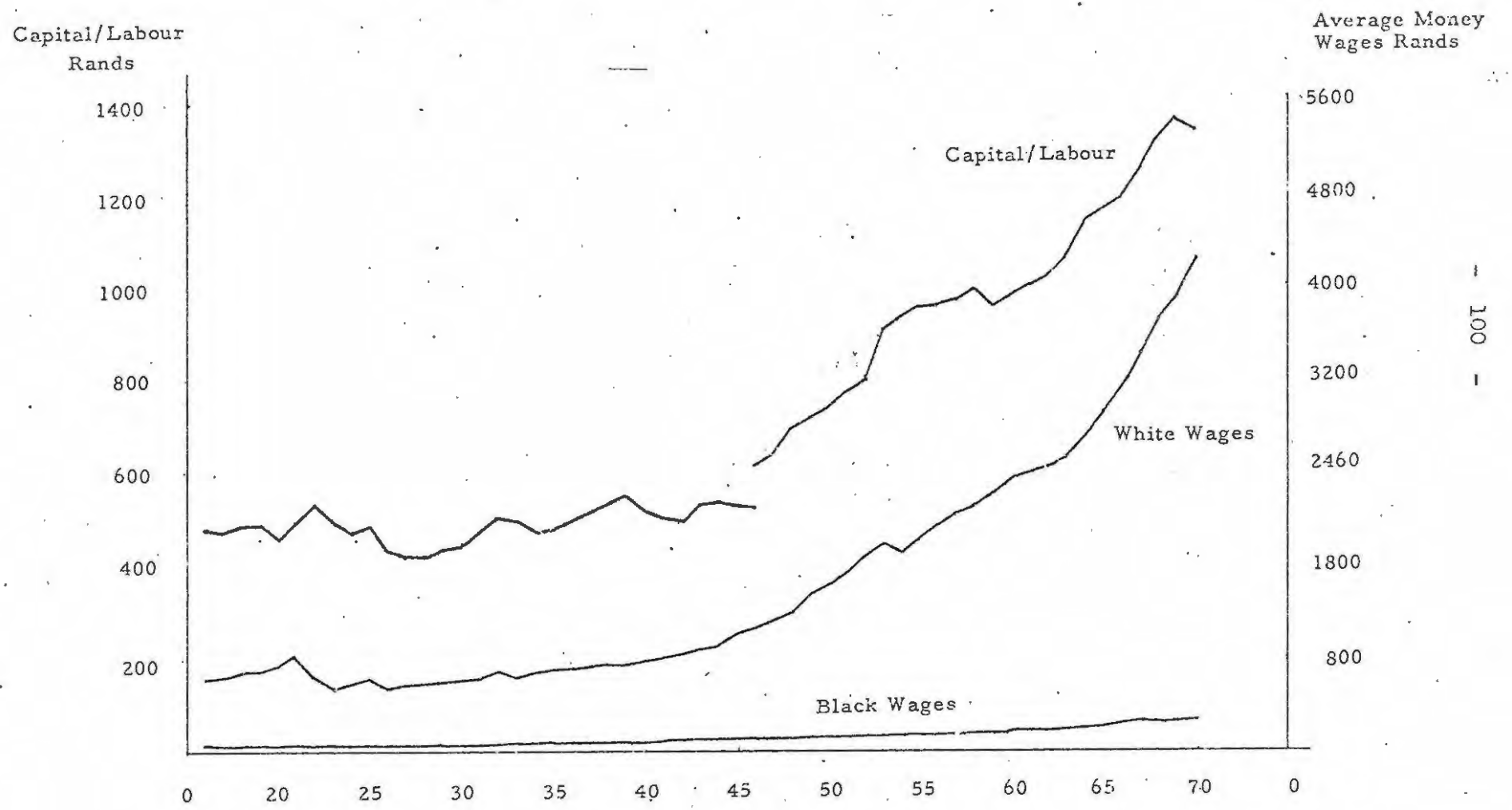
Year	B/W	Year	B/W	Year	B/W	Year	B/W
1916	9.1:1	1930	8.8:1	1944	7.7:1	1958	7.7:1
1917	8.5:1	1931	8.8:1	1945	8.2:1	1959	8.8:1
1918	8.2:1	1932	8.9:1	1946	8.3:1	1960	8.2:1
1919	7.4:1	1933	8.5:1	1947	8.3:1	1961	8.4:1
1920	7.1:1	1934	8.3:1	1948	7.9:1	1962	8.4:1
1921	7.9:1	1935	8.5:1	1949	8.3:1	1963	8.2:1
1922	9.7:1	1936	8.5:1	1950	8.0:1	1964	8.4:1
1923	8.6:1	1937	8.2:1	1951	7.7:1	1965	8.5:1
1924	8.7:1	1938	8.1:1	1952	7.8:1	1966	8.6:1
1925	8.5:1	1939	8.0:1	1953	7.4:1	1967	8.6:1
1926	7.9:1	1940	8.2:1	1954	6.9:1	1968	8.9:1
1927	8.0:1	1941	8.5:1	1955	7.3:1	1969	9.0:1
1928	8.6:1	1942	8.4:0	1956	7.4:1	1970	9.5:1
1929	8.2:1	1943	7.6:1	1957	7.5:1		

Source: Table A.3., Statistical Appendix.

One of the important consequences of the colour bar on the mines has been described by Sheila van der Horst in the following way: "Employers in the mining industries are prevented from making full use of the capacities of Natives. Consequently they employ Native labour as a relatively undifferentiated mass, and in the Transvaal gold- and coal-mines they have turned their attention rather to preventing

DIAGRAM 4.1

SOUTH AFRICAN MINING, CAPITAL LABOUR RATIOS AND MONEY WAGES, 1916 - 1970



competition driving up the rates of pay and the costs of recruiting than to desiring widespread incentives to natives to increase their efficiency".[1] Given this constraint, the mines found it expedient to join together to form the Chamber of Mines in 1889. From the outset two major objectives of this organisation have been to increase labour supplies on the mines and to reduce, or prevent increases in, the wages of unskilled labour. To these ends the first recruiting organisation, the Witwatersrand Native Labour Association, was established in 1902. By 1919 this and the Native Recruiting Corporation gave the mines centralised control over all recruitment in South Africa and other neighbouring countries.[2]

An important advantage of recruitment was that it overcame competition between individual mines for unskilled labour. In the first few years of its operation the Chamber of Mines was able to lower the real wage rate of unskilled labour and thereafter to hold it virtually constant.[3] It was only in the late 1960's that the first signs of increases in this wage rate were again evident.[4] Attempts were also

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1. S.T. van der Horst, Native Labour in South Africa, pp. 191-192.

2. See S.T. van der Horst, ibid., Chs. 5, 7 and 12. F. Wilson, Labour in the South African Gold Mines, Ch. 4, F. Wilson, Migrant Labour in South Africa, Ch. 2, W.J. Breytenbach, Migratory Labour Arrangements in Southern Africa.

3. S.T. van der Horst, ibid., p. 165.

4. See Table A.3., Statistical Appendix.

made to standardise other conditions of work, but differences between mines appear to have been important and well known amongst the workers.

One of the important aspects of the system of recruitment was that it forstered a system of temporary migration, in which all but a very small number of Africans were prohibited from residing permanently in the mines. Temporary migration, male labour compounds and all their attendant problems have characterised mining in South Africa since its inception, and although this system has existed in other parts of Southern Africa, its obligatory nature became unique to South Africa.

In the rest of this section we provide information on the incidence of recruitment and outline the main changes in legislation dealing with foreign and local labour on the mines.

The ratio of recruited to "voluntary" labour in the South African mines increased steadily up to the 1920s and thereafter declined in most of the donor countries.[1] Since the 1950s and 1960s, certain countries have prohibited recruitment as such, and the mines have had to rely more heavily on "voluntary" workers from these sources. In those countries in which recruitment has been prohibited, it appears that since the mid-1950s recruitment is again on the relative

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1. See S.T. van der Horst, op. cit., pp. 190 and 202 and F. Wilson, Labour in the South African Gold Mines, p. 87.

increase.[1] It is not unlikely that these changes reflect altered domestic conditions in these countries, although part of the explanation of the increase in the ratio of recruited to "voluntary" workers in some countries in recent years lies in South Africa's more stringent application of immigration laws as well as in its urban legislation.

The main sources of African labour to the gold and coal mines are given in Table 4.2. Between 1916 and 1936 the percentage of local African workers in the mines increased slightly from 49.2 to 52.2 per cent of the total African mine labour force. Thereafter it fell steadily to reach its lowest point, 31.4 per cent, in 1969. There are three outstanding features about labour supplies from outside South Africa. Lesotho's share rose from 2.6 per cent in 1906 to 17.5 per cent in 1969, Mozambique's share fell from 65.4 per cent to 29.9 per cent over the same period and the share of countries north of the latitude 22°S increased from 1.1. per cent in 1916 to 18.8 per cent in 1969.[2]

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1. W.J. Breytenbach, Migratory Labour Arrangements in Southern Africa, p. 41. Breytenbach shows that the proportion of recruits from Lesotho, Botswana and Swaziland has increased from 22.6 per cent in 1960 to 48.5 per cent in 1970. Over the same period the total number of migrants from the countries declined from 431 000 to 294 000.

2. See notes 1-2, Table 4.2.

TABLE 4.2.

YEAR	Total African Mine Labour Force	Percentage of African Labour from Various Countries in Total			
		South Africa	Lesotho, Botswana, Swaziland	Countries North of South Africa	All Foreign Countries
1916	219000	49.2	11.6	39.2	50.8
1926	203000	41.3	14.0	44.7	58.7
1936	318000	52.2	19.0	28.9	47.9
1946	305000	41.3	16.6	42.1	58.7
1956	334000	34.7	16.6	48.7	65.3
1966	383000	34.1	22.9	43.1	66.0
1969	371000	31.4	22.9	45.7	68.6

Source: F. Wilson, Labour in the South African Gold Mines, p. 70, Table 8. See also S.T. van der Horst, op. cit., pp. 215-7.

Notes: (1) Labour force figures are recorded on the 31st December each year.

(2) The share of Lesotho rose from 2.6 per cent in 1906 to 17.5 per cent in 1969. The share of Mozambique fell from 65.4 per cent in 1906 to 26.9 per cent in 1969. The share of countries north of the latitude 22°S increased from 1.1 per cent in 1916 to 18.8 per cent in 1969.

It is clear from this that over most of the period the mines increased their dependence on foreign labour and, with the exception of Lesotho, this involved an extension of the recruiting system in a northerly direction. Since a large proportion of mine labour from Lesotho arrives "voluntarily" on the mines, it is likely that the average cost of unskilled

labour due to recruitment increased over time.[1]

The system of recruitment and temporary migration on the mines has been re-inforced by three sets of legislation. These are to do with the recruitment and conditions of service of local African labour, the regulation of entry of foreign labour and regulations regarding employment and residence of all Africans in urban areas. In this sub-section we deal with the first two sets of regulations, while the last is discussed in the next section.

In 1911 an act equivalent to the Masters and Servants Act was passed for the mines. This, the Native Labour Regulation Act No. 15, laid down the terms of recruitment of local African labour, and also standards for their working and living conditions.[2] Part of the motivation behind this legislation was to eliminate some of the abuses to which the recruiting system had been prone. However, it also strengthened the position of the Chamber of Mines by making breach of contract on the part of an African employee a criminal offence. It also made it illegal for foreign labourers to enter or remain in the country unless they worked on the mines. Conditions of recruitment of foreign workers were left open to be arranged with the government of the labourers country of origin. The Native Labour Regulation Act was

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1. Two qualifications to this are that peak agricultural seasons in countries north of the latitude 22°S tend to coincide with the slack agricultural periods in the more southerly regions. This means that "northern" and "southern" labour complement one another to some degree. Secondly, labourers recruited from the north generally accept longer contracts than those in the south and their costs per unit of labour are thereby decreased.

2. G.V. Doxey, The Industrial Colour Bar in South Africa, Cape Town, O.U.P. 1961, p. 125.

subsequently consolidated and replaced by the Bantu Labour Act No. 67 of 1964.[1]

In addition to this restrictions were placed on the entry of foreign workers by the immigration laws,[2] an amendment of which gave the Chamber of Mines the sole right to recruit labour in countries north of South Africa.

In more recent years, despite the relaxation of restrictions concerning recruitment of foreign African labourers to sectors other than the mines, the overall control of foreign Africans entering and working in South Africa was increased,[3] as a result of "the Republic of South Africa's declared policy to reduce the number of non-Republican Bantu as fast as is feasibly possible".[4] This represents the latest development in a policy which for most of the present century has been to allow only foreign male African workers into the Republic (with the exception of people from Lesotho, Botswana and Swaziland) and to restrict their employment mainly to the mines.

The legislation described above applies more specifically to the mining sector. Also of indirect but considerable importance to labour supplies on the mines was the network of controls over movement and settlement of African and other Black people in the urban areas of the country.

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1. W.J. Breytenbach, op. cit., pp. 17-18.

2. Admission of Persons to the Union Regulation Act 22 of 1913 and Mines Act No. 1 of 1937. Up until 1958 workers from Lesotho, Botswana and Swaziland were not regarded as aliens.

3. Recent legislation to this effect is contained in the Border Control Act No. 61 of 1967 and the Admission of Persons to the Republic Regulation Act No. 95.

4. W.J. Breytenbach, op. cit., p. 40.

As we have seen in previous sections, pass laws were an important part of the social and economic system before the period of rapid urbanization. Prior to the twentieth century they were linked with the Masters and Servants Laws of the Cape Colony, Natal and the Boer Republics.[1] It was only after the 1918 influenza epidemic that this system was adopted more specifically to the control of African rural-urban migration.

The first of a series of important Acts governing this movement was the Natives (Urban Areas) Act of 1923. As in the case of the Natives Labour Regulation Act this had some aspects which were designed to improve the lot of Africans and some which were not in their interests. On the one hand it provided for an improvement in living conditions of those Africans with residential rights in the urban areas, and on the other it contained far-reaching provisions for the restriction of right of entry and residence in urban areas for the vast majority of the African population. Up until 1937 these powers were vested in urban municipal authorities. After 1937 an amendment in the law gave them over to the state, and thereafter influx control appears to have become more effective. Subsequent amendments and consolidation of which the Bantu (Urban Areas) Act No. 25 of 1945 and the Bantu Laws Amendment Act were outstanding, widened the scope and enhanced the effectiveness of these laws, without changing their intended consequences.

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1. G.V. Doxey, op. cit., p. 116.

This legislation had an important bearing on labour supplies in the mines in that it specifically excluded from its provisions local and foreign African labour on the mines, thereby extending the supply and inhibiting wages increases for unskilled labour in this sector.

It is not possible to establish the full quantitative impact of these measures on labour supplies in the gold mines. Their impact depends on such factors as the severity of application of the pass and immigration laws as well as the scope for their evasion.[1] One indication of the effectiveness of the system of recruitment and immigration controls in channelling foreign labour to the mines may be obtained by comparing the percentages of foreign African workers in the total African labour forces of the various sectors. In 1954 there were 6.9 per cent in agriculture, 50.8 per cent in mining and quarrying (61.4 per cent on the gold and coal mines), 3.1 per cent in all non-primary (mining and agriculture) sectors.[2] The low percentage of foreign labour in agriculture may be attributed to factors such as low wages

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1. We have already referred to estimates of annual rates of pass law convictions. See F. Wilson, Migrant Labour in South Africa, pp. 232-3, Appendix II. It is commonly known that a good deal of evasion of the pass and immigration laws has always taken place and that the rigidity of application of the pass laws varies from on district to the next. Their most strict application in recent times appears to have been in the Western Cape where no African labour, foreign or local is permitted to obtain permanent employment.

2. Source: G.M.D. Leistner, "Foreign Bantu Workers in South Africa: Their Present Position in the Economy", S.A.J.E. Vol. 35, 1967, p. 48, Table II.

paid and the proximity and number of local Africans, whereas the sharp difference between the percentage of foreign workers on the mines and in manufacturing must be attributed largely to the recruiting system and barriers against entry into the urban areas.

In view of the preferential official treatment of the mines (and also White agriculture) regarding the supply of unskilled labour and in view of the frequently voiced belief in the existence of elastic labour supplies in South Africa[1] it may seem surprising to find that the reports of the Chamber of Mines have almost incessantly complained of shortages of unskilled labour throughout most of the present century.[2] Sheila van der Horst has pointed out that these so-called "shortages" may merely reflect a situation in which some mines wish to have more labour at the going wage rate.[3] But this raises the question as to why the mines combined to fix wages. One explanation is that managers on the mines believed that the supply of African labour was inversely related to the wage rate. This idea, that the aggregate supply of work offered on the mines would decline if the wage rate was increased, has always been questioned by a minority of

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1. See, for example, J.B. Knight, "A Theory of Income Distribution in South Africa", Bulletin of the Oxford University Institute of Economics and Statistics, Vol. 51, 1964, p. 289. H.J.J. Boeckman, "Bantu Wages in South Africa", S.A.J.E. Vol. 30, 1962, p. 110.

2. See S.T. van der Horst, op. cit., Ch. 10 and F. Wilson, Labour in the South African Gold Mines, Ch. 4.

3. S.T. van der Horst, ibid., p. 201.

employers in South Africa and its improbability has been clearly demonstrated by Berg.[1] Nevertheless, it is possible that a belief in this mechanism may partly account for collusion on the part of the mines. However, this explanation on its own is not entirely satisfying. Another is that put forward by Francis Wilson, who attempts to explain the fixed wage rate for unskilled labour, and also the differential between mining and manufacturing wages, in semi-historical terms. He argues that until the 1920's, during which time the mines dominated the labour market in South Africa, it paid them to join together and hold down the wages of unskilled labour. Thereafter the mines were able to continue to fix unskilled wages with the backing of legislation which isolated this sector from the competition of other industries. According to Wilson, "The difference that developed after 1936 in the level of unskilled earnings in the two sectors reinforced the policy of collusion. Once such a differential has come into being those paying wages on the lower level have an added incentive to collude either when the supplies of labour isolated for the sole use of the gold mines diminish ... or when their demand increases to exceed the available supplies of isolated labour."[2] This explanation provides an additional reason for believing that unskilled

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1. E.J. Berg, "Backward-Sloping Labour Supply Functions in Dual Economies - The Africa Case", Q.J.E., Vol. 75, 1961.

2. F. Wilson, Labour in the South African Gold Mines, p. 103.

labour supplies in South Africa were inelastic for at least a part of the period of industrial expansion in the late nineteenth and early twentieth century.

Conditions in this sector also give a clue to changing labour elasticity over time. One indication of increased elasticity of supply in the mine labour market was a decline in the ratio of recruited to "voluntary" unskilled labour after the second decade of the twentieth century. For the first time the Chamber of Mines felt that labour supplies had "improved".[1] However, this stage of "abundant supplies" may have been relatively short-lived. By the mid 1930s expansion in manufacturing, and to a lesser extent in agriculture, created renewed competition for labour and complaints of "shortages" on the mines were again heard.[2]

Post-war expansion of secondary industry and agriculture made the labour situation even more acute, and it was only after 1958 that there was what has been referred to as "a sharp, unexpected and largely inexplicable, increase in the number of Africans offering themselves for employment".[3] This "sudden" increase in labour supplies is probably closely linked to the sharp reduction in African infant mortality rates which took place during and after the Second World War

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1. F. Wilson, op. cit., p. 87.

2. The question of changing elasticity of labour supply is dealt with in more detail in the final chapter, where some of the theoretical issues are explored.

3. F. Wilson, ibid., p. 87.

as a result of wide-spread infectious disease controls as well as the rapid dispersion of more effective medicines.

Two important points arise out of our discussion of conditions in the mines. The first is that there appears to be a very much closer association between capital-labour ratios and wage-rates of skilled (White workers) than between the former and wage-rates of unskilled workers. This clearly calls into question the fundamental proposition of the Fei-Ranis analysis that capital-labour ratios will remain constant so long as the wage-rate of unskilled workers is constant. The second point, which arises out of discussion of labour legislation and collusion on the part of mine-owners, is that conditions of labour supply appear to have altered considerably over the period. What is suggested by our study of the mines mirrors the findings that emerge from our discussion of agriculture in the previous chapter. This is that supplies of unskilled labour at the outset appear to have been limited, which helps account for the collusion on the mines. However, by the 1920's and 1930's altered conditions, particularly in agriculture, had resulted in a relative abundance of unskilled labour. Finally in the years since the Second World War, with the expansion of manufacturing industry, labour again appears to have become relatively scarce.

To understand this apparent change we need to look more closely into conditions in the manufacturing and service sectors. This we do in the next section.

4.3. Labour in the Manufacturing and Service Sectors

Prior to the 1920s there was relatively little state intervention specific to the labour markets of the manufacturing and service sectors. This was due no doubt to the dominance of the mines as a source of employment, as well as the difficulty of applying legislation to the heterogeneous and geographically dispersed secondary and tertiary industries.[1]

Within a decade there had been a radical change in this state of affairs and the foundations of almost all important legislation affecting this sector for the next three decades had been laid. Two broad categories may be distinguished: industrial legislation which covered conditions of work and relations between labour and management, and urban legislation which, as we have already seen, covered the movement and conditions of residence of Blacks in the urban-industrial centres. We look first at aspects of the industrial legislation and then briefly at some of the urban legislation which has not yet been touched upon.

Like the colour-bar on the mines, much of the industrial legislation was designed to protect White labour.[2] In the 1920s and 1930s it was aimed particularly at protecting and

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1. For a description of legislation operating prior to the 1920s see S.T. van der Horst, op. cit., pp. 234-239.

2. Other aspects of this legislation have been stressed by some writers, but these are not directly relevant here. See for example, D. Hobart Houghton, The South African Economy, p.145.

aiding unskilled "poor whites".[1] The measures adopted formed part of the "civilized labour policy", in which "civilized labour" was defined as "labour rendered by persons whose standard of living conforms to the standard of living generally recognised as tolerable from the usual European standpoint". "Uncivilized labour is to be regarded as labour rendered by persons whose aim is restricted to the bare requirements of the necessities of life as understood among barbarous and underdeveloped peoples".[2] With the exception of some Coloureds in the Cape and a few others, this definition drew a sharp line between the White (regarded as civilized) and Black (regarded as uncivilized) sections of the population.

The apprenticeship laws were among the first to underpin this policy. A provision of the Apprenticeship Act of 1922 restricted entry to candidates with an educational qualification high enough to effectively exclude all but a few Blacks.[3] These laws were complemented by an educational system which discriminated heavily in favour of Whites. Per capita expenditure on Whites varied between 10 and 15 times

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1. Perhaps the best explanation at the time of the effects of the use of industrial legislation for the protection of the "poor White" is that given by the majority Report of the Economic and Wage Commission, 1925. (Hills, Clay, Martin Report), Pretoria, U.G. 14'26, 1926.

2. Quoted in S.P. van der Horst, ibid., p. 250.

3. An exception was some Coloured youths in the Cape.

the amount spent on Africans and between 3 and 4 times the amounts spent on Coloureds and Asians. Between 1920 and 1968 the gap between White and African education expenditure widened while that between Whites and other Blacks appears to have narrowed.[1]

Both the apprenticeship laws and the pattern of educational expenditure in South Africa restricted the supply of skilled labour by limiting the pool from which it could be drawn. In this way wages of skilled (White) workers were able to rise while those of unskilled (Black) workers were depressed. To this extent conditions in manufacturing were not unlike those in the mining sector, although there was greater scope for job fragmentation and the substitution of Black for White labour in the case of manufacturing industries.

Customs legislation was also adapted to the "civilized labour" policy. The Customs Act of 1925 contained a provision which limited tariff protection to industries maintaining a satisfactory ratio of Black to White workers. This legislation was carried out by the Board of Trade and Industries, which appears to have executed its powers stringently up until the late 1930s.

The excuse of the "civilised labour policy" has been described as "the employment of European unskilled labourers

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1. Sources: (1) A Survey of Race Relations in South Africa, Johannesburg, S.A.I.R.R., 1972, p. 244. (2) S.P.R.C.U.A.S. Report No. 4., (Education Beyond Apartheid), 1971, Johannesburg, Christian Institute of Southern Africa, 1971, p. 24. (3) E. Kellman (ed). Handbook of Race Relations in South Africa, Cape Town O.U.P., 1949, p. 383, Tables 29, 30 and 31.

at wage-rates above those generally prevailing for unskilled labour".[1] This was most effectively achieved in the public sector where there was considerable substitution of Whites for Blacks at higher rates of pay.[2] The effectiveness of this measure in the public sector is attributable largely to the fact that its excess cost could be met from the country's annual budget. The effects of this policy on White and Black employment are clear in at least one case. Consider diagram 4.2., which shows employment of White and Black labour on the South African Railways between 1910 and 1955. Between 1925 and 1929 there was a sharp fall in the level of Black employment, while that of Whites rose very sharply. After this employment of Whites and Blacks increased at more or less the same rate, but it was only in 1955, 30 years after the implementation of this policy, that the number of Blacks on the railways again equalled the number of Whites.

In the private sector the policy met with greater opposition. More than just the apprenticeship and customs legislation were necessary to prevent the substitution of cheap Black labour for the more costly White worker. Two sets of measures were brought into use; industrial conciliation legislation, which enhanced the bargaining power of White workers, and wage legislation, which discouraged employers from substituting Black for White labour.

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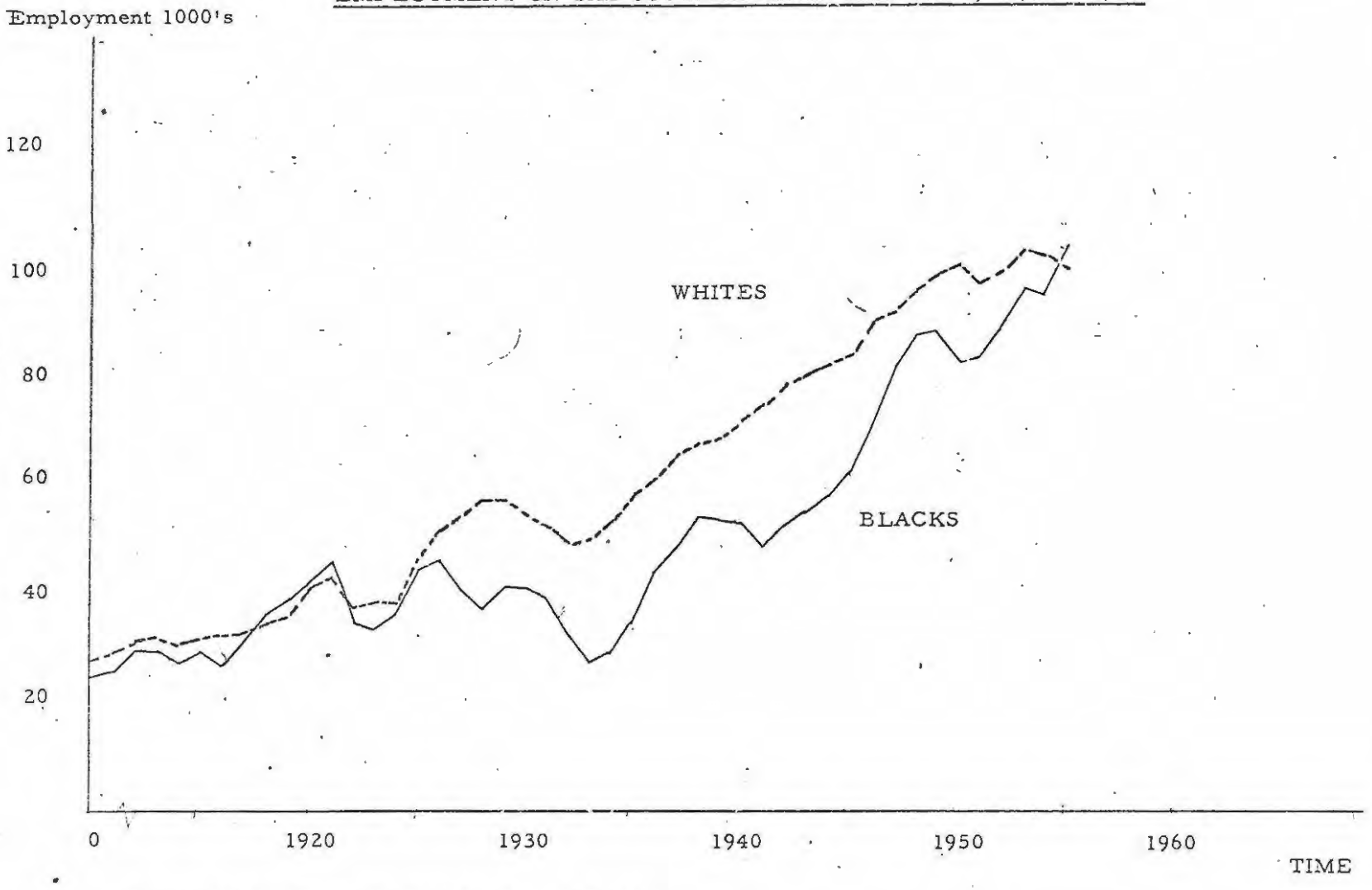
1. S.T. van der Horst, op. cit., p. 249.

2. For a description of justifications for this action see the Report of the Economic and Wage Commission, 1925, pp. 129-137.

DIAGRAM 4. 2.

EMPLOYMENT ON THE SOUTH AFRICAN RAILWAYS, 1910 - 1955



Source: Union Statistics for 50 Years, B-15.

The Industrial Conciliation Act of 1924 applied to all organised labour (excluding farm labour and domestic servants) and "covered the regulation of conditions of work, the setting of wages and the settlement of labour disputes."[1] This Act recognised White trade unions and at the same time excluded almost all Africans by defining pass bearers as non-employees. An amendment to the law in 1959 made this all-embracing by explicitly excluding "Natives" from the definition of employee. This amendment also included a provision which entitled the Minister of Labour to "reserve" specific occupations for individuals belonging to particular "race" groups.[2]

The Wages Act of 1925 contained measures similar to those provided for in the 1924 Industrial Conciliation Act, but was intended to apply to unorganised labour. Again, labour in agriculture, in domestic service, or in the public sector was excluded, and, in practice, the provisions have not been applied to the mines either. African trade unions were not recognised and both strikes and lockouts involving this group were forbidden. This legislation was supplemented in 1953 by the Native Labour (Settlement of Disputes) Act which provided machinery for the settlement of disputes between Africans and their employees. Again, the new legislation did not recognise African trade unions.

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1. G.V. Doxey, op. cit., p. 136.
2. G.V. Doxey, ibid., pp. 136-138.

The Wages Act established a Wage Board with the authority to make recommendations to the Minister of Labour regarding wage determinations for unorganised labour in certain spheres of industry. In the original act determinations were made applicable to labour regardless of "race". It was also stipulated that determinations could not be made below a minimum representing a "civilized wage". In this way White labour could be protected from Blacks by the Board raising the wage-rate to a level above the marginal product of most Black workers. It was generally believed that in those cases where White and Black labour were more or less equally productive, the pressure of public opinion as well as the threat of White trade union action would force employers to choose the former. Although the "race" clause was dropped in an amendment to the Act in 1937, the first African wage determinations came only after the mid 1950s.

During the 1920s and 1930s Wage Board recommendations were used almost exclusively to improve the position of White workers and by the late 1930s White labour in most industries had become sufficiently well organised to be included under the Industrial Conciliation rather than the Wage legislation.

As was the case with legislation affecting mine labour, the quantitative impact of this legislation is not easy to assess. Despite this, it is possible to suggest the direction of its effects and also to indicate changes in the severity of application over time.

The industrial conciliation legislation tended to weaken

the relative bargaining position of Black labour and to strengthen that of Whites. In this way it perpetuated a scarcity of skilled labour as the colour bar had done on the mines. At the same time, unskilled labour supplies tended to increase, and their wages to be depressed.

Wage legislation had a greater effect on the demand side. As predicted by the Economic and Wage Commission of 1925, minimum wage determinations of the kind made in South Africa appear to have reinforced the colour bar by raising the wage above the marginal physical product of most Black labour and encouraging the substitution of Whites for Blacks.[1] However, the period in which these activities had a large impact on employment in manufacturing was probably short-lived. In table 4.3. we present ratios of the employment of Blacks to Whites in the manufacturing sector between 1916 and 1970. There is a marked fall in this ratio from 2.9:1 in 1924 to 2.3:1 in 1934, indicating a period of declining relative employment of Blacks. Thereafter the ratio increases and there are indications of an improvement in the employment opportunities of Blacks during the war years. This reflects both the mobilization of White troops and the relaxation of much labour legislation, including the pass laws, during these years. Average wages of Black labour also rose and it is likely that a good deal of job "dilution" took place.

Almost immediately after the War, labour and influx control legislation was reinforced with a renewed vigour and

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1. Report of the Economic and Wage Commission, pp. 124-129.

TABLE 4.3.

RATIOS OF EMPLOYMENT OF BLACKS TO WHITES IN THE SOUTH AFRICAN MANUFACTURING SECTOR, 1916-1970

Year	B/W	Year	B/W	Year	B/W	Year	B/W
1916	2.8:1	1930	2.6:1	1944	3.2:1	1958	3.8:1
1917	2.9:1	1931	2.5:1	1945	3.2:1	1959	3.7:1
1918	2.9:1	1932	2.4:1	1946	3.1:1	1960	3.7:1
1919	2.9:1	1933	2.3:1	1947	3.1:1	1961	3.7:1
1920	2.9:1	1934	2.3:1	1948	3.1:1	1962	3.8:1
1921	3.0:1	1935	2.4:1	1949	3.1:1	1963	3.9:1
1922	2.9:1	1936	2.4:1	1950	3.2:1	1964	3.8:1
1923	2.9:1	1937	2.5:1	1951	3.2:1	1965	4.0:1
1924	2.9:1	1938	2.5:1	1952	3.3:1	1966	3.9:1
1925	2.8:1	1939	2.5:1	1953	3.4:1	1967	4.0:1
1926	2.8:1	1940	2.7:1	1954	3.4:1	1968	4.0:1
1927	2.7:1	1941	2.8:1	1955	3.5:1	1969	4.1:1
1928	2.6:1	1942	3.0:1	1956	3.8:1	1970	4.2:1
1929	2.6:1	1943	3.1:1	1957	3.8:1		

Source: Table A.6. Chapter 2. Statistical Appendix

many of the gains of the war years were lost to Black workers. One factor was the sharp relative and absolute decline of the wages of Black workers in the manufacturing sector and another was a reversal of the war time trend in the ratio of Black to White employment. In Diagram 4.2. percentage changes in the real average annual earnings of Black and White labour have

been plotted for the period, 1911 to 1970. The diagram clearly shows a marked up-turn in the average earnings of Blacks during the war years, followed by falling average wages after 1945. Between 1947 and 1952 there was an absolute decline in the average earnings of Blacks. In response to this deterioration, the Wage Board for the first time turned its attention seriously to African wages.

Apparently as a result of wage determinations after 1957, African wages rose fairly steeply until 1963. However, these measures, though effective in the case of the relatively limited number of White workers who had the backing of trade union action, were unable to achieve the same ends in a market open to the competition of the unskilled African workers. As is suggested by the results in Table 4.3., some of the gains in average wages were lost through a falling ratio of Black to White workers between 1957 and 1961. After 1966, the gap between White and Black earnings began to widen again.[1]

Despite the changes in the ratio of Blacks to Whites, to which we have drawn attention, it is noticeable that this ratio was smaller and varied much less than the ratio of Black to White workers on the mines. The comparatively small number of Black to White workers in the manufacturing sector (roughly 3:1 as against 8:1) almost certainly reflects the greater stringency of influx control, wage legislation and

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1. See D.H. Pursell, "Bantu Real Wages and Employment opportunities", S.A.J.E. Vol. 36, 1968, p. 99; See also D.F. Pursell, "The Impact of the South African Wage Board on Skilled/Unskilled Wage Differentials," Eastern African Economic Review, Vol. 1, 1969.

other measures which have operated in favour of White workers. However, due to the relative heterogeneity of the manufacturing sector and its rapid growth, particularly since World War II, these measures have been increasingly difficult to sustain, as is reflected by the rising ratio of Black to White workers.

Since World War II, the number of Black workers moving into skilled and semi-skilled jobs has increased considerably. This and the fact that artificial restrictions have been placed on the entry of unskilled African workers into this sector makes the relationship between wage-rates of Black and White workers and capital-labour ratios more ambiguous than in the case of the mines. This is reflected in wage-rate and capital-labour ratio lines drawn in Diagram A.6 in the Statistical Appendix and also in the regression analysis for the period 1916 to 1955, the results of which are

$$Z = 489.32 - \underset{(14.01)}{3.34Y} + \underset{(15.33)}{1.07X}$$

$$R^2 = 0.38$$

Where Z = capital-labour ratio, Y = real wage-rates of Black workers, X = real wage-rates of White workers. The signs of the coefficients are, again, negative in the case of Black wage-rates and positive in the case of White wage-rates suggesting that the Fei-Ranis hypothesis of a close positive relationship between unskilled wage-rates and capital-labour ratios should be rejected. Although both the individual coefficients and the coefficient of multiple determination

were significant at the 95 per cent level, the value of the latter (R^2 = 0.38) suggests that only a small part of the total variation in capital-labour ratios (namely 38 per cent) can be accounted for by the two variables. In addition the d statistic, which was 0.00296 indicated that there was positive autocorrelation, which casts further doubt on the significance of the coefficients.

An aspect of the legislation which we have not yet considered was that of segregation within the urban areas. The Urban Areas and Group Areas Acts[1] have enforced compulsory residential segregation in the White urban areas with few exceptions (for example, domestic servants). In general the application of this legislation has involved the removal of Blacks from the centre to the periphery of towns, often at great distances from the industrial areas. Increased transport costs as well as the costs of new housing have been borne either by individual workers or by municipalities and the state through subsidization schemes.

In general urban labour legislation has tended to raise the costs of Black, and particularly African unskilled labour thereby reducing the number employed. The supply of African labour has also been reduced by legally imposed disincentives to living in the urban areas, such as the inability to own and, in some cases, rent land and housing. The pass law system also helps to reduce the supply of labour by making work in the urban areas less attractive. The pass law system has also decreased mobility and often aggravated regional

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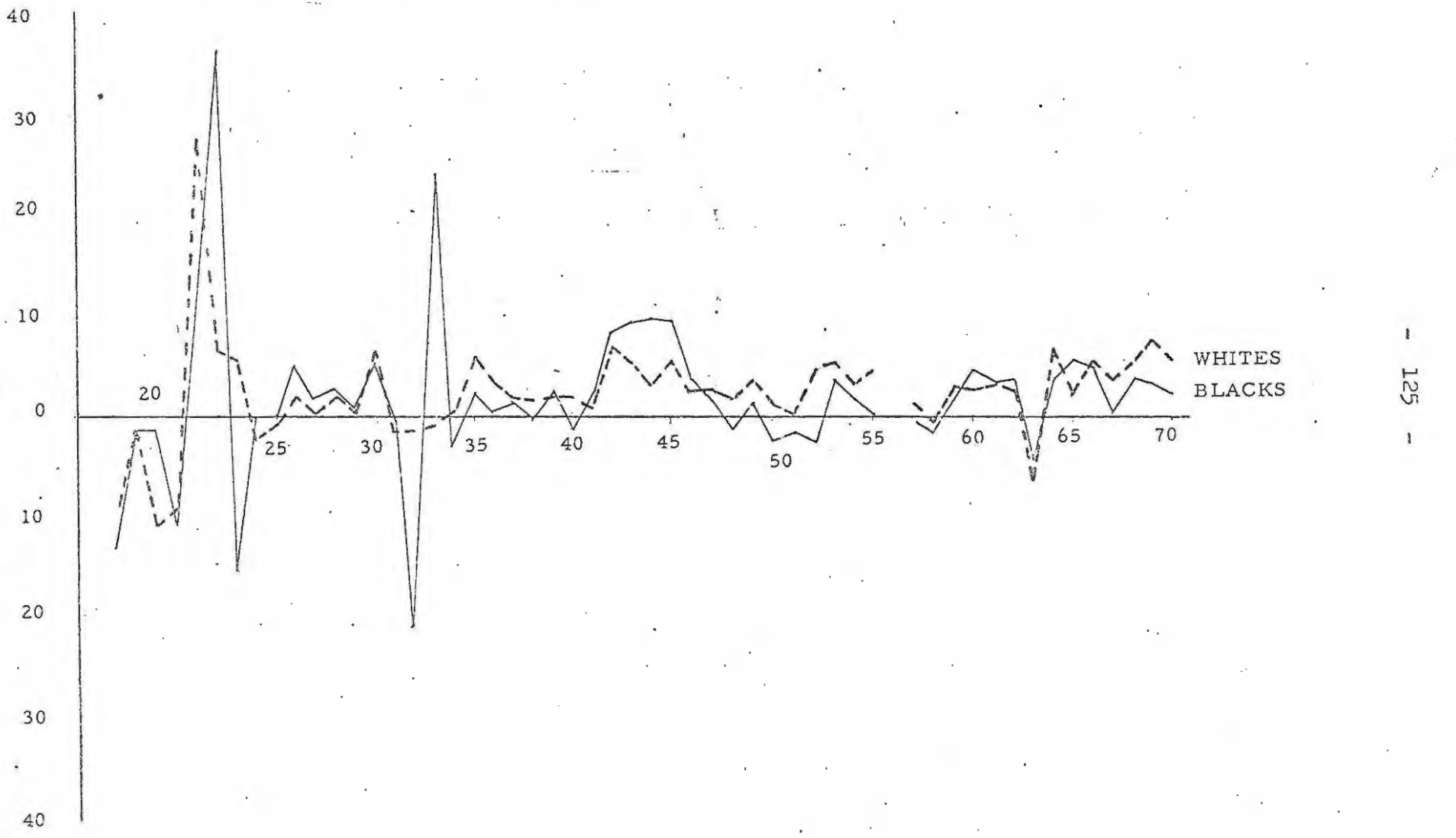
1. See G.V. Doxey, op. cit.

DIAGRAM 4.3

PERCENTAGE CHANGE IN REAL AVERAGE ANNUAL EARNINGS OF WHITES AND BLACKS IN SOUTH AFRICAN MANUFACTURING, INDUSTRIES, 1916-1970 (1938 Prices)



shortages, despite the activities of state run labour bureaux since 1952.[1]

It seems clear from these considerations that the system of influx control had a considerable effect on labour supplies in the urban-industrial areas. However, for those Africans with security of tenure in these areas, this system of controls created a relatively protected economic environment. This is reflected, for example, in the higher rates of earnings of Blacks in the manufacturing sector. As in the case of measures which in previous times tended to protect White labour in the towns, the unintended consequences are usually less noticeable than the intended ones. In this regard it has been said that "The policy of limiting the entry of Natives into urban areas gains support because the consequent rise in money wage-rates within urban areas is immediate and apparent, while the effect on those excluded is less obvious. The unpriveleged are relegated to work on farms and in the mines, or to trying to make a living from peasant farming in the Native areas, supplemented by periodic visits to the mines or seasonal work on farms".[2]

Despite the increased application of influx control measures, the African population in the White urban areas has continued to rise steadily. This is clearly shown in Table 4.2. which records urban and rural population between 1911

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1. State run African labour bureaux were brought into existence after the Native Laws Amendment Act was passed in 1952, in an attempt to reduce "the appalling wastage and uneconomic employment of Native labour". See G.V. Doxey, op. cit., p. 172.

2. S.T. van der Horst, op. cit., p. 278.

TABLE 4.4.

RURAL AND URBAN POPULATION OF SOUTH AFRICA, CENSUS YEARS 1921 - 1960.

Year	All Races			Whites			Africans			Coloureds and Asians		
	Total	Urban	Rural	Total	Urban	Rural	Total	Urban	Rural	Total	Urban	Rural
1911	5972757	1489881 (24.9)	4482876 (75.1)	1276319	667159 (52.3)	609160 (47.7)	4018878	494275 (12.3)	3524603 (87.7)	677560	328447 (48.5)	349113 (51.5)
1921	6927403	1931863 (27.9)	4995540 (72.1)	1521343	902881 (59.3)	618462 (40.7)	4697285	649314 (13.8)	4047971 (86.2)	708775	379668 (53.6)	329107 (46.4)
1936	9587663	3155896 (32.9)	6431967 (67.1)	2003334	1346193 (67.2)	657141 (32.8)	6595597	1219892 (18.5)	5373705 (81.5)	988932	589811 (59.6)	399121 (40.4)
1946	11415925	4411560 (38.6)	7004365 (61.4)	2372044	1771378 (74.7)	600666 (25.3)	7830559	1863277 (23.8)	5967282 (76.2)	1213322	776904 (64.0)	436418 (36.0)
1951	12671452	5473452 (43.2)	7198000 (56.8)	2641659	2079418 (78.7)	562271 (21.3)	8560083	2381592 (27.8)	6178491 (72.2)	1469680	1012442 (68.9)	457238 (31.1)
1960	16002797	7463005 (46.6)	8539792 (53.4)	3088492	2571883 (83.3)	576609 (16.7)	10927922	3466583 (31.7)	7461339 (68.3)	1986383	1424539 (71.7)	561844 (28.3)
1970	21446169	10280202 (47.9)	11167969 (52.1)	3751328	3257805 (86.8)	493523 (13.2)	15057952	4989371 (33.1)	10068581 (66.9)	2638889	2033026 (77.0)	605863 (23.0)

Sources: 1) Urban and Rural Populations of South Africa, 1904-1960, Department (Bureau) of Statistics, Report No. 02-02-01, pp. 1-5, tables 1.1 to 1.5.
2) Population of the Cities, Towns and Rural Areas, Department of Statistics, Population Census, 6th May, 1970, Report No. 02-05-01, p. 2, table 1.

Note: Figures in parenthesis give percentages of rural and urban populations in the total in each case.

and 1970.[1] The increase in the African urban population between 1960 and 1970 was 3.7 per cent per annum which was substantially in excess of the 2.65 per cent increase in locally born Africans as a whole,[2] which indicates that there was a considerable net inflow into the urban areas.

The failure of the influx control measures to halt the flow of Africans into "White" urban areas and the increasing awareness of the deleterious effects of these measures on conditions in the African rural areas underlies the more vigorous implementation in the 1950s and 1960s of measures associated with the South African Government's "Separate Development" plan. The aspect of this overall plan that has a close bearing on manufacturing industry and the process of labour re-allocation is that of "border industrial decentralisation", or the inducing of industries to locate or re-locate in the so-called border areas (between "White" South Africa and the reserves). This policy has been applied vigorously during only a few years at the end of the period under consideration here. It's effects do not alter our general results. In those years in which the policy has been applied its effect has probably been to inhibit the process of

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1. It should be noted that the urban areas are not all defined as White. In the 1970 census 265733 Africans lived in "urban areas in the Homelands", but of this number a large proportion would have been classified as living in white areas in previous censuses. Source: Bulletin of Statistics, Department of Statistics, Pretoria, June 1972, p. 3, Table A. 2-1.

2. J.L. Sadie, "Population and Economic Development in South Africa", S.A.J.E., Vol. 39, 1971, p. 208, Tables 1 and 2.

labour re-allocation by encouraging the application of more capital-intensive methods of production both within and outside of the "border industry areas."[1]

What generalisation, then, can we make about the market for labour in the manufacturing sector. When compared to the mines, supplies of unskilled African labour have been made relatively scarce, or from the point of employers, the costs of unskilled labour have been made relatively high both in relation to capital and skilled labour inputs. These circumstances in the labour market would lead us to expect capital-labour ratios in the manufacturing and service sectors to rise more rapidly than in mining. That this is so is clearly indicated by the census data in the main sectors of the economy between 1921 and 1970, assembled in table 2.4. (chapter 2). In 1921 the capital-labour ratios in mining, manufacturing and services were, respectively 272, 244 and 859. By 1970 the equivalent ratios were 943, 964 and 22857. Rates of increase in the capital-labour ratio were highest in the manufacturing and service sectors. However, rising wage-rates of skilled and semi-skilled workers probably do not account for all the variation in the capital-labour ratios. Another important factor, which cannot be gone into here is the state of factor proportions in countries in which most industrial technology is being developed.

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1. For a close analysis of the effects of this policy in theory and practice, see F.T. Bell, Industrial Decentralisation in South Africa, Cape Town, O.U.P., 1975.

The upshot of this section is that the relationship between the capital-labour ratio and wage-rates of unskilled workers in the case of South African manufacturing and service industries suggests, as in the case of the mines, that the Fei-Ranis model doesn't hold. Furthermore the conditions affecting labour supply in the manufacturing sector and in mining are different in several important ways. It follows from this that their aggregation in chapter 2 produces misleading results, which again casts doubt on the validity of the Fei-Ranis model and also on their statistical tests.

Before leaving our discussion of aspects of industrial development it is necessary to return to the vital assumption of Fei and Ranis that successful development will be "largely a domestic matter." In the next section, which concludes our institutional historical analysis of the South African economy, we consider some of the consequences of state intervention, especially foreign trade policy, on re-allocation of labour into the manufacturing sector.

4.4. Tariff Protection and Labour Re-allocation

Up to this point we have dealt almost exclusively with aspects of the internal development of the South African economy. This approach may suffice for countries in which only a small fraction of economic activity is oriented towards the foreign market. In South Africa, foreign trade has played a very major role since the opening of the mines. In 1920, the value of total exports as a percentage of gross domestic product was 33.3 per cent. This fell to 24.6 per

cent in 1955 and was approximately 18.3 per cent in 1970.[1] In addition, foreign capital played an almost exclusive role in the original development of gold and diamond mining and continues to be important, particularly, since the Second World War, in the manufacturing sector.[2]

The importance of foreign trade and the role of foreign investment in South Africa's industrial expansion seriously undermine the applicability of the Fei-Ranis model since its crucial assumption that development is "a domestic matter," does not hold in this case. Without doubt, foreign capital has played and enormous role in stimulating the transfer of labour from low to high productivity activities in South Africa. There is almost certainly a need for further research on this aspect, dealing not only with the quantitative significance of foreign capital, but also its effects on industrial structures in South Africa.

In the remaining part of this section we deal not with the scale of foreign trade and investments and their direct effect on the transfer of labour, but with the consequences of foreign trade policy, and, in particular of tariff

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1. See table A.8 for export data. Gross domestic product figures are from South African Statistics, 1972.

2. An analysis of the role of foreign investment in the early development of South African mining appears in S.H. Frankel, Capital Investment in Africa, London, O.U.P., 1938. More extensive coverage of the gold mining industry in particular is given in S.H. Frankel, Investment and the Return to Equity in the South African Gold Mining Industry, 1887-1952. An International Comparison, Basil Blackwell, Oxford, 1967.

protection, on the capital-intensity in the various sectors. This it is hoped will indicate what some of the indirect effects of this policy have been on labour-re-allocation.

Prior to the 1920s, foreign trade policy was formulated primarily with a view to using this sector as a source of state revenue. The Cullinan Commission of 1911[1] did recommend the use of tariff measures to encourage the employment of White labour in local industries, but this aspect of policy became important only during and after the 1920s.

In 1925 the Customs Act firmly established the principle of tariff protection of domestic industries on the grounds that this would boost production and employment and contribute to the solution of the "poor White" problem in South Africa. Rapid increases in employment and output after a lull during the Great Depression seemed to support this view. However, much of this expansion was heavily supported by gold exports. Both capital and raw materials had to be imported for manufacturing expansion, and as we have seen, agriculture also benefitted from import rebates on non-labour inputs. It was estimated that the ratio of gold to all other exports rose from 50 per cent in the six year period ending in 1929 to 70 per cent in the six year period ending in 1938.[2] Furthermore,

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1. Report of the Commission Appointed to Inquire into the Conditions of Trade and Industries and other matters appertaining thereto, Government Printer, U.G. 10'12.

2. S.H. Frankel, "An Analysis of the Growth in the National Income of the Union in the Period of Prosperity before the War," S.A.J.E. Vol. 12, 1944, p. 115.

50 per cent of all raw materials used in manufacturing in the prewar period were imported, whereas this sector supplied only 2.5 per cent of the country's total exports.[1] In criticism of the view that tariff protection in this period had been beneficial to the economy, Frankel argues that "Increased self-sufficiency can only lead to an increased real income per head if it results either in employment of labour which would otherwise not be employed or if it results in the employment of labour to better purpose than previously."[2] In view of the heavy dependence of this sector on tariff protection and on the foreign exchange earning powers of the mines in the pre-war period, it is possible that increase manufacturing employment were at the expense of lost opportunities elsewhere, particularly in the mines.

For these reasons it may be misleading to refer to this and the post-war period up to the 1950s as one of economic growth led by import replacements.[3] To establish this it would be necessary to show not only that manufacturing industry has expanded as a consequence of protection (which is

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1. See S.H. Frankel, op. cit., p. 115 and Table 4.2 above.
2. S.H. Frankel, ibid., p. 119. See also Third Interim Report of the Industrial and Agricultural Requirements Commission (van Eck), Pretoria, U.G. 40'41.
3. Report of the Commission of Enquiry into the Export Trade of the Republic of South Africa, p. 29.

only to be expected) but also that this expansion has been greater than that which would have occurred had the cost-raising effects of tariff barriers in industry as a whole not occurred.[1]

After the 1950s tariff protection was extended to industries in the border areas which were, with little real justification, believed to be ideally placed for the exports market.[2] This also formed part of the plan for a renewed emphasis in the export market advocated by the Reynders Commission in 1972.[3]

In general protection has tended to lower the cost of capital and raw materials and raise the relative cost of labour. This has happened because capital and raw materials required for domestic industrial expansion have generally been imported, and, in an effort to promote local production substantial rebates on these factors have been applied. This is true of equipment and raw materials in agriculture, mining and manufacturing.[4] On the other hand commodity prices have risen sharply, for these and other reasons. In general this

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1. The writer's attention was drawn to this point by Professor R.T. Bell.

2. Report of the Commission of Enquiry into the Policy relating to the Protection of Industries, Section X, p. 54.

3. Report of the Commission of Inquiry into the Export Trade of the Republic of South Africa, (1972).

4. Report of the Commission of Inquiry into the Policy Relating to the Protection of Industries, p. 7-20. Report of the Commission of Inquiry into the Export Trade of the Republic of South Africa, pp. 41 and 123.

means that the cost of labour as an input factor also rises. In response there has been a tendency to substitute labour for capital. In view of the legislative factors discussed earlier, this would have generally involved the substitution of capital for unskilled labour; usually Blacks.

To add to this, protection in South Africa has involved a shift from the importation of consumer non-durables to consumer durables.[1] Since the latter are generally more labour-intensive this may have accentuated the capital-using trend in manufacturing industries.[2]

The capital-using bias of these policies may also help explain the large role of capital in the growth of manufacturing in South Africa, as well as the high capital-output ratios in this sector and in manufacturing.[3]

Tariff protection in South Africa has directed resources and incomes away from mining towards White agriculture and, more particularly, manufacturing industries.

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1. Report of the Commission of Inquiry into the Policy Relating to the Protection of Industries, p. 142.

2. See I. Little, T. Skitovsky and M. Scott, Industry and Trade in Some Developing Countries, O.E.C.D., London, O.U.P., 1970, p. 111.

3. L.F. Bergman, "Technological Change in South African Manufacturing Industry 1955-64", S.A.J.E. Vol. 36, 1968. For the description of a similar experience in Pakistan see A.R. Khan, "Capital Intensity and the Efficiency of Factor Use, A Comparative Study of the Observed Capital-Labour Ratios of Pakistani Industries," Pakistani Development, Review, d.u.

At the same time it has raised the costs of labour and inhibited the development of export-oriented industries. The consequences for employment of unskilled labour in industry as well as development in the agricultural sector are indirect and difficult to assess, but were doubtlessly of considerable importance, particularly in the decades immediately before and after the Second World War.

Since the 1950's there appears to have been an important change of approach on the part of the State to foreign trade and efforts are once again being directed towards stimulating production for the export market.[1]

This concludes the historical-cum-institutional part of our analysis. Having gathered together a good deal of descriptive and statistical material throwing light on various aspects of the model of economic dualism and on the pattern of economic development in South Africa, we are able to return to a more detailed and penetrating assessment of the model and its tests as conducted in chapter 2. The next chapter is devoted to this assessment.

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1. See the Report of the Commission of Inquiry into the Export Trade of the Republic of South Africa, R.P. 69/72.

CHAPTER 5.

AN ASSESSMENT OF THE MODEL OF ECONOMIC DUALISM

5.1. Introduction

Let us cast a glance back over the ground covered in the last three chapters. The purpose of all three is to compare the Fei-Ranis version of the model of economic dualism with South African experience over a period of roughly half a century. Two distinct methods of comparison are used; one involves a purely statistical analysis and assessment of the model and the other an historical-institutional approach. We have now acquired a good deal of statistical and descriptive information about the labour process in South Africa and have laid the foundations for a critical overall assessment of the model. Up to this point, however, the view presented of the various parts of the model has been fragmentary; each sector being dealt with as a separate entity. What remains to be done is to draw these parts together to present a unified view of the South African economic system. In addition to presenting the outlines of such a system, we consider in some detail alternative versions of the model of economic dualism, as well as some criticisms of the model by other writers dealing with other case studies. Thus by referring both to earlier chapters and to other writings on the subject we hope to present an over-all assessment not only of the Fei-Ranis model itself, but of the concept "economic dualism" in general as an explanatory and predictive device for dealing with underdeveloped countries.

5.2. Disguised Unemployment and the Constant Institutional Wage

There are two crucial assumptions underlying Fei and Ranis' theory of labour re-allocation. One deals with the conditions of production and the other with the distribution of output in the agricultural sector. The first of these is summarised in the concept of "disguised unemployment" and the second in that of a "constant institutional wage".

Disguised unemployment is said to occur when the marginal product of labour is either zero, or positive but less than the average agricultural wage.[1] Lewis' analysis is less restrictive than this. Although he used the concept of "disguised unemployment" in his original article,[2] he later says that: "It is of little consequence whether persons moving out of the low earnings economy have been in 'disguised unemployment', or whether their marginal product has been zero, negative or merely small. All that the analysis requires is that the supply willing to move at the current wage rate should greatly exceed the demand."[3] It is of "little consequence" since in both cases the capitalist sector obtains an abundant supply of labour at a constant wage.

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1. J.C.H. Fei and G. Ranis, Development of the Labour Surplus Economy, p. 203.
2. W.A. Lewis, "Economic Development with Unlimited Supplies of Labour," p. 402.
3. W.A. Lewis, "Further Notes ..." p. 3. ff. 1.

For Fei and Ranis, a constant institutional wage is said to exist where the agricultural product is distributed not according to the marginal contribution of labour, but on a per capita basis. This strongly suggests that ownership of the means of production is on a communal basis and the production involves co-operative labour extending beyond the sphere of the nuclear family. Given these assumptions, it follows that as labour is reallocated from agriculture to industry two hypothetical stages occur. In the first, labour with a zero product is withdrawn (and reallocated to industry), and the released agricultural surplus is used as a wages fund in industry. In the second stage the withdrawal of disguisedly unemployed labour results in a reduction in the total agricultural product, but of a smaller magnitude than the amount consumed by the released worker. Since this reduction in output diminishes the per capita (of industrial labour) surplus which may be transferred to industry as a wages fund, the terms of trade may turn against industry. Lewis thought this might slow down the rate of industrial expansion.[1] Fei and Ranis, on the other hand, argued that it would only be a short run problem and that rising agricultural prices would attract investment to this sector.[2] Lewis also dealt with the latter possibility, but he feared that rising productivity in agriculture would result in increasing incomes in this sector, which would force up the industrial

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1. W.A. Lewis, "Economic Development with Unlimited Supplies of Labour", p. 432.

2. J.C.H. Fei and G. Ranis, op. cit., Ch. 6, Sections 4 and 5.

wage.[1] Here Fei and Ranis made an important departure from Lewis. They argued that rising incomes of labour in agriculture would be prevented by the expropriation of surplus by a landlord class.[2] In their model agricultural investment shifts the total physical product of labour curve outwards, thereby postponing rising prices. At the same time, control over agricultural surpluses by the landlord ensures that incomes in agriculture remain constant until such time as all "disguisedly unemployed" labour has been absorbed into industry. Once this happens a turning point is reached after which labour in both sectors is paid a wage equivalent to its marginal contribution.[3]

The major difficulties with this model stem from Fei and Ranis' underlying assumptions. First, their model implies a social system in agriculture which may not be generally representative. In this system there is on the one hand a form of communal crop-sharing and on the other a landlord class with the right to expropriate agricultural surpluses. Social arrangements including both these features may have existed in nineteenth century Japan,[4] but are unlikely to be representative of pre-capitalist agricultural systems in general.[5]

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1. Lewis, op. cit., p. 433.
2. J.C.H. Fei and G. Ranis, op. cit., Ch. 2, Section 6.
3. J.C.H. Fei and G. Ranis, ibid., Ch. 6, Section 5.
4. See Yhi Min Ho, "Development with Surplus Population - the Case of Tawain: A Critique of the Classical Two Sector Model à la Lewis", Economic Development and Cultural Change, vol. 20, 1972, p. 226.
5. Reynolds also finds this "a rather unusual organisation of agriculture". L.G. Reynolds, "Economic Development with Surplus Labour: Some Complications", O.E.P. Vol. 29, 1969.

This combination of social arrangements clearly did not exist in the South African case.

A general point of criticism is that Fei and Ranis avoid the problem of describing the institutional transition from a system of communal to one of individual control of agricultural resources and output. A high rate of saving is, of course, not necessarily incompatible with a system of communal ownership, but the expropriation and rechannelling of agricultural surpluses into investment is likely to require structural changes in traditional patterns of social organisation as well as the emergence of marketing and financial institutions. These changes do not necessarily follow automatically from industrial development, nor do they necessarily follow the pattern visualised by Fei and Ranis even if mobilization of agriculture does take place. This pattern did not emerge for example, in South Africa, where, as we have seen, important differences between white and African agriculture occurred.

Of the many criticisms of the concept of "disguised unemployment," McLoughlin's is perhaps most relevant here. His view is that seasonal variations in the agricultural work pattern of traditional societies in African countries South of the Sahara have been mistaken for "disguised unemployment, and he argues that "There is not now, nor has there ever been "surplus", "underemployed" African agricultural labour - "disguised unemployment" in rural Africa is either fiction

or fabrication and in either case false."[1] In view of our earlier description of conditions in agriculture prior to and for several decades after industrial development first took place, McLoughlin's argument does find partial support in the South African case.[2] But what McLoughlin fails to see is that labour surpluses, although not in existence at the outset of industrial expansion may come into existence once it is well under way.

While we accept that the concept of disguised unemployment is questionable in South Africa, it does not necessarily follow from this, as Lewis himself has shown, that there have not been labour surpluses, in the sense of "the supply of labour willing to move at the current wage greatly exceeding the demand." This leads us to a general point about surplus labour and its relationship with the wage-rate in the capitalist sector over a long period of time. The point is that a constant level of wages over a long period may be consistent with both elastic and inelastic supplies in the short run. For the latter (inelastic supplies in the short run) all that is necessary is that the supply curve of labour shifts outwards (as a consequence, for example, of growth in the labour force) at the same speed as the demand curve for labour.

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1. P.F.M. McLoughlin, "The Need for a "Full Employment" and not a "Disguised Unemployment" Assumption in African Development Theorizing", Zeitschrift Für National-ökonomie, December, 1962, p. 364.

2. For a contrary view see S.S. Brand, The Contributions of Agriculture to the Economic Development of South Africa since 1910, p. 266.

5.3. Dualism Within South African Agriculture

Let us consider some of the relationships between variables which the model might lead us to anticipate. Perhaps the most important of these is the relationship between productivity in the agricultural sector and the supply of industrial labour. Increases in agricultural output in South Africa have been associated not with the release of labour from agriculture but with an inflow of labour into the sector, and hence more limited supplies to industry. This has been true of White and African agriculture. In the former, increases in investment have resulted in a net inflow of labour from other sectors for most of the period considered, despite the relatively capital intensive path of growth. In African agriculture a falling level of per capita, and perhaps even absolute output, has been associated with increased labour supplies in industry. This is true of both local and foreign born labour supplies. Furthermore short run increases in agricultural output here have also been associated with a cyclical decline in labour supply to the mines.

The crux of this problem lies in industry's independence from African agriculture for food and raw material supplies. In the early phases of mining expansion labour and not agriculture commodities, which could be and were imported in large quantities,[1] was the scarce resource in industry. For historical reasons industry remained independant of Black

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1. See F. Wilson, "Farming 1866-1966", Oxford History of South Africa, Vol. II, p. 114.

agriculture for food but not for labour. On the other hand its dependence on the product of White agriculture increased due, in part, to state intervention in favour of White farmers. This meant that the potential conflict between White agriculture and industry over scarce labour supplies could be resolved by suppressing or, at best, neglecting to give sufficient protection and direct aid to Black agriculture.

White agriculture became the main source of industrial food and other agricultural requirements with, as we saw in Chapter 3, the aid of state subsidies, tariff protection and the maintenance of supplies of cheap labour. White agriculture did not have the factor endowments characteristic of the agricultural sector assumed by Fei and Ranis, nor has it played as significant a role in providing investment funds for industrial expansion. In many respects and especially during the 1920's and 1930's, this role was performed instead by the mining sector,[1] which in turn was originally financed almost exclusively by foreign capital. This factor alone clearly undermines, in the South African case, Fei and Ranis' basic contention that development is primarily a domestic problem and that agriculture has a major role to play in providing investment funds for industrial expansion.

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1. See S.H. Frankel, The Economic Impact on Under-Developed Societies: Essays on International Investment and Social Change, Oxford, Basil Blackwell, 1953, especially Essay IV. See also S.S. Brand, The Contributions of Agriculture to the Economic Development of South Africa Since 1910, pp. 285-287.

In contrast to White agriculture, African agriculture both within South Africa and in neighbouring countries, provided the bulk of unskilled labour for industrial expansion. Factor endowments in this part of agriculture which were originally similar to those in White agriculture became characteristic of those assumed by the model - namely, a relative abundance of labour in relation to land and capital. Despite this there has always been an inverse relationship between agricultural output in this sector and labour supplies in industry,[1] as we tried to show in the second part of chapter 3. It is to this relationship that Lewis makes reference when he says that "A rise in the productivity of the subsistence sector hurts the capitalist sector if there is no trade between them..."[2]

A closely related objection to the Fei-Ranis' model put forward by some writers is that it implies a once-and-for-all transfer of individual workers out of agriculture into industry. They point out that in many cases labour actually migrates from agriculture for only temporary spells of work in the industrial sector.[3] Since the model is concerned with the transfer of labour time, it does not in itself seem important that migrant labourers work in agriculture and industry at different times of the year. What is significant

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1. This may be a fairly general phenomenon. See H.T. Oshima, "Underdevelopment in Backward Economies - An Empirical Comment," J.P.E., Vol. 66, 1958.

2. W.A. Lewis, "Economic Development with Unlimited Supplies of Labour", p. 433.

3. See, for example, S.S. Brand, op. cit., p. 277.

is the effect of the system on the relationship between the industrial wage and supply of unskilled labour. Some writers have tried to show that where temporary migration exists an increase in the industrial wage-rate tends to reduce the supply of labour. Behind this reasoning is the idea that migrant workers have a "target" income in mind, which determines the length of their stay in the industrial (high productivity) sector.[1] Berg has shown that even in situations in which individual workers do have targets, the aggregate supply of labour is unlikely, in most cases, to respond negatively to increases in the industrial wage. This, he argues, becomes even more unlikely after workers have had sustained contacts with the towns and have developed an increased preference for material goods.[2]

Berg focuses his attention primarily on temporary migration. More recently Bell has attempted to generalise the explanation of labour migration to include all cases ranging from permanent residence in the traditional to permanent settlement in the modern sector.[3] Aggregate labour supplies in this model are determined not only by productivity in agriculture, but, more comprehensively, by labour's preference for rural or urban life as well as other factors which enter into the decision-making processes of potential migrant labourers. Two important categories of migrants are

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1. Cases of this argument are mentioned by S.T. van der Horst, Native Labour in South Africa, p. 129.

2. E.J. Berg, "Backward-Sloping Supply Functions in Dual Economies", Q.J.E. Vol. 75.

3. R.T. Bell, "Migrant Labour: Theory and Policy," S.A.J.E Vol. 40, 1972.

distinguished. Those who enter the labour market as "permanent" migrants, accompanied by their families, and those who enter individually as "temporary" migrants.[1] Supplies of permanent and temporary migrants are matched by separate demand functions. This is because permanent ("stabilized") labour is expected to yield a higher marginal physical product than temporary labour. Initially, the industrial wage rate at which permanent migrants transfer is higher than that at which temporary migrants will do so, due to the greater losses, in terms of forgone agricultural income, sustained by the former in parting with the rural sector.

In discussing the relationship between labour supplies and the industrial wage rate, Bell is primarily concerned with the effect of the latter on the conversion of labour from permanent residence in the traditional to permanent settlement in the modern sector. However, his analysis also clarifies the narrower problem of the relationship between changes in agricultural productivity, labour supplies and the industrial wage-rate. It indicates that under systems of both permanent and temporary migration rising agricultural productivity will reduce either the number of labourers transferring to industry or the length of time individuals will do so in a given time period. In this way the aggregate supply of labour is likely to be decreased and the industrial wage to rise. Thus the existence of migrating labour does not fundamentally alter the nature of labour supply envisaged

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1. R.T. Bell, op. cit., p. 350-351.

in the Lewis model.

This also, incidently, contradicts the view held by some writers that the existence of alternative income earning opportunities in agriculture gives management in industry greater bargaining power over temporary migrants. It also indicates that the effects of changes in either agricultural productivity or the industrial wage rate on aggregate supply operate in the same way whether the labour force is composed of individuals who transfer on a temporary or permanent basis. Furthermore, it implies that measures which deprive workers of the choice of permanent migration inhibit productivity increases both in industry and in agriculture, and also tend to force up the wage rate of permanent industrial workers and depress that of temporary migrants.[1]

A general, and perhaps obvious, point which emerges from this discussion is that the two parts of agriculture and the industrial sector in South Africa have been bound together in a network of economic relations. African agriculture throughout the period considered has been far from "self-sufficient," and in view of the responsiveness of households in the African areas to changing wage-rates in industry and productivity it is also misleading to refer to the sector as "traditional". It is mistaken to think of this sector as independant, isolated and unchanging; a view which is often associated with the term dualism.

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1. The writer wishes to thank Professor R.T. Bell for discussions on these points.

5.4. Categories of Unskilled Labour in South Africa

Up to this point we have only distinguished between conditions within the two parts of agriculture. However, there are a number of distinct sources of unskilled rural labour which should be mentioned.

First, there has probably been a difference in the supply prices of foreign and local unskilled labour. Labourers from countries such as Lesotho appear to have had significantly lower income-earning opportunities than locally born workers.[1] The supply price of migratory labour is in part a function of the distance between the migrant's home and his place of work. Even within South African agriculture there are some notable differences. Perhaps the highest income earning group is the settled African labour force on White farms. In the African agricultural sector itself there are wide differences between the potential income earning opportunities of people. These depend on their geographical location as well as their rights to land for cultivation and grazing. Since the 1913 Land Act unknown numbers of displaced squatters and tenants have been absorbed into this sector and given varying degrees of access to the means of production. More recently quasi-urban townships or "re-settlement camps" have absorbed many of these

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1. Leistner, who has attempted to assemble data on wages in neighbouring Southern African economies, concludes that wage comparisons may not be very meaningful since "labour movements in the region are critically determined by the availability of employment rather than by wage differentials. G.M.E. Leistner, "Foreign Bantu Workers in South Africa: Their Present Position in the Economy", S.A.J.E., Vol., 35, 1967, p. 40. See also p. 56, table xii.

displaced people both from White agriculture and the "White" urban areas.[1] Per capita incomes of many are little more than the value of their very low monthly rations and rent free housing.

These categories point to distinct differences in the objective conditions of labour in the "agricultural" sector and suggest that at any given point in time the supply curve of unskilled labour may be upward sloping rather than horizontal - even if at very low wage rates. They throw additional doubt on the applicability of the concept of a constant institutional wage throughout agriculture, in the South African case.

5.5. Labour Supplies in Historical Perspective

One of the important findings that emerges from our description of agricultural and industrial development in South Africa is that the elasticity of labour supply has changed over time. Historically African agriculture experienced full employment and relatively high levels of per capita agricultural production followed by falling per capita and possibly even absolute production. It may be true that in some cases a declining per capita output of the de facto African agricultural population partly reflects the attractiveness of industrial employment. However, both the fact that real wage-rates in manufacturing and mining appear to have fallen for a

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1. It is debatable whether these should be included in the agricultural or industrial sector. What is important however is the ability of these people to earn a living outside the high productivity sector.

number of years (up until the early 1920s) and then remained constant (until the 1960's in the case of the mines, and the 1940's in the case of manufacturing) and the fact that per capita agricultural production in the African reserves has declined over most of the period, strongly suggests that labour supplies have historically become more abundant during the early phase of industrial expansion. This phase appears to have begun near the turn of the century and reached its lowest point in the two decades prior to the Second World War. There are some indications of improvement during and after the war, although no clear-cut "turning point" is indicated.[1]

This phenomenon is not unique to South Africa. Arrighi found that labour surpluses came into being during the period of industrialization of the Rhodesian economy.[2] Lewis himself foresaw this possibility. He argued that "even a pre-capitalist economy with abundant land is capable of developing a labour surplus. For example in most of Africa and Latin America labour is more or less fully employed, since there are no shortages of cultivable land. However, a labour surplus could be created by the expansion of capitalist production at the expense of pre-capitalist forms of handwork, in manufacturing, in agriculture and elsewhere."[3]

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1. It should be noted again that it is not necessary to have either a "constant institutional wage" or perfectly elastic labour supplies for the industrial wage to remain constant. A constant of falling wage rate over time is consistent with inelastic labour supplies at any given point in time. For a falling wage rate all that is required is that increases in the supply of labour outstrip increases in demand.

2. G. Arrighi, "Labour Supplies in Historical Perspective: A Study of the Proletarianization of the African Peasantry in Rhodesia, J.D.S. vol. 6, 1970.

3. W.A. Lewis, "Further Notes..." p. 25.

The essential difference between the positions of Lewis and Arrighi lies in their prediction of the outcome of capitalistic expansion. Lewis argues that "Sooner or later the pre-capitalist forms are all destroyed, and the labour surplus is exhausted".[1] Arrighi, on the other hand, feels that capital "deepening" rather than "widening" will occur irrespective of the existence of surpluses in labour market."[2] Ultimately it is only possible to establish one or the other position by reference to concrete cases. This we attempt to do in our final assessment of the Fei Ranis tests in the last section.

5.6. The Non-agricultural Sector, Industrial Wages and the Capital-Labour Ratio

In South Africa the distinction between "subsistence" and "capitalist" clearly cross-cuts the distinction between agriculture and non-agriculture. This is so particularly because of methods of production and organisation in White agriculture. However, since agriculture has developed from a primarily subsistence to a market-oriented sector and since it has been largely a food producing sector (as against plantation production for export) it seems not unreasonable to separate it from industry as we have done. Subsistence activities occur in the non-agricultural sector of the economy as well, particularly if individuals in the quasi-urban

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1. W.A. Lewis, op. cit., p. 25.
2. G. Arrighi, op. cit., p. 226.

resettlement camps and townships are included in this sector. It has not been possible to establish what proportion of the total labour force falls into this category, although the existence of low productivity employment in South Africa's urban-industrial centres is probably far less pronounced than in many other African economies. This is due largely to South Africa's influx control measures,[1] and has probably caused greater rural impoverishment than would otherwise have been the case.

It is important to bear these considerations in mind when assessing rates of transfer of labour from low to high productivity sectors. The exclusion of White agriculture from our statistical tests, for example, means that we underestimate the absolute number of "transferred" workers. On the other hand, since this sector is declining in importance relative to other capitalist sectors in the economy, we probably obtain a better estimate of the capitalist sector's ability to absorb labour by excluding it.

Finally, it should be recalled that our choice in chapter 2, of mining and manufacturing as a proxy for the non-agricultural sector in the statistical tests means that we avoid the problem of exaggerating the rates of labour absorption by including low productivity non-agricultural workers.[2]

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1. The problem of urban unemployment in other African economies has been discussed by J.R. Harris and M.P. Todaro, "Migration, Unemployment and Development. A Two Sector Analysis". A.E.R. Vol. 60, 1970.

2. Discussed in Chapter 2.

Having defined the non-agricultural or "capitalist" sector, the next problem is to establish whether labour is transferred to industry at a constant industrial wage, and whether this involves a process of capital shallowing until all surplus labour has been absorbed.

In both the Lewis and Fei-Ranis versions of the model the transfer of unskilled labour is determined independently of the industrial wage rate. However, as we have already indicated the transfer of unskilled labour in South Africa has been indirectly associated with the industrial wage rate due to the relationship between skilled and unskilled labour in the economy's productive processes. This association was explained in chapter 4, where we observed the stable ratio between White and Black workers that has existed in mining and manufacturing since the 1920's.

Neither Lewis nor Fei and Ranis have much to say about skilled labour in an underdeveloped labour-surplus economy. Although Lewis recognises the possibility of labour combining to preserve a priviledged position, he tends to underplay this aspect and argues that skilled labour "is only a very temporary bottleneck in the sense that if capital is available for development, the capitalists or their government will soon provide the facilities for training more skilled people."[1] In South Africa this "quasi-bottleneck" in the supply of skilled labour has been perpetuated, partly as a result of

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1. W.A. Lewis, "Economic Development with Unlimited Supplies of Labour," p. 406.

the industrial colour bar, and coincides very closely with the supply of white labour.

However, the consequences of exogenous wage increases brought about by official minimum wage legislation or by agreements between unions and employer associations, have been widely discussed both in South Africa and elsewhere.[1] They are part of the explanation of the increasing capital intensity of methods of production, low rates of unskilled labour transfers and the inability to overcome pronounced rural and urban unemployment. Turner goes so far as to suggest that exogenous wage increases of this kind coupled with a capital-using bias in underdeveloped countries may actually intensify "dualism". "That underdeveloped countries have a certain bias towards capital-intensive investment seems fairly well established. Since this generally means that labour is a lower proportion of costs to the enterprise than it would otherwise be, the individual concern's willingness to concede wage increases is higher; but this in turn reinforces the tendency to capital-intensive (or labour-saving) development. This 'spiral' process may tend to produce a dual society: rising productivity and living standards in a limited modern sector on the one hand, while the restriction of that sector's employment forces the mass of new workers created by population growth into the traditional economy - where standards are thereby held down or depressed."[2] In

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1. See Chapter 4, Section 4.

2. H.A. Turner, Wage Trends, Wage Policies, and Collective Bargaining: The Problems for Underdeveloped Countries, Cambridge, University Press, 1966, p. 21.

this passage Turner is referring in particular to African economies, but similar problems have been found in many other underdeveloped countries.[1] In South Africa this tendency has been reinforced by the restriction of bargaining power to White workers, and also by direct prohibitions on the substitution of Black for White labour. The significance of this for the model is that it is not possible to assume that the existence of powerful, well-organised groups of skilled labour has little bearing on wage-rates and absorption rates of unskilled workers, as Lewis and Fei and Ranis do.

Let us now turn to the "closed economy" assumption in the Fei-Ranis model. In their earlier writings Fei and Ranis were primarily concerned with problems of development in a closed economy, or one in which foreign trade is a "facilitator" rather than the "engine" of industrial expansion. Their view was that in underdeveloped economies dominated by agriculture and abundant labour supplies "the development effort... is primarily a domestic matter and decided on the battlefields of domestic policy".[2] More recently they have modified their

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1. See, for example, L.G. Reynolds and P. Gregory, Wages, Productivity and Industrialization in Puerto Rico, The Economic Growth Centre, Homewood Illionois, Richard D. Irwin, 1965, especially Ch. 2. R.U. Millar, "The Relevance of Surplus Labour Theory to the Urban Labour Markets of Latin America, International Institute for Labour Studies, Vol. 8, 1971.

2. J.C.H. Fei and G. Ranis, Development of the Labour Surplus Economy, p. 290.

position by making a distinction between large (e.g. India and China) and small (e.g. Japan, Tawain, Korea) economies of this type. Referring to the "small" economy they argue that "In the case of the labour surplus natural resource poor country, the broad outline of the transition into modern growth can be viewed as aiming to move from import substitution to export substitution or in resource terms, from a land or raw materials-intensive to a labour-intensive phase".[1] The South African economy, while fitting more accurately into their category of "small" rather than "large" economies, differs from them, both in terms of its initial resource endowments and its path of development. South African experience was of an initial phase of limited supplies of labour and rich natural, particularly mineral, resources, followed by a period of more abundant labour supplies. Primary product export-orientation was followed by import-substitution precisely at the time when labour supplies were becoming relatively more abundant. Finally, there appears to have been a tendency towards export-substitution in the last decade of the period being reviewed - a time when there were signs, again, of a relative scarcity of labour.

Unlike either the "small" or "large" labour surplus economies discussed by Fei and Ranis, foreign capital has played a very important role in the development of mining, manufacturing, and even agriculture, in South Africa. Mining rather than agriculture was the "engine" of growth in the

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1. J.H. Fei and G. Ranis, "Development and Employment in the Open Dualistic Economy" Malayan Economic Review, vol. 16, 1971, p. 115.

first phase of industrial expansion. However, unlike agriculture in the Fei-Ranis economy, the mining industry in South Africa has drawn the economy into international trade on a very substantial basis from the outset.

As we saw in Chapter 4, the form of tariff protection adopted for manufacturing and agriculture appears to have accentuated the capital-using bias in the entire capitalist sector by driving up the relative price of labour and lowering that of capital. Thus, increasing capital-labour ratios at this time were a result not of the elimination of labour-surpluses, but occurred in spite of them, and, indeed, probably helped accentuate the problem of rural and urban unemployment.

5.7. Fei and Ranis' Empirical Tests Reconsidered and Conclusions on the Model

Having outlined some of the major difficulties with certain assumptions underlying the Fei-Ranis model in the light of South African experience, we are now in a position to give a more penetrating assessment of the results of the statistical results, and indeed the tests themselves, obtained in chapter 2.

The first of these tests (diagram 2.3), the C.M.E.C., does not exhibit the expected dramatic "turning point" in the economy's development. Even as late as 1952 population growth outstripped the rate of growth of employment in mining and manufacturing industries. Since unskilled labour, with which the model is basically concerned, in South African industries is drawn almost exclusively from the foreign and

locally born African population, it would be more relevant to compare rates of increase in employment with rates of increase in the African population. If this had been done the results of the C.M.E.C. would indicate an even less successful development performance since increases in the African population have been greater than increases in the total population since the 1951 census.[1] It is interesting to note that there is a fairly marked increase in population growth after 1945, which seems to suggest that industrial development and population growth are associated with one another rather than independently determined. This would clearly have an important bearing on the plausibility of the Fei-Ranis model as well as the C.M.E.C. analysis.[2]

One further point about this test is that it tells us little about the length of time it is likely to take for an economy to lose its dualistic features. This depends not only on the rate of population increase and the growth of industrial employment but also on the absolute size of the high and low productivity sectors. This is a particularly important consideration in an economy like South Africa's, which draws on unskilled labour from both local and foreign sources.

Turning to the input-ratio and decomposition analysis (Diagram 2.4) we find that despite the rapid increases in population after the Second World war the horizontal effect

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1. See Statistical Appendix, Table A.7.

2. See W.A. Lewis, "Economic Development with Unlimited Supplies of Labour," pp. 404-5.

(which measures the labour-using bias of techniques) became negative, and it was only after the mid-1950s that there were signs of a change in this tendency. A partial explanation of this is that although population increased sharply during and after the Second World War, these increases were reflected in the labour force only fifteen to twenty years later, in the late 1950s and early 1960s. Another factor was the tendency during the war to utilise capital stock more fully and to replace capital stock less frequently due to war-time shortages. This and the renewed availability of capital after the war help to account for the appearance of very pronounced capital deepening (negative horizontal effect) after 1945. Thus, what appears to have been the adoption of labour-using techniques during World War II is in part merely a reflection of the employment of more people with a given capital stock. Added to this was the substitution of a greater number of unskilled or semi-skilled Black workers for a given number of Whites, which was made possible by the mobilization of White labour and the relaxation of the pass laws.

These factors are also reflected in Diagram 2.5. which illustrates capital-labour ratios and the industrial wage rate over time. Again a fairly sharp "turning point" occurs after 1945, but there is also strong evidence of a rising capital-labour ratio during the 1930s. In view of this and

the peculiar conditions prevailing during the Second World War the "turning point" in the capital-labour ratio in South Africa may just as convincingly be taken to have commenced after the Great Depression.

The second feature which should be noted about the functions in Diagram 2.5 is that there is a close correspondence in the movement of the K/L ratio and the wage (All Races) lines over time. However, as our regression analysis in chapter 2 shows, insofar as there is any positive relationship at all between capital-labour it becomes clear that it is due to the White, skilled wage component. Furthermore if the category "industry" is disaggregated into its component sectors, mining and manufacturing, it emerges that this tendency is to a very large extent a reflection of conditions in the latter sector, as is revealed in the regression in chapter 4. These results directly contradict the fundamental assertions of both the Lewis and Fei-Ranis versions of the model.

A final point about the capital-labour ratio in "industry" is that it appears to have been falling in the early part of the period under consideration. Wages rates of both Black and White workers also appear to have fallen slightly up until the 1920s. Although the four year period in which this occurs is too short for us to draw definite conclusions, it is not unlikely that this decline in wage-rates and capital-labour ratios marks the end of (the first) phase of

limited labour supplies in South Africa.[1]

Our discussion of changes in the capital-labour ratio and their underlying causes lead us finally to a consideration of the so-called "turning point" in the development of a dual economy. For Fei and Ranis this phenomenon is crucial to the assessment of their model. They assert that "In historical perspective, ..., our central thesis can be supported or rejected in a really meaningful sense only in terms of the existence or non-existence of two distinct historical phases of growth".[2]

The results of the tests in South Africa do indicate a fairly marked change between the historical period prior to the Great Depression and the period after the Second World War, and the decade between these points may be looked upon as one of transition. However, it does not follow from this that South African experience can be regarded as an example of successful transition from a labour surplus to a labour scarcity situation; or from a dual to a single, homogeneous, high-productivity economy - which seems to be the essense of the development problem in their view. Our analysis has shown that in the period prior to the 1940s there was a noticeable increase in labour supplies. Furthermore real

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1. A number of suggested explanations for a similar phenomenon in Japanese experience are put forward by Reubens. See E.P. Reubens, "Capital-Labour Ratios in Theory and in History: Comment", A.E.R., vol. 54, 1964, p. 1059.

2. J.C.H. Fei and G. Ranis "On the Empirical Relevancy of the Ranis-Fei Model of Economic Development: Reply," A.E.R., Vol. 61, 1971, p. 704.

wage rates of unskilled labour, in mining and manufacturing industries remained constant over the same period, and in the case of mining they continued to do so up until the late 1960s. Despite this, capital-labour ratios rose sharply during the 1930s and continued to do so after falling for a short period during the Second World War. In addition, it is significant that the sharp up-turn in the capital-labour ratio after 1945 was largely due to the unusual wartime conditions, particularly in the South African mining sector. In the manufacturing sector, which is presumably the sector Fei and Ranis have primarily in mind when referring to "non-agriculture", the up-turn in the capital-labour ratio is far less pronounced. The very great differences in quantitative results for the mining and manufacturing sectors when disaggregated, and our discussion of the qualitative differences in chapter 4 raise a general point of considerable importance for our assessment. Namely, to what extent should we rely on statistical tests of the kind formulated by Fei and Ranis, for an interpretation and assessment of the development "performance" of underdeveloped countries. In our analysis we have taken only one step in the direction of disaggregation, that is to break down the categories "Industry" and "Agriculture" and look at sub-sectors within these categories. This disaggregation has produced results which very deeply undermine other conclusions which might have been drawn solely from the aggregated results. It is therefore not meaningful, at least in a society as heterogeneous as South Africa, to rely only on the type of tests developed by Fei

and Ranis.

But what of the conceptual system itself, particularly in the more subtle form put forward by Lewis. First, as regards prediction, conclusions drawn from the model of dualism about the path of change in underdeveloped countries have been shown to be wrong in most of Africa, Latin America and Asia, and evidently also in South Africa. In other words, the prediction that capitalist development in a dual economy will automatically result in the steady absorption of the low productivity sector must be rejected. Dualism has in South Africa emerged during the phase of capitalist expansion and has been accentuated by the pattern of capitalist developments itself.

What of the model's analytical value? Lewis' version of the model does grasp, at a very high level of abstraction, one of the essential problems facing many underdeveloped countries; that of the co-existence of two distinct types of economic activity and their association with productive and unproductive employment, high incomes and low incomes as well as many social dichotomies in terms of health, education, and access to social and political privileges. The model also provides a useful, integrated set of concepts, making it possible to deal with some, at least, of the major interrelationships between these sectors; labour and commodity flows and prices. In this respect it still constitutes a useful starting point to the analysis of economic aspects of the development problem. But it must be emphasised that in any analysis of the concrete experience of particular societies

this framework should, at most, be taken only as a starting point. As is borne out by our analysis of aspects of agricultural and industrial development, the model deals with variables at a level of aggregation which misses, in the South African instance, some of the essential features of development. In addition to this, the fact that the model is limited primarily to domestic factors, restricts its applicability very severely in the South African case and probably excludes all but a few underdeveloped countries; those in which foreign trade and investment play only a small part in industrial development.

Finally, and especially important, the model of dualism lacks an historical dimension, and yet is clearly applicable, if at all, to only a relatively brief period in the history of a few countries. As we have tried to show, it is only applicable, if at all, to the South African economy as it was in the 1920's and 1930's. Prior to and after this period the typical institutional conditions in South African industry and agriculture elude the most basic assumptions on which the model rests.

For this reason the model should be accepted only as a loose analytical framework to deal with only a limited range of questions of interpretation of development during a relatively short historical period. The insights it can provide are valuable only when interpreted in this context, and with a acute awareness of the limitations of its basic assumptions and categories.

STATISTICAL APPENDIX

Note On Use Of Appendix

The purpose of this appendix is to ease the flow of discussion in the main body of the text and at the same time document as fully as possible the sources and methods of calculation underlying the data used in the study. Data not presented in the historical/institutional chapter are given here along with additional diagrams. Methods of compilation and calculation are discussed in the body of the text, while sources are given in the footnotes.

A.1. Industry: Mining and Manufacturing

This sub-section outlines the sources and methods of calculation underlying Table 2.1 (Industry) in Chapter 2. Since the data in this table are obtained by aggregating mining and manufacturing industries, all that is necessary here is to discuss sources and methods underlying the individual tables for these two sectors. These are discussed below.

1 (a) Mining:

(i) Presentation: Table 2.1. (Chapter 2) presents data for mining industries in South Africa for the period 1910 to 1970. All figures include mining and quarrying. Columns 1 to 7 show labour, capital stock, the capital-labour ratio, K/L, the rate of increase in K/L, η_q, and the rate of growth of the labour force, η_L, the radial effect, η_r, and the horizontal effect, η_h. In columns 5b and 6b, five

TABLE A.1

SOUTH AFRICA - MINING, 1910-1970

YEAR	Labour	Capital Stock	K/L	η_t	η_L		η_r		η_h
	1000	R1000000							
	1	2	3	4	5a	5b	6a	6b	7
1910	-	128	-	-	-	-	6.7	-	-
1	326	130	399	-	-	-	1.6	-	-
2	332	148	446	11.8	1.8	-	13.9	-	-
3	326	152	466	4.5	-1.8	-	2.7	-	-
4	283	152	537	15.2	-15.1	-1.2	0.0	2.8	-4.0
5	277	150	543	1.1	-2.4	-1.8	-1.3	-0.3	-0.8
6	308	148	481	-12.9	11.4	-2.3	-1.4	-1.4	-0.9
7	305	146	478	-0.6	-0.8	0.5	-1.4	-1.7	2.2
8	292	142	486	1.7	-4.6	2.3	-2.8	-1.7	4.0
9	290	140	484	-0.4	-0.8	-2.2	-1.4	-1.4	-0.8
20	307	138	449	-7.8	6.2	-3.9	-1.5	-1.4	-2.5
1	277	138	499	11.1	-11.1	0.1	0.0	-0.6	0.5
2	254	136	535	7.2	-9.0	1.0	-1.5	0.6	0.4
3	290	138	477	-12.2	14.0	-0.3	1.5	1.2	1.5
4	304	144	474	-0.6	5.0	4.5	4.4	1.2	3.3
5	302	146	483	1.9	.7	6.9	1.4	1.7	5.2
6	342	146	427	-13.1	13.3	4.5	0.0	1.7	2.8
7	351	148	421	-1.4	2.7	2.8	1.4	1.1	1.7
8	358	150	419	-0.5	2.0	3.1	1.4	1.1	2.0
9	347	152	438	4.5	-3.2	-1.8	1.3	1.6	-3.4
30	350	154	440	0.5	0.9	-2.7	1.3	1.3	-4.0
1	331	158	478	8.6	-6.0	-1.6	2.6	1.6	-3.2
2	308	158	513	7.3	-7.3	1.0	0.0	2.5	-1.5
3	332	162	488	-5.1	7.8	2.9	2.5	4.6	-1.7
4	364	172	472	-3.4	9.6	5.9	6.2	6.4	-0.5
5	402	192	478	1.3	10.4	7.9	11.6	8.0	-0.1
6	438	214	489	2.3	8.9	7.3	11.5	9.3	-2.0
7	449	232	517	5.7	2.6	5.6	8.4	8.8	-3.2
8	470	252	536	3.7	4.8	5.0	8.6	6.8	-1.8
9	475	262	551	2.8	1.2	4.0	4.0	4.5	-0.5
40	512	266	519	-6.2	7.7	3.3	1.5	2.4	0.9
1	532	266	500	-3.8	3.8	0.1	0.0	0.2	-0.1
2	527	260	493	-1.4	-0.9	-0.5	-2.3	-1.0	0.4
3	474	254	536	8.7	-11.1	-1.3	-2.4	-1.4	0.1
4	465	250	538	0.4	-2.1	-2.4	-1.6	-1.4	1.0
5	473	248	524	-2.7	1.8	-2.5	-0.8	-0.6	1.9
6	476	248	521	-0.6	0.6	-1.1	0.0	0.6	-1.7
7	469	252	537	3.1	-1.4	0.7	1.6	2.0	-1.3
8	449	262	583	8.6	-4.4	1.3	4.0	3.4	2.1
9	480	276	575	-1.4	6.8	1.3	5.3	4.8	-3.5
50	503	294	584	1.6	4.9	1.5	6.5	6.1	-4.6
1	505	314	621	6.3	0.4	2.1	6.8	7.0	-4.9
2	518	340	656	5.6	2.6	2.4	8.3	7.5	-5.1
3	506	368	727	10.8	-2.5	1.4	8.2	7.3	-5.9
4	531	398	749	3.0	5.0	-	8.2	-	-
5	540	418	774	3.3	1.7	-	5.0	-	-
1946	465	285	614	-	-	-	-	-	-
7	458	292	635	3.9	-1.5	-	2.4	-	-
8	439	305	696	9.1	-4.4	-	4.5	-	-
9	468	336	718	3.2	6.6	1.3	10.1	6.1	-4.8
50	493	359	729	1.5	5.3	2.9	6.9	7.4	-4.5
1	494	383	776	6.4	0.3	2.5	6.8	8.1	-5.6
2	527	417	792	2.1	6.7	2.1	8.9	7.4	-5.3
3	494	450	909	14.8	-6.6	1.4	7.7	6.9	-5.5
4	517	480	929	2.2	4.7	1.9	6.9	6.2	-4.3
5	528	501	949	2.2	2.1	0.8	4.3	4.9	-4.1
6	541	517	955	0.6	2.5	2.1	3.1	3.9	-1.8
7	548	529	906	1.2	1.2	2.6	2.5	3.0	-0.4
8	549	543	989	2.4	0.2	2.4	2.6	2.9	-0.5
9	587	556	948	4.3	6.9	2.5	2.5	3.2	-0.7
60	593	579	976	3.0	1.1	2.3	4.1	3.3	-1.0
1	613	605	988	1.2	3.3	1.5	4.6	2.8	-1.3
2	612	621	1015	2.7	0.0	0.6	2.7	4.2	-3.6
3	591	622	1053	3.7	-5.6	0.5	0.1	4.0	-3.5
4	603	682	1130	7.3	2.1	0.0	9.6	3.6	-3.6
5	607	704	1159	2.6	0.7	-0.6	3.2	3.6	-4.2
6	612	722	1180	1.8	0.7	-0.2	2.6	5.1	-5.3
7	596	739	1240	5.1	-2.6	-0.6	2.4	3.8	-4.4
8	609	796	1307	5.4	2.1	0.3	7.7	3.7	-3.4
9	821	609	1349	3.2	0.0	-	3.2	-	-
70	637	844	1325	9.8	4.6	-	2.8	-	-

year moving averages of values in 5a and 6a are presented.

The mining sector's growth path is illustrated in diagram A.1 and its decomposition analysis in diagram A.2, which A.3 presents the input-ratio analysis.

(ii) Capital: Capital stock from 1910 to 1955 represents estimates of depreciated fixed capital stock in 1938 prices.[1]

For the period 1946 to 1970, capital is estimated from an investment series.[2] Estimates of investment were deflated to 1938 prices[3] to give real gross investment in fixed assets. A capital stock series was obtained by adding investment to a depreciated capital stock base.[4] The reducing

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1. Source: D. Franzsen and J.J. Willers, "Capital Accumulation and Economic Growth in South Africa," in Measurement of National Wealth (Income and Wealth Series, VIII,) edited by R. Goldsmith and C. Saunders, London, Bowes and Bowes, 1959. See Table II, p. 313. All figures are converted into rands.

2. Source: Supplement to the S.A.R.B. Quarterly Bulletin, June, 1971, Table 12.

3. Sources: (1) 1910-1955, Union Statistics for 50 years, H-15. (2) 1946-1970, Supplement to the S.A.R.B. Quarterly Bulletin, September, 1971, Table 8. A price index was obtained by linking these wholesale price indeces (all items including imports). This index was used throughout this study.

4. Source: D. Franzsen and J.J. Willers, op. cit., p. 313, Table II. The base year figure is an average for the five year period centred on 1946.

DIAGRAM A.1.

SOUTH AFRICAN MINES, GROWTH PATH, 1910-1970

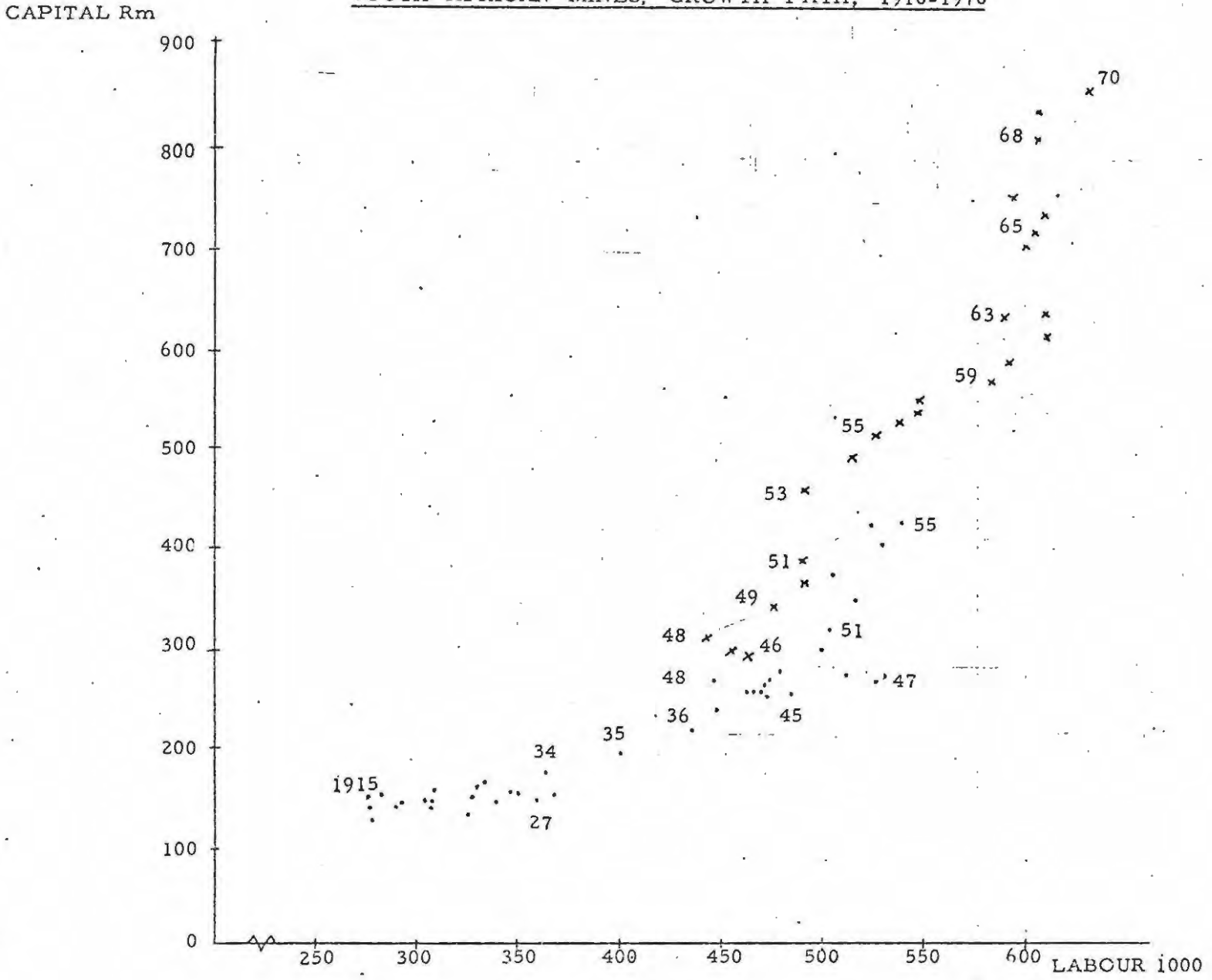


DIAGRAM A.2.

SOUTH AFRICAN MINES, DECOMPOSITON ANALYSIS, 1910-1970

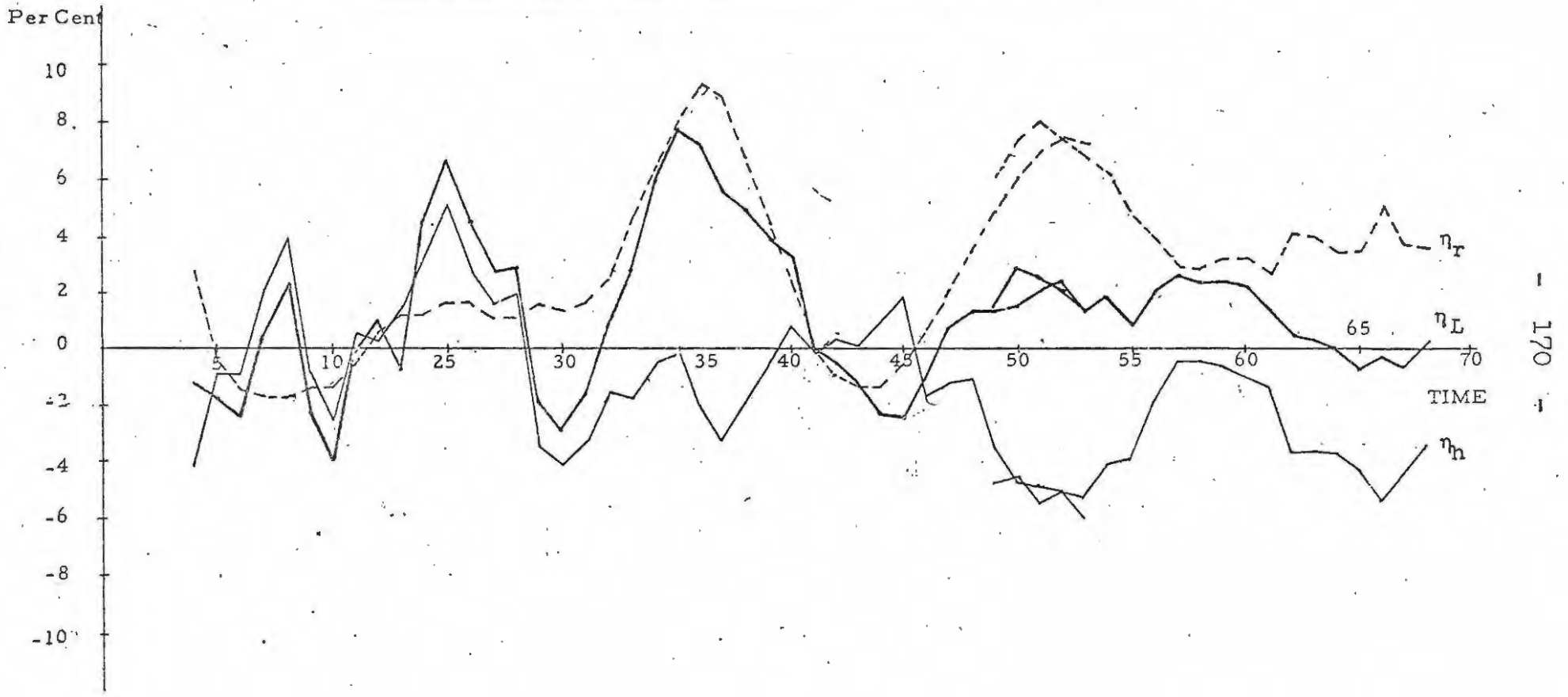
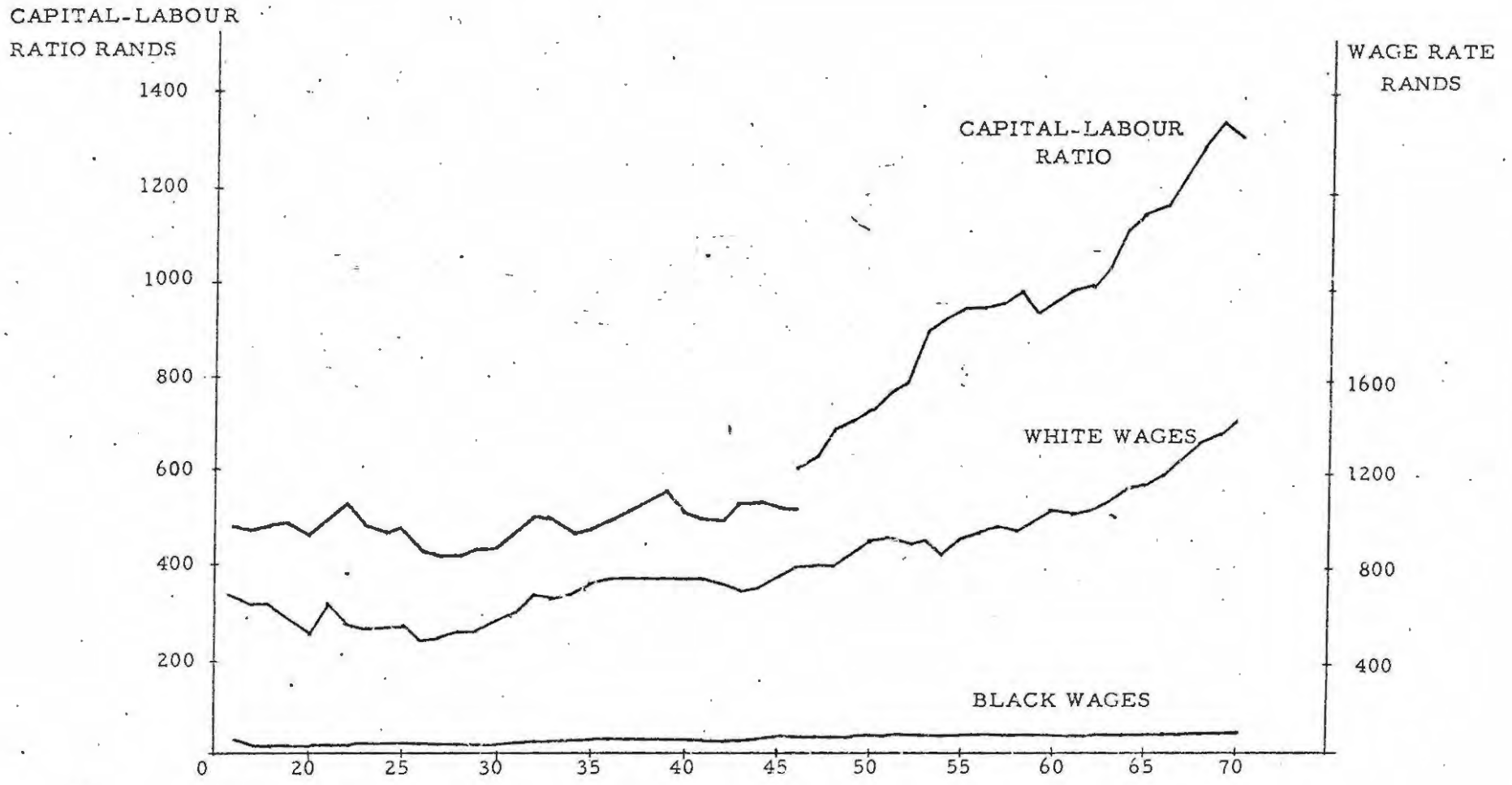


DIAGRAM A.3.

SOUTH AFRICAN MINES, CAPITAL-LABIUR RATIO AND WAGE RATES 1916-1970



balance method[1] was used in deducting depreciation at a rate of 4 per cent per annum.[2] This gave an estimate of depreciated capital stock in 1938 prices.

(iii) Labour: For the period 1910 to 1955, labour figures are based on employment statistics for the mining sector.[3] For the period 1946 to 1970 labour was based on employment figures comparable to the capital stock series for this period.[4]

1 (b) Manufacturing:

(i) Presentation: Table A.2 presents data for the manufacturing sector. All figures include private enterprises and public corporations but exclude government-owned enterprises. The arrangement of variables in Table A.2 is identical to

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1. This method was used throughout the study.

2. Source: D. Franzsen and J.J. Willers, ibid., p. 301, Table V. The estimate of 4 per cent was based on the depreciation rates for the mining sector.

3. Source: A. Spandau, Income Distribution and Economic Growth in South Africa, Vol. II, unpublished doctoral thesis, the University of South Africa, Grahamstown, 1971. Statistical Appendix, Table 43. These figures are taken from Reports of the Government Mining Engineer (1910-1959) and the Secretary for Mines (1960-1970) which appear in the U.G. and R.P. series respectively.

4. Source: Supplement to the S.A.R.B. Quarterly Bulletin, September, 1971, Table.5.

TABLE A.2

SOUTH AFRICA - MANUFACTURING, 1916-1970

YEAR	Capital Stock	Labour	K/L	η_V	η_L		η_r		η_h
	R1000000	'000							
	1	2	3	4	5a	5b	6a	6b	7
1916	46	76	606	-	-	-	4.6	1.8	-
7	48	91	525	-15.4	20.4	-	4.4	1.6	-
8	48	100	479	- 9.6	9.6	-	0.0	1.3	-
9	48	94	510	6.5	-6.4	7.5	0.0	1.7	5.8
20	48	107	450	-13.3	13.2	2.5	0.0	1.6	0.9
1	50	107	465	3.3	0.8	0.6	4.2	2.4	-1.8
2	52	103	507	9.0	-4.7	2.5	4.0	3.1	-0.6
3	54	103	526	3.7	0.0	1.6	3.9	3.9	-2.3
4	56	106	527	0.2	3.5	2.5	3.7	4.4	-1.9
5	58	115	505	-4.4	8.2	4.4	3.6	5.5	-1.1
6	62	121	513	1.6	5.3	5.2	6.9	6.5	-1.3
7	68	127	536	4.5	5.0	5.8	9.7	6.9	-1.1
8	74	132	560	4.5	4.2	4.3	8.8	6.7	-2.4
9	78	141	554	-1.1	6.4	2.8	5.4	5.3	-2.5
30	80	142	565	2.0	0.7	1.4	2.6	4.9	-3.3
1	80	139	576	1.9	-2.2	0.2	0.0	4.2	-4.0
2	86	136	632	9.7	-2.2	2.9	7.5	4.3	-1.4
3	90	133	679	7.4	-2.3	5.5	4.7	7.1	-1.6
4	96	160	601	-13.0	20.5	8.6	6.7	10.0	1.4
5	112	182	616	2.5	13.9	10.7	16.7	10.0	2.7
6	128	206	620	0.6	13.6	12.0	14.3	10.2	1.8
7	138	224	616	-0.6	8.5	8.3	7.8	9.5	-1.2
8	146	232	629	2.1	3.6	6.3	5.8	6.4	-0.1
9	150	236	635	1.0	1.8	5.9	2.7	3.5	2.4
40	152	245	619	-2.6	4.0	5.5	1.3	2.2	3.3
1	152	274	555	-11.5	11.5	5.9	0.0	1.1	4.8
2	156	291	529	-4.9	6.4	8.3	1.3	1.6	6.7
3	154	309	499	-6.0	6.0	8.0	0.0	2.5	5.5
4	162	333	487	-2.5	7.7	6.7	5.2	3.9	2.8
5	172	361	476	-2.3	8.6	6.4	6.2	5.4	1.0
6	184	379	485	1.9	5.0	7.1	7.0	7.8	-0.7
7	200	397	503	3.7	4.7	7.3	8.7	9.9	-2.5
8	224	434	516	2.6	9.3	6.7	12.0	10.7	-4.0
9	258	473	545	5.6	9.1	7.5	15.2	13.4	-5.9
50	286	498	574	5.3	5.2	7.7	10.9	13.3	-5.6
1	310	543	571	-0.5	9.1	6.6	20.2	13.8	-7.2
2	336	576	583	2.1	6.0	5.7	8.4	13.2	-7.3
3	384	596	644	10.5	3.5	5.6	14.3	12.5	-6.9
4	432	623	694	7.8	4.5	-	12.5	-	-
5	462	652	709	2.0	4.8	-	6.9	-	-
1946	204	456	447	-	-	-	-	-	-
7	213	465	459	2.7	2.0	-	4.9	-	-
8	234	471	497	8.3	1.3	-	10.1	-	-
9	261	503	520	4.6	6.8	4.3	11.9	8.2	-3.9
50	283	530	534	2.7	5.5	4.1	8.6	7.7	-3.5
1	299	561	533	0.2	5.7	4.2	5.7	7.2	-3.0
2	308	568	543	1.9	1.4	3.2	3.3	5.7	-2.5
3	328	578	568	4.6	1.7	2.7	6.5	4.4	-1.7
4	371	589	632	11.3	1.8	2.1	4.3	3.5	-1.7
5	376	602	621	-1.8	3.0	2.3	2.1	3.9	-1.6
6	384	623	616	-0.8	2.8	2.4	2.9	3.7	-1.3
7	395	637	621	0.8	2.2	1.8	3.8	4.2	-2.4
8	414	650	637	2.6	2.0	1.7	5.4	4.4	-2.7
9	439	642	683	7.2	-1.2	1.8	6.9	4.8	-2.7
60	450	658	684	0.1	2.5	2.1	3.2	4.6	-2.5
1	463	682	679	-0.7	3.6	3.2	3.2	5.4	-2.2
2	479	706	679	0.0	3.6	5.4	4.0	7.0	-1.6
3	523	761	687	1.2	7.8	7.0	9.7	9.3	-2.3
4	597	832	718	4.5	9.4	7.3	15.0	12.8	-5.8
5	680	922	738	2.8	10.8	7.4	14.4	13.3	-5.9
6	756	966	782	6.0	4.8	6.3	21.2	12.1	-5.8
7	312	1006	807	3.2	4.1	5.7	6.4	9.8	-4.1
8	847	1031	822	1.9	2.5	4.8	3.6	8.1	-3.3
9	880	1095	804	-2.2	6.3	-	3.3	-	-
70	959	1164	806	0.2	6.3	-	6.0	-	-

that in A.1. The growth path and decomposition analysis are given in diagrams A.4 and A.5 and the input ratio analysis in A.6.

(ii) Capital: For 1915 to 1955 capital represents estimates of depreciated fixed capital stock at 1938 prices.[1] Capital stock for the period 1946 to 1970 is estimated in the same way as it is in the mining sector. Investment figures are added to a base year stock figure[2] and depreciation was deducted at a rate of 8.4 per cent per annum,[3] to give an estimate of depreciated fixed capital stock in 1938 prices. It should be pointed out that the base year capital stock figure and the investment figures are not strictly comparable.

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1. Source: D. Franzsen and J.J. Willers, ibid., p. 313, Table II.

2. Source: D. Franzsen and J.J. Willers, ibid., p. 313, Table II. Average for five years centred on 1946.

3. This rate is a combination of the rates applied to the S.A.R.B. Quarterly Bulletin estimates of capital, which are 2 per cent per annum in the case of buildings and 10 per cent in the case of machinery and other equipment. This information was kindly supplied to the writer by Dr. E.C. Groenewald of the Economic Department of the S.A.R.B. Similar estimates, 2 per cent and 12 per cent respectively, were used by Franzsen and Willers,... ibid., p. 301, Table V. Since the ratio of land and buildings to machinery plant and tools has remained remarkably constant over long periods of time (See Union Statistics for 50 years, L-3 and S.A. Statistics, 1970, M-6) it was possible to take a weighted average of the individual depreciation rates. The weighted average was found to be 8.4. per cent per annum.

DIAGRAM A.4.

SOUTH AFRICAN MANUFACTURING, GROWTH PATH, 1916-70

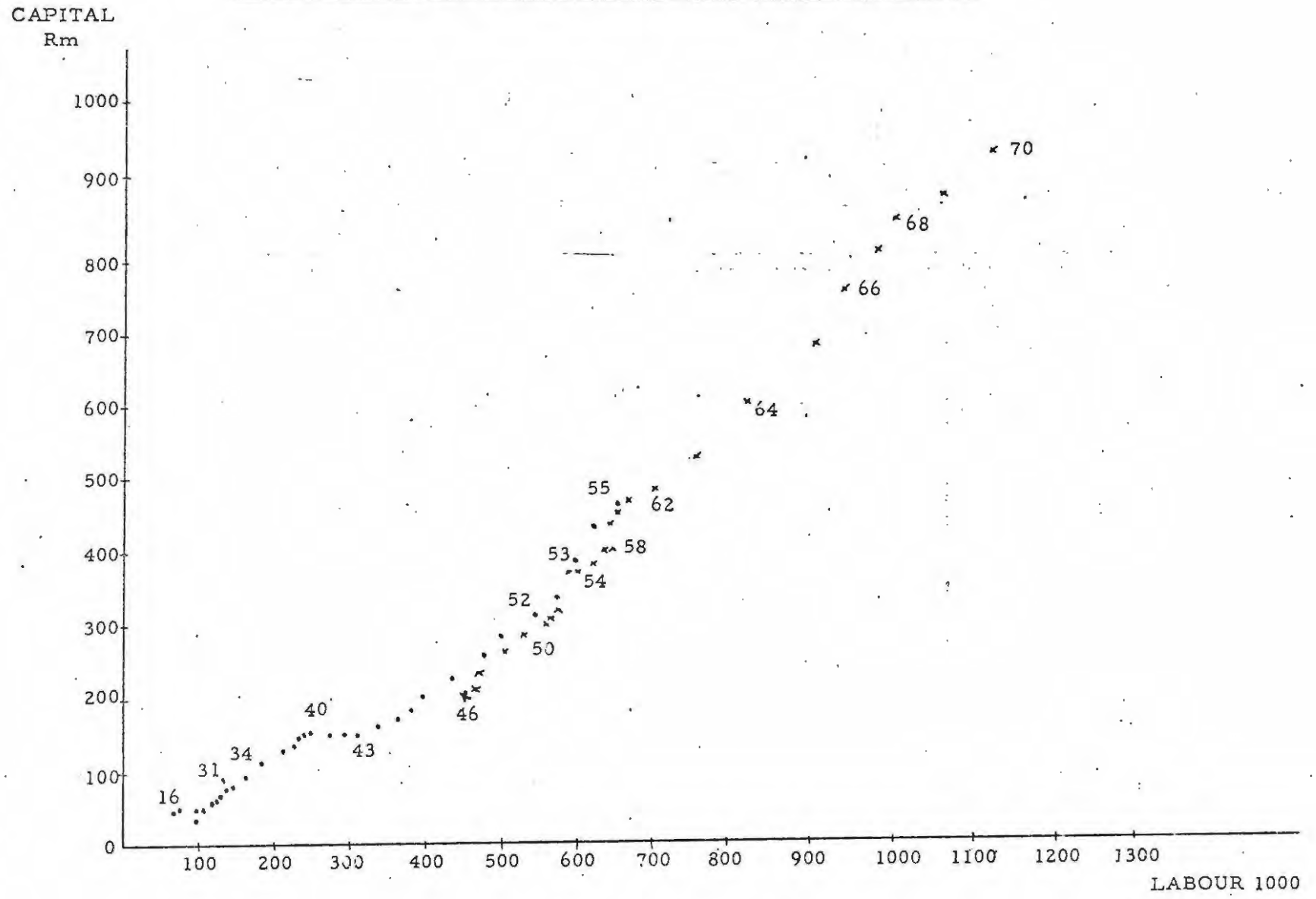


DIAGRAM A.5.

SOUTH AFRICAN MANUFACTURING, DECOMPOSITION ANALYSIS, 1916-70

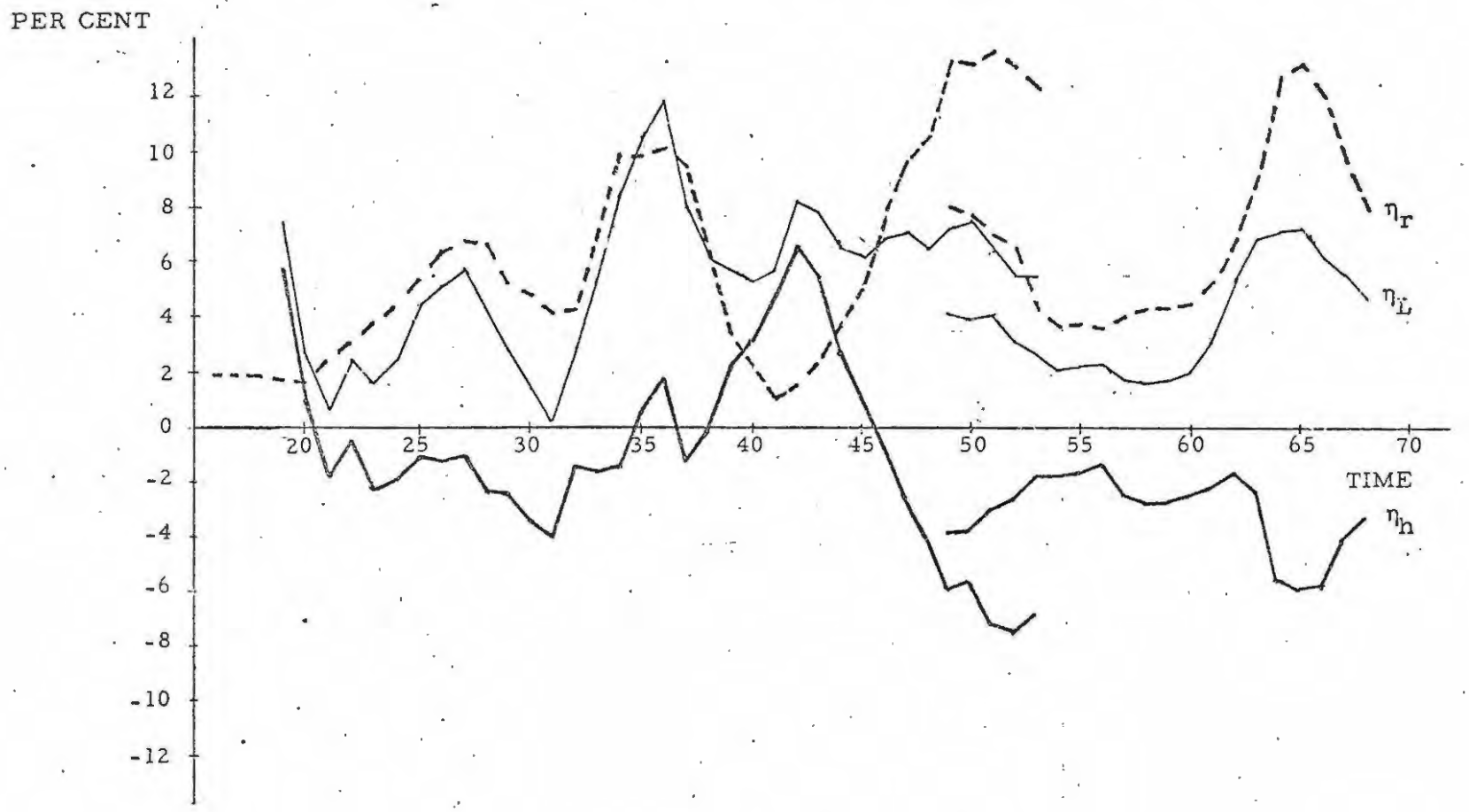
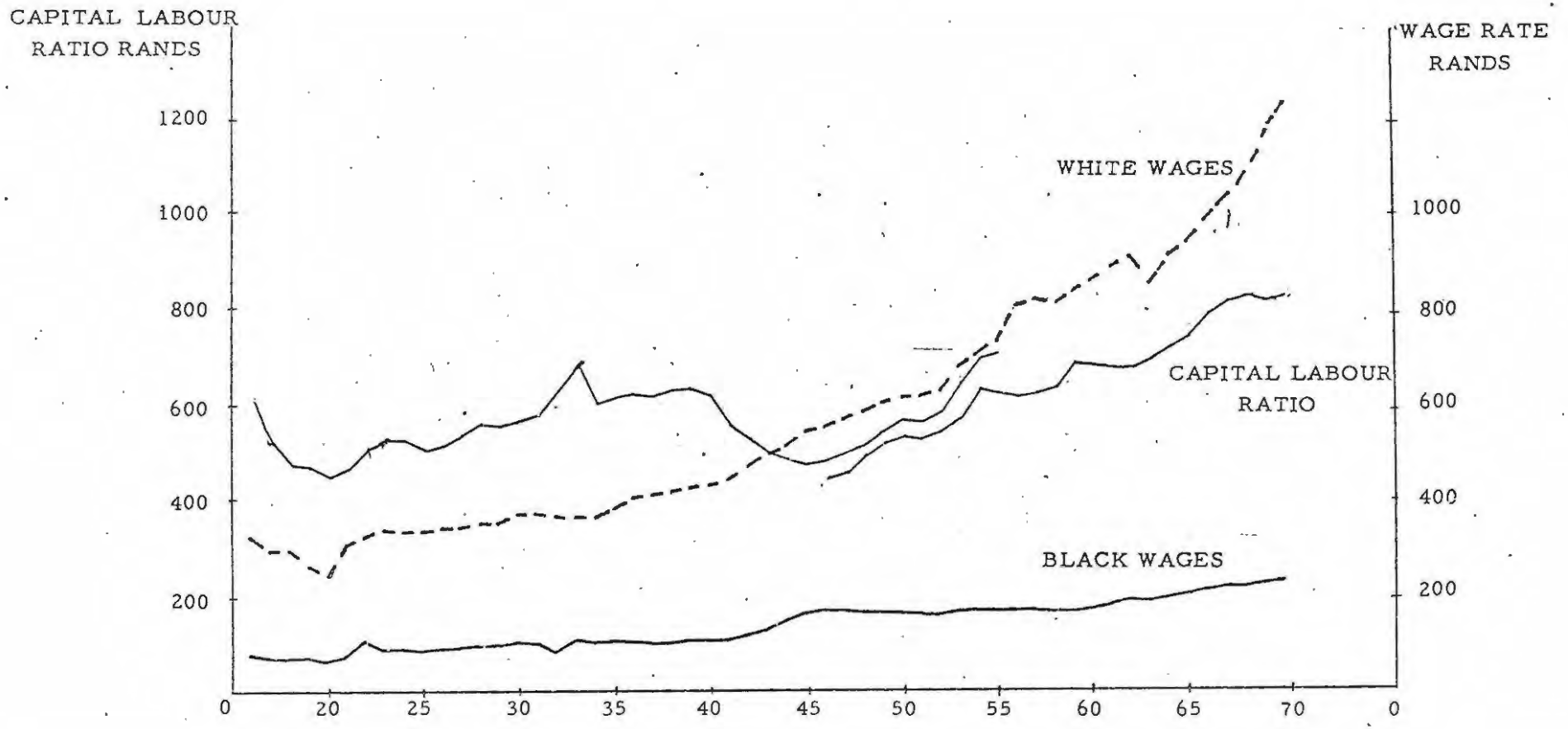


DIAGRAM A.6.

SOUTH AFRICAN MANUFACTURING, CAPITAL-LABOUR RATIOS AND WAGE RATES 1916-70



The former includes only private manufacturing industries and public corporations, while the latter includes, in addition to investment in these industries, investment in government-owned enterprises.[1] Fortunately, however, government owned enterprises form a small part of the total. In 1958 they contributed only 1 per cent of the total output of the manufacturing sector.[2] The effect of including government enterprises is to artificially raise the level of capital stock in succeeding years and to give higher values of η_K than would otherwise have been the case. However, these can be safely ignored due to the small absolute size of the effect.

(iii) Labour: Estimates of labcur in manufacturing are based on employment figures.[3] It should be noted that for the years 1916 to 1925, the figures on which our estimates are based included private- and government-owned undertakings.[4]

The proportion of labour in private industries

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1. This information was kindly supplied to the writer by Dr. B.C. Groenewald of the Economics Department of the S.A.R.B.

2. C.J. du Plessanie, Die Bepaling en die Gebruik van Kapitaal-Opbrengsverhoudings, unpublished M.A. (Econ.) thesis, Pretoria, University of Pretoria, 1968, p. 47.

3. Source: Union Statistics for 50 Years, p. L-3.

4. See Union Statistics for 50 Years, L-36, Note (b).

for these years has been estimated by finding the proportion of "private" to "government" labour in the over-lapping year, 1925, and subtracting the percentage employed in government enterprises for earlier years, on the assumption that the proportion remained constant over the 10 year period. It should also be noted that no manufacturing census was taken in 1931 and 1932. For these years an estimate has been made on the assumption that employment levels fell at a constant rate between 1930 and 1933.

Neither of these operations are likely in themselves to appreciably affect the overall results of our analysis, which deals with long run tendencies.

Labour estimates for 1946 to 1970 are from the same source as investment for these years.[1] There is a slight difference in coverage of employment and investment figures. The former exclude government enterprises while the latter include them. As we have already noted, government-owned enterprises constitute a very small proportion of the total. The capital-labour ratio is slightly higher than it should be, but

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1. Source: Supplement to the S.A.R.B. Quarterly Bulletin, September, 1971, Table 5.

the difference is so small as to have no appreciable effect on the aggregate figures.[1]

(iv) Note on choice of data: Sources other than the S.A.R.B. were not chosen for either mining or manufacturing, for the period 1956 to 1970, for the following reasons: (a) No other currently available source gives comprehensive investment (or capital) series beyond 1964. (b) The S.A.R.B. estimates which have been used here have the advantage of giving a comprehensive and continuous coverage of the entire period 1946 to 1970. This makes it possible to compare a decade of overlapping data (1946-1955). (c) Finally, these estimates form part of the series of Non-Agricultural labour force and capital statistics presented in the next sub-section.

(v) Population: Finally, Table 2.1 (chapter 2) includes estimates of population which have not yet been discussed. The population figures in Column 1, Table 2.1 are made up of population census

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1. This inconsistency could affect the value of η_q if the proportion of government enterprises (and their labour force) in the total varied significantly over time. Since the ratio of gross fixed investment in government enterprises to gross fixed investment in private business enterprises and public corporations in 1970 was almost identical to that ratio in 1943, it is reasonable to assume that distortions from this source are negligible. See Supplement to the S.A.R.B. Quarterly Bulletin, June 1971, Table II.

data and secondary sources.[1] As was mentioned in Chapter 2, these figures probably represent considerable underenumeration for censuses prior to 1970. It should be recalled, however, that there is no reason to believe that this underenumeration was inconsistent. It is therefore reasonable to retain these figures in estimating rates of increase in population, except in the case of the increase between 1969 and 1970. Population estimates by Sadie, which attempt to eliminate the affects of underenumeration prior to 1970 are assembled in Table A.7.

A.2. Earnings in Mining and Manufacturing

This sub-section deals with sources and methods of calculation underlying the wage data in Table 2.2 (chapter 2). The data in Table 2.2. are obtained by adding together earnings and employment data for mining and manufacturing sectors. Each of these sectors will be discussed in turn.

2 (a) Mining:

(i) Presentation: Table A.3. assembles earnings and employment data for mining industries in South Africa between 1916 and 1970. Separate figures

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1. Sources: Population Census, 1960, R.P. 62/1963, p. 2, Table 1. This gives the growth of population in the Republic of South Africa from 1868 to 1960. (2) Population Census, 1970. No. 02-05-01, L 2-3. (3) Union Statistics for 50 Years, A-3. This gives mid-year estimates from 1910 to 1960. (4) South African Statistics, 1970, A-11. This gives mid-year estimates from 1946 to 1969.

TABLE A.3.

AVERAGE REAL EARNINGS OF WHITE AND BLACK LABOUR IN SOUTH AFRICAN MINING INDUSTRIES 1916-1970

YEAR	WHITES					BLACKS					ALL WORKERS			
	Total Earnings in Current Prices	Real Earnings in 1938 Prices	Employment	Per Capita Earnings White Workers	% Increase p.a. in per Capita Earnings	Total Earnings in Current Prices	Real Earnings in 1938 Prices	Employment	Per Capita Earnings Black Workers	% Increase p.a. in per Capita Earnings	Total Earnings in current Prices	Real Earnings in 1938 Prices	Employment	Per Capita Earnings of All Workers
	R1000	R1000		R		R1000	R1000		R		R1000	R1000		R
1916	18044	20753	30406	683	-	15570	17148	277431	62	-	34414	37901	307837	123
7	20525	20679	32149	643	-6.2	15102	15143	27330	55	-12.7	35698	35847	305449	117
8	21858	20543	31877	644	0.2	14622	13742	260034	53	- 3.8	36480	34286	291911	117
9	23558	20015	34566	579	-11.2	14962	12712	254992	50	- 6.0	38520	32727	289558	113
20	23642	19645	38032	517	-12.0	16505	11321	269394	42	-19.0	45118	30966	307426	101
1	25472	19600	30930	634	18.0	15232	11537	245875	47	11.9	41104	31139	276805	112
2	14398	13077	23712	551	-15.1	13748	12487	230348	54	14.9	28146	25564	254060	101
3	17198	16103	30021	537	- 2.6	16082	15058	259512	58	7.4	33280	31161	289523	108
4	18334	16975	31263	543	1.1	16508	15243	272851	56	-3.6	34892	32218	304114	106
5	18904	17520	31791	551	1.5	16426	15223	270281	56	0.0	35330	32743	302072	108
6	19610	18448	38258	482	-14.3	17472	16437	303079	54	-3.7	37082	34884	342137	102
7	20450	19130	39156	489	1.4	17618	16481	312158	53	-1.9	38068	35611	351314	101
8	21114	19779	37317	530	8.4	18162	16990	320978	53	0.0	39306	36769	358295	103
9	21538	20205	37793	535	0.9	18270	17139	309563	55	3.8	39408	37343	347356	108
30	21350	20509	35772	573	7.1	18230	17560	314587	56	1.8	39630	38069	350359	109
1	20718	20677	33743	613	6.9	17508	17473	296772	59	5.3	38226	38150	330515	115
2	20360	21253	31258	680	10.9	16850	17589	276893	64	8.4	37210	38841	308151	126
3	21544	23116	34786	665	-2.3	17618	18903	297349	64	0.0	39162	42019	332135	127
4	25078	26538	38980	681	2.4	19402	20531	325138	63	-1.6	44480	47069	364118	129
5	28928	30774	42596	724	6.3	21876	23272	359331	65	3.2	50804	54047	401837	134
6	32502	34467	45856	752	3.9	24778	26276	391690	67	3.1	57280	60742	437546	139
7	36928	37335	48902	763	1.2	25782	26717	400072	67	0.0	61810	64052	448974	143
8	37150	39150	51773	756	-0.9	27540	27540	418517	66	-1.5	66690	66690	470290	142
9	41056	41097	53558	767	1.5	28044	28072	422322	66	0.0	69100	69169	475880	145
40	43480	42050	55519	757	1.3	30478	29476	456886	65	-1.5	73958	71526	512405	140
1	45606	42150	56205	750	-0.9	32022	29595	475611	62	-4.8	77628	71745	531816	135
2	47494	40489	56270	720	-4.2	32022	27299	470721	58	-6.9	79516	67789	526991	129
3	47762	38394	55167	696	-3.4	29318	23567	419020	56	-3.6	77080	61961	474257	131
4	48214	37433	53397	701	0.7	33220	25792	411137	63	12.5	81434	63225	464531	136
5	51360	38850	51564	753	7.4	35678	26988	421466	64	1.6	87038	65838	473030	139
6	53048	40334	51347	786	4.4	36304	27117	424348	64	0.0	90452	67451	475695	142
7	55838	39970	50425	793	0.9	36270	25963	418625	62	-3.2	92108	65933	469050	141
8	59306	40126	50479	795	0.2	34010	24364	398989	61	-1.6	93316	64490	449468	143
9	67312	43937	51720	850	6.9	40018	26121	428249	61	0.0	107330	70059	479969	146
50	72642	50121	55906	897	5.5	45596	28623	447362	64	4.9	118238	78743	503268	156
1	85614	51821	57894	895	-0.2	47912	28019	447391	63	-1.6	136526	79840	505285	158
2	97990	51704	59215	873	-2.5	50616	27351	459250	60	-5.0	148826	80057	518466	154
3	104302	54211	60229	900	3.1	52676	27378	445617	61	1.7	156978	81589	505846	161
4	111460	56896	67766	840	-7.1	57760	29484	468274	63	3.3	169220	86381	531040	163
5	122312	60521	65301	925	10.1	61424	30393	474585	64	1.6	183736	90913	539886	168
6	130264	63204	66243	954	3.1	64290	31224	487720	64	0.0	194554	94489	553963	171
7	131890	63567	67902	965	1.2	66836	31526	490607	63	-1.6	201726	95153	562509	169
8	135194	61494	64555	953	-1.3	72034	33106	499227	66	4.8	207798	94711	563782	168
9	144856	66122	66858	988	3.7	75644	34974	542345	63	-4.8	222500	100225	609245	165
60	156564	69739	67691	1030	4.3	83334	37120	552390	67	6.3	239898	106858	620081	172
1	159641	69199	67734	1022	-0.7	83087	36362	568126	64	-4.7	245328	105560	636160	166
2	163329	69858	67436	1036	1.4	85503	36597	564720	65	1.6	248892	106455	632156	168
3	166853	71427	66675	1071	3.4	86603	36634	549185	67	3.1	255456	108061	615860	175
4	180043	74245	66176	1122	4.8	93580	38590	556258	69	3.0	273623	112834	622434	181
5	191542	75948	65837	1154	2.9	101634	40299	562511	72	4.3	293176	116247	628348	185
6	204977	78415	65971	1189	3.0	107962	41301	567218	73	1.4	312939	119717	633190	189
7	219621	81221	63958	1270	6.8	109704	40645	551557	74	1.4	329525	121866	615515	198
8	233110	84521	63207	1337	5.3	116304	42191	565456	75	1.4	349474	126713	628663	202
9	245310	85432	62792	1361	1.8	120090	42166	565072	75	0.0	363400	127598	627863	203
70	266422	89886	62638	1435	5.4	132742	44765	594177	75	0.0	399164	134615	656815	205

are given for Whites, Blacks and All workers.

(ii) Earnings: Earnings in current prices include salaries, wages and bonuses for all administrative, technical, clerical and other employees but exclude payments in kind.[1] These were converted into real terms in 1938 prices.[2]

(iii) Employment: Employment figures also include administrative technical, clerical and other employees.[3]

2 (b) Manufacturing:

(i) Presentation: Table A.4 assembles earnings and employment data for manufacturing industries in South Africa between 1916 and 1970.

(ii) Earnings: Earnings in current prices include salaries and wages but exclude payment in kind,[4]

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1. Sources: (1) A. Spandau, op. cit., statistical appendix Table 43. (2) South African Statistics 1965, H-63 and 1970, H-79. For definitions see also H-115, columns 1081-1104. (3) Quarterly Bulletin of Statistics, various issues 1971-73, Table B-28.

2. Sources: (1) Union Statistics for 50 Years, Index of Retail Prices, All Items, Annual Average, M-25. (2) Supplement to the S.A.R.B. Quarterly Bulletin, September, 1971, Table 7, All Items. This index has been used throughout this study.

3. Sources: (1) A. Spandau, ibid., statistical appendix, Table 43. (2) South African Statistics 1968, H-35 and 1970, H-48. For definitions see also H-110, Columns 321-360. (3) Quarterly Bulletin of Statistics, various issues, 1971-73, Table B-5.

4. Sources: (1) 1916-1955, Union Statistics for 50 Years, L-3. (2) 1956-1965 South African Statistics, 1968, H-64 and 1970, H-80. (3) Quarterly Bulletin of Statistics, various issues, 1971-1973, Table B 28.

TABLE A.4.

AVERAGE REAL EARNINGS OF WHITE AND BLACK LABOUR IN SOUTH AFRICAN MANUFACTURING INDUSTRIES 1916–1970

YEAR	WHITES					BLACKS					ALL WORKERS			
	Total Earnings in Current Prices	Real Earnings in 1938 Prices	Employment	Per Capita Earnings of White Workers	% Increase Per Annum in Per Capita Earnings	Total Earnings in Current Prices	Real Earnings in 1938 Prices	Employment	Per Capita Earnings of Black Workers	% Increase Per Annum in Per Capita Earnings	Total Earnings in Current Prices	Real Earnings in 1938 Prices	Employment	Per Capita Earnings of all Workers
	R1000	R1000		R		R1000	R1000		R		R1000	R1000		R
1916	8216	9018	28127	322		3490	3816	49434	78		11706	12891	77561	166
7	9376	9414	31944	295	-9.0	4249	4266	61435	69	-13.0	13625	13680	93379	146
8	10836	10184	35007	291	-1.4	5043	4740	67363	70	1.4	15879	14924	102370	146
9	10348	8792	33549	262	-11.1	5201	4419	62629	71	1.4	15549	13211	96178	137
20	13064	8960	37367	240	-9.2	6661	4569	71498	64	-10.9	19725	13529	108865	124
1	15028	11385	37041	307	27.9	7383	5593	72665	77	20.3	22411	16978	109706	155
2	12846	11668	35543	328	6.8	8031	7294	69282	105	36.4	20877	18962	104825	181
3	13274	12429	35802	347	5.8	6669	6244	68993	91	-15.4	19943	18673	104795	178
4	13850	12789	37713	339	-2.4	6995	6459	70695	91	0.0	20745	19155	108408	177
5	14808	13724	40791	336	-0.8	7312	6777	74035	91	0.0	22120	20500	114870	178
6	16034	15084	43911	343	2.1	7890	7422	76984	96	5.4	23924	22506	120928	186
7	17336	16217	47165	344	0.3	8326	7789	79757	98	2.1	25662	24007	126922	189
8	18952	17729	50378	352	2.3	8822	8253	81756	101	3.1	27774	25981	132134	197
9	20260	19006	53593	354	0.6	9470	8684	86991	102	1.0	29730	27889	140659	198
30	21484	20638	51809	377	6.5	9722	9339	86807	108	5.9	31206	29977	141615	212
1	20746	20659	55656	371	-1.6	8881	8844	8168	107	-0.9	29627	24469	137304	214
2	20006	20679	56577	366	-1.4	8117	8391	78478	85	-25.8	28123	29062	135055	215
3	19292	20700	57047	363	-0.8	7420	7961	75456	106	24.7	26712	28661	132503	216
4	23782	25166	63707	366	0.8	8854	9369	90904	103	-2.9	32636	34535	159611	216
5	28126	29921	77145	388	6.0	10402	11066	104609	106	2.9	38528	40987	181755	226
6	32180	34125	84913	402	3.6	12280	13022	121517	107	0.9	44460	47147	206430	228
7	36190	37562	91375	410	2.0	13972	14479	132639	109	1.9	50161	51981	224014	232
8	38650	38650	92673	417	1.7	15246	15246	134311	109	0.0	53896	53896	231986	232
9	39642	39654	93054	426	2.2	16054	16070	143069	112	2.8	55696	55762	236123	236
40	41988	40221	92545	435	2.1	17501	16928	152912	111	-0.9	59092	57149	245457	233
1	45966	42482	96540	440	1.1	21920	20259	177457	114	2.7	67886	62741	273779	229
2	53822	45844	97433	471	7.0	28192	24014	193815	124	8.8	82014	69718	291218	240
3	61156	49261	99125	496	5.3	35350	28416	209532	136	9.8	96506	77677	308657	251
4	68918	53508	104564	512	3.2	44044	34196	227964	150	10.3	112962	87703	332528	264
5	80446	60882	112219	542	5.9	54260	41014	248785	165	10.0	134706	101896	361004	282
6	89390	67032	120481	556	2.6	59746	44553	258541	172	4.2	149636	111585	379022	294
7	103366	74963	129686	571	2.7	64896	46453	267254	174	1.2	168362	120917	396940	304
8	120942	81828	140497	582	1.9	74340	50365	293259	172	-1.2	195382	132194	433756	305
9	140566	91253	152106	602	3.4	85640	55901	320967	174	1.2	226206	147654	473373	312
50	152530	95750	157129	609	1.2	92354	57975	340758	170	-2.4	244884	153725	497887	309
1	175482	102621	168245	610	0.2	106996	62521	374998	167	-1.8	282478	165191	543252	304
2	205832	110722	173476	638	4.6	122180	65724	402390	163	-2.5	328072	176415	575866	306
3	229454	119259	177847	671	5.2	135700	70530	418008	169	3.7	365154	189789	595855	319
4	248180	126637	183141	692	3.1	148062	75580	439541	172	1.8	396242	202267	622682	325
5	270112	133653	183334	725	4.8	162720	80515	468301	172	0.0	432832	214167	652635	328
6	259444	125883	158757	793	-	160299	77778	451896	172	-	419743	203660	610683	353
7	288545	135950	168259	808	1.2	167653	78991	462959	171	-0.6	456198	214985	631248	341
8	303190	136083	171528	805	-0.4	174871	79612	474258	168	-1.8	478061	217696	645786	337
9	316399	142313	171602	829	3.0	179581	80930	473959	171	1.8	495980	223314	645561	346
60	329558	146006	171595	851	2.7	188080	83326	464935	179	4.7	517638	230574	636530	362
1	355116	153944	175630	877	3.1	205795	89213	451499	185	3.4	560911	243134	657129	370
2	379174	162213	180545	898	2.4	223888	95781	497659	192	3.8	603062	257939	678304	380
3	398890	168770	200919	844	-6.4	248376	105088	575788	183	-4.9	647266	273801	775807	353
4	477210	196791	218721	900	6.6	286413	118108	620989	190	3.8	763618	314891	839710	375
5	546917	216462	233900	925	2.3	352362	139715	695600	201	5.8	898279	356177	929500	383
6	630382	241156	246900	977	5.6	394584	150950	716900	211	5.0	1023966	392106	963800	407
7	697674	258016	254400	1014	3.3	431372	159531	752700	212	0.5	1129046	417547	1007100	415
8	760880	275772	258500	1067	5.2	468405	169835	772100	220	3.8	1228985	445607	1030600	432
9	878010	308290	268500	1148	7.6	534150	187553	827000	227	3.2	1412160	495843	1095500	453
70	995318	335802	276500	1213	5.7	613811	207089	887200	233	2.6	1609129	542891	1164100	466

as in the case of mining. Again, earnings were converted into real terms, in 1938 prices.

(iii) Employment: Employment again includes executive, administrative, clerical, professional, technical, production and related workers.[1]

(iv) Changes in Classification: Two lines separate the data in Table A.4 into three periods, 1916-1925, 1926-1955 and 1956-1970. These lines demarcate changes in the classification of industries. In the first period, 1916-1925, the censuses included both privately-owned and government-owned enterprises.[2] On the assumption that the proportion of private to government enterprises remained the same over this ten year period, a constant fraction representing the share of government enterprises was deducted from all years in the case of both earnings and employment. The fraction was estimated from values in the overlapping years, 1925.[3]

The division between the periods 1926-1955 and

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1. Sources: (1) 1916-55, Union Statistics for 50 Years, L-3. (2) 1956-1965 South African Statistics, 1968, H-36 and 1970, H-48. (3) Quarterly Bulletin of Statistics, various issues, 1971-1975, Table B-7.

2. See Union Statistics for 50 Years, L-36, Section (b) Private and Government Undertakings.

3. See, Union Statistics for 50 Years, L-3.

1956-1970 marks the point at which the South African Bureau (now Department) of Statistics changed to the "International Standard Industrial Classification of all Economic Activities".[1] Some other changes have taken place over the years,[2] but these are minor and do not alter our results significantly.

(v) "Real" Wages: We should note that the exclusion of payments in kind from the earnings data results in a slight underestimation of real wages, particularly of African mine workers. Since payment in kind on the mines has in general formed a not insignificant part of real earnings of Blacks, but only a negligible part of the earnings of Whites,[3] the differential between Whites

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1. More precisely, the Bureau changed over to this system as from 1950/51. However several alterations in the categorization of major groups of industries took place between 1950/51 and 1950/55, and it was only after the latter date that consistency was re-attained. In this regard see (1) Union Statistics for 50 Years, L-36, L-37 and L-38, Sections (c), (d) and (g). (2) South African Statistics, 1970, O-12 and O-13, Section D.

2. See, (1) Union Statistics for 50 Years, L-37 and L-38, sections (d) and (g). (2) South African Statistics, 1970, O-12 to O-17, Sections D,E and F. The most important of the changes was the exclusion of the "automotive" industry from the industrial census for some years between 1950 and 1956. In the data presented in Table A.4, the automotive industry is included for all years.

3. See, Annual Reports of the Government Mining Engineer. For example, U.G. 37 of 1926, Table 9.

and Blacks is slightly exaggerated. On the other hand, real earnings of Blacks (Africans in particular) are probably slightly less than our figures indicate due to the fact that money wages have been deflated by a price index based on expenditure patterns of white households. Expenditure in food is less important in the case of White than of Black households and food prices have risen more rapidly than prices of all consumption goods taken together, except for brief periods.[1] Taking all into consideration, the aggregate data would seem to give a reasonably accurate reflection of the true picture.

A.3. Non-Agriculture

The sources and methods of calculation applicable to Table 2.3 (Chapter 2) are identical to those for the period 1946 to 1970 in Tables 2.1 (Chapter 2), as well as A.1 and A.2. The only difference is that Table 2.3 includes not only mining and manufacturing but also all other non-agricultural sectors.

(i) Capital: The base year capital stock figure[2] was

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1. See, (1) Union Statistics for 50 Years, H-23, H-26 and H-34. (2) Supplement to the S.A.R.B. Quarterly Bulletin, September, 1971, Table 7. (3) W.F.J. Steenkamp, "Bantu Wages in South Africa," S.A.J.E., Vol. 30, 1962, p. 99.

2. Source: D. Franzsen and J.J. Willers, op. cit., p. 319, Table II. The base year capital stock estimate was obtained by subtracting "agriculture" from "total private and public capital stock" to give a depreciated, fixed capital stock figure in 1938 prices centred on 1945.

centred on 1945 and to this was added gross domestic fixed investment in non-agricultural sectors.[1] Depreciation was deducted at a rate of 3.6 per cent per annum.[2] As in the case of earlier tables, investment figures were deflated to 1938 prices.

(ii) Employment: Estimates of non-agricultural labour were obtained from the same source as the investment figures, but these figures represent only 93 per cent of total employment in all non-agricultural industries.[3] The underenumeration of labour inflates the capital-labour ratios in this series, but is unlikely to be important in the other results.

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1. Source: Supplement to the S.A.R.B. Quarterly Bulletin, June, 1971, Table 12.

2. The rate of depreciation was estimated from the ratio of buildings and structures to machinery and equipment in the entire economy. This ratio was found to be almost constant between 1909 and 1955, and it was therefore assumed that the same would be true for the period 1955 to 1970. See D. Franzsen and J.J. Willers, op. cit., p. 310, Table XI. Having found this ratio, a weighted average of the individual rates of depreciation (2 per cent per annum on buildings and 10 per cent per annum on machinery and equipment) was calculated and found to be 3.6 per cent.

3. Source: Supplement to the S.A.R.B. Quarterly Bulletin, September 1971, Table 5. See footnote 4, p. 26.

(iii) Population: Population estimates in Table 2.3 are identical to those in Table 2.1 for the relevant years.

A.4. Census Data: Agriculture, Mining, Manufacturing and Services

Table 2.4 (Chapter 2) presents population census estimates of labour (or economically active population) in the four main sectors of the South African economy between 1921 and 1970.

(i) Labour: Labour estimates for the agricultural sector, which includes forestry, hunting and fishing (these form a small fraction of the total), include White managers, White labour and permanent and casual Black labour as well as domestic servants. African farm labourers in the African agricultural sector are excluded.[1] It should be noted that the inclusion of casual labour in the figures exaggerates the labour estimate. This probably lowers the absolute size of the capital labour ratio fairly significantly.

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1. Sources: (1) A. Spandau, op. cit., statistical appendix, Table 4.5. (2) J.L. Sadie, "Labour Supply in South Africa" Finance and Trade Review, Vol. 9, 1970/71, p. 231, Table 8. Sadie's estimates do not appear to be strictly comparable with the census data for 1921 to 1970. Compare the economically active agricultural "Bantu" labour force figure in Sadie's Table 8 with that in table 2.4. The probable explanation for this difference lies in the fact that censuses prior to the 1970 census tended to underenumerate the African population.

Furthermore the inclusion of casual labour makes inter-temporal comparisons unreliable. This is because the number of casual labourers drops sharply during poor agricultural years.

Manufacturing includes manufacturing industries, construction, electricity, gas, water and sanitary services.

Services include commerce, finance, transport, storage, communication and other services.

(ii) Capital: Capital stock figures are for sectors defined in the same way[1] as in the case of labour.[2] These represent depreciated fixed capital stock in 1938 prices.

A.5. Du Piesanie's Estimates

In Table A.5 we present estimates of capital and labour in mining and manufacturing industries. These figures include a wider range of industries than those in Table 2.1 (Industry) in Chapter 2.4. In addition, the capital stock estimates are independently derived, which means that this set of data provides a useful check of the data in Table 2.1.

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1. It should be noted that estimates of capital stock in White agriculture include a relatively small amount of capital used in African agriculture, which has a negligible effect on the totals.

2. Source: C.J. du Piesanie, op. cit., p. 64, Table IV,II. Du Piesanie's estimates are converted into 1938 prices. For 1970, estimates were obtained by extrapolating at a constant rate of increase from 1966. The rate of increase was an average for the period 1956-1966. Since this was a period of only four years, it is unlikely to introduce a large error into the results.

TABLE A.5.

SOUTH AFRICA - INDUSTRY (DU PIESANIE'S FIGURES), 1916-1955

YEAR	LABOUR	CAPITAL STOCK	K/L	η_q	η_c		η_r		η_h
	1000	R1000000							
	1	2	3	4	5a	5b	6a	6b	7
1916	392	205	523	-	-	-	-	-	-
7	407	198	486	-7.6	3.8	-	-3.5	-	-
8	403	189	469	-3.6	-1.0	-	-4.8	-	-
9	396	183	462	-1.5	-1.8	0.4	-3.3	-2.6	3.0
20	434	182	419	-10.3	9.6	-1.8	-0.5	-1.8	0.0
1	407	180	442	5.5	-6.6	0.7	-1.1	-0.5	1.2
2	379	181	478	8.1	-7.4	2.0	0.6	1.2	0.8
3	415	184	443	-7.9	9.5	0.4	1.7	2.0	-1.6
4	436	194	445	0.5	5.1	3.9	5.4	3.0	0.9
5	442	201	455	2.2	1.4	6.1	3.6	3.8	2.3
6	491	208	424	-7.3	11.1	4.7	3.5	4.2	0.5
7	508	218	429	1.2	3.5	3.6	4.8	3.6	0.0
8	521	226	434	1.2	2.6	3.5	3.7	3.2	0.3
9	519	231	445	2.5	-0.4	0.2	2.2	2.3	-0.3
30	523	235	449	0.9	0.8	-1.8	1.7	1.3	-3.1
1	496	233	470	4.7	-5.4	-1.5	-0.9	.8	-2.3
2	466	232	498	6.0	-6.4	1.4	-0.4	2.0	-0.6
3	484	235	486	-2.5	3.9	3.8	1.3	4.4	-0.6
4	552	254	460	-5.7	14.0	7.1	8.1	7.5	-0.4
5	622	289	465	1.1	12.7	9.4	13.8	10.0	-0.6
6	692	331	478	2.8	11.3	9.5	14.5	11.7	-2.2
7	727	371	510	6.7	5.0	6.9	12.1	11.3	-4.4
8	760	409	538	5.5	4.5	5.5	10.2	8.9	-3.4
9	767	433	565	5.0	1.0	4.4	5.9	6.0	-1.6
40	810	440	543	-4.1	5.6	3.7	1.6	3.2	0.5
1	857	441	515	-5.4	5.8	1.9	0.2	0.8	1.1
2	872	433	498	-3.4	1.8	2.0	-1.8	-0.3	1.7
3	832	425	511	2.6	-4.8	1.9	-1.9	-0.1	1.8
4	845	427	505	-1.2	1.6	1.4	0.5	0.8	0.6
5	886	437	493	-2.4	4.9	1.6	2.3	2.7	-1.1
6	916	458	500	1.4	3.4	3.2	4.8	5.3	-2.1
7	941	494	525	5.0	2.7	4.6	7.9	7.7	-3.1
8	972	549	565	7.6	3.3	4.5	11.1	9.3	-4.8
9	1056	617	584	3.4	8.6	5.0	12.4	10.1	-5.1
50	1105	680	615	5.3	4.6	5.4	10.2	10.3	-4.9
1	1168	739	633	2.9	5.7	4.8	8.7	10.3	-5.5
2	1223	808	661	4.4	4.7	4.1	9.3	9.7	-5.6
3	1230	895	728	10.1	0.6	3.8	10.8	8.8	-5.0
4	1288	978	759	4.2	4.7	-	9.3	-	-
5	1333	1035	790	4.1	3.5	-	5.8	-	-

(i) Presentation: Du Piesanie's estimates of capital stock are presented, along with estimates of labour in Table A.5. Estimates cover the years 1916 to 1955.[1] The order of presentation is identical to that in Tables A.1 and A.2. The results of the decomposition and input ratio analysis are illustrated in diagrams A.7 and A.8.

(ii) Capital: Capital represents depreciated, fixed capital stock in 1938 prices and includes mining, quarrying, manufacturing, and electricity, gas and steam.[2]

(iii) Labour figures for the mining sector and manufacturing sectors were taken from Tables A.1 and A.2. To these were added employment in construction[3] and electricity, gas and steam.[4] The only apparent inconsistency between the capital and labour estimates in this table arises out

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1. It was not possible to obtain comparable labour statistics for the ensuing years.

2. Source: C.J. du Piesanie, op. cit., p. 64, Table IV,II. "Manufacturing" includes private enterprises, public corporations and government enterprises. See C.J. du Piesanie, ibid., p. 47. Du Piesanie's estimates which were in 1958 prices have been deflated to 1938 prices.

3. Source: Union Statistics for 50 Years, L-29. For years prior to 1925, a constant percentage was deducted for government employees. This percentage was calculated from the ratio of government to total employees in the over-lapping year, 1925.

4. Source: Union Statistics for 50 Years, L-31. This category includes private establishments, public corporations and government enterprises.

DIAGRAM A.7.

SOUTH AFRICA - INDUSTRY (DU PIESANIE'S ESTIMATES), 1916-1955

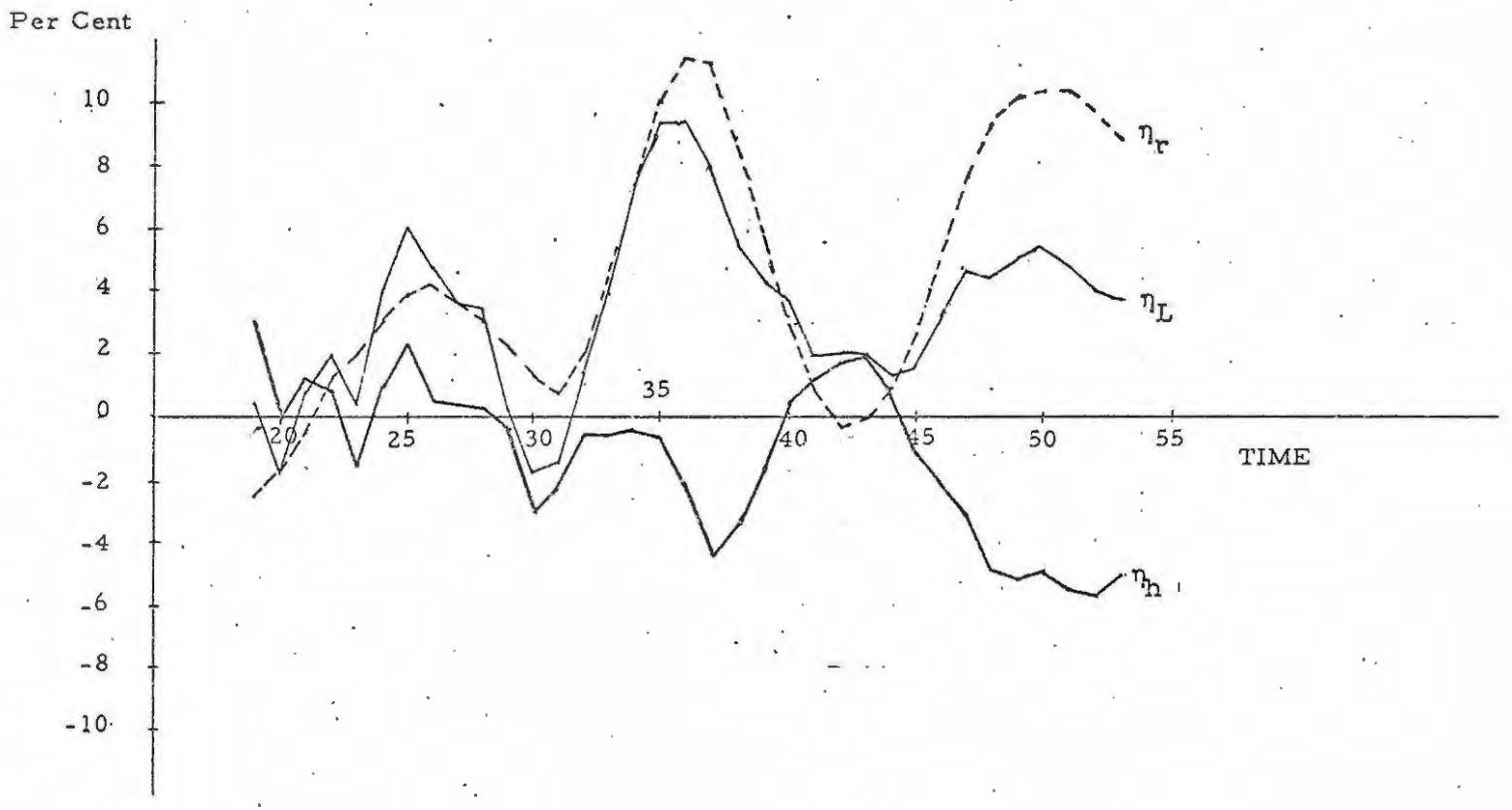
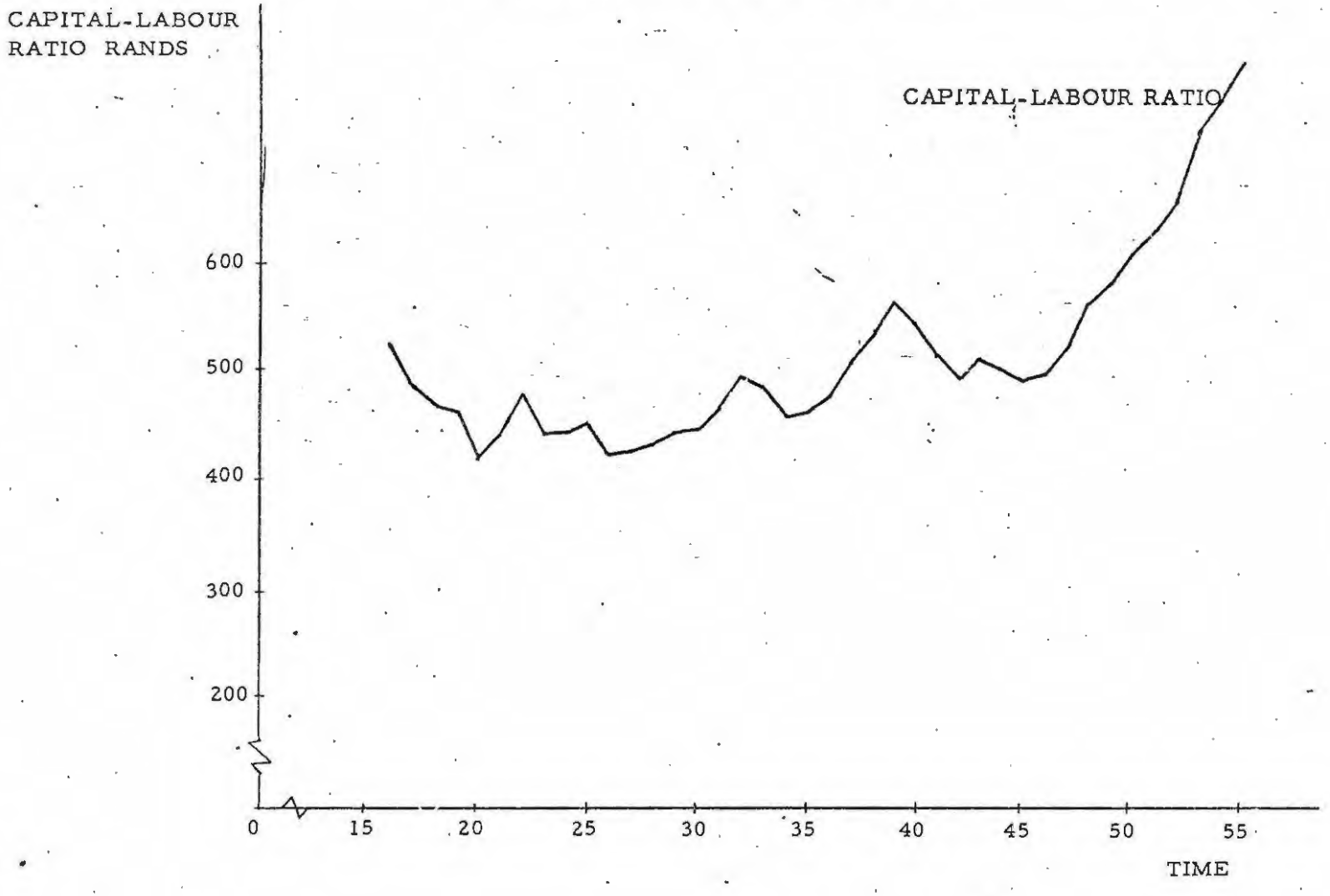


DIAGRAM A.8.

SOUTH AFRICAN INDUSTRY (DU PIESANIE'S ESTIMATES)

CAPITAL-LABOUR RATIO 1916 - 1955



of the fact that government enterprises are included in the capital estimates for manufacturing but not in the labour estimates. As the proportion of government-owned enterprises is very small (1 per cent in 1958) the effect on the results is likely to be insignificant.[1]

A.6. South African Railways and Harbours

Table A.6 presents data for the South African Railways and Harbours.

(i) Presentation: The presentation in Table A.6 is identical to that in Tables A.1, A.2 and A.5. This sector's growth path is illustrated in diagram A.9 and its decomposition analysis in A.10.

(ii) As before, capital represents depreciated fixed capital stock in 1938 prices.[2]

(iii) Labour represents employment in this sector.[3]

A.7. Alternative Population Estimates

Table A.7 gives Sadie's preliminary estimates of population size and rates of increase between 1931 and 1970.[4]

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1. See C.J. du Plessanie, op. cit., p. 47.

2. Source: D. Franzsen and J.J. Willers, op. cit., p. 313. Table II.

3. Source: Union Statistics for 50 Years, G-15.

4. Source: J.L. Sadie, "Population and Economic Development in South Africa", S.A.J.E. Vol. 39, 1971, p. 205, Tables 1 and 2.

TABLE A.6.

SOUTH AFRICA - S.A.R. & H., 1910-1955

YEAR	LABOUR	CAPITAL STOCK	K/L	η_a	η_L		η_r		η_h
		R1000000							
	1	2	3	4	5a	5b	6a	6b	7
1910	.52595	214	4069	-	-	-	-	-	-
1	54752	214	3909	-4.1	4.1		0.0	-	-
2	61063	218	3570	-9.5	11.5		1.9	-	-
3	62666	224	3575	0.1	2.6	3.2	2.8	1.5	1.7
4	59013	230	3597	9.0	-6.2	2.3	2.7	1.3	1.0
5	61402	230	3746	-4.0	4.0	1.6	0.0	0.6	1.0
6	61080	228	3733	-0.3	-0.5	3.0	-0.9	-0.4	3.4
7	65907	224	3399	-9.8	7.9	5.1	-1.8	-1.1	6.2
8	72477	220	3035	-12.0	10.0	6.4	-1.8	-0.9	7.3
9	75497	218	2888	-5.1	4.2	8.1	-0.9	-0.5	8.6
20	83338	220	2640	-9.4	10.4	1.6	0.9	-0.2	1.8
1	89858	222	2471	-6.8	7.8	2.1	0.9	0.7	1.4
2	72218	222	3074	24.4	-24.4	2.5	0.0	1.4	1.1
3	81378	228	2802	-9.7	12.7	1.8	2.7	1.9	-0.1
4	86181	234	2715	-3.2	5.9	1.3	2.6	2.6	-1.3
5	92372	242	2620	-3.6	7.2	5.7	3.3	3.2	2.5
6	97154	252	2594	-1.0	5.2	3.2	4.1	3.4	-0.2
7	94756	260	2744	5.8	-2.5	3.1	3.2	3.6	-0.5
8	94772	270	2849	3.8	0.0	1.8	3.8	3.5	-1.7
9	100095	280	2797	-1.9	5.6	-0.5	3.7	2.9	-3.4
30	100551	288	2864	2.4	0.5	-2.0	2.9	2.4	-4.4
1	94799	290	3059	6.8	-6.1	-4.2	0.7	1.7	-5.9
2	86287	292	3384	10.6	-9.9	-4.4	0.7	1.3	-5.7
3	77653	290	3735	10.4	-11.1	-2.2	0.7	1.1	-3.3
4	81175	294	3622	-3.1	4.5	1.3	1.4	1.9	-0.6
5	90561	300	3313	-9.3	11.6	4.9	2.0	2.5	2.4
6	103701	314	3028	-9.4	11.5	8.7	4.7	3.7	5.0
7	112091	326	2908	-4.1	8.1	8.2	3.8	4.2	4.0
8	120967	348	2877	-1.1	7.9	5.9	6.7	3.8	2.1
9	123421	362	2933	1.9	2.0	3.7	4.0	2.9	0.8
40	123166	362	2939	0.2	-0.2	3.2	0.0	1.9	1.3
1	123867	362	2922	-0.6	0.6	2.5	0.0	0.6	1.9
2	130693	358	2739	-6.7	5.5	2.9	-1.1	-0.2	3.1
3	136893	358	2615	-4.7	4.7	4.0	0.0	0.0	4.0
4	142004	358	2521	-3.7	3.7	5.9	0.0	0.7	5.2
5	149880	362	2415	-4.4	5.5	6.4	1.1	1.4	5.0
6	164878	374	2268	-6.5	10.0	6.5	3.3	2.1	4.4
7	178138	384	2156	-5.2	8.0	6.3	2.7	3.2	3.1
8	187705	398	2120	-1.7	5.4	4.7	3.6	3.5	1.2
9	193019	420	2176	2.6	2.8	2.5	5.5	3.1	-0.6
50	187914	430	2288	5.1	-2.7	1.8	2.4	2.9	-1.1
1	186225	436	2341	2.3	-0.9	1.8	1.4	3.2	-1.4
2	194105	444	2287	-2.4	4.2	1.0	1.8	3.0	-2.0
3	205274	466	2270	-0.7	5.8	2.3	5.0	3.2	-0.9
4	201810	486	2396	5.6	-1.2	-	4.3	-	-
5	210293	502	2387	-0.4	3.7	-	3.3	-	-

DIAGRAM A.9.

SOUTH AFRICAN RAILWAYS AND HARBOURS, GROWTH PATH, 1910-1955

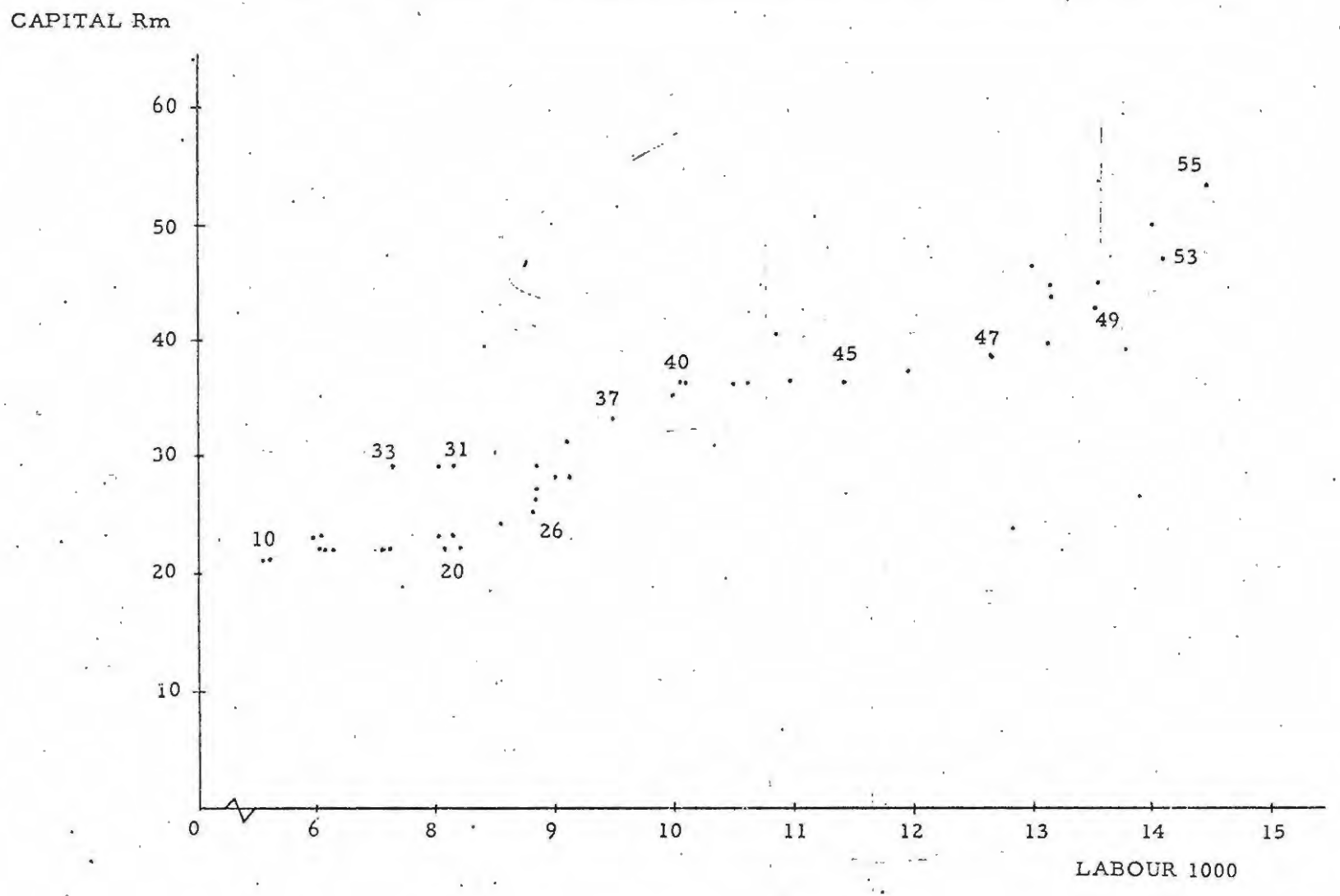
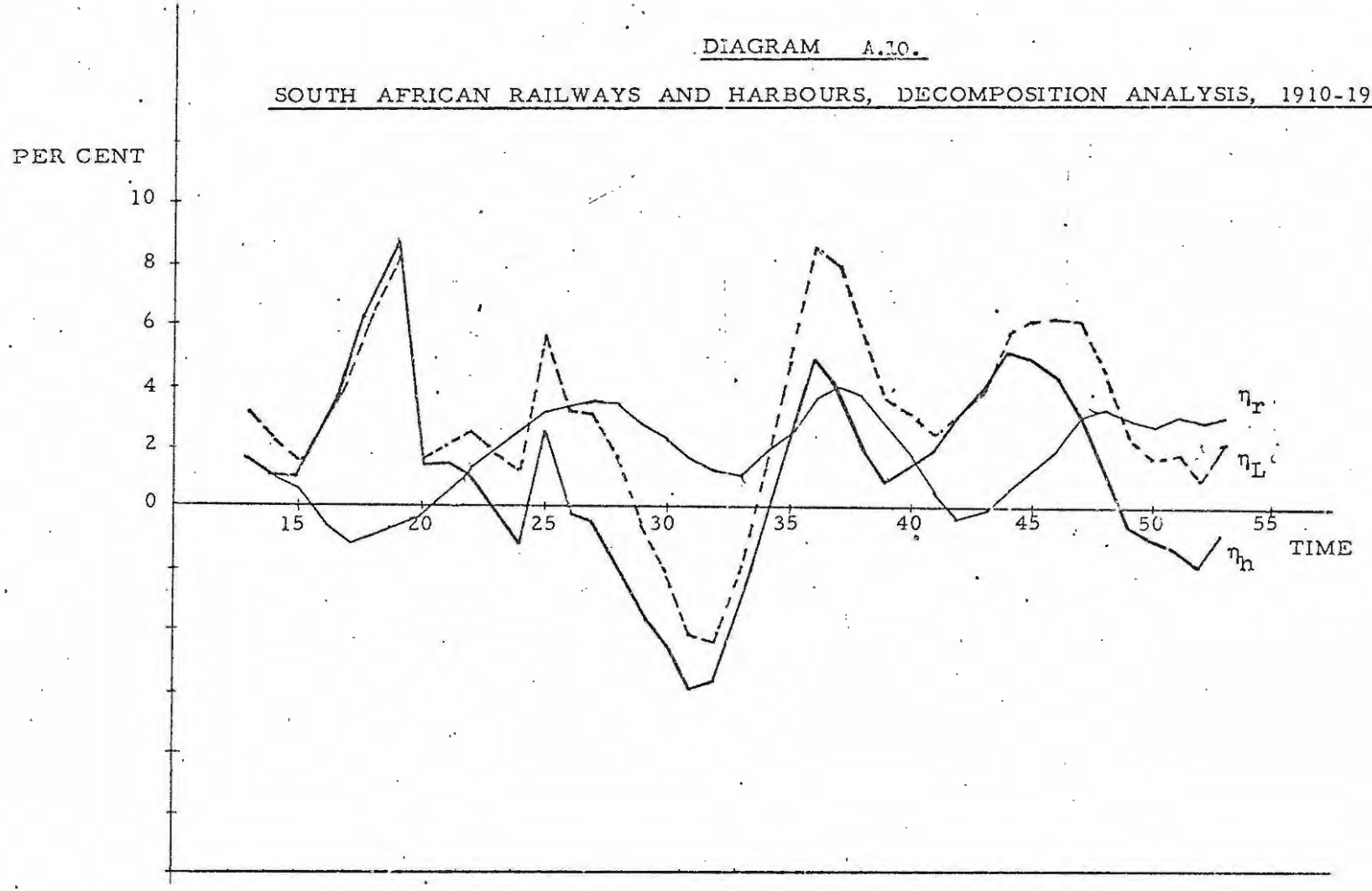


DIAGRAM A.10.

SOUTH AFRICAN RAILWAYS AND HARBOURS, DECOMPOSITION ANALYSIS, 1910-1955



The estimates of "Bantu" include only South African born Africans.[1]

TABLE A.7

Year	Whites (000)	% Change P.A.	Asiatics (000)	% Change P.A.	Coloureds (000)	% Change P.A.	Bantu (000)	% Change P.A.	Total (000)	% Change P.A.
1936	2003	-	228	-	802	-	6945	-	9978	-
1946	2372	1.71	315	3.31	1005	2.27	8376	1.87	12067	1.92
1951	2642	2.18	376	3.59	1146	2.68	9328	2.15	13492	2.28
1960	3080	1.66	494	2.94	1528	3.13	11627	2.39	16729	2.33
1970	3779	2.14	633	2.60	2036	3.01	14975	2.65	2.423	2.59

A.8. Exports of Major Sectors in South Africa

The following notes relate to table A.8. 1) 1912-1938: (a) Re-exports are excluded; (b) Gold specie is included in the category "gold". 2) 1953-57: In the case of agricultural products which have been processed, the value-added is included under manufacturing. In the case of minerals and metal products, the value added is not included under manufacturing. 3) 1958-69: (a) Export values are adjusted to

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1. These estimates should be compared with his more recent estimates for 1960 and 1970. See J.L. Sadie, "Labour Supply in South Africa", Finance and Trade Review, Vol. 9, 1970/71.

TABLE A.8.

SOUTH AFRICAN EXPORTS - CONTRIBUTION OF MAJOR SECTORS 1912-1969

Date	Value of Exports					Exports of Various Sectors as % Total			
	Total R1000000	Gold R1000000	Mining Excluding Gold R1000000	Agriculture R1000000	Manufacturing R1000000	Gold %	Mining Excluding Gold %	Agriculture %	Manufacturing %
	1	2	3	4	5	6			
1912	123,8	77.3	22.1	22.4	2,0	62.4	17,9	18.1	1.6
1918	133,2	70.6	21.7	36,5	4,3	53.0	16,3	27.4	3.2
1919	204,7	103.2	30.7	66,2	4,6	50.4	15,0	32.4	2.2
1920	186,2	93.6	35.1	51,4	6,1	50.3	18,9	27.6	3.3
1921	140,1	86.0	13.8	35,9	4,4	61.4	9,9	25.6	3.1
1922	123,5	63.7	15,7	38,9	5,3	51.5	12,7	31.5	4.3
1923	157,0	84.0	23.0	45,3	5,1	53.2	14,6	28.9	3.3
1924	164,3	88.5	22,3	47,9	5,6	53.8	13,6	29.2	3.4
1925	174,2	82.7	25.5	59,8	6,0	47.5	14,6	34.3	3.5
1926	165,1	86.0	30,5	42,7	5,6	52.3	18,5	25.8	3.4
1927	185,9	89.8	34,0	55,0	6,4	48.3	18,3	30.0	3.5
1928	185,9	88.4	26,4	63,7	7,5	47.6	14,2	34.3	4.0
1929	186,9	92.8	33,1	52,7	8,3	49.6	17,7	28.2	4.4
1930	160,3	95.0	18,7	39,8	6,6	59.4	11,7	24.9	4.1
1931	137,2	92.2	13,0	25,7	6,4	67.2	9,5	18.7	4.6
1932	135,3	97.0	7,7	26,8	3,8	71.7	5,7	19.8	2.8
1933	187,6	139.9	8,9	33,8	5,0	74.6	4,7	18.0	2.7
1934	160,5	112.4	10,7	32,2	5,2	70.1	6,7	20.1	3.2
1935	200,4	143.0	12,0	40,9	4,4	71.4	6,0	20.4	2.2
1936	224,6	165.5	14,6	39,2	5,4	73.7	6,5	17.4	2.4
1937	245,1	165.7	15,1	58,4	5,9	67.6	6,2	23.8	2.4
1938	205,7	146.6	13,0	41,1	5,1	71.3	6,3	20.0	2.5
1953	884,6	282,2	210,6	207,0	184,8	31,9	23,8	23,4	20,9
1954	932,8	303,4	186,4	244,8	198,2	33,2	20,4	26,8	19,5
1955	948,8	333,4	192,8	239,4	184,2	35,1	20,3	25,2	19,4
1956	1068,4	379,0	242,0	244,0	203,4	35,4	22,6	22,8	19,0
1957	1194,0	379,4	280,6	295,0	215,0	33,4	24,0	24,7	18,0
1958	1147,0	444,0	230,0	153,0	320,0	38,7	20,1	13,3	27,9
1966	1838,0	776,0	352,0	204,0	506,0	42,2	19,2	11,1	27,5
1969	2103,0	779,0	416,0	232,0	676,0	37,0	19,8	11,0	32,1

Sources: 1) S.H. Frankel (assisted by H. Herzfeld), "An Analysis of the Growth of the National Income of the Union in the Period of Prosperity before the War," S.A.J.E., Vol. 12, June 1944, Appendix E, p. 135. 2) 1953-57, Report of the Commission of Enquiry into Policy Relating to the Protection of Industry (Viljoen), Pretoria, G.P., U.G., 36'58, pp. 46-7, Table xi. 3) 1958-69 (a) Union Statistics for 50 years, N-5. (b) Report of the Commission of Enquiry into the Export Trade of the Republic of South Africa (Reynders), Pretoria, G.P., R.P., 69'72, p. 45, Table E/10. (c) South African Statistics, 1970, p. 3-4.

Notes: 1) 1912-1938, (a) Re-exports excluded from figures. (b) Gold price included in Category 'Gold'. 2) 1953-57, in the case of agricultural products which have been processed the value added is included under manufacturing; in the case of minerals and metal products this is not included. 3) 1958-69, (a) Export values adjusted to show producers prices. (b) In the case of mining, processing of metals and minerals included in manufacturing except in case of gold.

show producers' prices; (b) In the case of mining, processing of metals and minerals (except gold) is included in manufacturing.[1]

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1. Sources: (1) S.H. Frankel (assisted by H. Hexfeld), "An analysis of the Growth of National Income of the Union in the Period of Prosperity before the War," S.A.J.E., Vol. 12, June 1944, Appendix E, p. 135. (2) 1955-57, Report of the Commission of Enquiry into the Export Trade of the Republic of South Africa (Reynders), Pretoria, G.P., R.P., 69'72. (3) 1956-69 a) Union Statistics for 50 Years, N-5. b) Report of the Commission of Enquiry into Policy Relating to the Protection of Industry, (Viljoen), Pretoria, G.P.U.G., 56'58. c) South African Statistics, 1970, p. Q-4.

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