INVESTMENT MANAGEMENT: AN ANALYSIS OF THE RISK-RETURN PROFILES OF THE SOUTH AFRICAN AND KENYAN STOCK MARKETS.

THESIS

Submitted in fulfilment of the requirements of the degree of
MASTERS OF ARTS
at Rhodes University

by

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NOVEMBER 2002

DECLARATION

Except for references specifically indicated in the text, and as such help as I have indicated, this thesis is wholly my work and has not been submitted for degree purposes at any university.

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ABSTRACT

This study analyses the risk-return profiles of securities and constructed portfolio of the South African and Kenya's stock markets. The analysis is done with cognisance of the dynamism that characterizes contemporary financial markets especially in the face of globalisation. To this end the study *inter alia*, considers the impact of the technological, information and telecommunications revolution particularly with regard to trading, delivery and settlement period. It also considers the factors that influence the business environment in each of the two markets and how these affect their risk return profiles.

Key among the findings of the study are that, only a few sectors and securities in both the South African and Kenyan markets (8 % and less than 1 % respectively) exhibited very high risk-return profiles while most of the rest (32 % and 40 % respectively) recorded low risk-return profiles. Overall, the business environment in South Africa is evidently better when compared to that of Kenya. Consequently, each country's business environment may be used to explain the high/low risk return profiles.

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ACKNOWLEDGEMENTS

I sincerely thank my supervisor, Mr. P.Kimemia for the assistance he accorded me while writing this thesis.

I am also indebted to Prof. H.Nel, Mr. D. Mather, and Dr.Kariithi for voluntarily assisting me in one way or another in the course of my work. The entire members of staff in Economics department and especially the department secretary, Mrs.Brenda Erasmus- have greatly contributed to the completion of this study.

Special thanks goes to my wife, Waithera; and children; Wanjiku and Ndungu for their patience during the period of my study. I cannot forget the moral and financial contribution of my dear parents, brothers and sisters toward this study.

DEDICATION

This thesis is dedicated to the memory of my grand father, after whom I am named.

Stanley Ngaruiya Kago.

(1925-1994)

CHAPTER 1: INTRODUCTION

1.1 Background and Context of the study

Investment management is one of the fastest growing segments of the financial service sector in developed countries. In some cases, for example, the USA during the decade of the1990s, the total deposits invested in the industry exceeded the total deposits held by banks (Gorman and Hargadon, 2000:14). This, according to Lamm (2000:26) is demonstrated by the rapid growth of assets held in mutual funds, pension funds, hedge funds and in derivative instruments. The global market value in this industry exceeded $6 trillion at the close of the year 2000 (Gorman and Hargadon, 2000:17). Professional management firms provide portfolio management services for the institutions in this sector on a commission basis. Such institutions include trusts, commercial banks, insurance companies as well as mutual fund companies, or securities brokerage firms. Management firms' clients are drawn from pension funds, individuals and charitable foundations among other sources.

In South Africa, the investment management industry is relatively small compared to the developed countries, but experienced rapid growth in the 1990s as depicted by the increase of unit trusts (funds) from 31 to 260 (Financial Mail, 2000b:323). In Kenya, the industry is in its early stages though it has shown potential for growth (Economic Survey, 1998:88-89). In Kenya, only two fund companies are listed (NSE, 1998:34). In addition, the 22 investment advisors, mainly stockbrokers and banks carry out the business or operations of fund management (Economic Survey, 2000:77-78). However, because of the limited size of the fund market, each advisor operates its homemade funds and these are not traded in the stock market. Hence unlike in the developed countries as pointed out above, the small size of the industry may partly be attributed to the small size of their economies, the stock markets in both countries and political factors as will be discussed in Chapter 3. Irrespective of the size of the fund, or whether it is in developed or underdeveloped countries, there are common features which explain the decision of asset or fund managers in making investments. The section below discusses the spectrum of investment management for the purpose of enhancing our understanding of what the concept entails and its various facets in practice. Our discussion in this section also defines the context of the study at hand.

1.1.1 The spectrum of investment management

The scope of investment management is wide and varied because it deals with an array of activities. According to Jones (1994:5), it is an elaborate investment decision-making process to identify securities or funds based on some pre-determined criteria or constraints. One of the most important pre-condition is the objective of the investors. In this regard, investment management looks into the objective of the investors in view of the amount of money available, types of securities and portfolios or funds in the market, types of markets, and the underlying investment environment. As we have stated in Section 1.2, though the investor's objective to achieve desired returns may be achieved by quantitatively assessing the assets or portfolios, uncertainties surrounding the return requires the analysis of subjective factors. For this reason, investment management is considered to be wide.

Studies in the field of investment management have highlighted some of the subjective factors. As Ellis (2000:12) observes, assets returns are not only driven by business and market cycles but also changes in political, technological and social factors. In addition human behaviour, both rational and irrational such as the mania in the stock markets, affects investment management in that they influence the structure of funds or portfolios. According to Levine and Zervos (1996:323), the investment management industry is now more globally focused. This is largely attributed to rapid growth in emerging capital markets, pension reform in developed countries, tremendous advances in technology, and increasing cross-border capital flows facilitated by deregulation. Technological development on its part has brought in a more informed clientele and transaction mediums such as electronic-business, which transcends physical boundaries and regulatory barriers. What this implies is that innumerable factors other than the fundamentals of the asset or fund are at play in risk-return analysis.

In view of the above discussion, the application of investment management may, therefore, be viewed as the fusion of the investors' objectives, the risk-returns concept, investment environment and the adaptation to the changes in the industry. The results are not only identification of a single asset for investment but also, the creation of many portfolios or funds. Various factors have been cited as determinants

of the types of funds in the market. According to Jones (1994:528), legislation, objectives, management and costs or charges of operations may differentiate funds. Zwirlein and Reddy (2000:106) compliment this classification by pointing out that types of funds are determined by, but not limited to the following; the fund's investment objectives and strategy, total returns, risk measures and net asset value. From these studies, it may be argued that the many factors reflect attempts by investment managers to choose assets or construct portfolios that give returns expected by their clients.

Arguably, it is on these objectives, that some of the various portfolios in the markets today have been constructed. They include mutual funds (open-ended-funds), closed-ends funds, index funds and others derived from them. There are no hard-and-first rules as to the precise number of funds based on investment objectives. For example, Zwirlein and Reddy (2000:110) analysis of the risk-returns relationship and coefficient analysis of funds invested in different securities market cycles came up with only six categories. Francis (1991:647) and Jones (1994:539-541) identified eight and nineteen classes respectively. Among these funds, mutual funds are the most heavily invested. This may be because mutual funds are said to be some of the most successful in the developed world and even in South Africa (Lange, 2000:14). Most large banks and stand-alone fund firms in SA operate several varieties of mutual funds. Standard bank, for example, has 26 different types of mutual funds (JSE Handbook, 2001:30-36). Some of these include equity stocks funds, bonds or fixed income funds, options funds, global and emerging markets funds.

As Gorman and Hargadon (2000:16) point out, mutual funds invest in a diversified portfolio of investment securities with varying risk. In mutual funds, investors own not a given asset in the fund but a certain portion of every asset in the fund. Diversification thus enables an individual to pool funds with many other investors to buy a larger number of stocks or bonds than one might be able to purchase individually. Closely related to mutual funds are closed-end funds. They are "closed-end" because they have a fixed amount of money to invest, from capital raised in an initial public offering (Francis, 1991:648). Furthermore, a legal policy allows them to borrow money, invest widely up to, and including option and futures markets and

even speculate. Because of diversifying widely and pursuing more objectives, the funds returns are unstable and carry more risk than other funds.

Like mutual funds, closed ends may specialize in stocks, bonds, convertibles, or a mixture of these depending on their primary objective; whether income, growth or both. Another similarity of closed-end fund with open-ended fund (mutual fund) is that both are available for trading by any interested investors (Donald, 2000:40). Closed-end funds are not sensitive to profit making like mutual funds whose survival depends on the capacity to attract and retain shareholders. Some of the seven biggest closed funds with a combined net asset in excess of $700million at the end of 1999 have invested in SA according to Africa Investment (1999:3). One of them, New South Africa Fund specializes in gold mining stocks. Both mutual and close-end funds are said to be active or actively managed funds. According to Snigaroff (2000:21) active funds are expected to deliver better-than average market performance (market index). Funds that are not actively managed are index funds or passive funds.

Ellis (2000:15) points out that passive (index) funds do not attempt to outperform the market but try to reflect or mirror the market index such as the JSE all share index. Fund managers use the latter as a benchmark to measure the investment performance. Portfolio managers' performance is adjudicated as being good if the yields of their funds match that of the market index. This is because unlike active funds that struggle to beat the market, passive funds strive to closely replicate (track) the returns of a designated benchmark. Tracking allows portfolio managers to concentrate on stock markets trends instead of the movements of a given security. Thus the value of index funds changes with the performance of the underlying baskets of stocks on the selected index. A variety of funds have been created from index funds.

An enhanced index fund is an example of funds derived from index fund. Rehfeld (2000:143) points out that to form an enhanced fund one may select a benchmark such as JSE all share index or NSE 20 and then add or reduce certain stocks to the index. However, the value of share index funds (I-shares) changes only with the performance of the underlying baskets of stocks on the selected index. The good thing with I-shares is that unlike the unit trusts, they exploit markets volatility. They charge lower fees and outperform both the active and passive portfolios in that they offer higher returns

at controlled risk according to Lucchetti (1999:22). Besides, they are not as exposed to market movements as index funds. The IndexC0 is South Africa's first index share (I-share) which tracks All-Share Index 40. Since the Kenyan market lacks listed index funds, it is not expected to have enhanced funds either. According to Financial Mail Survey (2000:328), other funds, which emerged in the late 1990s such as, wrap funds and fund of funds are created from a portfolio of underlying unit trusts (such as mutual and closed end funds). Their main attraction is flexibility as the fund managers are able to move from one asset class, sector and even from one firm to another. Hence, the manager may, for example, shift from equity stock to money market or from industrial to technology sector.

From the preceding discussion it is quite evident that investment decisions on securities and funds to invest in are mainly determined by the underlying risk and return considerations. In addition, fund managers look at an array of factors that may enhance the returns or reduce risks. They also look at investors' objectives. On this basis they have come up with various funds such as mutual funds, and closed-end funds. Costs and competition considerations seem to be a major determinant in the active and passive funds. Adapting to the changing informational, competition and technological needs are critical in enhanced index funds, I-share funds, wrap and fund of funds.

However, it is not easy to attach specific characteristics to a given fund but it may be argued that all relevant factors are taken into account in deciding the structure of the fund. Such factors are the costs, type of markets in which the funds trades, specific market characteristics like liquidity and movement of the markets. Some of these factors influence the type of funds in the markets at different periods. For example, the volatility of the JSE market saw the shift of funds to money market funds from the equity stock funds between 1996 and 1999 (Financial Mail, 2000b:328). Also, the effect of the revolution in technology as discussed in Chapter 3, has increased investors' awareness and reduced costs and may be associated with the proliferation of funds. The costs of a fund are important not just because it determines the net return to the investment but also because it could influence its category.

Not all funds are good and in fact some active funds have been found to lower value. As Snigaroff (2000:17) observes, some active fund managers reduce value while others have hidden charges or incomprehensible costs. Snigaroff (2000:21) further points out that this may prompt fund managers to move on to the index funds and enhanced funds if they cannot develop active funds to beat the market and in the process change the risk-return matrix of their funds directly. However, Lakonishok et al (1992:374-375) argue that the line between active fund management and passive ones is blurring as the former adapt to retain clients and reduce overall costs. They also have implications even on the size of management firms. As Stoffman (2000:13) argues, investment companies must also consider merging to gain capital in order to increase returns to their portfolio holding and hedge against risks. Thus, the reasons of moving from one fund to another, constructing new funds and other cost measures are to improve returns and reduce the risk of the portfolios. Moreover, the invested securities or funds may become more volatile due to market movement as we have noted above. Such changes may also mean changes in the sizes of returns and risk and hence may require change of the funds held.

Various studies by Leiw and Vassalou (2000), Fama and French (1998), Reilly (1971), and Bhana (1991) have identified factors that influence the decision making process in investment management. As Liew and Vassalou (2000:231) observe, some of these factors like business cycle variables; momentum and trading strategies and size not only affect the riskiness and returns of investments but also retain evidence that is crucial in predicting economic growth. In their study, Liew and Vassalou (2000:222 and 240) concluded that there is a positive relationship between securities returns and both states of the business and market cycles and that, high security and portfolio returns indicated periods of high economic growth. Similarly, low returns imply bad economic times and predict poor economic growth.

Fama and French (1998:1981-1985) support this observation by adding that factors like trade size and strategies predict changes in investment opportunities. These factors affect stocks returns differently. Evidence shows that the size of returns and risk of cyclical, defensive and growth stocks depend on the business and markets cycles prevailing in the stock markets (Reilly, 1971:43). For example, Bhana

(1991:33) found that growth stocks (they are not necessarily growth companies or small-capitalised stocks) on the JSE market display higher return potential than those with the same risk during periods of rapid economic growth. In addition, whether the market is formal or informal has implications on the costs and liquidity of a security or fund (Falkena, 1989:58). The Johannesburg stock exchange (JSE) and the Nairobi stock exchange (NSE) are formal markets that operate on the strength of specific legislations in addition to self-regulations to strengthen the exchanges. Thus it is clear that economic fundamentals, types of stocks, type of market and the behaviour of all the market participants such as the brokers, and market makers may determine the decision of investment managers. Moreover, regulations also impact on the risk-return of the securities and the type of fund selected. Thus, the markets in which the securities and funds trade have implications on returns and risks.

As noted earlier, the change in volatility in the markets where the securities and funds trade may also influence the returns of individual securities and funds and hence the type of fund invested in. Sezler and Torres (2000:116) further observed that in the history of stock markets, prices of certain stocks, sectors or the entire markets have surged or plummeted in circumstances that cannot be explained by market fundamentals leading unprecedented huge capital gains or losses. Therefore, investments could, and do lose income during market changes. According to Liew and Vassalou (2000:227) the size premium of market changes has a lot of effect on the markets that are small, illiquid, and dominated by few large capitalization stocks. A bear market for instance, could imply negative returns on many securities and any funds constructed from those securities. This implies that the risk of the stock market affects the nature and composition of funds and unlike other forms of investment such as bank deposits, or real estates, their returns are not insured or guaranteed.

Each fund has its own investment goal and strategies but there is no guarantee that the fund will achieve its goal. As we have observed, though there are peripheral factors that investment managers consider, the central factor is the risk-return profile of that security or fund. Various theories have been propounded to measure the size of these returns and risk of individual assets and portfolios. They also measure how the assets' returns can be combined to give a desired level of return depending on the investors'

attitudes towards risk. Furthermore, these theories reflect the relationship of various assets returns and the stock market and how they move together. Chapter 2 of this study examines these theories and how they affect investment decisions.

1.2 Justification of the study

Whenever the outcome of an investment decision is determined at least in part by chance events, the environment of such investment is essentially uncertain. In such uncertain situations, scholars like Jacob and Pettit (1984:61) contend that managers ideally form expectations in a way that would reflect the best interests of the investor. For this reason, portfolio selection requires the use of a combination of statistical techniques and personal judgement. While diversification in securities is good, it should not be over-emphasized, as it is almost impossible to adequately supervise a large portfolio. Cassel (1999:22) suggests that a prudent portfolio manager is therefore the one who has a good investment strategy. He or she incorporates the individual needs, has a good conception of the stock market business outlook at the time, and understands the timing of investment and the risk factor.

The portfolio manager must understand the investment climate in order to select a good portfolio. The investment climate according to Francis (1994:792) is among other things, influenced by economic and political factors obtaining in a given country. The manager in this case, relies heavily on information from the economist and the financial analyst. On the economic front, the fund manager gets information about the current and expected future economic performance both locally and internationally. From the financial analysis, the investments manager assesses the profitability growth, the earnings prospects, the overall outlook of the industry, and then chooses a security for purchase, hold or sale. It is on the basis of these two objectives that the investment manager applies his or her personal judgement. Subjective judgement allows one the luxury of considering any number of factors that may impact on returns or risk. Thus it is suggested that the making up of an investment portfolio composition involves not only the weighing-up and assessing of the economic forces, but also assessing how other people will react to these forces in the future (West, 1969:59-64). This partly determines stock price movements and in turn indicates to the manager whether or not to change the size and structure of the portfolio in an attempt to continue meeting the investor needs.

As indicated by the title, the emphasis of this study is on the analysis of the risk-return profile of the South African and Kenyan financial markets. Mlambo and Biekpe (2001:61) indicate that there are immense differences in terms of the extent of the financial markets development between these two countries. It has been suggested that active capital markets in Kenya are hindered by interest rates and tax policies despite high returns (Callier, 1991:25). Furthermore, since the degree of uncertainty in economic, political and stock market activity in Kenya is high, the equity markets have been unable to improve the management of risk in individual enterprises (Mlambo and Beikpe, 2001:63). Also, there is a lack of a critical mass of sellers and buyers to give liquidity to the existing instruments in the market (Barger, 1993:6). Information flow is poor and unreliable, because of a lack of expertise in financial analysis, which in return discourages investment and fosters collusion and market inefficiency, thus making it even more difficult for investors to select portfolios in an informed way (Agriconsult, 1993:4).

On the other hand, South African financial markets are relatively bigger not only in terms of the number of securities traded, market capitalisation and turnover, but also by market specialisation (Financial Mail, 2000b: 134-145 and Mlambo and Beikpe, 2001:64). These attributes give the portfolio manager a wider range of securities from which to select. Moreover, South Africa has in place a well-developed information technology infrastructure that is essential to financial markets especially for international accessibility (JSE Handbook, 2000:30). Though the economy is relatively stable and predictable and there is still a clear government commitment to the role of the financial markets, international investors appear to be a bit sceptical (SARB, 1998:34). This is partly because South Africa, like other emerging markets is seen as being risky since the Asian crisis of 1997 and hence subject to contagion of other global emerging market (Mlambo and Beikpe, 2001:62). Other factors contributing to the risk element include the negative sentiments caused by political instability in the region (especially Zimbabwe) and a lower than expected economic performance (Finance Week, 2000:20).

In South Africa the portfolio managers have to contend with companies moving their listing offshore as well as the issue of cross holding among companies (Bhana, 2000:27). In Kenya, the problem is even more pronounced as foreign companies

continue to reduce their investment exposure while others are closing down (CMA, 2000:14). The investment environment in both countries is critical because of the risk exposure, regulatory bottlenecks and complicated tax systems and associated with the third world economies (Callier, 1991:48). Thus foreign investors attach the riskness of the NSE to its illiquid securities, few securities and low returns and trading irregularities (Barger, 1993:8). For the JSE, contagion effect from both the developed market and the emerging markets, pyramiding of companies, limited access, segmentation and difficulties in raising additional capital for the large companies are some of the riskness it is associated with (Bhana, 2000:37, 45; Mlambo and Beikpe, 2001:64). These markets are not helped by the tendency of the local based foreign companies to seek opportunities in the developed economies with stable returns, mainly because of the seemingly greater weight the capital markets are attaching to uncertainty (Johnson, 2000:24). In addition to this, low liquidity (as people hold on to their securities) limits a portfolio manager's choice. The relatively weak currencies for SA and Kenya respectively, further add uncertainty in the two financial markets (Financial Mail, 2000a: 35; CBK, 2000:47).

Against this background, the study is important because it identifies, establishes, ranks, and classify individual securities and ensuing portfolios risk-return profiles in the two countries. Moreover, the study constructs portfolios (or funds) for the two markets. We further attempt to analyse the constructed funds for the two countries using the portfolio theory. Another important reason is to show the empirical application of quantitative analysis (modern portfolio theory) in securities and portfolios in the two markets. This is especially important as portfolio theory was found to be rarely used in investment management as will be discussed in Chapter 4. The study is also important as it provides an insight into the underlying environment in which the financial assets operate in both SA and Kenya. This is especially crucial in providing explanations to the differences in the market capitalisation, liquidity, level of market segmentation (integration) and technological adaptation as will be discussed in Chapter 4 and Chapter 5. The findings of the study may form a basis for comparison of securities and funds in the two markets by investment managers with a view of identifying potential investment opportunities in the two markets.

On another level, the study gives an insight into how the perceived risk associated with emerging and pre-emerging markets affect the assets and assets management. Such an understanding may act as a guideline to investors seeking to invest in other countries with similar markets, assets and environment. Hence, it is important to study them with a view of not only understanding, but also identifying areas that may need the attention of the portfolio managers and other financial advisers in general. It is also anticipated that the results of the analysis may provide an insight into the unique potential rewards, opportunities, and weaknesses of each market. The results should also reflect the general trends in the performance of portfolios in the developing countries.

1.3 Goals of the study

To properly understand investment management in SA and Kenya, there is a need to establish the correlation between risk and returns of securities and funds. From the study, it may be possible to detect how the relationship influences manager's decisions as well as the overall investments management. In view of the above, the objective of this study will be, mainly to analyse the risk-return profiles of assets and funds in both South Africa and Kenya with reference to the stock markets. Other supplementary goals include:

- identifying the returns from the securities in each market;
- evaluating the returns quantitatively by applying the modern portfolio theory to obtain their risk-return relationships and subsequent classification of their profiles in a descending order;
- construction of funds (portfolios) from the ranked individual securities risk-return in each market and analysing the investment climate in the two markets; and
- identifying potential assets and funds for investment in each market.

1.4 Methodology

In order to provide an understanding of the risk-return profile of securities in Kenya and South Africa, literature review on capital markets was undertaken. The study utilizes data on returns from securities listed on the Johannesburg Stock Exchange (JSE) and the Nairobi Stock Exchange (NSE) for the period between 1990 and 1996.

For South Africa, the primary sources of the returns data are the JSE-Actuaries reports. Other sources include the quarterly and annual economic reports issued by the South Africa Reserve Bank (SARB). Kenya's returns data are mainly sourced from the Nairobi Stock Exchange reports. The secondary sources are the annual reports, by the Capital Market Authority (CMA) reports and the Central Bank of Kenya (CBK).

Since both the JSE Actuaries and NSE annual reports represent the stock prices and dividend separately, it is necessary to use a model to obtain the total returns. The study therefore employs the simple return model as proposed by Arnold (1998:235). The return model has been used by a number of scholars including Pierce (1984), Francis (1991), Farrell (1997) and Brealey and Meyers (1991). It consists of the dividend yield component and capital gains yield component. The returns are expressed as a percentage to eliminate the effect of currency differences. Arnold (1998:235) thus expresses the total return as:

Total return = yield component + capital gains yield

$$r = D_y + g.$$

The dividend yield component (D_y) is derived from the dividend income and is expressed as:

$$D_y = \frac{D_{t+1}}{P_t}$$

Where:

D_y = the dividend yield

D_{t+1} = dividend paid during the year

P_t = price of security during the year

Similarly, the capital gains yield (g) is a derivative of the capital gain (or loss) and is expressed as:

$$g = \frac{(P_{t+1} - P_t)}{P_t}$$

Where:

g= capital gains yield

P_{t+1} = price of the security at the end of the year (or sale price).

The total returns are then fed into the modern portfolio theory (MPT) to obtain three outputs namely; the standard deviation (risk), coefficient of correlation and covariance of return. According to Lamm (2000:22), the three quantitative measures are obtained in two stages. First, to assess the risk associated with these returns, the standard deviation is calculated. Then, the returns and risk obtained for each sector and security in each country are ranked in a descending order. This gives us the profiles of securities and sectors in order of high risk-returns to low risk-returns. In the second stage, the other MPT tool, return covariance is used to construct portfolios from the ranked individual securities' risk-return profiles. Again, the portfolios are ranked in a descending order. Observations and further analysis on these quantitative results are then evaluated against the suggested underlying subjective factors (environment) before conclusive investment recommendations are made.

1.5 Tools of analysis

The modern portfolio theory discussed in Chapter 2 forms the basis of the analysis employed in the South African and Kenyan markets. Our analysis incorporates three quantitative tools of measurements of an asset's return. The selected technique measures a security's return and risk. The technique then measures the overall risk of a security in relation to others in the portfolio and the returns of the portfolio. The three, which are technically referred to as total return, standard deviation of return, return covariance (correlation coefficient) respectively are reproduced from Chapter 2.

Total return;

$$E(R) = \sum \{(P_i)(R_i)\}$$

Where:

$E(R)$ = Expected return on a security

P_i = probability of return in particular state of affairs

R_i = possible returns under certain conditions

In this study, actual return or historical returns are used and therefore we sum the capital gains and dividend yields as explained in Chapter 2 (Section 2.3). The justification for adjustment is the argument that the difference between past (actual)

and future (expected) returns is not relevant in MPT because all distributions are subjective (Sharpe, 1970:24).

Standard deviation of return for a single security is expressed as;

$$\sigma = \sqrt{p_i}(R_i - \bar{R}_i)$$

Where:

σ = standard deviation of return

p_i = probabilities of return of an asset

R_i = possible return from the given asset in a given period

$\overline{R_i}$ = mean return

In our case, we obtain the standard deviation of actual returns for the seven-year (1990-1996) period for both the NSE and JSE markets. The expected return of the portfolio is a weighted average of the expected returns of individual securities in the portfolio. It is expressed as;

$$E(R_p) = \sum_{i=1}^{n} W_i E(R_i)$$

Where:

$E(R_p)$ = the expected return of the portfolio, Rp.

n = the number of possible assets in the portfolio

$E(R_i)$ = the expected return of an asset in the portfolio.

W_i = the proportion of the security in the portfolio

W_i, in our case is determined by the number of a given security in the constructed portfolios from the JSE and NSE markets respectively.

The portfolio risk is expressed as:

σσ

$$\sigma = \sqrt{(\sum_{r=1}^{n} w_i^2 Var(R_I) + \sum_{i=1}^{n} \sum_{j=1}^{n} w_i w_j Cov\, r_{ij})}$$

Where:

σ = portfolio standard deviation

Cov_{ij} = represents the covariance between i and j securities returns

$w_i w_j$ = the proportion that each security i and j represents in the portfolio.

The return covariance referred to above is expressed as:

$$Cov_{ij} = \frac{1}{n} \sum_{i=1}^{n} \{(R_i - \overline{R_i})(R_j - \overline{R_j})\}$$

Finally, the correlation coefficient, which is the standardized form of return covariance, is expressed as;

$$\rho_{ij} = \frac{Cov(R_i R_j)}{\sigma_i \sigma_j}$$

Where:

p_{ij} = correlation between securities i and j

σ_i = standard deviation of return of security i

σ_j = standard deviation of return of security j

The study takes cognisance of the fact that the historical data that is to be employed here is limited because MPT is a model of expected returns. However, its usage remains authentic as exemplified by various studies, such as Francis (1994:521), Lamm (2000:26), and Farrell (1997:92-93).

1.6 Summary of the chapters

The next Chapter (2) examines the theoretical framework that underlies individual assets and the portfolio returns analysis. Though the emphasis is on orthodox financial theories because of simultaneously considering return and risk, the study pays more attention to MPT for considering total returns as compared to the others (orthodox financial theories) such as the capital assets pricing model (CAPM), and the arbitrage pricing theory (APT). But first, Section 2.3 examines two traditional theories of asset valuation; the fundamental and technical analysis because their inherent weaknesses, such as lack of explicit measure of risk and return serve to highlight the benefits of the MPT. However, the continued popularity of the traditional theories among fund managers in SA as we shall expound in Chapter 4 further warrant their discussion.

Since investment management looks beyond quantitative analysis, other non-quantitative underpinnings of assets and funds returns may be explained by the behaviour of markets participants. As will be discussed in Section 2.6, these other factors include investors' expectations not only of the markets and the economy, but also expectations of how other market players behave in the market in a dynamic environment. Finally, owing to the reliance of stock markets (both the JSE and NSE) in this study as the primary source of data, understanding their movement is important. For this reason, chaos theory supplements both the quantitative and the subjective theories by deciphering order in the stock market. Chaos theory addressed in Section 3.7, explains how to make sense in a seemingly unpredictable stock market and hence capture market prices.

The role of the environment of investment in influencing not only the size of returns and risk of securities and portfolios but also composition of portfolios in SA and Kenya's markets are revisited and detailed in Chapter 3. The chapter attempts to explain how the political, economic, and other factors influenced the risk-return of assets and portfolios during the period under consideration in this study. On the political sphere discussed in Section 3.2, we review the impact of political news events in SA such as the 1990 to 1994 transition, and the subsequent political violence's influence on the assets returns and risks and hence the investment management. We further analyse shift in government policy, its privatisation strategies which are politically perceived, the reaction of the markets and risk-return

matrix of the securities. Other social economic factors like crime and industrial strikes are also discussed. The section further set out how a relative growing economy and stable macro-economic policies in SA, has influenced returns of the securities and the market as discussed in Chapter 3. In addition, the chapter examines the impact of the shifting of big listed companies on the risk-return profiles of the securities concerned.

Also in Chapter 3, Section 3.3, we discuss how political liberalisation in Kenya in the early 1990s, the political violence, corruption and problems with the donor countries have impacted on the stock markets and the risk and returns on assets during the period under review. Similarly the section relates returns and risks of the stocks and portfolios to the mixed economic performance, trade liberalisation, privatisation and the removal of exchange controls for the period between 1990 and 1996. We further consider the trends in weather patterns and how this may have impacted on agricultural production and the risk-return profile of related securities. The Chapter also discusses the effects of political developments in Southern Africa, especially on the South African market, as well as the impact of the dynamic sector of information technology and telecommunications. Capital market related issues (both domestic as well as international ones) are also discussed in this chapter.

In Chapter 4, we start off by identifying the types and characteristics of securities in both the JSE and NSE markets. Section 4.2 reinforces the relevance of the theories of valuation of investment returns (discussed in Chapter 2) on the Kenyan and SA markets. The study's focus on security is brought to the spotlight in Section 4.3 where we examine specific underlying company and markets factors that determine its returns and risk. Here we highlight how security's earnings are affected by transaction cost, taxes, and international price changes among other variables. Important too, are the level of ownership and control of listed companies, their size in the markets; and their management among other underlying factors. As far as markets are concerned, we seek to explain the implications of JSE and NSE markets' liquidity, depth and thinness, have on the risk-return profiles of the assets and portfolios under consideration.

In Chapter 5, we analyse the risk-return profiles of the securities and portfolios from both markets. In Section 5.2, we explain the sources of our data, procedures we have

used, and also attempt to highlight the problems of data collection in each market. For South Africa, the source was mainly the JSE-Actuarial index while NSE reports provided the bulk of the stock data from the Kenyan market. Sections 5.3 and 5.4 provide the statistical results from employing the portfolio theory techniques for both South Africa and Kenya. We obtain the mean return, standard deviation (risk levels), and range among others. The two sections also groups the securities according to the risk-return profiles and then attempt to rank them from the highest risk-return levels to the lowest. These sections also deals with the construction of portfolios, arising from our observations of the results in the in the preceding sections. The study attempts to interpret the quantitative results with due consideration to, among other things, the investment environment and market conditions discussed in Chapter 3 and Chapter 4.

Chapter 6 is mainly the conclusions and recommendations and starts off with a critical appraisal of our research findings especially with regard to their implications for the portfolio selection and investment management in general. The chapter further revisits the limitations of the study, after discussing the recommendations, and closes with some suggestions for further research.

CHAPTER 2. THEORIES OF SECURITIES VALUATION

2.1 Introduction

This chapter analyses the theories of securities valuation for purposes of identifying the most appropriate or relevant especially for the two markets in question. The techniques of asset valuation are divided into three categories. The first models referred to as traditional theories provide a method of arriving at returns and include the fundamental, and technical approaches. Then there are the orthodox financial theories, which not only value the size of returns but also their risk. All these theories share a common feature in that they are quantitative and are therefore, said to be logical (Trippi, 1995:8). The third class of models; chaos and behavioral theories are said to be non-logical because of the central role of non-quantitative variables (Hsieh, 1991:1839). Emphasis however is laid on the modern portfolio theory (MPT), one of the financial theories, because of its importance in security selection for the purpose of portfolio or fund construction. The traditional approach to assets valuation, the modern portfolio theory, as well as post-MPT theories, that is, the capital asset pricing model (CAPM) and the arbitrage pricing theory (APT) are discussed in Sections 2.3 to 2.5. Finally, the non-logical models of chaos and behavioral theories are discussed in Sections 2.6 and 2.7. Because of the relevance of the risk-return concept in this study, Section 2.2 below lays its foundation.

2.2 The return and risk concepts

According to Goetzmann (2001:1), returns and risk mean different things to different academicians and practitioners. As discussed later in Sections 2.3 to 2.6, the above-mentioned theories distinguish three types of returns. There are actual, required, and expected returns, and these are given various weights by the different theories of investment. There are, however innumerable types of such returns in the real world of investment (Humphrey and Shimko, 2000:7). The measurement of the risk of an asset or portfolio is the major feature that distinguishes the investment theories from all the other theories of valuation. According to Rutterford (1999:16) there exist total risk, systematic risk and unsystematic risk and these are accorded varying emphasis by the theories. The MPT lays more emphasis on total risk. But since risk is a component of uncertainty, we

first explain the relationship between return and uncertainty. According to Bellemore et al. (1979: 124), whenever an outcome of an investment is partly determined by chance, the environment of such an investment is uncertain. They also argue that classical economic thinking about the future assumes uncertainty. Mishkin and Eakins (1997:67) further add that uncertainty relates to unknown future and is a random process with a random outcome. To induce investors to invest in such an environment, one must guarantee a minimum level of returns and conventional investor would accept a positive return (Farrel, 1997:94). This may mean that the actual returns on investments may differ from the expected returns since information pertaining to the future is unknown. McMenamin (1999:31) on the other hand equates risk with volatility and contend that it may not suffice to recognize uncertainty but one must equally understand its source. To this end, managers apply both objective as well as subjective techniques in an effort to deal with investment under uncertainty. Levy and Sarnat (1994:65) argue that the application of subjective probability in uncertain situations makes it possible to convert uncertain situation into risk choice.

From the preceding section, it may be suggested that risk and uncertainty are not necessarily the same. Hence, it is important to make a distinction between risk and uncertainty. However, Reilly (1986:6) argues that investors often ignore the differences between the two. However, Library of Economics and Liberty (2001:47-48) provide a clear distinction by indicating that the component of uncertainty that may be quantitatively measured is risk while the immeasurable one is uncertainty.

2.2.1 Return measurement

As mentioned earlier there are three key types of returns; actual, expected and required. According to Jacob and Pettit (1984:186) actual returns are the sum of income received and change in capital over a specified investment period, usually one year. A rate of return may be obtained by dividing this sum by the initial price of the period in question (Arnold, 1998:233). The actual returns may be equal to, less than or even greater than expected returns (Elton et al, 1993:18). In addition, the change in capital may (may not) be net amount of taxes, brokerage commissions and any other relevant expenses.

As Arnold (1998:233) pointed out, the expected returns relate to the future and investors anticipate to be compensated with a future return for giving up current consumption of their capital. Rutterford (1999:36) adds that estimating expected returns is difficult because both the input variables are not known since they are determined ex-ante. Since the returns are expected in an uncertain future, expected returns use the probability distribution (Francis, 1991:11). Therefore, expected returns are expressed as an aggregate of returns, E (R), weighted by their individual probabilities $p_{(ri)}$.
This may be presented as:

$$E(R) = p(r_i)$$

Another important measure of return is the required rate of return. According to Ward and Stathoulis (1993/94:38), required rate of return consists of the risk free rate, inflation premium and the risk premium. It is basically the opportunity cost of the investment or the minimum compensation that investors demand to release their capital to a borrower or user of funds (Jones, 1994:306-307). Thus investors in this case will only part with their savings if they are compensated for the forgone income and to the firm, it is the cost of capital.

2.2.2 Risk and risk measurement

According to McMenamin (1999:399), risk " is the chance that the actual outcome will differ from the expected outcome." In this case, it is the chance that future incomes from the investment may be different from the expected (planned) returns. Risk is quantitatively measured by variance or standard deviation and the various outcomes of an investment are assigned weights to facilitate risk assessment (McMenamin, 1999:400).

Francis (1991:6-7) has identified risks associated with specific companies as business, liquidity, financial, market, and management among others. Investors will therefore factor in all these risk when deciding the level of expected returns. Brealey and Meyers (1988: 187) therefore argues that investors demand higher returns from that investment because they take into account both subjective and objective factors.

There are other measures of risk of an asset such as value at risk (VAR) Schatcher (1998:17). This technique measures the risk of returns by estimating the loss associated with very small probability (Schatcher, 1998:18). Jorion (1996:20) further points out that it is not necessarily a measure of worst outcome, but an estimate of the limits of possible gains and losses. The advantages of the VAR-based approach over the traditional net present value of Fischer (1930), is that it is expressed in units of currency, and also contains information about the distribution of possible future losses on a portfolio. Schachter (1998:18) identifies the lack of a theoretical framework, and the inability to capture all the relevant information about market risk as some of its primary weaknesses.

2.3 Traditional asset valuation techniques

2.3.1 Fundamental analysis

The fundamental technique looks at the economy, sector, company and qualitative factors of the business before investing in a particular asset (Francis, 1991:478). Fundamental analysts assess the security's returns using the intrinsic value or the present value (Ross et al,1999:390; Westerfield and Jaffe, 1999:390). This intrinsic value of the investment is obtained by discounting the cash flows stream over the investment period and then compared with the market price of an asset to determine whether it is under-or-over valued (Francis, 1991:479). This discount factor is the required rate of return and it incorporates the investment level of risk and timings of investments (McMenamin, 1999:244). Thus the risk is indirectly seen in the intrinsic value of a security.

Fool (2000:3), points out that analysts focus on macroeconomic factors that largely determine the flow of incomes such as gross national product, unemployment, interest rates, inventories and savings. According to Francis (1991:478) once they have assessed the state of the economy, fundamental analysts look at particular industries to determine which ones are likely to fare best as the economy moves along the business cycle. They look for those industries that offer better-than-average long-term investment opportunities. According to Fool (2000:4), they may classify industries into the defensive industries; cyclical; growth and special situations industries. While defensive industries

are least affected by normal business cycles, cyclical industries are highly affected by business cycles and prices (Fool 2000:5).

Finally, the analysts on a close and intensive scale look at the companies based on factors such as sales turnover and earnings, products or services, market share, management, and profitability (Fool, 2000:14). They further base their analysis on how they think the particular company will exploit its current and future opportunities. However, Reilly (1986:209) argues that application of the technique is limited (especially for companies with ordinary shares only) because both inputs in the model (expected returns and share price) have to be estimated. But, the debt securities such as bonds are considered to be better because the coupon rates as well as the maturity dates are pre-determined (Reily, 1986:209). More criticisms are that the financial statements data does not take cognisance of the underlying environment and that the data being relied upon may be inaccurate besides being historical (Andrews, 1978:46). It therefore, may be argued that the technique makes it difficult to appropriately ascertain the company's returns and risk.

2.3.2 Technical analysis

Another method of securities' valuation is through technical analysis. According to Francis (1991:521), the valuation of investment returns by use of the technical method is particularly important to assets that are traded in the stock markets. Francis (1991:522) points out that since technicians or chartists' interest is on price movement of securities and markets then they should concentrate on just that. Technicians believe that the law of demand and supply determines security prices, and hence they concentrate on the psychology surrounding a stock by looking for recurrence of certain trends in the market represented by *inter alia* bar charts, Dow theory, and contrarian opinion theories (Francis, 1991:523-529). Taylor and Allen (1992:303) goes further and look at how specific chart formations such as market averages depict certain price movements when trading volume is at different levels.

Like in the fundamental method, chartists do not measure risk directly as they assume that it is reflected in the market prices (Francis, 1991:528). Fool (2000:7) argues that

technicians believe that they can predict future price movements by studying charts patterns constructed from the existing financial data. According to Fama (1965:189), this argument contradicts the weak form efficiency of the efficient market hypothesis where past information cannot be used to predict the future. Fama's (1965:190) empirical tests also showed that security price changes are independent of one another and hence, there is no relationship between past and future prices. This is because predictive power of these patterns lacks conclusive statistical evidence unlike the case under the fundamental model discussed above or random theory propounded by Malkiel (1999:34).

2.4 Modern Portfolio Theory (MPT)

The two theories explored in Section 2.3 above give little attention to the risk element. The MPT, and other investment theories of finance pay a lot more attention to the assumption of uncertainty and hence risk as we explain in this Section, Section 2.5 and Section 2.6. Indeed, the MPT is one of earliest models to deal with risk and return and simultaneously (Rutterford, 1998:12). Attributed to the works of Markowitz (1952), the MPT is a normative theory that employs quantitative methods to explain the risk-return relationship. It is unique in that it shows how to construct optimal portfolios from a trade-off of risk and return (Farrel, 1997:18). According to Bellemore et al (1979:212), irrespective of the number of securities in the portfolio, MPT's application of covariance-correlation matrix provides investors with a technique that enables them hedge against market uncertainties. Sharpe (1990) and Markowitz (1987) credits the MPT for it's wide application and consulting across the fields of financial economics, probability, statistics, financial engineering as well receptiveness to computer technology. In this section we discuss the assumptions of the model, the measurement of returns and risk and finally, diversification of the model. All these concepts are important to the study as they are applied in the data analysis and in Chapter 5 leading to the conclusions in Chapter 6.

2.4.1 Risk and return in the context of modern portfolio theory

In analysing risk and return, MPT makes various assumptions (Farrel, 1997:18). The key assumptions are;

1) Investors are risk averse, expected-utility maximizers rather than returns maximizers.

2) In choosing portfolios, investors consider the expected average and the spread of return.

3) Investors base their investment decisions on a single-period time horizon.

4) It is feasible to allocate probabilities to each investment decision taken.

Moreover, the MPT implicitly assumes that investors are rational and that financial markets are efficient. The implications of these assumptions are discussed further both in this section and the subsequent ones.

From these assumptions emerge the importance of expected returns. The significance of the MPT, in determining a security's rate of return may be approached from the argument that investors have to be induced with a higher rate of returns in order to invest in risky investments (Rutterford, 1999:22). The return they expect for a single-period can be expressed as:

$$E(R) = \sum \{(P_i)(R_i)\}$$

Where:

$E(R)$ = Expected return on a security

P_i = probability of return in particular state of affairs

R_i = possible returns under certain conditions

(Francis, 1991:11)

From this expression, we note that it is possible under the MPT to identify both the investment alternatives and their probabilities. In Section 2.2.1, we stated the difficulties of estimating the expected returns and allocating them probabilities owing to uncertainties and subjectivity of the analysts. Howells and Bain (1998:30) argue that by basing their future expectations on returns in the past, the investors leave a lot of open possibilities. Seneque (1987:29) seems to support this by suggesting that historical returns represent the possible outcomes and depicts a normal probability curve. According to Sharpe (1970:24) however, the distinction between past and future returns is not relevant to MPT since all distributions are subjective and only when the

distribution is objective that one may not use the MPT. This may happen when the past exactly predicts the future (Sharpe, 1970:25).

The 'spread of return' referred to in assumption 2 above represents the variability of expected returns, which is the risk. According to Lamm (2000:24), standard deviation is one of the quantitative measurement of total risk. For a single security, it is expressed as:

$$\sigma = \sum P[(R_i - E(R)]^2$$

Where:

σ = standard deviation

P = probabilities of return

R_i = possible returns

$E(R_i)$ = expected return

(Francis, 1991:13)

The various outcomes are assigned weights to facilitate risk assessment as we mentioned in Section 2.2. According to Francis (1991:12-13), the standard deviation not only measures the risk of individual assets, but also a portfolio of assets. Farrel (1997:20) argues that as standard deviation (σ) increases in size, the more the number of possible outcomes and the more the risk the investment. Conversely, a small standard deviation (σ) means fewer investment alternatives and a lower risk.

2.4.2 Measuring Portfolio returns and risk

A portfolio in this sense is a combination of securities weighted by their contribution to the overall return (Jones, 1994:572). Thus, unlike the risk of a single asset outlined above, under the MPT, risk is described by the weighting of each security in the portfolio (Jacob and Pettit, 1984:296). Farrell (1997:21) points out that the expected return of the portfolio is just the weighted average of the expected returns of its individual securities. Thus for a portfolio with n securities, the return is expressed as:

$$E(R_p) = \sum_{i=1}^{n} W_i E(R_i)$$

Where:

$E(R_p)$ = the expected return of the portfolio, Rp.

n = the number of possible assets in the portfolio

$E(R_i)$ = the expected return of an asset in the portfolio.

W_i = the proportion of the security in the portfolio (Farrel, 1997:22)

2.4.3 Measuring portfolio risk under MPT

The risk of a security in relation to others in the portfolio determines that portfolio's risk (Farrel, 1997:24). Howells and Bain (1998:33) avers that the superiority of MPT lies in its ability to bring out a clear relationship between each security in the portfolio and the other securities as measured by covariance of return. The covariance describes the way in which securities vary with each other thus influencing the overall variance and consequently the risk of the portfolio (Farrell, 1997:25). According to Jones (1994:573) therefore, covariance measures the co-movement of a security relative to others in a portfolio. Statistically, the risk of a portfolio is expressed as a function of the variance of the portfolio. This may be expressed as:

$$\sigma = \sqrt{(\sum_{r=1}^{n} w_i^2 Var(R_I) + \sum_{i=1}^{n} \sum_{j=1}^{n} w_i w_j Cov\, r_{ij})}$$

Where:

σ = portfolio standard deviation

$Var(R_i)$ = the variance of the securities in the portfolio

$w_i w_j$ = the proportion that each security i and j represents in the portfolio.

Cov_{ij} = represents the covariance between i and j securities returns

(Jones, 1994:573)

As indicated earlier, covariance or co-movement among asset returns in a portfolio is an important component of its risk. According to Jones (1994:575), the covariance measures the extent to which two or more assets move together and is expressed as;

$$Cov_{ij} = \frac{1}{n}\sum_{i=1}^{n}\{(R_i - \overline{R_i})(R_j - \overline{R_j})\}$$

The symbols $\overline{R_i}$ and $\overline{R_j}$ represent the mean return of securities i and j respectively.

Farrel (1997:25) noted that at times, covariance might be negative for some period and positive in others hence making it difficult to interpret the overall results. Rutterford (1998:12) however recognises correlation of returns as being the heart of diversification and thus aiding the interpretation of the covariance of returns. This is through standardizing the covariance by application of correlation coefficient (Farrel, 1997:24). Jones (1994:576) points out that the coefficient is derived from the above covariance of returns formula and is expressed as:

$$\rho_{ij} = \frac{Cov(R_i R_j)}{\sigma_i \sigma_j}$$

Where:

ρ_{ij} = Correlation between securities i and j

$Cov(R_iR_j)$= represents the covariance between i and j securities returns

σ_i = standard deviation of return of security i

σ_j = standard deviation of return of security j

The correlation coefficient ranges between positive one and negative one. According to Farrel (1997:24), positive one (+ 1) is on the higher side and it means that two or more securities consistently and perfectly move in tandem. On the other hand, it is negative one (–1) when securities move consistently counter to each. Between the two extreme correlation coefficients, there lies a compromise of various degrees. Admati (1989:8) argues that the correlation coefficient (ρ) is more intuitive than covariance because ρ lies

between negative one and positive one. Jones (1994:576) hastens to add that lower positive and negative correlation coefficients are good to investors because they indicate lower portfolio risk.

2.4.4 Portfolio diversification

Assumption 1, 2, and 3 wrap up the investors' fears and expectations by facilitating risk reductions through diversification. Bellemore et al (1979:163) argue that diversification is achieved by adding securities in the portfolio. It factors in on the size and correlation of securities in the portfolio. Farrel (1997:25) further observes that the higher the correlation of returns, the lower the diversification potential and hence the risky the portfolio. Conversely, the lower the correlation coefficient, the more diversifiable the portfolio and the lower the risk (Farrel, 1997:25). For this reason, it may not be beneficial to diversify a highly correlated portfolio (Jacob and Pettit, 1984:300). The benefit of diversification may be observed in securities (say two or more) with uncorrelated risks, if the variability of portfolio risk is less than the sum of individual risks (Francis, 1991:229). Thus, it may be argued that portfolio managers attempt to diversify their investments by selecting their securities from an array of securities with uncorrelated risks. It is also clear that the MPT model demonstrates its ability to quantify the benefits of diversification. Markowitz (1959:98) proved this by working out a quantitative approach for diversification by use of variance-covariance relationship as discussed in the previous section.

Farrell (1997:25) showed that for a portfolio with a constant standard deviation, adding securities with correlation coefficient of any size other than positive one continually reduces the risk of the portfolio. Rutterford (1998:11) further suggests that while it may be possible to substantially improve returns without increasing risk (or dramatically reduce risk without sacrificing returns), MPT has demonstrated that addition of a more risky asset reduces the total portfolio risk. This is because assets with less than perfect correlation move in different directions during the market cycles. Conversely, the lower the correlation, the lower the covariance and the more powerful the diversification in checking the portfolio risks (Rutterford, 1998:11).

Asset allocation brings to the fore the quantitative capabilities of the MPT model. Markowitz's (1959:98) application of single mean-variance optimization technique enable investors to optimally allocate their money to different investments in a single upcoming-period, by considering a trade-off between risk and return. In the contemporary world, multi-period techniques and computer programs are in use to consider as many assets as possible and at the same time construct and restructure portfolios (Jones, 1994:587). According to Francis (1991:228), an efficient portfolio gives maximum returns subject to a given level of risk. The first two assumptions and the fourth are responsible for deriving efficient portfolios. Jacob and Pettit (1984:298) further point out that at any given level of risk, the efficient frontier gives the highest returns. They add that this frontier gives the best set of risk and return combinations from all possible assets and portfolios. Jacob and Pettit (1984:297) see the MPT as vital in that it allows investors to appreciate possible losses that may arise from negative outcomes or the returns accruing from positive outcomes.

2.4.5 Application

Away from its theoretical glamour, the superiority of the MPT is cast from its immense application since 1970s facilitated by computers (Sharpe, 1995:30). In the late eighties, greatly magnified by 1987 market crash, the MPT and other financial theories took the front line in shaping investment decisions with numerous software programs called optimizers coming to the market (Markowitz 1990:8) Though Sharpe et al (1995) noted some initial shortcomings of these programs, they continue to be used to date according to Personal Finance (2001:4). So useful is the theory that fiduciaries in the USA such as pension trustees managers, mutual funds, and units trusts among others are legally required to put in place and strictly follow a written investment policy, diversify properly, and have assets allocation plans which clearly focuses on expected rate of returns, risks and correlation analysis (Personal Finance, 2001:5).

In Hogan and Vella's (1996:3) view, "it is fitting for emerging markets where economic and political events are termed as crises." During the period of this study, the South African currency crisis and the Kenyan political and economic crisis may be taken as

examples of what appears to be implied by Hogan and Vella (1996). The application of the model is even possible across two or more countries. The evidence is the Emerging Market Equity Fund which has been constructed from 23 emerging countries including South Africa (IMF, 2000:8). The superiority of the MPT was crowned with the recognition and provision of a measure of downside risk and how to minimize it (Markowitz, 1959, 1987). A measure of the downside risk would enable investors to make decisions when faced with non-normal securities distribution. Lucas and Klaassen (1998) and Lucas (2000:39) added their support by suggesting that while for normal distribution both variance and downside measure may be used, in non normal distribution, partial or semi-variances are the best suited.

Rutterford (1998:13) fault the theory for implying that investors have to take on a defined risks in order to reduce risk exposure and that more complications arise due to the instability of covariance of returns over short periods thus making it ineffective as a means of risk diversification. Other investment theories modelled along the foundations of the MPT address some of these weaknesses. Notable and of interest to this study are the CAPM, and APT. These models seem to emphasise on one or the other components elucidated by MPT and are examined in the section below.

2.5 The Capital Asset Pricing Model (CAPM)

Ward (2000:35) credits CAPM to Sharpe (1964), Lintner (1965) and Markowitz (1952) and further point out that it is an offshoot of the MPT that provides an elegant linkage between a portfolio and a single risk factor. It is a positive model in that it provides a logical outcome and comes in handy as a model of estimating expected returns (Rutterford, 1998:25). Though the MPT distinguished non-systematic risk from the diversifiable systematic risk, it failed to provide an explicit relationship between the price of an asset and the risk (Sharpe, 1970:70). It is this task that CAPM attempts to accomplish. Instead of using covariance to measure the relationship between asset returns, the theory employs market (systematic) risk to relate asset price to the market as a whole (Rutterford, 1998:14).

2.5.1 Assumptions of CAPM

CAPM builds on the assumptions of the MPT discussed in Section 2.4. Since it is a positive theory, CAPM requires additional assumptions to deal with the security price, the risk-return relationship, and implications (Rutterford, 1998:12). Jacob and Pettit (1984:322) add 6 assumptions in addition to the 4 assumptions of MPT outlined in Section 2.4.1. These are: 5) that the investors can borrow and lend as much as they wish at risk-free rate of interest; 6) no taxes or transaction cost and therefore, no possibility of mispricing; 7) investors' perceptions about expected returns, variance and correlation of investments are identical; 8) the markets are ideally perfect which means that, among other things, all investors are price takers; 9) that all securities are marketable and publicly traded in equilibrium capital market; and finally, 10) there are no restrictions on short selling. Jacob and Pettit (1984:326) argued that from these assumptions, the implications of the model on price, expected returns: risk and equilibrium prices of all financial securities with uncertain future incomes are derived.

2.5.2 Implications of the assumptions

The implications of the risk free lending and borrowing assumptions are that the risk of the portfolio is determined only by the proportion of assets invested in risky assets. (Farrell, 1997:57). The argument is derived from assumption 6 that the return of the other riskless assets being combined with risky assets has zero standard deviation and zero variance (Farrel, 1997:57).

The homogeneity assumption implies that all the investors choose an identical portfolio. According to Sharpe (1970:81), every investor diversifies his/her portfolio investment in the same way irrespective of whether he or she finances it as a borrower or a lender. The identified portfolio is efficient and optimal and it is the market portfolio (Jacob and Pettit, 1984:326).

Furthermore, CAPM implies that by reducing beta of a portfolio, then, the investor is sacrificing the expected returns (Jacob and Pettit, 1984:341). In the CAPM the risk-adjusted portfolio performance cannot be improved by concentrating on low beta stocks

as this reduces portfolio diversification (Jacob and Pettit, 1984:369). From the assumption of a risk-free rate and the CAPM's prediction, the implication is that low risk tolerant (higher risk averse) investors require a lower risk. According to Farrell (1997:56) the assumptions' implications are that the pricing of market (systematic) risk, as measured by beta, indicates not only the relationship between the asset return and its risk, but also the portfolios

Jacob and Pettit (1984:375) further points out that CAPM implies that the alpha, which represents excess mean return, is zero and that a zero alpha does not enjoy abnormal returns. Where alpha is non-zero, the security is either under or overpriced. If alpha is greater than zero, then the security is under priced. For latter, the returns are too large than average and hence it is a buy stock (Jacob and Pettit, 1984:375). They also contend that the model derivation has implications on the classification of securities based on performance. Ruppert (2001:4) argues that investors holding aggressive stocks would expect to earn better than average returns while those who with defensive stocks would expect to get less than average returns.

According to Rutterford (1998:12) portfolio diversification eliminates firm specific-risk and therefore, it is the security's beta that affects portfolios risk, not the portfolio's unsystematic risk. Sharpe (1964:430) also argues that the market beta expresses the relationship between the expected return and the systematic risk for all assets and portfolios, both efficient and inefficient. The beta is also relevant to all assets and portfolios (Sharpe, 1978:79). Thus in equilibrium, all assets have the same reward to risk ratios and hence the structure of the portfolio will depend on the risk tolerance of the investor (Farrrel, 1997:58).

From assumption 2 (in Section 2.4.1) on expected returns, the model expresses risk in terms of volatility that is measured by beta. According to Merton (1973:867), the CAPM relates expected excess returns to volatility and thus shows how expected returns and expected fluctuations affect the outcomes of a portfolio so that uncertainty is incorporated into the results.

Sharpe (1970:70) points out that the beta describes the sensitivity of the portfolio or the asset to the market movements, with high-beta securities being more sensitive than low beta securities. Jacob and Pettit (1984:375) seem to confirm this assertion and explain that high-beta securities perform better during downturns and tend to under perform the market in boom times. Jacob and Pettit (1984:341) further suggest that a security whose beta is greater than one will be riskier than the market portfolio and, its expected returns exceeds that of the market. According to (Jacob and Pettit, 1984:369) aggressive stocks have such a beta and investors may hold them, as they tend to outperform the market in market upturns and include the income and the growth stocks.

2.5.3 Limitations, tests, and predictions of CAPM

Sharpe's (1970:38) argument that those investors who were neither privy to the inside information or lacked superior predictive powers in case of strong-form efficient markets to accept the investment strategy of CAPM may not hold in real markets. Roll and Ross (1992) doubted its accuracy in relation to the use of market index such as S&P500 index. Chan and Lakonishok (1993:34) later found that it could not pass as a comprehensive measure of risk-return relations because does not address the crucial downside risk of the investor. The investors are very much interested in knowing their chance of losing and how much they will loose (Jacob and Pettit, 1984:397).

Another possible pitfall of the CAPM is the emphasis on the argument that market portfolio is the only source of systematic risk (Mishkin and Eakins, 1999:79). Moreover, the predictive power of CAPM was thrown into disarray in later years. Rutterford (1998:32) questioned why investors did not want to be rewarded for taking unsystematic risk yet securities with a beta of zero were found to have a better return than risk free assets (treasury bills). In addition, stocks with higher betas were found to perform slightly worse than predicted by CAPM (Farrel, 1997:67). The validity of the model could possibly be verified through an empirical analysis. But, according to Seneque (1987:32) the model has not mustered all the conditions necessary for testing. Black, Jensen and Scholes (1972:80-85) performed a regression analysis in an attempt to find out whether

the betas could explain the differences in cross-sectional average returns but the analysis failed.

Jacob and Pettit (1984:395) refers to Fama and MacBeth's (1973) test on the model's assumption of constant risk over time using betas estimate over a 5-year period. The results found that expected returns could also be changing through the same period. Merton (1998:323) found that in a market with low short selling and divergence of opinion, high stock betas do not earn the excess returns predicted by CAPM because of the differences in returns expected by the marginal and the average investor. Finally, Fama and French (1992:427) also dismissed beta as insignificant in explaining average returns and concluded that size and book- to -market value better captures the returns.

2.6 The Arbitrage Pricing Theory (APT)

This arbitrage-pricing model is the work of Ross (1976) in an attempt to provide a framework to enhance the understanding of factors that determine returns in the capital markets (Jacob and Pettit, 1984:413). (Farrel, 1997:92-93) points out that the theorist attempted to do this by dividing systematic risk into infinite risk components without pre-determining what these risk factors were. Specifically(s), Roll and Ross (1980:1037) and (Roll and Ross, 1984:347-350) identified those factors that determined the risk in practice as; investors' risk tolerance/default risk premiums, interest rates, inflation and industrial production. The model thus submits that, the sensitivity of the stock to each of these 4 factors determines its expected returns.

According to Farrel (1997:92), the number of independent factors that affect returns are limited and since the model neither prices the factors nor mentions expected returns, it is a model of variance. It therefore argues that there are several betas whose numbers depend on the risk factors, which cannot be pre-determined and therefore, the model's task is to estimate these betas from the reaction of individual asset returns to changes in risk (Roll and Ross, 1984:248). The expected return of the arbitrage model is a linear function of the sensitivity of the security to the numerous independent factors included in the model (Jacob and Pettit, 1984:414).

2.6.1 Assumptions, implications and test of arbitrage pricing theory

The derivation of APT is based on the assumptions that there is no arbitrage trading, we have perfect markets and that expected returns are linearly explained (Ross, 1976:342). According to Morelli (1999:20), arbitrage opportunities cannot arise if; the economy is diversified, and expected returns on securities and weighted components of the systematic factors can be linearly expressed. Morelli (1999:21) further points out that an arbitrage opportunity exists when security prices spread enables investors to construct a portfolio whose net investment is zero but guarantees some profits. They attain this by trading the same asset in different markets and at different prices (Jacob and Pettit, 1984:413). Jacob and Pettit (1984:410) further observe that the APT is built on the assumption that one systematic factor affects returns but, uncertainty is derived from macro as well as firms-specific factors.

Though the APT implies the same expected beta-return relationship as CAPM, it does not necessarily require that all investors be mean-variance optimisers (Farrel, 1997:99). APT further implies that the index portfolio may be any well-diversified portfolio whose market factors (F) are highly correlated and only when risk-return relationship is violated by most individual securities that arbitrage opportunities arise (Jacob and Pettit, 1984:410).

It is not that the APT is without problems. Duffie (1996:102) explains that the tendency is towards more restrictions to the: absence of arbitrage, single agent optimality, and the equilibrium assumptions. McMenamin (1999:156) notes that the model is ambiguous as to the nature and the number of relevant risk factors. The other hiccups of the APT lie not only in the usage of its complex mathematical model, but also in the establishment of each factor premium and measurement of the sensitivity of coefficient to be applied in the model. It is further rebuked because of its silence on the pricing of factors and by implication the expected returns (Black, 1995). Geweke and Zhou (1996:585) found that even adding more factors in the model brought about only a little improvement. Solnik (1983:326) finally, faults the APT with the violation of the efficient market paradigm because of the spillover effects in trading periods between markets.

2.7 Non-linear theories approach to investment

2.7.1 The Chaos theory

Bill and Pike (1996:46) contend that the efficient market hypothesis (EMH) argument that securities price movements follow a random walk and are therefore unpredictable is wrong. In fact, the unexplained noise in the market by EMH is important in determining the price movement (Elton et al, 1981:359). Hence research in the field of non-linear systems, like chaos have provided important tools for security analysis. The realm of chaos theory lies in the possibility of making correct long-term predictions of any system accurately if the initial conditions are known (Trippi, 1995:5). Like fractal systems, daily or any periodic market price changes are sensitive to their initial conditions (Danahue, 1997:3). Based on this assumption, it is possible to make sense (order) out of random numbers such as the unpredictable security prices.

Danahue (1997:4) argues that the theory acknowledges the fact that the prices are very sensitive to minute noises in the stock exchanges. This again, is because the market as opposed to EMH arguments has a memory whose influence on movement diminishes with time. According to Trippi (1995:7) if unpredictable future prices and returns are non-linear, they can exhibit illogical behaviour and may either be stable or unstable. What appears to be important is the sensitivity of the stock market price movements to the tiny disturbance of the current prices. Hence, such disturbances are macroeconomic variable like initial inflation, and interest rates, political changes, to remote psychological factors as investors' greed and fears, which cause overreaction or even under-reaction of human beings (Bill and Pike, 1996:46).

The chaos theory claims that the market prices are dynamic and exhibit aperiodic behaviour (Trippi, 1995:8). That is, though they are ever changing, they do not exactly repeat themselves. The stock market systems are self-similar in that their patterns, just like the blood veins keep on branching out further and further. Danahue (1997:4) further argues that though stock markets tend to be highly random, they exhibit a particular trend. Danahue (1997:6) further suggests the stock markets are also self-similar in that

the individual security prices form part of the whole market. It is, however, possible for the market to change in a way that would appear to be smooth and orderly.

According to Trippi (1995:9), chaos theory has practical implications on the behaviour of security markets and decisions of investment managers. This is evident from its distinction of random process and chaotic processes which is important in determining the predictability of observable price movements or asset returns (Bill and Pike, 1996:46). Thus investment managers apply this theory as they construct portfolios consisting of money market and derivatives instruments and currency exchange, real estates and the traditional long-term securities (Danahue, 1997:8).

2.7.2 Behavioural theories

Another common approach to investment management is the behavioural perspective of finance. Keynes (1973:143-148) agrees with orthodox financial theorists that investment decision are based on rational behaviour but goes further to argue that irrational behaviour plays an important role too. It is difficult to quantify the irrational drive in an economic model as attempted by orthodox theorists. However, a lot of literature supports the behavioural theorists argument on the stock markets. Shiller (1981:421) and Lakonishok et al (1994:1541) agree that stock prices not only reflect rational investors behaviour but also the irrational behaviour. Such irrational behaviour implies that investors never learn from past mistakes but continue to make systematic errors in forming their expectations.

This theory goes beyond the contribution of subjective judgement in the securities market and introduces the question of market psychology. According to Frank (1999:91) investors' psychology is not static, but oscillates between irrational exuberance and irrational depression. This view that investors at times exhibit the herd mentality in their trading is attributable to asymmetrical information and incomplete markets, facts that appear to counter the EMH and equilibrium models of investment (Frank, 1999:92). Morris (2001:48) argue that behaviour such as the rush to exit the market for fear of

economic recessions or insatiable greed for internet stocks provide evidence of the animal spirit among the concerned investors.

Keynes (1973:148) argues that in decision-making, investors should be guided by both known facts and unknown future outcomes of an investment yield. However, they should not give a lot of weight to an uncertain future that is hidden from them. He rejected the Bayesian approach of equal probabilities and suggested that the ability to anticipate future yields is also influenced by matters that are very uncertain. The Delong et al (1990:707) view is that the failure of the conventional methods and the consequent instabilities are explained by the psychological behaviour of the investors. Lakonishok, Shleifer and Vishny (1994:1545), suggested that markets and yields volatility are due to speculators presence, uninformed traders and the animal-like behaviour. The sudden and violent world stock market crashes of 1929 and 1982 gives us a taste of the instability and long-term consequences that they bequeath to investors (Kamphuis, 1987:20).

Debondt and Thaler (1987:803) argue that the unreasonable behaviour of uninformed individuals sways the market, often in a violent manner. These traders who are often termed as "noise traders" cause stock prices to rise or fall though not necessarily creating arbitrage profits. Keynes' (1973:154) comprehension of this environment is that, to start with, the existing investment market models are a result of the actions of the larger number of ignorant investors. The investment yields change significantly without any changes in the fundamentals underlying the asset. These changes are often abrupt and may be violent implying that they are short-term (Debondt and Thaler, 1987:557). The professionals who instead of moving to calm the markets follow suit to capitalise on the tragedy do not help this situation.

According to Debondt and Thaler (1996:115), the stock markets prices and hence expected returns are not fully accounted for by speculators. This sometimes-violent spontaneous movement is an exemplification of the instinctive behaviour, which Keynes (19936) described as the animal spirit- a kind of shifting psychology from irrational excitement for example, to irrational depression as optimism is replaced by pessimism

(Keynes, 1973:161). Such a behaviour in the world stock markets prevailed between experiencing (2001 and 2002). Frank (1999:90) concurs adding that when this animal instinct grips the investors, they move like herds with no direction. These spontaneous actions may have long term-term consequences on the market movements, stability and yields (Debondt and Thaler, 1985:803). For example, due to the technology stocks crash in the NYSE, the ripple effects in the long-term made JSE loose one-third of its capitalization (Samuelson, 2001:13). Such observations may not be derived from mathematical models or any conventions.

2.8 Conclusion

The 1950s saw radical changes in finance thinking with the introduction of risk analysis in assets and portfolio management. Overall, the MPT provides a model that applies quantitative inputs to determine expected returns of securities and portfolios and their risks. It is mainly about diversification and risk reduction. Unlike the traditional theories, it provides a model that simultaneously harmonises both the returns expectations and risk requirements of the investor. Perhaps, it is the explicit decision rule that makes it relatively more appealing: simply select your risk preference and there are your returns. Alternatively, the investor can select the required returns and the model gives the appropriate level of risk. The MPT also provides investors with an optimal portfolio that is fully diversified.

The CAPM's pricing status enables investors to tell whether assets are undervalued or overvalued and hence implicitly determine risk and returns with respect to the market. The APT applies market factors instead of market portfolio of CAPM. The linear or logical theories we have discussed above have been downgraded to the traditional models with the "new models" assuming that only some investors are irrational (Brown and Reilly, 2000:86). According to Barber and Odean (1999:1), in these models, over-confident investors do not believe in efficient markets for example, and the smart investors may gain abnormal returns at their expense. Our study will, however, not dwell much on these models. It would appear like no mathematical models or conventions are sufficient to make an investment decision. They do not account for the instinctive

behaviour of the investor. However, they form a good basis for estimating returns and predicting the future. We should use mathematical models while remembering the importance of aperiodic behaviour and crowd behaviour in markets' disturbances.

Our study takes the position that it is important to rely on the logical models to enhance innovativeness of the entrepreneur. This is because whether it is risk in the models of orthodox theorists and organised markets of EMH, or the volatility by the irrational investor suggested by finance behavioural or chaotician theorists, they all affect investments. However, the superiority of the former lies in its adaptability to modern technology, and the accompanying advantages such as the speed of information processing. In fact, Keynes, and other behavioural and chaotacian theorists are not opposed to the orthodox view of employing models- probability distribution- to account for the future returns. The bone of contention is when the investors' drift to the application of orthodox models any time they are faced with uncertainty.

Ultimately, the decision as to which one of these theories would be applicable in the evaluation of securities and funds returns depends on the availability, composition or types of securities and markets. The environment in which they operate is undoubtedly important in determining the securities and funds returns. In Chapter 3, we explore the various components of investment environment such as economic, political and market factors in which securities and funds operate in both South Africa and Kenya.

CHAPTER 3. THE ENVIRONMENT OF INVESTMENT MANAGEMENT

3.1 Introduction

Investment occurs in a diversified climate. Some aspects of the environment are favourable to its operations and survival, while others have adverse effects. The environment underlying investment decisions include; the fundamentals of the economy, the stock market cycles as well as the industry and specific business of the securities being invested (Bellemore et al, 1979:328). Models exist to explore risk and return of security or the entire market as we saw in Section 2.5 to 2.6. But factors beyond the reach of the model also move the stock prices thus interfering with the expected returns (Bellemore et al, 1979:2-3). Subjective and unquantifiable factors such as: political situations, market sentiments, and investors and other markets participants behaviour in the stock markets may also determine the environment as pointed out in Chapter 2. What this means is that the environment may to some extent be unpredictable and uncontrollable. The analysis of the general environment and the challenges that it poses to investments and hence the risk-return profile is necessary in our study of the JSE and the NSE markets. For this reason, the discussion below focuses on the political, economic, and market factors that affect investments returns and risk in South Africa and Kenya.

3.2 Political and economic environment in South Africa

Studies in South Africa, shows that political news events, both domestic and external, government policy shifts, exchange controls, crime and industrial strikes affect the investment climate and hence the risk and returns of the investors in the stock market (Page and Way, 1992:35; Bhana, 1997:44-45). The strength of the belief by business analysts in South Africa as reported by popular press that domestic politics drive the stock markets has been confirmed by numerous studies (Marwe and Smit, 1997:11,19; Bhana, 1999:29). Their study established that there is a relationship between domestic politics and the volume traded and volatilities of the All Share Index, All Gold Index and the Industrial Index. They further argue that the behaviour of market participants also

affecting the stock prices in SA. Collins (2001:9) points out that economic fundamentals affect the stock market performance.

Merwe and Smit (1997:11) further observed that political news events like the release of Mandela in 1990, the political violence that followed, the transition in 1994, and the accompanying mixture of optimism and pessimism influenced the movements of the JSE. The study showed that domestic political events explained the volatility of between 19 percent and 59 percent of the volume traded. However, the political news events only explained between 1 percent and 23 percent of the share price movement (volatility) in the JSE. Even the classification of South Africa as an emerging market has effects on the share performance (South Africa Reserve Bank (SARB), 1998:24).

The implication to the risk and returns of the investors is that if the political news is interpreted as being good, then the prices would rise and holders of such stocks would earn higher capital gains. If the perception of the news is negative, then the resulting selling of shares means that holders of such stocks would experience capital loss. Such negative perceptions may explain the occasional decline of the JSE as the markets try to respond to these political events. One such event in this respect was the 1998 announcement of the appointment a new governor of the Reserve Bank (Economist Intelligence Unit (EIU), 1998:29, 40).

Other political events that seem to have negatively affected the JSE are the South Africa's official position on Zimbabwe political crisis in year 2000, which was interpreted in certain quarters as condoning either the government's land reform policy, or being outrightly indecisive (African Research Bulletin (ARB), 2000:14506). Similarly, it is suggested that the government policy on HIV/ AIDS and the unsuccessful SA bid for the 2004 Olympic games contributed to the weakening of the currency (Rand) and the decline in the stock market (Herald, 2000a:15). Thus, it may be argued that the effects of news events on the stock markets in turn affect the performance of individual securities and funds risk-return profiles and hence the investment decisions.

Economist Intelligent Unit, (1998:29,40) suggests that the removal of the financial rand in 1995, the imposition of exchange controls, and the 1996 rumours of the health of Mandela (former South African president) affected the JSE market performance. The report further points to the reservations on the government's free market policies especially regarding privatisation as partly explaining the relative weak performance of the JSE as shown by the fall of All share index from 8700 in January to 7570 in December 1998. The political alliance between the ruling party (ANC) and the labour movement in SA has been blamed for playing a role in the strengthening of rigid labour laws that have implications on both the costs of production and stock markets prices (ARB, 2000:14506). Bhana (1997:48) notes that the powerful union was responsible for the loss of 3.9 million man-days in 1994 through strikes. The share returns fell both around the time of strike announcements and later during the strike period by 3.64 percent. Market reaction tends to worsen when the strikes persist for a long period.

South Africa's policy shift from shift from a social-economic framework based on Reconstruction and Development Programme (RDP) to a market led economic policy (Growth Employment And Redistribution (GEAR)) policy in 1997, signalled a reversal of the political ideology whose bearing on the risk and returns of the stock market is important. However, the adoption of GEAR policy is blamed for the loss of about a million jobs since 1994 and being against the spirit of the earlier RDP policy (Financial mail, 2000c:14). This explains the opposition to the privatisation of state corporations such as Eskom and Telkom (ARB, 2000:14508). The research also observes that the demand for social investments, relaxation of deficit targets and a state led-development strategy instead of a market driven one may have further implications on investments. Any attempt by the government to return to the policies otherwise considered to impede free market principles may have a negative impact on economic performance (ARB, 2000:14510). Such a negative impact on the economy may find its expression in, *inter alia*, the securities market.

Corruption has also been identified as a potential threat to the economy in SA though the

creation of strong anti-corruption institutions is a sign that it is being controlled. In Africa, Transparency International ranks SA as 4th least (19th out of a sample of 22 countries) corrupt nation for 2000 and 1999 years respectively while on a world scale, it was ranked 32 in 1998 down from 21st position in 1995 indicating the threat posed by the vice (African Research Bulletin, 2000:14494). Moreover, the numerous criminal activities tend to dampen the investors confidence. The crime situation has made the country be branded as a high risk-economy and specifically the fourteenth riskiest investment destination despite good monetary policies (Nick, 2000:15). The report observes that investors rate crime as the greatest hindrance to doing business in SA.

Finally, the threats of a new legislation by the parliament's trade and industry committee to force banks to invest in small and medium sized (SMME) black businesses, the transformation of financial sectors and the establishment of cooperatives (ARB, 2000:14507) are also cited as factors that could inhibit growth in investments. Such legislation, places uncertainties over the future of the banking industry and if taken as real threat may be factored on the JSE market in the form of stock prices fall. Hence, it may be argued that domestic political news, corruption, crime, and legislation can impact negatively on investment returns as it affects the stock markets prices.

External political factors also influence the risk and returns of the stock markets. It is argued that Asian countries financial markets could have been cushioned if they had exchange controls to restrict short- term capital outflow when panic hit the foreign investors (Economist, 1999:8). The collapse of these markets had a negative effect on the JSE market (SARB 1998:24). Also, the bearish JSE market in the second quarter of the year 2000 was partly attributed to the negative sentiment in the run up to the Zimbabwe elections, as already mentioned above (SARB, 2000:18).

Globalization, is said to advocate for the removal of trade barriers (Herald, 2000b:3). The report (Conference on Globalisation in Indonesia in year 2000) argument against globalization is the potential negative impact it may have not only on the sovereignty, but also on the capital markets of poor countries. The political risk is the biased movement

(outflow) of capital from the stock markets of poor countries owing to what is perceived as unfavourable legislation. The Bank for International Settlements (BIS, 1998) report shows that relaxing financial controls has increased volumes traded both on foreign exchange markets and stock markets. The report however adds that out of the more than US $1 trillion a day speculative trade in worlds' stock markets, only little is traded or benefit developing countries.

The end of economic isolation and the return of SA to international markets in the 1990s may have significant implications on the risk-return profile of the JSE' listed securities. The opening up of the SA market, the low domestic savings, and South Africa's tag as an emerging capital market made some large companies to seek foreign listing (SARB, 1998:24). Bhana (1997:37) argues that the major financial benefit of this strategy is the elimination of capital market segmentation brought about by factors such as exchange controls and capital movement controls, information barriers and the low stock prices. This is because the cost of capital may be higher in a segmented market than in an integrated one and hence, the need for cheap capital is the overriding factor of listing overseas. Bhana (1997:38) further found that cross-listing of South African companies, specifically on the London Stock Exchange (LSE) increased returns in the short-term to the shareholders and also increased volatility of stock prices and returns.

However, one observes a test on the effect of changes in the economic environment as such as a shift in policy. Allowing of foreign listing of local companies for example may threaten the country's attractiveness as a reliable investment destination. The African Research Bulletin (2000:14598) cites the South African government's refusal to allow some companies to list abroad, for example, Gold Fields. The argument is that future investment by foreign companies in the South African stock markets may be jeopardized if the investors took the refusal as a precedent. Furthermore, Hazelhurst (2000:15) argues that the revision of historical GDP by Statistics South Africa forced the markets to revise their forecast more than three times in the year 2000. It began with an estimated GDP of more than 3 percent, then to a low of 2 percent and back to more than 3 percent at the end

of November 2000. This only fuels uncertainty in the investment environment making it difficult for any meaningful long-term planning by investors and investment managers.

On the positive side, the country continues to attract substantial proportion of the dwindling foreign direct investments (FDI) to African countries, accounting for about 14 percent of the less than US $10 billion in 2000 (UNCTAD, 2000). The expected positive impact on the economy may be reflected in improved returns from improved companies' profits and prices of securities.

3.3 Political and economic environment in Kenya

Though some global, and in particular Africa's political and economic environment discussed in Section 3.4 below also affects investment returns and risk in Kenya, domestic political conditions may have important effects too. According to the World Bank (1999:6), some the combined effect of government's lack of political will to tackle corruption, uncertainties during and after the 1992 and 1997 multi-party elections are some of the factors that underlies the investment climate in Kenya. The report also point to the stalled constitutional reforms since 1995 and backtracking on structural reforms mutually agreed upon with the donor agencies in the last ten years as contributing negatively to the investment environment. It is notable that in this period economic growth has fallen from a high of 5 percent in the 1980s to lower than 1 percent in the year 2000 (Economic Survey, 2000:5). These conditions may have led to the dramatic fall in the NSE index over the last four years since 1997 (CMA, 2001:2).

Corruption tends to enhance political risk and thus worsens the investment climate especially for capital markets. Kenya's position has been worsening as shown by its being branded as the fourth most corrupt country in Africa (out of a sample of 19 countries) both in 1999 and 2000 (ARB, 2000:14494). The government development plan identifies corruption as having had negative effects on the economy (CBS, 1995:78). The Public Account Committee (1997) has documented corruption cases between 1992 and 1995 associated with state enterprises include the Kenya Ports Authority (KPA), and National Social Security Fund (NSSF). However, the Nairobi Stock Exchange index

showed an upward trend during the same period rising to 3468 in December 1995 from 954 in 1992 (Economic Survey, 1998:78). This implies that other political and economic indicators other than corruption had a stronger influence the stock market.

Government policies are important in influencing investment climate in Kenya. There has been delay in the implementation of government policy on privatisation though it has been blamed on political interests and corruption (Mukonyi, 2001:3). If political consideration had not delayed privatisation of both the telecommunication and power sectors as envisaged in 1999, the estimated trading volume and hence the liquidity of NSE would have improved by between 20 and 30 percent (Murigu, 2001). These estimates are based on earlier floatation of other state enterprises through the exchange.

According to World Bank (1999:8), the partial privatisation of 8 public enterprises (since 1998) raised $136 million and was the major drive behind the improved trading, growth and regional importance of NSE in late 1980s and 1990s. It is on the backdrop of this view that the report attributes the failure of government divestiture in other public corporations (Telkom Kenya Ltd, Kenya Power and Lighting Company (KPLC) and Kenya Ports Authority (KPA)) as being based on political expediency. The optimism and pessimism that accompany possible floatation of these utilities since 1999 may also alter the investors' confidence and thus influence the performance of the exchange (African Stock Exchanges, 1999:60).

Kenya's relationship with international lenders and donors is crucial in evaluating the investment climate. In the 1980s and 1990s, donors increasingly attached aid conditionalities to 'good governance' (Szeft, 1998:224). The conditions entailed economic liberalization, democratisation, transparency and accountability. The failure of the government to meet these conditions led to withholding of funds. This has had both positive and negative effects on capital flows in the stock markets because of the delicate linkages of the economy on donor agencies on the one hand and the aid demands on the other. In this respect, the suspension of $350 million and $250 million between 1991 and 1993 and 1997 respectively by donors, insecurity, and poor physical infrastructure may

have disrupted the flow of capital into the NSE (Capital Market Authority (CMA), 2000:15).

The above events, in addition to the uncertainties surrounding the 1997 elections, may be blamed for reduced participation by foreign investors, who accounted for about 36 percent of the turnover by 1997 (African Stock Exchange, 1999:60). The reduced participation of foreigners may have contributed to the fall in NSE index from 3530 in June 1997 to 3115 by December 1997 (Economic Survey, 1998:88). Thus it may be suggested that the continued bearish market since 1997 (to date by the time of this study) as reflected by a further fall of the NSE index to 2303 in 1999 to below 1600 by 2000, indicates the combined negative impact of persistent political uncertainties since 1990 though economic fundamentals have also played a major role (Economic Survey, 2000:92).

But, as we shall observe, the economic and market liberalization, as well as the improved business confidence may have contributed to the general rise of the NSE index between 1994 and to 1997. For instance, trade liberalization and the removal of exchange controls in Kenya in the 1990s, as well as the partial opening of the NSE to foreign investors from 1995 saw investments increasing from US $4 million to a peak of US $38 million in 1997 despite an economic downturn (African Stock Exchanges, 1999:61). In particular, the opening of NSE market to foreigners in 1995 saw improved trading in the bourse (CMA, 1998:19-20) These positive government policies that were both political and economic could have boosted the stock prices and returns to the investors.

Furthermore, as was the case in our analysis of the JSE, political news events seem to also have an impact NSE as evidenced by the movements in its index (Economic Survey, 1996:194). The political violence and unrest over the clamour for multiparty democracy in late 1980s and early1990s appear to have had mixed effects on the stock market. The report indicates the NSE index fell from 862.74 to 814.95 in 1989. In 1990, the index rose from 811.25 to 895. In spite of the 1991 introduction of multi-party politics and the

uncertainties of an impending election (1992), the NSE maintained an upward trend rising to 959.97 in December from 913 in January.

Economic Survey (1996:194) stock market data shows that uncertainties over the subsequent general elections did not deter the upward trend of the NSE index as it increased from 954 to 1246 by the close of the year. But this rise corresponds with the resumption of economic aid by the multilateral lenders. The effects seem to have been felt later in 1994 and 1995 when the index fell from 4559 to 3468 in 1995. During the year 1995, which is also associated with anticipation for constitutional reforms, the NSE index fell from 3939 in January to 3468 in December.

Change in investors confidence on an account of the violence and uncertainties surrounding the 1997 general election, was partly to blame for the poor performance of NSE in this period (Economic Survey, 1998:88). The implication of this investment climate is that investors, especially foreigners, are likely to demand high-risk premium to their returns in the stock markets in an effort to hedge against such risks and in the extreme case, may pull out of the stock market in an effort to reduce further losses. This may partly be the case on the NSE where the index has been falling since 1997 as pointed out elsewhere in this section.

Since 1990, Kenya economic environment has generally been bad for the investment management, safe for the period between 1995 and 1997 (CMA, 1998:12). The economy has been on a downturn trend since 1980s with the GDP registering a paltry 1.4 percent at the end of 1999 from a high of 5 percent in 1985 (CBK, 1999:29). As we have outlined in our discussion of the political environment, this poor performance may be attributable to economic mismanagement in the public service, corruption, and declining donor support. The latter, has particularly had serious ramifications on the economy. For instance, the suspension of donor funding in 1991 to 1993 and 1997 led to deterioration of macro economic indicators with the GDP falling, coupled with a rise in interest rates while the volume of investments declined and the balance of payment worsened (CBK, 1999:16). The report pinpoints increased government borrowing in the domestic market, and more

so, in short-term (money market) which rose by 33 percent in 1998 alone (CBK, 1999:16).

Besides crowding out the private sector from the thin credit market, heavy domestic borrowing by the government tends to put pressure on interest rates and inflation thus increasing the cost of capital, depleting savings and hence denying potential investments to the stock market (CMA, 2001:17). In this regard, the interest rate whose benchmark is 90 day Treasury bill rose from 16 percent in 1990 to 21 percent in 1996 and further to 26 percent in 1997 as government borrowing persisted in the absence of donor aid (Economic Survey, 1998:183). The economy has further been worsened by other factors such as drought, floods, rising unemployment, and high oil prices (CMA, 2000:15). This gloomy scenario affects investment returns in that corporations and individuals tend to sink into a debt trap as the cost of the credit rises while they are unable or fear to raise finances from the capital markets.

The slow relaxation of legislation bottlenecks regarding funds management may be said to have negatively affected the investment environment and hence the returns (CMA, 2000:71). The small size of the capital market may be seen in this light. With a capitalisation of only Kshs. 100 billion (US$ 1.5 billion) the market is relatively small and illiquid (CMA, 2000:18). Therefore, existing fund managers have been limited to constructing and altering their portfolios from the few dominant traditional securities in the market (NSE, 1998:2) Other potential sources of capital to improve the stock market from non-financial institutions such as the National Social Security Fund (NSSF), National Health Insurance Fund (NHIF) and cooperatives societies are inaccessible to private fund managers due to lack of clear-cut regulations (Economic Survey, 2000:88). Despite some form of legislation in the past, their boards have engaged in *utra-vires* activities such as real estate development, and land speculation. The report further notes that the bill meant to enable these organisations unbundle their huge capital to the private asset managers has not been passed by parliament. This leaves the fund managers to deal with the relatively small resources from the private sector.

Government positive policy shift may further improve economic environment and hence impact on the returns and risk For example, policies in place to increase competition, innovativeness and hence liquidity in Kenya include allowing foreign investors to own up-to 30 percent of local fund management firms and a majority stake, that is, 51 percent in brokerage firms (Economic Survey, 1998:88). The report further observes the government effort to improve investment and liquidity in the stock market, by licensing venture capital funds and dealers in 1997. Incentives to encourage usage of these investment vehicles included a 10-year tax holiday for licensed venture funds, while capital gain accruing to dealers and insurance companies were exempted from tax just like other institutional investors. To improve international standing of listed companies and other corporate bonds issuers and therefore attract capital to the Kenyan market, all expenses relating to credit rating has been made tax allowable (Economic Survey, 1998:89). With these benefits are potential risks in that the market is now more exposed to global capital markets movement and therefore stock prices and returns may become more volatile.

3.4 Influence of investment environment on risk and return analysis

In Sections 3.2 and 3.3, specific country's political and economic environment affecting risk and returns on investments have been examined. However, there are other global and regional environment conditions, which also tend to influence trends in the risk-return profile. It is important to consider these influences because some investors, especially large ones, look at countries' potential securities and funds risk-returns from a regional perspective. As we discussed above, one of the reasons why SA stock market for example, is seen as risky is merely because it is grouped as part of emerging market. Kenya on the other hand is partly surrounded by politically unstable countries like Somalia and Sudan. Consequently, a risk-return analysis must take into account such influences.

Political environment determines the movement of and consequently the risk level of the markets. Political risk, though subjective, may be used to measure the sensitivity of this environment (African Research Bulletin, 2000:14489). It is further argued that investors

attempt to assign weights or probabilities to these indicators though they are subjective (Kitchen, 1986:7). Some of the effects of the political factors may be demonstrated by the reaction of the capital markets to adverse reports around the world. In extreme cases, leading political indicators are, restriction of transfer or movement of funds by the host country, destruction of foreign-owned assets by hostile residents, governmental collapse and wars (Francis, 1991:8,9). In other instances, anticipation, anxiety and suspicion around the political system have been observed to affect investment. Such events may have either a positive or a negative impact on the investment. As pointed out earlier in Section 3.2, the fall of the Asian countries' stock markets as well as the violent elections in Zimbambwe were blamed for the decline of the JSE markets. Evidently, therefore, these global or regional factors influenced securities returns and risk in SA.

While considering the global politics, investors rate Africa as the riskiest investment area (African Research Bulletin, 2000:14497). To the global investor the continent has missed opportunities in the 20th century as it has been bogged down by wars, discord, and corruption, which have renewed doubts about its future. Poor governance in Africa attributed to mismanagement and corruption has contributed to disintegration of institutions of law and order, disabled mechanisms for growth and subsequent economic failures (World Bank, 2000). This led to decease in capital in-flows through both multilateral and direct investors. The aid from donor countries for example, during the year 2000 was barely $40 billion, a 15 percent drop from 1999 (World Bank, 2000). Among the implications of such decline of capital inflows are slow economic growth and low stock market activity. Relatively less active markets are risky, difficult to invest in and trade owing to factors such as low stock prices and illiquidity associated with them.

Economists use leading indicators to assess the current economic environment and also estimate future environment of investment (Francis, 1991:478). The basic measure of overall economic performance is GNP, and the movement of its component parts may provide a useful insight into the direction in which certain sectors are moving as well as their national significance. The author also identifies other major economic fundamentals as inflation rates, interest rates, domestic liquidity, exchange rates, balance of payments

and foreign capital. The interplay of the monetary and fiscal policies with these factors lay a foundation for either risk loving or risk averse investors. Changes in any of these economic variables affect investors in that they alter the return and risk matrix and expectations and affect the capital markets. In SA for instance, the reserve bank feared that persistent high oil prices, which saw fuel prices soaring by 30 percent, could obstruct the monetary policy of achieving an inflation target of 3-6 percent by 2002 (SARB, 2000:1-2). Such eventualities would cast doubt on the ability of the government to sustain stable macro- economic environment for the investors and may lead to withdrawal of capital from the stock markets.

Selzer and Torres (2000:117) point out that other non economic-related factors such as the behaviour of the investors, both rational and irrational, affect investments. Their study has attributed patterns of human behaviour to major market crashes such as 1929 and 1987. In view of the forgoing, it is vital to monitor these macro economic variables and their closely-related aspects in order to appreciate their connection with investment returns. One of the most important economic variable as mentioned above is the general price movement. A look at the global oil price movement (shock) of the last half of the year 2000 would reveal this interesting relationship.

According to (Pang, 2000:2, the global oil prices rose to almost $38 a barrel in the year 2000, the highest since the 1990s Gulf War and more than three times its level at the end of 1998. By the third quarter of the year 2000, fears were high that prices could yet rise above $40 a barrel at the close of the year. This was based on reports that both the oil stocks were at historically low levels at the time the northern hemisphere was entering winter season. Pang (2000) further observed that expectations for further oil price rise were increased by the producers' (OPEC) warning that factors outside their control such as high taxes in oil-importing countries and speculation in financial markets made prices uncontrollable. From these developments and expectations, it was suggested that the world economic growth would begin to slow if oil prices remained above the US $30 for some time. However, at the end of the year 2000 the oil prices had fallen by about US $10 per barrel (Hezelhurst, 2001:24). The overall implication from the above scenario is

that investment managers (Kenya and South Africa for this purpose) have to keep on adjusting their investment analysis and strategies to reflect developments in the economic environment as they struggle to meet their clients' expectations.

The short and long-term impact of these oil prices have on investment returns is a major concern to any financial advisor. This goes down to the complex question of the economic forecasts in the decision making-process. In this regard, the world economy was expected to grow by 4.7 percent in the year 2000 and 4.2 percent in the year 2001, respectively the fastest two consecutive years of growth since the mid-1980s (IMF, 2000a:6). With the higher oil prices, the GDP growth expectation could not be reliable, which implies that the stock markets too, were uncertain, as these developments are normally factored into the stock prices and thus end up affecting investment returns. The direct effect of this pessimism, brought about by soaring oil prices, rising interests rates, nervousness and warnings about declining corporate earnings in the economy is low-investor confidence. Lisa (2000:3) argues that this slump in investor confidence was reflected in the world stock markets and gave the example in September 2000, where the fears that high fuel costs would reduce earnings in the last quarter of the year 2000 saw airline stocks falling in USA and Hong Kong.

According to Gupte (2001:12), it is not hard to see how continued pessimism about poor investment returns performance in Africa's stock markets has discouraged investors in the past. First the study notes that Africa enters the 21st Century with some of the world's poorest countries. Then the average income per capita is lower than it was at the end of 1960s, with HIV/AIDS and corruption reversing most of the social and economic gains of the last 40 years. Third, population continues to grow rapidly and it requires an economic growth rate in excess of 7 percent annually and equitable distribution of income if the number of people living in absolute poverty is to be halved by 2015. Finally, the study argues that though some African countries showed improved economic growth in the last half of 1990s, their vulnerability to external shock and changes in the world markets has increased the variability of their stock prices and returns.

Arguably, the debt crisis of the 1980s and 1990s in some African countries forced them to devalue their currencies, experience inflationary pressures and restructure their economies (World Bank, 2000:3). One good thing about these reforms is, however, that the continuing reforms have increased privatisation, opened up the markets and are improving macroeconomic stability while diversification is starting to bear fruits. These latter positive factors may improve the investors' perception and sentiments of the African investment opportunities, as they dampen risks and raises return. The importance of this for Kenyan and South African stock markets is that they could gain from the spin-offs therein.

The World Bank (2000) further cites dependency on primary resources for export such as minerals and cash crops coupled with trade liberalisation as having made its capital markets vulnerable to global markets price movements. This makes investment returns in Africa risky and volatile as they are exposed to price fluctuations in the world markets The severe effect of the 1997 Asian economies meltdown on African economies are a testimony of this dependency.

3.5 Implications of investment environment on investment management

In this section, we examine the main implications and challenges that an investment manager faces in the process of analysing securities and funds, and even constructing new funds in an attempt to satisfy the investors needs and expectations under a dynamic and unpredictable environment. According to Jeffreys (2000:1), "industry leaders can no longer rely on the past for guidance on how to manage an investment company. It is critical to make strategic decisions based on what the future is likely to be, not on prior successes." Our discussion, therefore, focuses on the implications of the information technology, telecommunications, changes in investment management industry, capital market challenges, ethical factors, globalization as well as the behaviour of investors in a dynamic global system. The discussion closes with an analysis of the new stock valuation methods.

PricewaterhouseCoopers (PWC, 1999:1) identified the "new imperatives" as the major challenge. They are: technology management, risk management and knowledge management. The findings of the research indicate that the main implications the investment management firms will face from these imperatives are the capacity to understand the global trends and how to design and implement strategies to benefit from the emerging trends. A major problem is the capacity to identify threats and opportunities that the investment industry is facing now and in the future. A further implication lies in new investment opportunities such as electronic-trade, electronic-business, among others. To wade-off these challenges the research suggests that investment managers will be required to use information technology innovatively, hire and retain highly qualified personnel, and have effective risk management strategies in place.

Changes in technology have had major implications on returns of investment because of the way they are transforming the capital markets sector. According to Farrell (1999:6-10), "nowhere has telecommunications and information technology had a greater impact than on capital markets". The study argues that it is possible, and in reality, firms are now creating direct links to settle stock exchange-listed equities, and also resolve cross-border settlements. Extended trading hours and shorter settlement cycles is changing the capital market operational and economic structure. In the USA for example, the study notes that the NYSE is set to change from three days after trade date (T+3) to next day after trade (T+1). The study further notes these changes in one of the major stock markets are expected to have huge operational, risk, financial and service implications on all other capital markets. Farrel (1999:10-12) observes that this is because of the suggested affects on all financial markets' participants, such as retail and institutional investors, brokers and dealers, and payment and clearing systems. The shorter trading cycle on the other end of the continuum will change the operational, market risk and the market liquidity. Most emerging capital markets including South Africa have committed to adopting the three-day after trade (T+3) settlement cycle (JSE, 2000:1-2). The NSE is still in the ten days after trade (T+10) according to NSE report (2000:39). Those left out of this trend including the latter are likely to lose the benefits of long trading hours, reduced costs and a diverse range of securities to choose from.

The PWC (1999:2) further argues that revolution in technology is changing the way business is done and with the advent of electronic trading and electronic business, portfolio managers are more than ever before faced with new challenges beside the traditional ones. The report identifies the increasingly knowledgeable and concerned investors, new and complex investment opportunities in e-business and e-trade, investors activism, increased number of securities and new funds they have to consider, the volume of data flow and the risks that goes with them. The implications are that the performance of fund managers depends on how well they incorporate these factors into improving risk-return analysis of securities and funds.

From the experience of developed stock markets, it may be argued that perhaps the greatest test to generating sufficient returns at controlled risks by investment managers in Kenya and SA lies in the capital markets and investment firms' ability to promote their international presence. As Arnold (1998:32) concedes, differences in culture, laws, interests, nationalism and infrastructure have increased the challenge of realising a global presence. The attempted but failed mergers between London Stock Exchange and Deustche bourse (Germany) in the year 2000 is attributed to cultural interests, nationalism factors and differences in tax systems (Economist, 2000:23-29). The report further points out that global standards for cross-border capital flow are in their early stages. In so doing, the developed stock markets aim at reducing not only the capital the banks have to set aside for trading, but also the number of trades to be settled by a common settlement system in order to increase.

African stock exchanges have been seeking linkages, though at a slower pace (Alile, 1993:1-4). The implications of such linkages to Kenya and South African markets could be increased investment return and reduced risks on securities and funds. This would be expected as the markets become more effective and efficient due to reduction in costs (e.g, operational and transaction cost), shorter payment and settlement period within the exchanges and among traders, and improved liquidity among other possible benefits.

The PWC (1999:3) research also found that convergence among financial services is largely driven by investor demand for integrated wealth management. Adaptation to information technology is also cited as increasing the pace of integration in this industry. As the financial sector firms modernize, integration of all financial services, from investment banking, brokerages, to portfolio management are expected to increase. The increasing mergers in the financial service industry complement the study's observations. Some of the global mergers and acquisitions in the financial services industry alone in 2000 attest to this. Investment bank Goldman Sachs Group Inc. and market maker firm Spear Leeds & Kellogg, Citigroup bank acquired Associates First Capital Corporation, while Chase bank Manhattan merged with investment bank, JP Morgan (Economist 2000: 30).

Technology is another development that has implications on the investment management as noted by Kelly (1999:13). The study suggests that the costs of technology supporting e-business and other infrastructure changes, such as shortened settlement cycles are high and create the need for greater economies of scale among stock exchanges. And there is evidence to support these assertions. Financial mail (2000b:216) survey indicated an explosion of global mergers and acquisitions (M&A) activities in 1999. The argument is that though consolidation was largely driven by a bull market reaching an all time record of US $ 3.4 trillion by the end of the year (1999), a 42 percent increase from year 1998, information technology accelerated the integration. In South Africa, M&A have grown significantly in the last seven years with a high of R314billion obtained in 1998 (Financial Mail, 2000b:216).

A continuing debate centres on the investors' cost of hiring fund portfolio managers. According to Droms and Walker (1994:12), the movement is towards compensation pegged on risk-adjusted performance They argue that a fixed fee untied to the risk consideration drives the managers to more risk and overly large sized portfolios in the hope of earning high returns to please their clients. Meyers et al (1991:268) argue that to guarantee high portfolio performance and maintain risk preferences of clients, investors should tie both managers' compensation and fund management fees to risk-adjusted

performance. This is a two pronged-strategy in that the agent and the stakeholders are at par in that they will all automatically shoulder a proportion of risk by absorbing some of the losses that may arise (Delport, 2000:11). On the other hand, both would reap high returns if their investment strategies materialise.

There are implications on investment returns from the usage of internet as well. According to PWC (1999:5) there are benefits to investors in the utilization of internet resources in innovative ways. This calls for acquisition of the technology that best supports and furthers an organisation's strategic goals. Therefore, the report suggests that investment management firms may be required to go beyond the boundaries of having a high quality website to exploring new internet-based products and methods of electronically delivering customer service. For example, it is now being recognised that the future of the internet and wireless technology is the same implying the two are merging (Fortune, 2000:20). To this end some fund firms like Investec of South Africa have built among its global funds, portfolios specialising on electronic business and mobile phones to take advantage of internet and related products (Financial Mail Survey, 2000b:325) From this perspective, investment managers must construct portfolios and funds that will place their clients in a strategic position to benefit from the expected profits from such products.

Kelly's (2000:14) research observed that globalization will continue to create a range of new products, the markets will become more independent and specialized, and that players will transcend sectors and geographical boundaries causing sophisticated investors to demand more information and reports from their money managers. Conventional methods of rating funds such as the credit rating will become insufficient, as investors demand more information from their investment managers. Therefore, the research concluded that only those companies that actively disclose relevant information to their clients would have a substantial edge over their competitors. BusinessWeek, (2001:18) further point out that as global markets become closely linked clients will need to be better informed about how such aspects like legal and accounting imply to the different investment vehicles and their portfolios respond to market conditions. This

encourages sound investment and protects the industry from possible liability resulting from poor disclosure. In addition, favourable third party reviews, solid internal controls and appropriate performance will all be critical in ensuring their success.

Moreover, capital markets are in the midst of a global, systemic restructuring. Hintze (2000:4) found that communications and technology had enabled individual financial markets to link together creating one global market. The research further argues that a global market has required investment managers to invest heavily in the use of internet channels, electronic communications networks (ECNs) and alternative trading systems (ATS). Hintze (2000:5) noted that apart from raising the volume of data, stock market linkages have created an immense security risk. The risks involved could be data theft and data loss by accident or sabotage by distraught employees, and even outright system collapse. Restructuring and adaptation will enable firms and stock markets to acquire relevant programs and information to better their performance and reduce uncertainty. The Y2K scare was but just an illustration of the potential losses, costs and uncertainty that would affect the increasingly integrated capital markets.

Ethical issues also have implications on investments environment. Howells and Bain (1998:431) examine violation of ethics in stock markets and argue that they are partly determined by the global economy. The study argues that changes in expectations in an economy followed by rapid price movements in the capital markets has promoted greed and gullibility in the financial markets at the expense of ethics. They give the example of the 1974 collapse of Franklin National Bank in New York and Herstatt bank in Germany. From these banks' collapse, the severe effects of contagion among interdependent institutions like the banking, the foreign exchange markets and the capital markets all over the world were realized. Therefore, the implications to investors are likely to be even severe today. This may be demonstrated by the sharp increase in cross-border securities and banking transactions, where foreign securities trading accounts for more than a quarter of the world's stock markets transactions (Howells and Bain, 1998:432).

Today, various common global standards and regulatory bodies are in place to match the global financial and capital markets. Though the International Organisation of Securities Commission (IOSC) regulate capital markets directly, others like International Accounting standard (IAS) and Bank for International Settlements (BIS) are important in ensuring compliance of the underlying companies (BIS, 1999). However owing to the different views on ethics, these regulations have not been very effective. Ethical issues have been more critical in times of market turmoil, fuelled by economic instability and rapid and painful changes in business environment (Howell and Bains, 1998:432). Reckless international investors for example, overlooked loose regulatory framework, poor corporate governance and pumped in more than US$500 billion into the Asian economies between 1993 and 1997 (Economist, 1999:6). Their rush to exit on realization of the weak base fuelled the 1997 crisis. Similarly, in 1998, gripped by fear of loss of their money, investors quickly reduced their exposure in Brazil markets causing it also to collapse. Thus, there are implications on the absence of or existence of loose ethics which may facilitate huge losses of stock market investments.

According to Delport (2000:10), easy access to information and data on markets has increased the clients' awareness on portfolio performance and the best fund managers. This may have increased militancy among the investors in protecting their interests. It is therefore, becoming a common currency for unhappy investors to call in managers whom they feel are going to unlock under-performing investments. Delport (2000:11), give the example of South African investors who invited Coronation Fund Management (SA), to restructure the investment portfolio of OTK Holdings (a listed company in JSE) after the returns on equity fell from 29 percent in 1997 to 17 percent in 1999. On the entry, of the new managers the company's shares gained around 10 percent. Arguably, professionalism has implications on the returns of the investments.

Another important challenge is that of ensuring low costs of running an investment. Kuhle et al (2000:3) research has shown that in the long run, the effect of different costs (e.g, load and non-load charges) on performance of funds tends to be the same. This seems to endorse the long held view that most of the empirical research into the

relationship between fund performance and various variables of factor inputs have no significant relation. Droms and Walker (1994:12) found that mutual funds gave almost similar returns irrespective of whether they imposed load or no-load charges. The implications are that fund managers will find it hard to justify higher charges on their portfolios compared to other funds with similar objectives. Besides such higher charges further deplete investor's return and funds.

Within the new economy, investment management faces the gigantic task of valuing the new stocks there in (King, 2000:11). More fascinating is the new definition of the term "long- term" which means, focussing on two quarters (Jahnke, 2000: 46). The obvious implication of this development is the difficulties to be encountered in comparing the risk-return results of the stocks in the old and the new economy. According to Janke (2000:48), claims that the 'new economy stocks' are overvalued by as much as 95 percent in some cases have not deterred the investors from the Technology, Media and Telecommunication stocks (TMT). The dominant stocks in the new economy include Cisco, Intel and AOL–TimeWarner, and Amazon.com. In South Africa and Kenya, we have Didata, and African Lakes (AOL) respectively. King (2000:12) further points out that the new economy companies have "no profits, no assets, and no experience" yet the market capitalization of Internet companies is $1.1 trillion". This poses a challenge to the rigidity of the traditional valuation models and also has implications on the returns of the investments from the compositions of stocks from the two economies.

3.6 CONCLUSION

From the preceding the analysis of the risk-return profile and by extension investment management in South Africa and Kenya would be incomplete if one failed to approach it against the background of *inter alia* economic, political, technological and investors' behaviour. Individual or a combination of these factors has put risk-return analysis of securities and funds into a sharp focus. It is imperative that one not only considers the investment climate in the two countries from a domestic perspective, but also from global as well as regional ones.

Globalization which is closely associated with technological changes, information availability, ethics and costs considerations has implications on securities' and funds' risk and returns. Stoffman (2000:20) consequently argues that, the investment industry in general must consider creating sufficient capital required to survive and participate in the global economy, while at the same time they brace themselves for the intense competition. The implications on stock markets are evident from, reduced trading cycles, efficient payment and settlement cycles, stock turnovers which are expected to change stocks and funds profiles. New businesses such as e-trading and related products may imply the need to restructure investments to take advantage of these market changes. This is to improve securities and funds returns and reduce the risk.

More challenging is the integration of the new and the old economy securities. However, particular securities in the stock markets and how the environment in South Africa and Kenya directly affects them may be identified. The next Chapter examines how particular concentration; market size, liquidity, taxation, and transaction costs among others affect each market. This is aimed at enhancing our understanding of the changes in the underlying return and risk of listed securities and funds in Kenya and South Africa.

CHAPTER 4. TYPES OF SECURITIES, VALUATION AND HOW THEY ARE AFFECTED BY SPECIFIC FACTORS IN SOUTH AFRICA AND KENYA

4.1. Introduction

To facilitate the analysis of the risk-returns profiles of Kenyan and South African markets it is necessary to establish the specific securities to be used. In this regard, this Chapter identifies and discusses the major securities that are traded in the Kenyan and South African stock markets. Basically, equities and fixed interest- paying assets appear to be the mostly traded ones. The Chapter further explores the specific valuation techniques of return and risk in the two markets. The study attaches important to these techniques because it enables one to know empirical methods used to arrive at both the total returns and risk measurements. This should be viewed against the theories discussed in Chapter 2. Having established the types of stocks and valuation methods in Sections 4.2 and 4.3 respectively, we proceed to examine possible individual and market factors that affect the total returns (or the component of return) and risk in Section 4.4. The specific factors in this respect are viewed in the context of how they influence the listed stocks prices and dividend or interest payments. Also the effect of each of the two stock exchanges in terms of regulations, processing of traded securities among others are deemed to influence the risk-return analysis.

4.2 Types of securities in South African and Kenyan markets

The theoretical framework in Chapter 2 considered the main approaches to the measurement of securities return and risk. The returns arises both from variable and fixed income-bearing securities and possible changes in the underlying price at the time of sale of the financial asset. According to Fourie, Falkena and Kok (1999:9), both equities and bonds are traded on the JSE. Capital Markets Authority (2001:25) also identifies the NSE as trading in equities and bonds. For both NSE and JSE markets, the major traded equities are ordinary shares (common stocks) whiles others are the preferred stocks (JSE Actuaries, 1996:20 and NSE (1998:2). The long-term debt instruments traded on both markets include government bonds, treasury bonds, and corporate bonds (Davey and Firer, 1992:41; CMA, 2001:17,22). For the South African market, the money market

instruments such as treasury bills, commercial paper, bank acceptance, and negotiable certificates of deposit widely traded (Fourie, Falkena and Kok, 1992:111-134). It is evident in Kenya that treasury bills are the single most traded short –term instruments while commercial paper and medium terms notes are gaining ground (CMA, 2001:93; CMA, 2000:107).

Both ordinary and preference shares returns are in the form of incomes (arising from dividend or interest) and capital gain arising from trading in the market. According to Fourie, Falkena and Kok (1992:144) companies are under no obligation to pay ordinary shareholders dividends, preferred shareholders must contractually be paid a certain amount of dividend. Fourie, Falkena and Kok (1992:145) also explain that preference shares are further structured on the basis of the mode of payment, and convertibility. Hence, in between ordinary stocks and preference shares are the convertible preference shares. In South Africa, trends shows that companies raise equity capital on the JSE in the form of ordinary shares, preference shares and convertible debentures (Ward, 1995/96:29). In Kenya, the three equity stocks are traded at the NSE (2001:7). Fourie, Falkena and kok (1999:199) point out that a distinct feature of the ordinary share is that it confers upon its holders the right to vote as opposed to the other types of equities. However, they suggest that there are various classes of ordinary shares listed on the JSE carrying different rights. For instance, some holders of ordinary stocks may cede their voting rights in favour of higher dividends or exchange them as the case may be.

Evidence shows that in both the Kenyan and South African markets, ordinary shares dominate the stock markets over other types of equities (Firer et al, 1999:8); CMA, 2001:91). According to Milne (1999:11), in South Africa, ordinary shares, on average, earn more returns than other assets such as real estates and endowment policy although they tend to be more risky Ordinary shares appeal to investors because they are easily accepted and understood (Ward, 1995/96:29). In Kenya, ordinary shares dominate the stock exchange both by market capitalization and volume traded (CMA, 2000:103). The domination of ordinary shares over preferred and convertible stocks in both markets may

be taken as an indication of the relative importance of ordinary shares as a means of earning income to the investors.

Ward (1995/96:29) mentions a special type of ordinary shares that is traded in South African market; the rights issue. It is also issued in the NSE (CMA, 2000:101). The study describes rights issues as additional shares that are offered to existing shareholders, but at a discount. In South Africa, the discount on rights varies from 10 percent to 15 percent of the underlying market price of the shares in question. The rights are traded separately in the form of Nil Paid Letter (NPL), which is advantageous because it enables the holders to offload their rights without necessarily selling the initial stocks. Ward (1995/96:29) further argues that a possible risk associated with the rights issue is the dilution of the future earnings resulting from additional shares.

Fourie, Falkena and Kok (1999:199) argues that of all the classes of securities, considered in this study, ordinary shares seem to be the most risky. This is partly because neither dividend income nor capital gains is guaranteed. They further point out that ordinary shareholders rank last in the claims of the company's assets in the event of bankruptcy. Ward (1995/96:29) argues that returns on ordinary shares on the other hand are reduced by tax in its various forms. According to Grote and Fletcher (2000:786), South African companies paying dividends are required to file for secondary tax on companies (STC) and a pay capital gains tax (from year 2001 at an effective rate of 15 percent) while foreign dividends are subjected to a withholding tax of 15 percent. According to NSE (2000:6) report, ordinary shareholders receive dividends after corporation tax, preference dividends and debentures interest have been paid. The dividends incomes are also subject to a withholding tax but the shares do not attract capital gains tax on disposal (CMA, 2000:70)

As we have noted above, preference shares are the other component of equities that are traded in the Kenyan and South African markets (Ward 1995/96:29; CMA, 2001). Like ordinary shares, they pay dividends and have various classes that accord them various favours. Fourie, Falkena (1999:199) argue that the main outstanding characteristic of

preferences shares is that they receive fixed dividends and carry no voting powers. Ward (1995/96:29) identifies the various types of preference shares such as cumulative and non-cumulative preference shares that are traded on the JSE. Investors in cumulative preference shares are entitled to dividends in arrears but the non-cumulative stakeholders will receive only the current annual dividends.

Fourie, Falkena and Kok (1992:144-145) suggests two more major differences with ordinary shares, apart from voting rights which make preferred shares less risky. First, investors in preference shares are legally bound to receive a fixed rate of dividends. Secondly, in the event of bankruptcy, preference shareholders are ranked ahead of ordinary stocks holders in claiming the assets of the company. As a result, preference shares tend to attract higher dividends than the ordinary ones and their prices are less volatile (Ward, 1995/96:29). Consequently, they are usually issued at a premium above the market price of the ordinary shares. In the Kenyan market, only 12 preference shares trade on the exchange and accounts for less than 1 percent of the market capitalization (NSE, 2001:13). The low presence may be a reflection of low returns and the extent of their risk due to poor trading.

Another important class of preference shares traded on the JSE and the NSE is the convertible preference shares (Ward, 1995/96:29; NSE, 2000:12). Kelly (1993:109) points out that like preference ordinary shares, holders of these stocks earn a fixed rate of dividend that is higher than that of ordinary shares. Similarly, they have no voting powers. Unlike both ordinary shares and preference ordinary shares, convertible preference shares have a known life span. Due to the certainty of dividend payment and the contractual obligation of the issuer to substitute convertible shares into ordinary shares at a future date, they tend to be less risky than the preferred ordinary shares and ordinary shares (Ward 1995/96:29). According to Fourie, Falkena and Kok (1999:200), on conversion of convertible preference shares, there tends to be fewer shares than would have been the case had ordinary shares been issued. They further observe that the implication to the investors is two-fold; one, the fewer ordinary shares means that future earnings will be attributable to fewer shares and hence more dividend payment. Two;

successful conversion of shares demonstrates the ability of the company to meet its obligations and this vote of confidence may be transmitted in the market in the form of higher prices of its ordinary stocks. If this were the case, then it would be capital appreciation for the investor.

The exchange of preferred shares with ordinary shares may be full or partial depending on the agreement. Ward's (1995/96:30) evidence on South Africa companies shows that they normally make the conversion one year after the year in which dividends on ordinary shares equaled or exceeded the dividends on preference shares. Therefore, if there is faster growth in ordinary shares dividends, then conversion of preference shares will come earlier. Ward (1995/96:30) sees two implications to the investors of convertible preference shares. First, the risk on the future dividends (returns) will increase due to early conversion and therefore, loss of fixed dividends. Secondly, the loss of capital gains for the premium over the ordinary price being lesser due to dilution. Thirdly, a non-resident shareholders tax (NRST) is charged on non-residents in South Africa. This deduction further reduces the returns (incomes) of the investor. There appears to be no convertible preference shares traded on the NSE, only the ordinary preference shares and non-cumulative shares are traded (NSE, 2001:3).

There are other classes of preference shares, which are important is in South African market. According to Fourie, Falkena and Kok (1992:145), these preference shares have a combination of one or more of the above-mentioned characteristics and include the participating preference shares and redeemable preference shares. They further argue that the two most outstanding features of the participating share are: one, the special entitlement to a portion of final dividends based on a pre-determined terms just like ordinary shareholders. The other one is that participating preference shares also earn fixed dividends like preference shares and convertible preference shares. This makes participating shares less risky than any other class of preferred shares while earning higher dividends. Fourie, Falkena and Kok (1999:200) point out that redeemable preference shares on the other hand are sorted out at the discretion of the issuing company. This makes them risky to the investors as the issuer may redeem them when

the market prices are low. These two classes of preference shares are few on the JSE and are not traded at all on the NSE market (Ward, 1995/96:30, NSE, 2001:12).

Government bonds (gilts) are issued by the respective governments (treasury) in both South Africa and Kenya (Firer and Mcleod, 1999:9; CMA, 2001:86-87). They are also traded on the JSE but there is no evidence that they trade on the NSE (Fourie, Felkana and Kok, 1992:133; NSE, 2001:17). The bond is the oldest type of securities traded in South Africa since 1820 (Morgenood, 1987:20). According to Howells and Bain (1998:150) gilts pay a fixed interest, have long maturity period, and high credit rating which makes them almost risk free. Fourie, Falkena and Kok (1999: 171) argue that the prices of bond are market-determined. They point out that apart from the economic fundamentals, such as market interest rates and inflation rates, bond prices are highly affected by term of maturity, and future expectations as reflected by the business confidence. Lwabona (1999:65) adds that bonds taking longer to mature should, and do pay higher interest rates. Thus the implication to the investor is that the longer the bond takes to mature, the higher the interest that it should earn. As bonds approach maturity, their risk decreases and so are their yield rates.

According to Fourie, Falkena and Kok (1999:187), bonds (government) exceeding 3 years are long term while short-term bonds are those whose outstanding period to maturity falls to three years. They further argue that the high level of tradability relative to the equity markets indicates the significance of the gilt market in South Africa. Morgenrood (1988:13-14) point out that the increase in liquidity in the bond market may be due to participation of large and well funded bond issuers, that is, central (reserve) bank, public corporations and utilities who also double as market markers. This is in addition to merchant banks and large brokerage firms who also act as their intermediaries. The CMA (2000:18) report suggests the high level of issue and tradability of government bonds in Kenya owing to the poor performance of equity market. In Kenya, high and variable market interest rates, unstable inflation rates, heavy government borrowing and a statutory requirement for insurance companies to deposit 20 percent of their investment in government bonds are suggested as the factors that influence the

interest income of the government bonds (Economic Survey, 2000:28). In this market, capital incomes have been relatively high and volatile.

It is quite evident that trading of gilts and semi-gilts take place outside the NSE and JSE given that they account for less than half of the trades and less than a third at the NSE and the JSE respectively (CMA, 2000:9; Fourie, Falkena and Kok, 1999:187). This means that investors (in the stock markets) are denied maximum exposure to the bonds markets which otherwise might have improved their liquidity. It may therefore, be argued that investors' risk (in the stock exchange) would have been reduced if most of the bond dealing was done through the stock markets. We also note the importance of short-term bonds in South Africa and Kenya (Fourie, Falkena and Kok, 1999:187; CBK, 1999:17). This is because of the liquidity implications on returns especially the capital gains. Firer and Mcleod (1999:11) argue against the statutory requirement for insurance companies and the pension funds in South Africa to hold government bonds in their portfolios. Such holdings reduce their liquidity and hence their returns while increasing the risks. The South African Bank Act (1993) required banks to hold bonds to meet their liquidity requirements (Fourie, Falkena and Kok, 1999:173). This should have a positive impact on the interest and capital incomes, as it combines both the good credit rating of the bonds and the high liquidity.

Ward (1995/96:37) confirms the high liquidity of gilts in South Africa by observing that turnover is about 400 percent of its outstanding capitalization while the equities turnover is about 4 percent. But with only slightly more than a quarter of bonds trade passing through JSE as we noted above, in addition to low activity on the equities segment, we arrive at the same argument that the interest returns are likely to be more risky, though they are default-risk free. There are 106 different bonds traded on the JSE, R150 (government) E 168 (Eskom), Telkom 208 are the most traded.

There are only 6 government stocks in Kenya with the commercial banks dominating the bond market trading in both the primary and secondary markets, while thus denying the NSE the much needed liquidity (CBK, 1999:16) The Floating Rate (FT) Bonds, treasury

bonds and long term stocks the major long-term bonds traded on the NSE and rank second after ordinary shares in terms of market capitalization (CMA, 2001:87). At the NSE, the low returns on ordinary shares may partly explain the high volume of bond trading. According to the NSE (1999: 18 and 29), government bonds are exempted from the stamp duty and their brokerage costs are negligible (only 0.05 percent at the time of the study). The absence of capital gains tax as well as the low transaction costs on bonds indicates that most of the returns reach the investors (NSE, 1999:29). It may be therefore argued that bonds holding give good returns to investors due to their relatively high liquidity and the low risk.

Both treasury bills (TBs) and commercial papers are some of the short-term money instruments that are traded at the stock exchanges in both countries (Morgenrood, 1988:13; CBK, 1999:17). Treasury bills are fixed-interest paying debt instruments which may be distinguished by both their maturity dates and coupon rates (Mishkin and Eakins, 2000:221). In Kenya and South Africa, the issuer of the treasury bills is the central government (treasury) through weekly auctions where mainly the 91 days and 182 days TBs are tendered (Fourie, Falkena and Kok, 1999:167; NSE, 2000:10). In Kenya, the 91 days and the 182 days TBs whose maturity period do not exceed six months are the most commonly traded (CMA, 2001:87). This may be traced to the heavy government borrowing and the creation of a separate market for the fixed-interest bearing instruments (CMA, 2000:18). It is further reinforced by the bills' high liquidity. In Kenya for example, they constituted about 70 percent of the entire government domestic debt in the year 2000 (Economic Survey, 2000:28).

Like in the bond market, the central bank plays the market marker while major banks and other institutional investors like insurance companies and the pension fund dominate the purchase side thus, bypassing the exchange (Kelly, 1993:81). In Kenya, the continued decline in GDP (from 1997 to 2001) for example, the high and fluctuation in inflation rates, low corporate profits and low business confidence made the TBs a safer investment for the risk averse investors (CMA, 2000:15; Fourie, Falkena and Kok, 1999:167) however, point out that there is low trading of TBs in the South African markets owing to

low volumes of issues. This perhaps explains their relatively low participation in the stock exchanges. The investors' risk is normally low because the government is neither expected to default on payment of interest income nor the redemption of the principal stocks upon maturity (Kelly, 1993:80). The possible risk on interest incomes and capital income could be the negative affect of market interest rates, changes on exchange rates when one factors in the foreign participation and increased negative business confidence.

Various bonds issued by companies are an important source of returns to investors in both countries (Davey and Firer, 1992:41; NSE, 1999:13) The debentures, for instance, in most cases pay a fixed interest rate although some may pay variable interest rates to the investors and are secured on the assets of the issuing company (Fourie, Falkena and Kok 1999:196). This aspect contributes to the reduction of their risk. Furthermore because the debenture holders have a prior right of claim of the assets of the company in the event of bankruptcy, they are less risky than the preference shares. According to Fourie, Falkena and Kok (1999:197), a convertible debenture issued by companies in South Africa is a sub-category of debentures, which is distinguished by the term structure. Convertible debentures in SA are mainly converted to equity stocks, mostly ordinary shares. The conversion date may or may not be fixed in advance. In this respect, convertible debentures are less risky than ordinary shares since the interest payable is fixed and known. However, they can be said to become riskier than other classes of debentures as they near their conversion period. But on conversion, investors expect higher returns because of the increased risk. This is particularly so if they are converting to ordinary shares besides acquiring the voting rights. Owing to these advantages, the interest incomes are expected to be lower than those of ordinary and preference shares. It is however, relatively more riskier than that of the gilts, semi-gilts and the TBs because companies may default. Ward (1995/96:33) views South African convertible debentures to be more advantageous to investors because of tax deduction on interest earned, unlike the investors in the equities considered above. However, this depends on the type of investor. With pension and insurance companies, no tax is charged while individuals are charged (at the current rate of 43 percent).

According to Fourie, Falkena and Kok (1999:187), convertible bonds are not subjected to marketable securities tax on transfer of listed debentures both to residents and non-resident investors. They further argue that the risk of the debentures may increase if the date of conversion is not fixed and depends on the rate of growth of ordinary share dividends. If the dividends growth of ordinary shares rises faster than expected, an earlier conversion might result in the loss of fixed income and capital gains. This is due to the fall in market price as the net amount of interest paid could be less than expected. According to Ward (1995/96:33), there are a few convertibles on the JSE (numbering only 20 in 1996). Though NSE has only two corporate bonds each of three-year tenure, they are significant owing to their relative size in market capitalization (CMA, 2000:18). This low rate of issue and tradability may be due to the complexity of pricing and conversion. For the investor, whom we expect to hold the bonds to conversion, low fixed interest rates would yield low interest incomes. On conversion to ordinary shares, capital gains may fall because of the possible fall in prices due to dilution of equities.

Reputable private sector institutions in both South Africa and Kenya issue long-term fixed interest-paying debt instrument known as corporate bonds (Davey and Firer, 1992:41; CMA, 2000:18). Howells and Bain (1998:168) point out that capital gain income from bonds is associated with capital risk that arises from the sensitivity to inflation and changes in expectations, which threaten investors when they decide to sell the stock before maturity. However, they argue that the risk attached to corporate bonds is lower when compared to issuers of preference and ordinary shares, in the event of bankruptcy as they have a prior claim. According to Negash (2001:34), only a few corporate bonds in South Africa are publicly traded. In Kenya, corporate bonds issues are few as per the CMA (2001:22) report. The report attributes the poor performance to fear of failure of an initial public offering on the NSE and high cost of borrowing from commercial banks. In fact, the issue is associated with well performing companies and so far only East African Development Bank, Safaricom and Shelter Afrique have issued these bond (CMA, 2001:22).

Finally, a commercial paper (CP), which is essentially a short-term money instrument normally issued at a discount, also forms part of the composite investment package in the two markets (Kelly, 1993:79; CMA, 2000:18). Howells and Bain (1998:152) point out that commercial paper has a maturity period of 7 to 45 days with the issuer of the paper being a reputable company, just as is the case with the corporate bonds. According to Horne (1977:443) the risk associated with the commercial paper is high because it is not charged to specified assets of the issuer. Therefore in the event of bankruptcy, the investors have no recourse. Owing to the difficulties in measuring the probability of default by investors, some stock exchanges require listed companies intending to issue a commercial paper to be rated by a credit rating agency (Howells and Bain, 1998:152). Since the trading of CPs is done in large blocks and the fact that investors hold them to maturity, transaction costs tend to be low thus, earning more net interest incomes to the investors.

In Kenya, the use of commercial papers is relatively new having been introduced into the stock exchange in 1997 (NSE, 1999:23). Its entry, into the market, albeit late, could be viewed against the backdrop of irregular and relatively high market interest rates and high cost of borrowing from the banks (CMA, 1999:12). Thus there have been a surge in the use of CPs, from only one issue in 1997 to nineteen in 1999 and majority of them have been renewed (CMA, 2000:18,106).

4.3 Securities' Valuation in SA and Kenya

Investors rely on various appraisal methods to estimate incomes before reaching an investment decision. In Chapter 2, we discussed the five approaches on investment techniques as the fundamental analysis, technical analysis, modern portfolio theory, capital asset pricing model, and arbitrage pricing theory. What appears to underlie all the theories is their ability to identify returns or price the assets. Both return and asset pricing are on the basis of valuing the listed companies. Studies have presented a mixed appreciation and usage of the various techniques by companies, academics and practitioners. Boy's (1979:36) survey found that big companies used various ratio analyses. More so, the bigger the company, the more sophisticated analyses techniques

they applied. This alone suggests that analysts would most likely use even more sophisticated analysis techniques for bigger companies and stocks. Limited usage, even if by relatively small companies is a pointer to the differences between theoretical and practical application of the valuation techniques.

The Fundamental approach has more appeal in South Africa and even in the more developed markets of USA and UK than any other valuation method (Lovell-Greene et al, 1986:7). This scenario demonstrates the continued domination of the traditional analysis technique over orthodox financial theories in securities appraisal in South Africa, the UK and the USA. Arnold and Moizer (1984:195) suggested that the popularity of the fundamental analysis was in line with what was presumed to be expectations of an analyst. That is, to identity over or under-valued stocks for investment. The method provides a way of justification of work done for the client by the analysts from the amount of data collected and analysis done.

As we highlighted in Chapter 3, fundamental analysis involves examination of the macro-economic variables, the industry, and the particular company. According to Fouche and Rensburg (1999:22,23), analysts in SA seem to consider most of the indicators, that is, GDP, business cycles, inflation rates, interest rates, and exchange rates. They, however, favour driving forces of the industry at a given time. This could be the market share, or future growth potential among others. In the firm, they seek the financial statements and in particular the income statement, balance sheet, and cash flow statements for the best leads. They also attach a lot of weight to the discussions they have with the management especially on with future long-term plans, objectives, and strategies of the company. Among the specific fundamental factors, appropriate price-earnings ratios for forecasting purposes and analysis of accounting ratios respectively are most favoured while dividend yields is the least sort factor. This is in contrast to a decade ago when dividends estimates were highly ranked by South African analysts; implying investors were more attracted by dividend incomes (Lovell-Greene et al, 1986:11). The shift towards price-earnings ratio forecasts may indicate shift in preference towards capital gains.

A survey by Wit and Eyden (1999:92) found that the technical analysis technique was the second most used method by South African analysts in valuing securities after the fundamental analysis. Their study attributed its attractiveness to the availability of software programmers. More succinctly, it is useful in timing the buy or sell orders, the market trends and in confirming the direction of market movements. The study identified practical limitations of the efficacy of the technical analysis especially in the time required to monitor the trend, and possible inaccuracies, and misinterpretation of the trend. In addition, technical analysis in itself was full of various forms of application and lacks finality and therefore one has to collaborate/incorporate other methods like the fundamental analysis.

As we stated in Chapter 2, MPT rejects both the fundamental and the technical analysis. Wit and Eyden (1999:91) found that despite it popularity in the academic world, modern portfolio theory and its predecessors; CAPM, APT theory, are the least applied in SA. Their study found that portfolio managers in SA hardly use CAPM. They further observe that its usage seems to be declining not only in SA but also internationally. According to Wit and Eyden (1999:91), operational or application difficulties are a possible explanation of their distrust. Often, comprehensive data to measure the beta coefficient (market risk) and operation of the method are cited as the limitations of these methods in addition to shortage of experience and training in these methodologies.

Lovell-Greene, et al (1986:19) argued that the usage of the different techniques was imperative as it signaled each method's area of excellence. Wit and Eyden (1999:91) in this regard stated that the fundamental technique is better in identifying a good buy, the technical method in indicating the time to buy with the modern portfolio method giving other stocks to combine with in order to optimise returns. As such, each technique is specialized but still depends on others. The overwhelming usage of the traditional valuation method is an indication that the JSE is not efficient in this regard (Lovelle-Greene et al, 1986:13). If it were efficient, analysts would not apply techniques meant to identify stocks that could earn abnormal returns, and would make more usage of efficient appraisal techniques as observed by Fouche and Rensburg (1999:21). The high

preference of dividend payments, the speculative behaviour, and the absence of specialized fund managers in unit trusts and mutual funds in Kenya may explain the extensive application of the fundamental method (Murigu, 2001).

4.4 Company specific and market factors that influence return and risk-return

In deciding to invest in stocks, investors are influenced by a number of factors which this section attempts to identify with particular reference to the South African and Kenyan markets. One of them is transaction cost. The rationale for considering transaction cost is the fact that investors receive incomes net of transaction costs. Another important factor is the concentration of companies. Though it assures stability of returns as will be expounded in Section 4.3.2, it may assume low returns in the long run. Important too is the depth of the market as determined by the level of trading and liquidity of the market among others as explained in Section 4.3.3. Finally the section brings to the fore how company specific factors (e.g dividend policy) and operations of the stock markets affect the risk-return profiles of the various securities and funds under consideration.

In deciding to invest in stocks, rational investors are not just influenced by the size of the returns but also the transfer cost of ownership. The exchange of financial assets involves transaction costs. Starting from the marketing of the share, transfer of certificates and maintenance of register. The rationale for considering transaction costs is the fact that investors receive incomes net of transaction costs. The effect of the transaction costs on returns of securities will depend on the pricing structure of the transactions costs. Subsequently, the pricing structure affects the efficiency of the stock markets, which could be observed in changes in the volume (liquidity) of the stock markets (Bencivenga et al, 1996: 243-259). The study further viewed transaction costs in the stock markets as consisting of both the real resources costs and the pure transfers which affect the level of investment, the types of investments and degree of capital formation.

4.4.1 Transaction costs and taxes

Seneque and Gourley (1983:35) cite transaction costs and differential income taxes as the most important factors that affect investor's decision about returns of an investment.

Bencivenga, et al (1996:243) point out that the exchange of financial assets involves transaction costs which arises in the marketing of the share, transfer of ownership, and maintenance of registers (or computer systems and files). Their view is that effect of the transaction costs on returns of securities will depend on the pricing structure of the transactions costs. Subsequently, the pricing structure affects the efficiency of the stock markets, which could be observed in changes in the volume (liquidity) of the stock markets (Bencivenga et al, 1996:244) The study further viewed transaction costs in the stock markets as consisting of both the real resources costs and the pure transfers which affect the level of investment, the types of investments and degree of capital formation.

Bencivenga, et al (1996:245) describe pure transfers as involving payments to intermediaries, such as stockbrokers and market makers in the form of fees or rents, and statutory taxes on financial transactions. They further argue that apart from the income and the expenditure of the investor, transaction costs also influence the holding period of stocks. Howells and Bain (1998:20) approach the transaction costs from the cost of capital edge and observe that additional costs increase the cost of capital. Thus long-term securities benefit more from reduction in transaction costs. They further note that such low transactions costs increases the efficiency of the stock market, encourage investments in long-term stocks and, therefore, more transaction-intensive stocks. Moreso, transactions cost effects are more on net of transactions cost incomes of long-term investments. Irrespective of type of transaction costs, their reduction raises the volume of trading in securities, and can, but not necessarily increases the real output in the economy (Bencivenga et al, 1996:248).

CMA (2000:71) report shows that in Kenya, transfer of listed securities, newly issued and additional securities do not pay stamp duty and value added tax, while expenses incurred in listing share on the exchange are tax deductible. The brokerage commission is fixed but on a sliding scale ranging between 2 percent and 1 percent depending on the size of the transaction (NSE, 1998:6). This illustration of the low transactions costs incurred by an investor in Kenyan stocks implies only a small proportion of the total income is taken away. Hence, investors receive most of the payable incomes (returns). Barger (1993:3)

however argues that transaction costs of equity are still high in Kenya (compared to that of bonds). Barger (1993:6) attributes the high costs to the failure of investment bankers to offer comprehensive range of underwriting and dealing services thus making such services expensive as they end up being offered by other non-specialized institutions, such as commission brokers.

In South Africa, transactions costs include marketable securities tax, negotiable brokerage charges, and stamp duties on transfer of stocks (Fourie et al, 1999:205). The immediate effect of these charges is to reduce the returns of the investor. Other transaction costs include the transfer tax imposed on sale or transfer of shares and the capital gains tax introduced in 2001 (Taxgram, 2001:1). But, it is possible for investors to reduce overall costs by avoiding high research costs, engaging in infrequent trading, holding stocks for longer periods, carrying liquid stocks in the portfolio and reducing the amount of reporting to the shareholders (Koch, 1999:27). The implicit costs seem to be low given electronic trading and stock de-materialization which help eliminate delays in delivery and settlement of stocks.

As we have pointed above, taxes also impact on returns. Seneque and Gourley (1993:25) point out that tax imposed on dividends and capital incomes directly reduce the net income on securities. Investments on equities in the Kenyan market have their dividends income subjected to a withholding tax of 5 percent and 7.5 percent for residents and non-residents respectively (NSE, 1999:22). According to Meyerowitz and Emslie (2000:84), dividends income in South Africa are classified under investment income for the purposes of taxation and are therefore, taxed normally. However, they add that inter-company dividends paid by local companies and close corporations are exempted from normal tax but instead pay secondary tax on companies (STC) by the paying company. Moreover, no withholding tax is paid on interest and dividend incomes.

4.4.2 Concentration or control of companies by others

Gampers and Metrick (2001:229) point out that it is not clear how control of company by other contribute to the size of returns but states that oligopolistic tendencies and

management control which are the hallmark of control (pyramiding) affect competitiveness and product pricing. The concentration of companies though it affects the two countries appears to be more critical in South Africa as we discuss below. According to Afflek-Graves et al (1986:195), in South Africa, investing in large stocks is likely to earn better risk-adjusted returns than investment in small stock. They attribute the preference of better earnings from former to the fact that large a stock indicates that they are the controlling companies. Jones (1992:273) describes this peculiar characteristic as pyramiding or concentration of industries and further suggested that specifically, pure pyramiding is pursued by the holding companies having voting control after investing at least 51 percent in operating companies both in listed and unlisted ones with assets but owing no debts. Castle and Kanter (2000:49) point out that a few large listed conglomerates dominate the JSE. Moreover, most of the listed holding is complicated by the fact that such companies have both assets and debts of their own.

Political, economic and technological reasons have nurtured concentration of capital in a few large companies in the history of most stock markets (Gampers and Metrick, 2001:229). Jones (1992:273) identified three possible causes of concentration on the JSE as being the imposition of the exchange controls in 1961 as well as the government legislation forcing foreign owned banks to sell local holdings. In addition, the international economic sanctions and consequent dis-investments in the 1980s further encouraged consolidation by the existing companies. This implies that only large conglomerates like the mining houses and insurance companies had the necessary capital to acquire the stocks of firms de-listing from the JSE. Important too, is the rapid growth of life insurance business and pension funds that acquired major stakes in banks. This is evident from the control of 80 percent of listed companies in late 1980s by three conglomerates, namely; Old Mutual; Sanlam and Liberty life group (Jones, 1992:274). Jones (1992:300) observes that some few stocks or sectors on the JSE could have large effects on the stock markets either through high dividends payments or huge increases (fall) in market capitalization which reflect high capital incomes and cites gold-related companies such as Anglo-American. Their study argues that owing to the significance of gold in the economy as a major foreign exchange earner, its stocks in SA are influenced

by international price fluctuations. Anglo American has the potential to pay high incomes to investors when prices are favourable. Additionally, other investors may use gold stocks to hedge against inflation and currency risks and, therefore, improve their earnings potential.

In Kenya too, the control of ownership and cross-holding of listed companies on the NSE is evident from the repeated presence in the board of directors by same companies and individuals (NSE, 1998: 8-128). Cross holding in Kenyan listed stocks is not very strong but there are clear monopolistic and oligopolistic tendencies by some companies. This is illustrated by steady and high dividends payments by major banks, coupled with their huge market capitalization, an indication of growth in markets share and stock prices (NSE, 2000:25). Popiel (1992:202) sees a plausible reason for the concentration in a few stocks on the NSE as based one deliberate policies that overemphasize on banking-centered financial systems at the expense of the securities segment The tendency to concentration of stocks in Kenya is based on government approach that views stability and liquidity of the banks as being equivalent to the entire financial systems stability may affect the returns and risks of other listed stocks as investors shun them (Economic Survey, 1998:93).

4.4.3 Thin markets

(Barger, 1993:6) suggests that the depth of a market as determined by volume of trading, the number of listed stocks and their value or capitalization among others also affects the risk-return complexion. Barger (1993:6) further argues that African stock exchanges lacks substantial depth and hence experience thin trading. According to Popiel (1992:171) the thinness of financial markets is detrimental to the investor in several ways. One is that investors in thin markets buy the highly valued stocks or the 'blue chip', leaving majority of the other stocks largely untraded. Secondly, thin markets create uncertainties over the value of the stocks. Third, they cause markets to have low levels of liquidity. Fourth is that thinness limits the ability of investors to reduce risk optimally. Finally, in a thin market, investors are unable to buy small stocks. The combined effects of these factors are to reduce the demand of security as a vehicle of investing leading to

fall in prices. To the investor, a fall in prices constitutes a loss or reduction of the capital gains.

According to Page and Palmer (1991:69), small firms, as measured by capitalization, on the JSE are thinly traded. They are characterized by low volume of trading. Rensburg (2000:32) observed that on the JSE, major players restrict their buying to about 50 stocks. In Kenya, trading seems to be concentrated on the top 10 listed stocks as measured by market capitalization whose composition has changed little during the last 10 years (NSE, 1998:6-40). Barger (1993:6) attributes thin market in Kenya to low trading volume as indicated by low security-GNP ratio and high transaction costs cited in Section 4.3.1. Since the Kenyan and South African markets are evidently considered to be thin, investors should choose growth stocks as they are potentially well positioned to deliver superior returns than the others with the same risk (Reilly, 1971:43).

4.4.4 Company specific-factors

There are several company-specific factors that influence the returns of their stocks. But in this section we only examine five of them. These are earnings power of a company, the dividend policy, method of raising capital, listing advisors and the liquidity of the market. Most of the observations are based on studies on the South African market because of unavailability of such studies on the Kenyan markets

Bernstein (1985:806) identified growth in earning power and the price as some of the determinants of share returns. According to Seneque and Gourley (1983:35), the dividend policy of a company affects its value and more so, the current dividends exert the most influence. This is an indication that the company specific factors affect both the returns and the price of the its shares. According to Bhana (1996:29), this argument survives despite doubts of the relevance of dividends policy in asset valuation and demand and supply price determination in perfect market by Miller and Modigliani. The argument is that the lower the purchase price, the higher the capital gains. Internal decisions as relate to investment, finance and operations of the company influence the earnings and risk of the company.

According to Reilly (1971:41), the price of the stock, which determines capital gains, also responds to factors beyond the company fundamentals. This is partially because of the differences between a company's characteristics and its share price, which are not necessarily the same. Reilly (1971) points to aspects such as whether the stock is cyclical, defensive, and speculative or growth, and the perception of the markets on the expected performance of the underlying company, among others, tend to differ. Consequently, companies with strong earnings and low priced shares would be regarded as potentially being capable of delivering higher returns. With the two stock markets bearing the characteristics of thin markets, the companies, which issue stocks at low prices, would be expected to have higher returns.

Seneque and Gourley (1983:40) found that earnings and future prospects of a company heavily influenced its management's decisions on dividend policies in SA. When the total dividend returns realized from the company-specific and market influences are separated and adjusted for the risk, dividends policy was observed to affect prices and the payout ratio of the companies listed on the JSE (Sealy and Knight, 1987:37). Investors in these securities were found to prefer returns in the form of capital gains. This conclusion underscores the importance that management attaches to impressive returns as a strategy for influencing the future prices in the company. By so doing, the investor in such companies is likely to realize more capital income on disposal of their stocks.

According to the NSE (1998:3) report, Kenyan companies are keen to pay dividends consistently because they believe the practice has a positive effect on the future of the company. Barger (1993:8) also observed that such a policy on dividend payments though influenced by management's decisions, seem to be driven by an overriding desire to influence the perception of brokers who dominate the stock trading at the NSE.

Company-retained earnings also tend to influence returns. According to Bhana (1992:32), in making a decision to either pay or retain earnings, a company not only looks into the investors needs for either dividends or capital gains, but also the future survival of the company. This study on the JSE showed that if investments of retained earnings were

efficient, then the more than proportionate increment from these earnings would put a premium on the shares of the company. However, if the market perceives retained earnings as inefficiently invested, it would discount the market price of shares and the investors would be expected to make capital losses. Bhana (1991:33) found out that most of the companies listed on the JSE had invested their retained earnings efficiently. It may, therefore, be deduced from the study that investors in these stocks gained from the ensuing price appreciation. Our study was unable to establish how retained earnings in Kenya affect dividends and prices of stocks. Callier's (1991:21) conclusion that developing stock markets (NSE fits in this category) are inefficient and from the fact that retained earnings are a major source of capital for the Kenyan companies, then it suffice to say, the retained earnings are important in determining the level of returns.

How a company raises its capital needs may also affect its returns. Ross, et al (1996:370-371) points out that additional funds may be raised through in the JSE through a new issue, a rights issue or a bonus issue. They also argue that the effects of public offering of shares on returns may be observed before and during the listing or thereafter. Bhana (1989:195) argues that there is no consensus as to the effect of new issues on the returns and prices of the shares at the JSE. The study based this observation on the fact that the effect of new listing on returns of companies traded on the JSE is short-term and has little effect on the market value of the underlying stocks in the long run. Bradfield and Hampton (1989:82) observed that after the listing, the shares on the JSE generally showed risk-adjusted positive returns.

The handling of the listing particularly the choice of underwriters and brokers also tends to influence the returns. Under-pricing is particularly blamed for having affected newly listed companies more than those that had existed for a longer period (Ibbotson, Sindelar and Riter, 1994: 67-68). Davey and Firer (1992:45) observed that in SA new equity issues hardly changed the share prices. The study attributed the insensitivity of the share price in the South African market to concentration or cross-holding of the listed companies. Returns on stocks listed on the NSE are reduced by the high underwriting costs (Barger, 1993:6). Low equity issues on the NSE are quite evident given the fact that

only 23 offerings had been made since 1990 (CMA, 2000:101). With only one dealer, underwriting in Kenya is bound to be expensive, as the task is left to stockbrokers (CMA, 2001:99).

As we have stated before, volume of trading also impact on returns. In developed markets, when earnings results are released, a strong relationship is observed between the price movements and the volume traded (Smirlock and Storks, 1988:39). There is a positive relationship between the size and the volume of shares issued and the initial returns. According to Karpoff (1987:125), a positive correlation exists between price and the volume traded. Those public offerings with large volumes of listing also depicted high volatility on returns. However, there is hardly any correlation between the volume of issue and the market returns on the JSE market (Lawson and Ward, 1998:30). Thus a substantial increase or a decrease in the buy orders or sell orders of shares may raise or lower the amount of capital gain to the investors.

Atkins and Ward (1996:49-50) support these findings on the effect of the volume of shares traded, on the prices in SA. This observation is also in line with the argument under the price pressure hypothesis. This argument is compelling given the participation by bulk trading of institutional investors like unit trusts, pension funds, mutual funds, dealers and other market makers in the two stock markets. Atkins and Ward (1996:55) studies found a share price rise of between 3 and 5 percent rise in shares due to bulk purchases of stocks on the JSE and an average fall of 21.5 percent on block sale of stock.

Apart from the small size of economy, other possible causes of the small size of Kenyan stock markets is the lack of a critical mass of sellers and buyers to give liquidity to the existing instruments in the market and the domination of the non-securities segment of the financial system (Callier, 1991:205). Other factors include ignorance of potential investors. For instance, it is argued that by 1999 less than 2 percent of the population invested in stock markets (NSE, 1999:11). With this low activity in the market, the liquidity should be expected to be low and, therefore, the returns. This is in contrast with the South African market. Affleck-Graves, et al (1982:21-22) found that in SA however,

investors will earn higher returns if they invest in low priced stocks than highly priced stocks. Large firms have however been found to give higher returns because of factors underlying the market conditions such as the cross holding (concentration) among listed companies on the JSE. This is as we noted in Section 4.3.2. Other factors that contributed to higher returns were the domination of institutional investors, and the low liquidity (Affleck-Graves et al, 1986:195-196).

4.4.5 Nature and operations of the stock markets.

The functioning of the financial markets is also crucial. Popiel (1991:205) views the nature and interaction of the financial instruments, regulations, information, and the operation of the trading system by regulators, brokers, market makers and dealers contributing in determining the size of returns and the risk of such markets. Certain quantitative and qualitative characteristics of stock markets also influence risk and returns of securities as well. Apart from the financial depth and liquidity cited in Sections 4.3.2 and 4.4.4, the regulations, information flow, and the efficiency of the trading systems in the execution of trades are important. Stock markets are a constituency of the wider and complex financial systems and represent only the capital segment of the entire financial system.

4.4.5.1 Type of markets

Faure (1987:20) points out that the stock markets are formal markets or stock exchanges in which financial assets are traded. Formal markets are established and operated by legislation and are reinforced by a set of self-regulatory rules. According to Falkena (1989:17) regulations are desirable as they check against price manipulation by market participants, insider trading, and front- running. In addition, exchanges are said to be cash markets because they restrict themselves to trading on a few securities. JSE and NSE largely fall into this category as they trade only in listed equities, debentures and public sector stocks.

A basic feature of the JSE and the NSE is the primary listing and consequent secondary trading of securities (Kelly, 1993:237; NSE, 2000:15). The JSE and NSE act as both

markets primary markets and secondary markets where initial public offering (IPO) are made and the issued stocks are traded respectively as the secondary markets. Popiel (1992:215) points out that by providing organized structures of trading money and capital instruments, stock exchange markets give cash to investors. Along with this cash, comes the market risk. The nature and interaction of market participants that is, sellers (issuers of securities), buyers of securities (investors), the financial intermediaries (simultaneous buyers and issuers of securities), and brokers in stock exchange markets could affect the returns and risk of the financial assets traded therein (Ross et al, 1996:374-378).

4.4.5.2 Market size

Investment returns also depend on the level of activities on the stock market. The activity of a market is to some extent influenced by its size, liquidity, depth as well as its breath (Demirguc-Kunt and Levine, 1996:291). Indicators of size and liquidity are market capitalization and velocity (turnover) of trades respectively. Klerk and Tiot (1986:21) also argue that a deep market offers a variety of securities differentiated by maturity, yield, liquidity and risk. Thus it should include equities, debts, and quasi-equities. Starting with the size, the JSE significantly has large and well listed with over 700 companies and an average capitalization of $250 billion. (SARB, 2000:68). Evidence shows that the Kenyan market is small with less that 60 companies and suffers from low capitalization given that it had only $1475 million as at year 2000 (Mlambo and Biekpe, 2001:62). With a low liquidity, the market is expected to be unattractive and hence low and risky returns.

4.4.5.3 Market liquidity

On liquidity, the South African market is relatively liquid with a turnover of 34 percent and market value of shares to GDP of 56 percent (Mlambo and Biekpe, 2001:62). The Kenyan stock market is evidently considered to be illiquid with a turnover of only 3.6 percent and a value traded to GDP of only 0.7 percent by year 2000 (Mlambo and Biekpe, 2001:62). Trading seems to be concentrated on the top 10 listed stocks, measured by capitalization whose composition has changed little over the last 10 years, although there is some evidence of cross-holding by the major companies (NSE, 1998:6-40).

Hence investors should choose growth stocks as they are potentially well positioned to deliver superior returns than the others with the same risk (Reilly, 1971:43). In terms of the degree of activity, NSE seems to be inactive as it has recorded an average of 3.5 percent in the last 10 years and less than 20 initial public offering in the same period (NSE, 1999:31).

Further indication of low capitalization in Kenya is evident when compared with South Korea. With Kenya having about 60 listed companies and capitalization of less than $10 billion, almost the same number of listed companies in South Korea, the latter on average have $66 billion market capitalization (Dermirguc-Kunt and Lavine, 1996:292). Popiel (1991:206) argues that liquidity is critical to reliability of a market as a means of raising funds. That is to say that illiquid markets attract fewer trades implying that most investors in such markets hold risky assets. Klerk and Toit (1986:21), however, did not find a connection between tradability (liquidity) and volume of trade and returns of shares on the JSE.

4.4.5.4 Financial advisors and dealers

The role of market advisors and dealers are also important in determining the returns and risk profiles of securities. Popiel (1991:205) argues that in the stock markets, brokers and market makers influence the stock prices. The NSE market operations are hampered by the notable absence of market makers with only one dealer, no investment bankers and few stockbrokers (CMA, 2000:16). Also, the mutual funds and unit trusts markets are new and relatively untested (NSE, 2000:23). With such market characteristics, we should expect low returns and high risk from those stock markets. However, Maughfling (1993:1) noted the low linkage of Kenya's market to the world stock markets. This could on the other hand imply low market securities returns.

The JSE has a well-developed merchant banking industry, dealers and broker (local and international) and an efficient information system (Ross et al, 1996:373-374). Atkins and Ward (1996:55) also concluded that on the JSE, institutional investors trading in block shares induced increases of share prices by up to 3.5 percent while selling block selling

caused a decline of up to 1.7 percent. This evidence therefore confirms the importance of financial service advisors, dealers, and institutional investors effect on the returns of the shares.

4.4.5.5 Regulations

Regulations are important not only for controlling the financial markets but also in protecting the investor returns. For NSE is regulated by the Capital Market Authority Act (1989) that has been amended severally to accommodate changes in the market (NSE, 1999:29) According to CMA (2000:41, 110,119), the authority licenses potential traders, dealers and fund managers. It also monitors and discipline members of the exchange. The association of stockbrokers have also imposed a self-regulatory mechanism that work with the authority. Ross, et al (1996:370) points out that two Acts impose the regulation of the JSE. The Financial Market Control Act No.55 of 1989 and the Financial Services Board (FSB) Act No.97 of 1990 controls and supervises the market and its participants respectively. Like the NSE, members also regulate themselves. self-regulations, and governments legislation. According to Falkena (1989:18-19), these rules are used to continuously monitor all market players, and especially the specialists because of their role in maintaining a fair and orderly market. These include minimum requirements for listing, financial statements disclosures, and directors' interests in their companies. This helps in building confidence in the markets, ensure some degree of accountability and reliability of data and trades, protected investors from fraudulent trading and market volatility. Thus the confidence bestowed on the market by investors may depend on how well the market is regulated and hence reduces the risk.

The speed of trade execution of after-market trades, that is, payment and transfer of securities are, also crucial in influencing the risk-return profile. On the NSE, the settlement cycle is two week after trade (T+14) (NSE, 1999:14). According to CMA (2001:29), the delay in the past seven years of implementation of an electronic system has had a negative effect on the NSE. The report argues that the system can improve trading, delivery, registration, settlement and depository system of the market. The system as it is operated now exposes stocks waiting to be transferred to liquidity risks, as they cannot

benefit from any price appreciation in the intervening period when they are locked up. Similarly, in the waiting period, risks associated with default of payment, fraud, theft and loss of stocks certificates are high (NSE, 1999:5).

Manual operation of the depository and settlement system is associated with some inherent risks NSE (2000:8). These include bad or wrong deliveries, loss of certificates, default in settlement, and delay in transfers. This implies exposure if investors returns to market risks, risk of default, and liquidity risks among others. Investors are also denied new capital flow, low transaction costs and foreign investment and cross-border trading which would transform into high returns and low risk (NSE, 1999:5) Due to employment of electronic trading and settlement and de-materialization of securities on the JSE, settlement period is shorter, that is, T+5 and risks of wrong deliveries, loss certificates, and theft of securities have been eliminated (JSE, 2000:6). The immediate transfer and registration of trades and stocks suggests improvement in liquidity and hence enhanced returns. Automation is expected to reduce the costs of operating the exchanges, the brokerages and intermediaries costs which should pass on as higher returns and low risks to the investors (JSE, 2000:7).

Having identified the types of securities in the South African and Kenya markets, how they are valued, and the factors that influence the return and risk, it is necessary to test the actual determinant of the risk-return profile. The ordinary shares have been observed to be the most popular and are employed the analysis and conclusions in Chapter 5 and 6. In the next Chapter, we shift our focus to the empirical analysis of the performance of various securities and funds using the MPT technique described in Chapter 2. We also discuss portfolio selection as informed by the risk-return profiles of the said instruments.

CHAPTER 5: EMPIRICAL ANALYSIS OF RISK AND RETURNS IN SOUTH AFRICA AND KENYA'S STOCK MARKETS

5.1 Introduction

This Chapter focuses on an analysis of the South African and Kenyan stock markets. For the purposes of this study, and for the reasons stated earlier, we mainly discuss the returns of equity stocks using the modern portfolio theory (MPT). The Chapter starts off with an explanation of the concepts, the research design as well as the methodology and statistical tools employed in our analysis. This is necessary for the purpose of enabling the reader to understand with greater clarity, our results in the subsequent sections. An analysis for each market is done in two stages. The first stage involves computation of the average mean return, and the standard deviation of returns of selected sectors for each market, ranking them in a descending order. The results of stage one set the basis for derivation of portfolios or investment units in the second phase. The constructed portfolios are again ranked in a descending order on the basis of their risk-reducing potential. Observations made are used as the basis for preliminary investment decision-making process. Alongside the main risk-return profile analysis, other statistical measures especially the minimum returns; maximum returns and the geometric mean are used to compare the returns in cases where the risk has not been adjusted.

Numerous studies on the successful application of portfolio theory on risk-return analysis profile of certain stocks or segments of the stock markets exist. Gilbertson and Goldberg (1981:40) application of the modern portfolio theory in their study on the industrial sector of the JSE Securities is one of them. The analysis of mutual funds in South Africa has also benefited from the portfolio theory (Gilbertson and Vermaak, 1982:35). Firer and Mcleod (1999:8) also carried out a time series comparative study of the ordinary stocks, bonds and cash assets for a period of 74 years. However, unlike in the studies cited above, we have not targeted a particular industry or compared different assets in the same market. Our study does not compare the two markets either, per se, but considers each market separately for analysis. The only comparison is on the performance of each sector and portfolios for each of the equity market relative to others in each of the market. The

rankings of the sectors of the market by the equity stocks are included for a period of seven years.

The study period is from 1990 to 1996. The computed returns and the ensuing risk-return analysis in the seven-year period must be seen from the investment management perspective. To achieve this, our results will inevitably embody the effects of economic and political factors, weather changes, and industry or company-specific factors on the South African and Kenyan markets as observed in Chapters 1, 3 and 4.

5.2 Sources, collection and procedure of data selection

As indicated in Chapter three, the total returns on investment are the primary data used in the risk-return analysis. The total returns are basically the sum of the dividends income and capital gain. For the South African market, returns are obtained from the price index for all sectors and dividends yields as classified by JSE-Actuaries (JSE-Actuaries, 1996:20-76). Another source is the South African Reserve Bank (SARB, 1997:32-33), which aggregates various sectors into large but fewer sectors. The study's opinion was that such a combination of sectors could to some extent undermine individual sectors' risk-return profile. For this reason, the former is used in this study. From the given monthly dividend yields, annual yields are computed. The capital gains components are obtained by subtracting the closing price index from the opening price index for each year over the period between 1990 and 1996.

The problem with this procedure is that it does not necessarily give us the highest possible capital gain for the year and may underestimate the risk and returns for the sectors considered. This method also fails to capture the market price movements and volatilities that would have otherwise been incorporated, had the average or high-low price index been taken. The reason for avoiding the high–low index prices is to ensure the maintenance of a risk-averse position where the investor would buy stocks at the beginning and hold them up to the end of the study period. No intermittent trading is conducted in between. Where the price index starts other than in the month of January, that month is taken to be the opening balance. Where the closing price indexes are not

quoted, the lowest of the previous year's low prices are used. The purpose of this is to eliminate the effects in the following year's trading prices. Again, no averages are taken, as doing so will be inconsistent with the study's assumption that the investors hold their portfolios for a long period and can only buy portfolios at the beginning of the year and only sell them at the end of the year.

The advantage of using dividends' yield instead of actual dividends is the fact that the former tends to eliminate the effects of currencies movements. The yield also reflects both the underlying stock market environment and the specific sector fundamentals. It is, however, noted that the yield may be exaggerated where the stock is lowly traded or illiquid. On the dividends yields, JSE-Actuaries give monthly dividends as and when the paying companies, which have different financial year-ends, report them. Since dividends are paid once in a year, it would be erroneous to pick the dividends paid at the beginning of the year and those paid at the end of the year. By so doing, one would have omitted many companies that pay their dividends in all other months. Similarly, one would also be disregarding companies that listed or de-listed for various reasons in that year. To remedy this, averages of the monthly dividend yields for each sector are calculated. Not all the required data was available for the entire period of study. For example, indices like JSE Health Care, Services and Information were only available for the years 1994, 1995 and 1996. Hence, they would be expected to either over-weigh or under-weigh returns and risks because of the short-term period in which they are captured in the study. The computed data of JSE sectors capital gain and dividend yields is shown on Appendix A(ii).

No single source was found to carry comprehensive data on the Kenyan equity markets. Additionally, there were no sector price indices at the time of the study. Only the opening prices of individual companies on the NSE is available from the statistical abstract (Central Bureau of Statistics (CBS), 1996:183). Partial closing prices were obtained from the NSE annual report (1999 and 2000). Thus there is no complete monthly stock market and therefore, capital gain is computed from high and low market prices. Data sources for individual companies were the Nairobi Stock Exchange quoted companies' report (1994),

African stock exchanges (1999), and Nairobi Stock Exchange Handbook (1998, and 1999). Since the high-low price differential gives the highest possible gains in any year, it may be possible to analyse the performance of the stocks in question against the prevailing investment climate.

Though there are no sector price indices and dividend yields for the NSE, the individual companies recognized agricultural, commercial and services, financial, as well as industrial and allied as shown (see Appendix B(iv)) were used for the purpose of portfolio construction. Among the above-cited databases, dividend yields for 1990 to 1993 are not available and are therefore, derived from actual dividends paid. In this regard, two methods were used. Firstly, earnings per share were applied but this posed the problem of inconsistency, which arose where earning per share, market price or market capitalization data could not be obtained. In the absence of earnings per share, dividend yields were obtained from the par value of the ordinary shares. Accordingly, where closing market price was not available, the average of high and low prices was employed. Precisely, the current market price at the time of the dividend declaration should have been used but that data was not available for most companies.

To confirm the accuracy of the derived dividend yields, the above described methods are applied to that period whose data was not available. No significant difference was noted. Where dividend figures are omitted, the reason is that the dividend had not been paid at the time of data publication, the preceding year's dividends are assumed. Where either opening or closing prices are not available, the preceding prices are assumed to prevail for the purposes of obtaining dividends. The treatment of data in this way is expected to understate returns for those companies that experienced high yields and overstate returns for those that have low yields. The process of obtaining data is shown on Appendix A(i). One observes that quoted companies' dividend yields are not smooth through out the period. The high yields periods are either preceded and or followed by low yields.

5.2.1 Data classification

In some instances, similar treatment was accorded to the two markets when it came to the preparation of data. On dividend computation, no sectors on the JSE or individual companies on the NSE are excluded based on pyramidal, market capitalization levels, and volume of trading, listing date or cross listing characteristics. This is unlike comparative studies on the New York Stock Exchange (NYSE) and JSE Securities that have excluded companies for: being holding companies; on merging and acquisitions; and on initial public offering (Lawson and Ward, 1998:31). This is despite what was observed in Chapter 4 that mining resource, banking and financial, and insurance sectors bear significant weight on the market not only by market capitalization but because of cross listing and their influence of on international prices.

For the NSE, we observed that Banking and Agricultural sectors dominate the stock market. Furthermore, de-listed companies are not omitted unlike in the time series study of financial assets on the JSE by Firer and Mcleod (1999:11). This is because of the problems in identifying such stocks and determining the sectors they belong to. This is compensated by allocating zero dividends income and zero capital gain which also indicates that those sectors or companies may not have listed at the time under consideration, may have changed names, or their data was not available.

Where the closing prices are not quoted, the lowest of the previous year's low prices are used. Those companies and sectors that pay other types of dividends other than the ordinary share dividends are not included. Companies whose ordinary shares prices are not quoted (only preference shares are quoted) on the stock markets are not included, for example, NSE's Kenya Planters Co-operative Union Ltd (NSE, 1998:18).

In Appendix A(i) and Appendix B(i), some years' capital and dividends incomes are marked by dashes. The latter represent periods when a sector was not in existence if followed by figures. Similarly, if dashes are marked after the figures, then it means the sector was removed or combined with others. In that format, the manipulation of data using the Excel 2000 is not possible. In order to meet the processing requirements of the

Excel 2000 program, naught (zero) is substituted for dash as in Appendix A(ii) for South Africa and Appendix B(iv) for Kenya, respectively. This gives such sectors the same treatment as those that paid zero dividends. In Appendix A(i) some sectors show negative capital gains. Although such statistics do not make much sense, they serve to indicate whether the overall returns are gains or losses.

In Appendix A(ii) and Appendix B(ii) adjustments for the South African and Kenyan markets respectively have been made to smoothen figures for various statistics that could not be processed by the program. In calculating geometric mean, the data could not be manipulated if any or all periods had zero cumulative absolute returns. In cases where all sectors or companies had zero returns, geometric mean was assumed to be zero. In the other cases, the periods with zero returns are omitted.

5.3 Results from the JSE

Appendix A(ii) shows the computation of returns for each year for 59 sectors on the JSE securities over the seven-year period from 1990 to 1996. Column one lists all the sectors. Under Column two the opening price index, is subtracted from closing price index in column three to obtain capital income in column four for 1990. Column six is the total income or returns obtained from adding capital gains to dividend yields in column five. All the data is expressed in percentages and the total returns are absolute nominal returns for that year. All the other columns bear the same kind of data as in column two, three, four, five and six but for the different years. As Appendix A(ii) shows, most sectors on the JSE reported positive capital income while a few showed capital income losses. Where we have zero, it is either an indication that the company is not yet listed, has been removed from the list, or there were no dividend yields paid.

5.3.1 Total returns

Table 5-1 below is a summary of column 9 of Appendix A(ii). It shows the distribution of the JSE absolute total returns year-by-year for the seven years and by type of return. The results indicate that there were more positive than negative returns over the years under review. In this respect, 1993 offered the highest number of sectors with positive total

income while 1990 the most sectors paying negative absolute returns. The year 1992 registered almost an equal number of sectors indicating positive as well as those posting negative returns. This is probably the attributable to changing attitudes towards the then impending political transition. Arguably, 1992 would have been ideal for risk-averse investor and risk neutral investors. However, this would probably have not been prudent given that the sizes of individual sector risks are not shown.

Table 5-1: Summary of the JSE sectors by the type of arithmetic mean return

Year	**Sector results**	
	Positive returns	*Negative returns*
1990	19	*24*
1991	37	*8*
1992	20	*23*
1993	41	*3*
1994	39	*5*
1995	34	*18*
1996	*36*	*18*

Source data: JSE-Actuaries, 1996:20-76.

5.3.2 Minimum returns

As we stated in Section 5.1, the minimum returns, maximum returns, range, are important for showing the extreme returns of an asset when the risk is not adjusted for. Minimum returns are shown on column 10 of Appendix A(ii) for the 59 sectors on the JSE between 1990 and 1996. The minimum returns indicate the least cumulative income (returns) that investor would have received in the seven years. The data summarized on Table 5-2 (below) show that, the highest total income loss is 98 percent from printing and publishing sector and the lowest loss is 0.2 percent from the industrial holdings sector. If an investor picked the wrong sector, in this case, Printing and Publishing, the decision would have resulted in a whopping 98 percent loss of income. The best of the minimum returns is financial sector, which yields a 5 percent return while the lowest income gain is 0.7 percent. This implies that picking the best sectors in this category guarantees a return

of 4 percent. On the whole, an investor who picked both the best and worst sector in the minimum returns category would have lost 97 percent. Such an investor would have improved his or her position slightly from the worse-off investor (98 percent loss). Moreover, the investor would be far away from those who held sectors that did not earn any income or those sectors that gave holders positive income though modest.

Our data indicates that eight sectors have neither lost nor earned any incomes during the period under study. Of the minimum expected returns, only 9 sectors earned positive income with the highest reaching about 5 percent and the lowest gain being slightly above half percent. Four sectors out of eight were not operational or recognized between 1990 and 1994. These are the health care, information technology, retail and service sectors. The other four sectors, which include redevelopment, development stage, media, paper were quoted on the JSE for less than two years. The relatively short duration (of being quoted) may be an indication their poor performance. On average, the investor in all sectors in the seven years would have lost a maximum of 20 percent from all sectors or investment. This includes the JSE all share index. If this main index were excluded, the investor would have been worse off by a further one percent. From Appendix A(ii), mining resources and related sectors accounted for 30 percent of all the sectors on the JSE up to 1996. If they were excluded from the portfolio, the minimum returns losses would have increased up to over 400 percent. Combining the financial and mining sectors, which form over 40 percent of the sectors, shows that the investors' losses further rose to 740 percent. The rest of the other sectors, excluding the mining the financial sectors portfolio returns posted a loss of 430 percent

Table 5-2: A summary of the JSE sectors minimum returns

Sectors	Returns (percentages)		Total returns
	Lowest	Highest	
Worst	-98	- 0.2	-97.8
Best	0.7	4.8	4.1

Source data: JSE-Actuaries, 1996:20-76.

5.3.3 Maximum returns

As Appendix A(ii) shows, the best sector is venture capital market, which in the seven years of study returned over 1000 percent. As it is clear from Appendix(ii), only returns for the year 1996 are recorded for this sector. This may be an indication that it was the first year of listing of the venture capital market. Of the 59 sectors, only six sectors showed zero returns. Of these, the Paper sector in the maximum return category earned zero returns in cumulative terms in the 7-year period. The sector however showed a standard deviation of 5 percent. Consequently, investing in the Paper sector over the long –term is not beneficial to the investor as they would earn no returns but would bear some risk.

5.3.4 The Range

Column twelve on Appendix A(ii) shows the range of the JSE sectors in the study period. The range shows the extent to which absolute returns can rise or fall when the risk has not been adjusted. What we observe is that the sectors with the high negative minimum returns and high positive maximum returns produce high range values. However, this is not the case for sectors with very low arithmetic mean return. Gold O.F, for example, a sector ranked thirty-sixth by arithmetic mean return of only 15 percent has a range of 182 percent. This suggests that despite the sector's low returns, it has the potential of enhancing returns in the long-term by up to 200 percent under good investment conditions. Other sectors with very low returns but very high range values in the context of our study are ranked fifty-second, thirty-ninth and forty-third respectively. They are Motor sector, Clothing, Footware and Textile sector, and Curtailed Operations sector. A possible reason for their range is because of their sensitivity to changes in level of income and weather conditions.

5.3.5 The arithmetic mean and geometric mean

The relevance of geometric mean was outlined in Section 5.1 as comparative statistic that does not account for risk but compounds annual returns. Both the arithmetic mean returns and geometric mean for all JSE sectors are shown in Appendix A(ii) column thirteen and fourteen respectively. The arithmetic returns and geometric mean returns show the single

period returns and annualised or compound return respectively for the seven-year period. According to Gilbertson and Vermaak (1981:37), the average return is relevant because of its conceptual relationship to modern portfolio theory. The geometric mean on the other hand is important where periods of analysis are long, and returns assessment alone without considering the risk factor. Both are useful where the period of returns is not identical. From the summary, arithmetic mean for most of the sectors exceed geometric mean. This is expected partly because some sectors have reported returns for lesser periods.

Few sectors like Other Metals, Coal, Platinum, Gold Evander and Motor shows exceptionally higher differences between geometric mean and their respective arithmetic mean returns. This indicates that returns from these five sectors would have been better had investors reinvesting their annual returns to their respective sectors year-after-year for the seven year period. Benefits would have been even more especially if the returns were ploughed back for the last three sectors because they offer very low arithmetic mean returns that are less than 9 percent, 5 percent and 1 percent for Platinum, Gold Evander and Motor sectors respectively. By and large, the cumulative arithmetic mean returns and the geometric mean of the JSE sectors for the seven-year period shows little differences except for the few sectors identified above. This suggests that single period returns and annualized returns tend to be the same in the long–term. A possible explanation of their closeness is that the reinvested funds contribution little to the improvement of the sectors' returns. Another suggestion is that it takes a long time for the reinvested funds to yield returns, possibly more than can be observed under the study period. The problem with this ranking is that it ignores the risk as indicated taken by the standard deviation.

5.3.6 The arithmetic mean and standard deviation

The more important ranking is by mean return size of the sectors and its standard deviation. This is because it is the one prescribed by the modern portfolio theory and exploits the three tools of analysis mentioned in Section 1.5. The computed average returns are ranked further sorted on Appendix A(ii) is ranked by the size of arithmetic returns and standard deviations. The best cumulative nominal average return for the first

7 years period is 160 percent and is delivered by Venture capital market sector. As column sixteen shows, the same sector (Venture capital) gives the highest standard deviation reaching well over 400 percent.

As the summary analysis on Appendix A(ii) column fifteen depicts, the first four JSE sectors, that is, Venture capital market, Gold Rand and Others, Steel and Allied have the highest cumulative nominal average returns. In this class of the best sectors, Beverages, Hotels and Leisure sector give the lowest cumulative nominal average return of 33 percent. Similarly, the sector carries the least risk at 24 percent. In as far as this upper class is concerned, the observations concur with the modern portfolio theory that the higher the returns the higher the risk. From this category, it is evident that the best sector earned only 5 times more than the lowest performer, but the risk is close to 20 times higher. Thus investors in these top sectors by return simultaneously bears the highest risk.

At the lower edge of the Table, the five poorest sectors by returns have negative cumulative nominal return. Gold West Wits, Pharmaceuticals and Medical, and Tin are the worst sectors by returns. The trios also exhibit very high standard deviation of between 17 percent and 55 percent relative to their returns. Evidently, the second worst performer by returns, the Pharmaceutical and Medical sector being riskier than the Beverages sector, the fourth best overall sector, compounds this picture. From this observation, we argue that the lower the return the higher the risk, at least for the lowest earning portfolios. This observation is inconsistent with the modern portfolio theory which propose that the lower the risk, the lower should be the returns. This would be possible as investors discover the sectors giving lower returns and therefore avoid them. As they expect such sectors to perform poorly in future, they continue to dispose them, which may increase their risk as they become more illiquid for example. This may be supported by the two sectors whose market depends on the level of incomes.

To provide clarity on the risk-return profiles of the JSE sectors, we derive Table 5-3 from the rankings of Appendix A(ii). The Table 5-3 is a summary of the selected JSE sectors ranked by returns and risk for the seven-year period. The Table groups nominal average

returns into five classes. The class offering the highest return is ranked top with the others following in a descending order. On the first row of Table 5-4 from left to right are the standard deviations, which have 6 classes in a decreasing order. Out of the 5 sectors with over 31 percent mean return, only one, that is, Venture capital sector, has a risk of over 100 percent. This means that the sector is extremely risky. In this class, most sectors have standard deviation of between 76-100 percent. From the table, it appears that the class with highest arithmetic mean has only 5 sectors, which earned an average return of over 31 percent. Thus, only 8 percent of all the listed JSE sectors earned an average return of over 31.The class offering the second best average returns of 21 percent to 30 percent has 16 sectors. Some sectors in this class have standard deviations exceeding 100 percent cent. This indicates that they are also risky. In fact 2 sectors in this category have risk of over 75 percent. Majority of the sectors in this class, have relatively low standard deviation of between 26 and 50 percent. Only one sector has moderate risk of between 51 and 75 percent.

The third cluster of sectors ranked by returns and standard deviation consists of 19 of the 59 sectors or 32 percent of all JSE listed sectors between 1990 and 1997. These offered a return of between 11 and 20 percent. This is the third ranking class by average returns performance. As the Table 6-4 shows, it had most of the JSE sectors with a cumulative nominal return of between 11 percent and 20 percent. Industrial Holdings and Redevelopment Capital sectors are the leading and last sectors in this category respectively. Their standard deviations just like returns are moderate with 19 and 25 percent respectively. Two mining sectors, Coal and Gold Klerksdorp which are ranked lower on performance by arithmetic mean returns, have high standard deviation of return from their group with 80 percent and 75 percent respectively. Such risks are three-and-half times that of Steel and Allied, the third best overall sectors by return. This again is not consistent with the modern portfolio theory, because it proposes that sectors with higher return should also exhibit higher risk, a fact contradicted by Steel and Allied sector.

As our analysis in Table 5-3 reveals, 16 sectors of the 19 sectors or more than 80 percent of the sectors in that category have standard deviation of less than 50 percent. Thus almost a third of all the listed sectors gave back a return of less than 20 percent in the 7-year period. This implies that most sectors on the JSE offered relatively low returns and carried a relatively low risk as well. The fourth ranked class confirms this, as it gives a very low though positive return of a maximum of 10 percent with most of the sectors (5 out of 59) having a corresponding low standard deviation of between 1 and 25 percent. Therefore, investing in this class would have yielded both low returns and low risk. This is consistent with modern portfolio theory.

Table 5-3: Classification of the JSE sectors by mean returns and risk size.

	Standard deviations						
Arithmetic mean	**0ver 100**	**76-100**	**51-75**	**26-50**	**1-25**	**0**	**Total**
31 and over	1	2		1	1		5
21-30		2	1	10	3		16
11-20		2	1	8	8		19
1-10	1		1	2	5		9
0						5	5
-25-0			1	1	3		5
Total	2	6	4	22	20	5	59

Source data: JSE-Actuaries, 1996:20-76.

Of the other 4 sectors, 1 has a very high standard deviation of over 100 percent while 2 others have high standard deviation of between 51 and 75 percent. These three sectors thus exhibit low returns but very high risk. Since their returns are not commensurate with their risks, they are neither good for risk averse or risk seekers as they are against the MPT. Therefore, investors would avoid them.

The fifth ranked class by arithmetic mean has 5 sectors. Our results indicate that all the sectors have zero return and corresponding zero standard deviation in the seven years period under review. This implies that the sectors gives no income to investors and carries no risk at the end of the period. Investing in the sectors in this class could not therefore be considered to be beneficial to either risk avoiding or risk taking investors especially during the period under review.

The sixth class on Table 5-3 consists of 5 sectors and they all give negative returns with the highest loosing 22 percent. Two sectors in this class have standard deviations of between 51 percent and 75 percent, and between 26 and 50 percent respectively. Since they give negative returns, then we may consider them to be very risky.

Particularly notable in this class (see Appendix A(ii) also) are the Gold West Wits, and Pharmaceutical and medical sector whose returns losses are over 25 percent and 12 percent but have relatively high risk as depicted by their standard deviations of 43 percent and 54 percent respectively. Thus 40 percent of the sectors in this class giving the lowest (negative) return have high standard deviations of over 50 percent. This clearly appears to contradict the modern portfolio theory. This is because we would expect this class to have the sectors with the lowest risk if conformed to the theory. But though the results indicate the class appears to earn the lowest return (negative) for all categories, it does not carry the lowest risk.

The implication is that though these sectors carry substantial risk, they at the same time yield negative returns at the end of investment period. Hence, investors not only bear risk, but also loose income. This may be due to the volatility of the stocks forming the sector such that very high returns are followed or preceded by high returns. Thus, investing in sectors in this period would mean not only loss of capital, but also bearing risk which is even worse than sectors in class five above. Even though 60 percent (3 out of 5 sectors) of all the sectors in this category have very low standard deviation of less than 25 percent, it is not worthwhile investing in them because they all offered negative returns.

From Table 5-3, it is clear that most sectors on the JSE in the seven-year period are low risk. This is derived from the evidence that 22 sectors of the 59 have standard deviation of less than 50 percent. Moreover, indications are that 47 of the 59 sectors or 80 percent of all the JSE sectors have standard deviations of less than 50 percent. Examining the above Table, we note that only 2 sectors that are extremely risky with a standard deviation of over 100 percent. This implies that investors in this market have low chances of investing in risky sectors. If they do, they would most likely be rewarded by very high returns. The above scenario is justifiable only when the sectors are considered independent of one another and the market. What we found out in Chapter 3 is that diversification is a major benefit of the modern portfolio theory. This is so long as it reduces risk through combining portfolios of various returns and risk denominations.

To produce an optimal portfolio, or the best combination of portfolios, the investors must determine risk of a sector relative to other sectors in the market. To identify the riskiness of any sector within the framework of the overall sectors listed on the JSE between 1990 and 1996, we calculate the covariance of return and correlation coefficient.

5.3.7 Derivation and construction of portfolios or funds from the JSE sectors: Application of covariance and correlation coefficient

We discussed in Chapter 2 that covariance of return establishes the direction of assets movement in relation to others in the portfolio and their risk reducing potential. Both covariance and correlation coefficient then help us in ranking the portfolios in order of their risk-return profile. To achieve this we use Appendix A(iv). The first column shows the list of sectors used in Appendix A(ii). The second and third columns show the average returns and the standard deviation of all sectors sorted in descending order. These statistics are then used to compute the covariances, which are presented in Table 5-4 below.

From Table 5-4 below, the covariance of the six portfolios paired into two portfolios is shown. Fifteen possible portfolios are derived from the six return-based classifications in Table 5-3. These exclude combining a portfolio with itself. All the new portfolios show positive covariance. This signifies that most portfolio returns move in the same direction and carry some risk. Portfolio 1,6 with 285 percent depicts a large positive return covariance. Therefore, combinations of these two portfolios would be expected to have moved very closely together in the same direction during the period under review. In terms of the modern portfolio theory, the resultant portfolio is also expected to be the most risky. The, covariance of returns (285 percent) is higher than the average standard deviation of 76 percent from each individual sector (i.e., the average of 129 percent and 40 percent for sector 1 and 6 respectively) as shown from Table 5-7.

Table 5-4: Computed return covariances for the JSE sectors derived portfolios

Portfolio	Return covariance
1,2	103
1,3	89
1,4	103
1,5	0
1,6	285
2,3	6
2,4	8
2,5	0
2,6	18
3,4	7
3,5	0
3,6	16
4,5	0
4,6	23
5,6	0

Source data: JSE-Actuaries, 1996:20-76.

Hence, the combined risk-return of the new portfolio is expected to be higher that of the individual portfolios 1 and 6, respectively. The enhanced risk makes the portfolio unfavourable to the risk-averse investor than would be the case for individual portfolios. But in an investment environment which is conducive, the said portfolio would offer very high returns. Because combined portfolio 1,6 exhibit very high covariance of returns, they would be expected to offer negative returns or losses to their holders during bad economic times for example. The other portfolios; 1,3; portfolios 1, 4; and 1,2 are ranked second, third, and fourth respectively. They are expected to move very closely and in the same direction owing to their high covariance of 103 percent, and 90 percent respectively. This very high covariance of returns or co-movement suggests that the three new portfolios not only move in the same direction but very closely to one another.

Therefore, these new portfolios may offer very high returns under good economic and market conditions. Conversely, the trio may experience very risky bad economic times or business conditions. Therefore, it may not be good to invest in such portfolios. Furthermore, their respective individual standard deviations are 82 percent, 80 percent, and 77 percent respectively. Comparing the results of individual portfolio risks and the covariance of returns of the new portfolios indicates latter does not offer better risk-return benefits that the former. This implies the new portfolios' risk-reduction capacity is low.

Portfolio 4,6 and portfolio 2,6 have a relatively low covariance of 23 percent and 18 percent respectively, and are ranked sixth and seventh according to their covariance of return. Their low covariances of return values appear to give mixed signals. In the eighth and the ninth position are Portfolios 2, 3, and portfolios 2,4. These do have positive but very low covariances of return. Such low values suggest a mixed signal in that the portfolios would move in tandem in some periods and move opposite to each other in other periods. With such unreliable combinations of portfolios, it may not be good to invest in them.

The lowest ranked portfolio has zero covariance of return. Any portfolio combined with portfolio 5 reports a zero covariance. This suggests that the resultant portfolios, 1,5; 2,5; 3,5; 4,5, and 5,6 respectively move independent of each other. As such, they carry any change in investment environment may not be predicated how it will affect the new risk-return profile composition. However, mixing portfolio 5 with any other portfolio is beneficial, as it is a potential risk-reducing portfolio owing to its low zero covariance of return. It may thus improve the overall risk while maintaining stable returns.

To complement the interpretation of covariances of return for the above portfolios, it is necessary to obtain the correlation coefficient. As the study described in Chapter 2, correlation coefficient lies between –1 and + 1. The former depicts an extreme relationship in which the portfolios movement is consistently opposite one another (Farrel, 1997:26). If the combined portfolios are on the other end of the continuum, that is +1, then we expect such portfolios to move in tandem with each other. The argument is that all sizes of correlation coefficient except + 1 have risk reducing potential.

From Table 5-4, we derive the correlation coefficient as shown in Table 5-5 below for each of the 15 portfolios. Our results show only positive correlation coefficient between portfolios. The highest portfolio has coefficient correlation of 0.76 indicating a very strong relationship to each other suggesting that the JSE-derived combined portfolios move in the same direction and hence may be very risky. The lowest correlation coefficient from our results is zero, indicating independence between those portfolios as was the case with their covariances.

Table 5-5 thus, shows some portfolios moving consistently in one direction, some in the opposite direction while others are moving independent of one another. At a glance, ten out of fifteen portfolios are positively correlated. This implies that of all the possible combinations of portfolios, that is, two-thirds of them move in the same direction. Of these, combinations of equity portfolios 3,4; 2,3; 2,4; 2,6; 3,6; and 4,6 respectively have correlation coefficient of at least 0.65. This suggests that returns from the six-paired portfolios are expected to move strongly in the same direction.

This means that in good economic and market conditions, an increase in returns of one portfolio may be followed by an increase in the return of the other portfolio in the combined portfolio. Their relatively high correlation coefficient also indicates any of the new portfolios has high-risk potential. A further implication for this would be that high-risk investors would find it more profitable to invest in this period. As such, the portfolios returns are expected to be volatile over time.

Since the investments are long-term, (seven years for our purposes), the implication from modern portfolio theory's perspective is that these portfolios are not good for risk- averse investors. Only risk seekers may take up such high-risk investments. The remaining four portfolios have a medium correlation coefficient varying between 0.64 and 0.5. Hence, both their co-movement is mildly in tandem, and their returns are relatively stable. These portfolios would be attractive to the risk-averse investor.

The other one-third of the JSE derived equity portfolios returns has a zero correlation coefficient. This indicates that the combined portfolio returns are independent of one another. Therefore, combining portfolios in this way would neither improve nor reduce their risk-return profile. As such investors holding portfolios structured in this manner may neither gain nor lose their returns from the changes in underlying investment environment. Notably, any portfolio that combines with portfolio 5 will not yield any improvement in the risk-return profile. But, such combinations are expected to maintain very stable returns in the seven-year investment period.

Table 5-5: Computed correlation coefficients for the JSE portfolios

Portfolio	Correlation coefficient
1,2	.614
1,3	.625
1,4	503
1,5	0
1,6	.563
2,3	.75
,2,4	.744
2,5	0
2,6	.7
3,4	76
3,5	0
3,6	.69
4,5	0
4,6	.683
5,6	0

Source data: JSE-Actuaries, 1996:20-76.

In order to relate portfolios' risk and return, Table 5-6 is generated. The table shows that the most highly ranked portfolio combinations are 1 and 6. They are however ranked ninth in terms of correlation coefficient. This possibly indicates that the expected returns are volatile or highly unstable. However, the relatively medium correlation coefficient shows that the direction of movement by the two portfolios is not consistent. Thus at one period, the portfolios would be moving in the same direction while in others they would move in opposite direction thus explaining the riskiness or volatility of the combined portfolio returns because of the unreliability of risk.

Table 5-6 shows the ranking of combined portfolios' risk-return in a descending order. Column one and two's ranks combined portfolios from the highest to the lowest return covariance. Columns three and four show the rankings of the combined portfolios and combined returns respectively. The actual rankings shown by columns two and three indicate that the combined portfolios with the highest covariances do not necessarily have the highest average return. Portfolio 1,4; as well as 3, 4 are ranked third and ninth respectively both in terms of covariances of return and average return.

Even though portfolios 4,5 and portfolio 5,6 are equally ranked by covariance of return, they offer different average return to the investor. In this respect, portfolio 1,6 with the highest covariance of return is ranked fourth in terms of the average returns. In general, the first four portfolios give the impression that the fifteen JSE-derived portfolios with high covariances of return also have high returns. Portfolio 4, 6 give the most diverse ranking being number 5 in terms of its covariance size but twelve in terms of the returns. While the last five portfolios have the same covariance of return, they have ranked differently by their average returns with the best portfolio 1,5 ranking highly by average returns at number four.

From the Table (5-6), it is clear that portfolio 5,6 ranks as the one with the lowest covariance of return and average returns. The covariance indicates to us that portfolios 1,3 ranks fourth but second in terms of return. Thus, they show large correlation coefficient and high returns. This reveals that their joint returns are relatively risky. Moreover, the strong correlation suggests that they move in tandem with each. Hence, the combined portfolio produces high returns that are equally risky.

The results of Table 5-6 further shows that four out of fifteen portfolios are correspondingly ranked by both covariance of return and average return. These are portfolio 1,4; 3,4; 4, 5, as well as 5,6. Portfolio 1,4 is particularly unique because of its high ranking. Its third overall position makes it the combined portfolio with the highest risk and returns respectively.

The portfolio consists of fourteen of the JSE sectors considered in our study. Hence it can be argued that 27 percent (14 out of 59 sectors) of the possible portfolio combinations on the JSE picked on the basis of their risk- reducing potential, may be properly ranked in the order of their risk- return profiles. This is because the derived rankings depict them as giving return commensurate with their standard deviation or risk.

Table 5-6: The JSE derived portfolios ranked in a descending order by risk and return

Portfolios	Covariances of return rankings	Ranking by arithmetic mean return	Combined portfolios arithmetic returns
1 and 6	1	5	25
1 and 2	2	1	41.5
1and 4	3	3	32
1 and 3	4	2	37
4 and 6	5	12	3.693627
2 and 6	6	10	8.610734
3 and 6	7	11	7.751692
2 and 4	8	7	16
3 and4	9	9	10.90951
2 and 3	10	6	20.4
1 and 5	11	4	29
2 and 5	11	8	15.82662
3 and 5	11	13	3.157823
4 and5	11	14	-0.90024
5 and 6	11	15	-4.05807

Source data: JSE-Actuaries, 1996:20-76.

Because of the high covariances, the sectors' risk-return profiles in the two portfolios are expected to move consistently in the same direction. This depicts the ability of diversification to proportionately adjust the risk and return of the portfolios. This further

implies that irrespective of the fundamental company-specific and sector differences, their returns and risk may respond to underlying investment conditions in a similar manner.

Possible reasons for the combined portfolio relative reduction of risk may be observed by analysis of the characteristics of the portfolios. Portfolio 1 and 4 consists of a total 14 sectors. These represent 27 percent of all the JSE sectors studied as noted earlier. The composition as Appendix A(iv) shows, is representative of the JSE index.

The sectors are representative of the JSE market and consist of primary mining resources, agricultural, industrial, banking and financial services and unit trust sectors. These characteristics will be discussed further in Chapter 6.

Ranking of the second, third and fourth portfolios almost conform to the trend of equal ranking by portfolio risk, movement and return. For the other portfolios, the covariance of return and return size of the portfolio rank them differently. The most extreme of this category is the joint portfolio 4 and 6 as it is ranked fifth in terms of its portfolio risk and direction of movement but twelfth in terms of the returns. The new portfolio consists of 14 sectors. As Appendix A(iv) shows, it is constituted by sectors with very low average mean, that is less that 10 percent and negative average mean. But the average sectors risks are extreme with a range of over 90 percent. Looking into the characteristics of the sectors we observe that they represent over 20 percent by number of all JSE sectors for the period of study. The composition includes only the financial services, industrial and primary mining resources sectors. Hence, the sectors are narrowly distributed in terms of their industry make-up. Also, the sectors include newly listed ones at the time the study like the Media. Other sectors in the portfolio like Tin, Paper and Sugar had reported no returns in the period of study. This may suggest that there is a wide differential in ranking and further indicates two things for our purposes; One, the inability of the combined portfolios to reduce or raise the risk-returns proportionately. That, portfolio 4 and 6 combinations have reduced the riskiness and returns of portfolio 4 more than they have raised and reduced the risk of portfolio 6.

Secondly, equal weights may distort this adjustment given that sectors only basis of clustering together is simply their risk and return characteristics. But the combined portfolios show evidence of risk reduction. Consequently, it may be argued that the analysis is not conclusive and further analysis is necessary in order to determine with finality whether a single ranking is possible or to establish an alternative ranking criteria altogether. Looking into the characteristics of the sectors we observe that they represent over 20 percent by number of all JSE sectors for the period of study. The composition includes only the financial services, industrial and primary mining resources sectors. Hence, the sectors are narrowly distributed in terms of their industry make-up. Also, the sectors include newly listed ones at the time the study like the Media. Other sectors in the portfolio like Tin, Paper and Sugar had reported no returns in the period of study.

Table 5-7: Classification of JSE derived portfolios by sector composition, mean return and risk

Portfolio type	Number of securities in the portfolio	Average return	Average standard deviation
1	5	57.645	129.5774293
2	15	25.33759785	40.81803126
3	19	15.503383861	33.77306604
4	9	6.3156645112	29.56562222
5	5	0	0
6	5	-8.11613	23.54600822
	58*		

Source data: JSE-Actuaries, 1996:20-76.

* Sectors exclude JSE sector index.

On the lower end, joint portfolios 5 and 6 are the lowest ranked in terms of covariance of return and return sizes respectively. The combined portfolio is notable because half of the sectors in the portfolio have zero returns, which have implications on covariance of returns interpretations. This indicates that the sectors in the portfolio are low risk; their movement with respect to each other is mixed and offers the lowest returns. For all sectors, the risk reduction potential of covariance of returns of portfolios suggest that the riskiness of JSE portfolios does enable such a portfolio to give high returns.

5.4 The NSE results

The total returns component is the basic measurements that are used in analysing the risk-return profile of securities listed on the NSE market. The process of obtaining the total cumulative absolute returns for the securities quoted on the NSE as we stated in Section 5.3 is presented on panel Appendix B(i). Columns 2 to column 8 on the said Appendix show how we computed the year-by-year absolute total returns for the securities listed on the NSE between 1990 and 1996. The NSE securities for the seven-years between 1990 and 1996 are arranged according to sectors. The first is agriculture, followed by commercial and services, then finance and investments and finally industrial and allied. Column one lists the securities by sectors ordered as above, while row one shows the number of years or periods. Below each year are the high-low prices of the dividend yield from the sources identified earlier in Section 5.2. On column two and column three are the high and low prices respectively for 1990. Column four represents the computed capital gains (column three minus column two) while column five lists the dividend yields. The sum of column four and five are on column six representing the year's total absolute return. The process of computing capital gains and total return is repeated for the other six years. The annual returns on Appendix B(i) are then extracted to form Appendix B(ii).

5.4.1 Total returns

As before, column one of Appendix B(ii) shows the sixty-one listed companies by 1990 divided into the four sectors described above. The annual absolute total returns for each year are shown from column two to eight and their sum gives the cumulative returns. The

summation is presented on column nine as absolute cumulative returns for each company on the NSE for the seven-year period. From the results obtained, Limuru Tea in the agricultural sector gives a cumulative return of almost 3000 percent, the highest on the NSE.

The lowest return is zero and is given by seven companies with one of them, Theta group, being from the agricultural sector. Two of the securities are from the commercial and services sectors. These are Kenya Airways and Philips International. The three from finance and investment sector are CFC bank, Kenstock and Regent Asset Africa. Athi-River mining is the last one and is in the Industrial and allied sector. A possible reason for zero returns is due to data manipulation process in this study as we outlined in Section 5.2. This is especially so because companies have been included irrespective of the duration of quotation as long as they were listed during the period of the study. Another possible explanation of the zero returns by the companies may be due to their outright poor performance. The absence of negative total returns may partly be due to the use of companies' high-low price in determination of capital gains (income) that disregards the specific dates of security prices.

As a further explanation of Appendix B(ii), Table 5-8 below analyses NSE companies by the size of their cumulative absolute returns for the seven years. Seven out of all the companies included in the study earned a cumulative return of over 500 percent. Since they constitute only 11 percent, it indicates that only a few companies earned reasonably high returns. Twenty companies or one third of the companies made cumulative returns of between zero and 100 percent. Thus, most companies made relatively low returns. Forty-six companies or 75 percent of the companies made cumulative returns of less than 300 percent. Eight companies made moderate returns of between 200 percent and 500 percent.

Table 5-8: Classification of NSE securities absolute returns.

Cumulative return	Number of companies
Over 500	7
401-500	3
301-400	5
201-300	12
101-200	14
0-100	20

Source data: CBS, 1996:183; NSE, various.

5.4.2 The minimum returns, maximum returns and range

From Appendix B(ii), we construct Appendix B(iii). Column three, four and five show the statistical summary of minimum returns, maximum returns and range respectively. From column three, we observe that the best company offered a minimum absolute return 28 percent. This indicates that in the long-term, an investor would gain 28 percent by investing in Barclays bank under harsh investment conditions. According to our results, the minimum cumulative return that a company would have returned is zero. Thus it may be argued that investment in sixteen of the companies quoted on the NSE in the seven years under review could not earn income. A suggested reason for the failure of 26 percent of all the companies to give any return in the long- term may be partly due to bad investment environment. Another reason for poor results as pointed out earlier in Section 5.2, may be flawed data. We may have introduced flawed data because of adjustments made in the course of data collection and processing. Going by our results, it means that such investments would be worthless when risk is not considered.

For Appendix B(iii), the summary is presented on Table 5-9 below. Only three companies could afford a minimum return of over 15 percent. As we observed the highest gave a return of 28 percent. The summary shows that most securities or 33 percent (20 out of 61 sectors) gave minimum returns of zero and below one percent. Furthermore, 58 companies had minimum returns of between 0 percent and 15 percent. Therefore, in long-term many investments in quoted companies would be expected to perform badly in a bad

investment climate. The difference between the highest and lowest minimum returns is less than 30 percent. Therefore, there are no marked differences between the best and worst performer in bad times if the risk is not considered.

Table 5-9: The NSE securities classified by maximum, minimum returns, and range

Minimum absolute returns (%)	Number of companies	Maximum absolute return (%)	Maximum absolute returns (%)	Range (%)	Number of companies
Over 15	3	**Over 100**	17	**Over 100**	19
11-15	5	**76-100**	7	**76-100**	6
6-10	17	**51-75**	10	**51-75**	9
1-5	16	**26-50**	8	**26-50**	10
Below 1	20	**0-25**	21	**0-25**	17

Source data: CBS, 1996:183; NSE, various.

From the Appendix B(iii) column four, the best security generated a maximum absolute return of over 900 percent while the worst was offered no returns at all. Limuru Tea, the security that had highest cumulative total returns also happens to have been the same one offering the highest return in this category. Similarly, those securities offering the lowest return in the category of maximum returns are the same as those that we identified above as giving the lowest returns in the minimum return category. In Table 5-9 above, column four, 17 securities or 27 percent of the companies quoted on the NSE in the period of study offered a maximum return of over 100 percent. Hence, almost a third of the companies showed a potential of giving very high returns. The high potential is further reinforced be the observations that 24 securities or 38 percent of the companies could give over 76 percent returns in the seven-year period. 18 companies indicate moderate maximum returns of between 26 and 50 percent. However, most securities, that is 21, or 33 percent of all NSE listed securities gave returns of between zero and twenty-five percent. This would suggest that despite good trading conditions, most investments on the NSE could only offer low returns. From the Table, 45 securities or 70 percent of the

companies gave over 76 percent or below 25 percent. Thus the maximum return offered by the listed securities on the NSE shows that most of the companies offered either very high returns or very low returns in the long term under their best trading environment when risk is not taken into account.

The range as shown in column five (see Appendix B(iii)) relates the minimum and the maximum returns. It shows volatility of absolute returns unadjusted for the risk. As expected, securities with extreme minimum and maximum returns give the highest range. Nineteen securities or 31 percent of all indicate a very high range of over 100 percent. This means that most of the companies are volatile. The minimum returns, maximum returns and range provides a way of selecting securities on the basis of the size of returns only. For the purpose of our study, this analysis would be incomplete as it fails to recognize the risk of the securities. Thus in order to get the risk-adjusted returns of the selected companies we use the arithmetic mean and the standard deviation computed in this study. A further analysis by use of the geometric mean helps in comparing the arithmetic mean return.

5.4.3 The arithmetic mean returns and standard deviations.

To explain the relationship between returns and risk of the securities on the NSE, we extract columns one, five and six of Appendix B(iii). We then sort the data from the highest to the lowest by the size of their arithmetic mean and standard deviation and represent them on Appendix B(iv). Clearly, the highest arithmetic mean return and the standard deviation of return in the seven-year period of the study did Limuru Tea respectively offer 389 percent and 466 percent. The annualised returns of 85 percent are also very high. Therefore the results appear to suggest that, for all the securities quoted in the seven-year period, Limuru Tea ranked first in terms of yielding the highest return but it also happened to be the most risky asset. That the security gives very high returns and is very risky compared to all other securities on the NSE is evident from the average returns and standard deviation of the second ranked asset, which are 200 percent less than that of Limuru Tea. The security is good for risk-seekers. Possible reasons for the high

returns and risk are favourable international market prices, and good quality of the products.

Appendix B(iv) results are summarized on Table 5-10 below. Four securities including the first ranked, Limuru Tea, managed over 100 percent average returns. The other three ranking second, third and fourth by size of arithmetic returns are Brooke Bond, BOC Kenya, and BAT Kenya. They all have standard deviations of return of over 200 percent. The compounded returns of the four securities also correspond to their average returns with BOC Kenya recording the highest at 98 percent. Hence, the best four securities on the NSE during the period under review offered very high returns, but are also, predictably, very risky. Any long-term investment in these assets would give good returns but one must be ready to contend with the high risk. In general, the securities seem to conform to the modern portfolio theory that the higher the return- the risky the asset, apart from BOC Kenya. Being the third ranked asset by arithmetic mean return with a standard deviation of 270 percent, BOC Kenya's standard deviation is 40 percent higher than the standard deviation of the second ranked asset by average returns, Brooke Bond, whose standard deviation is 230. Partly, the implication for the NSE, in the long-term is that, the assets delivering highest return are not necessarily ones most risky.

Viewed by return size, the last seven companies achieved zero returns and corresponding zero standard deviations as Appendix B(iv) shows. The seven lowest ranked companies by average return size are Theta group, Kenya Airways, Philips international, Chancery Investment, Kenstock, Regeant Asset Africa, and Athi River Mining. They constitute of eleven percent of all the listed companies between 1990 and 1996. Three of the companies are from the finance and investment, two from commercial and services and one each from industrial and allied, and the agricultural sector respectively. As pointed out earlier, the reasons for the seemingly dismal results may have been because of the mode of data manipulation as we have stated before. Further problems may be associated with listing timing in relation to the period of study or outright poor performance due to poor weather, as well as bad economic conditions peculiar to specific industries and companies. The second best category of securities on the NSE measured by returns and

risk are Barclays bank and East African Cables ranking fifth and sixth respectively as shown in Appendix B(iv). With average returns of 98 percent and 77 percent respectively, and standard deviations of 55 for the former and 86 percent respectively, both securities may be said to have relatively high returns and high risks as well.

Thus investing in the long term the two securities would yield very high returns but at a corresponding high risk. Such securities are good for high-risk takers. The results indicate that East African Cables is more risky than Barclay's security though it offers lower returns. The two companies are from finance and investment sector and industrial and allied respectively. The good performance may be due to domination of the two companies in their respective industries coupled with good management. Apart from possible economic growth in the period under review, other factors may be high interest rates due to government monetary policies. The high risk may be due to default risk factors for the banking industry and uncertainty of effects trade liberalisation in the industrial sector.

The third class constitute of eight companies offering average returns of between 51 percent and 75 percent during the seven years. The best security in this category as measured by return size is Standard bank, which is ranked seventh overall with an average return of 74 percent and standard deviation of 55 percent. This indicates the bank offered high returns in the long-term and is relatively not highly risky. Apart from the possible favourable conditions in the finance and investment sector that we have pointed above, specific company factors like good management may explain the lower risk. A unique security in this category is Sasini Coffee and Tea that offers an average return of 63 percent but with a standard deviation of 77 percent. Its ranking in relation to all other sectors in the period of study is ninth. This suggests that though it offers high returns, the security is very risky. While high returns may be accounted for the favourable primary commodity export market in the agricultural sector and good management, the very high risk may be due to exchange rates conditions and unstable export prices as well as poor weather conditions. Furthermore, compared with Standard bank, the best sector in this

category, Sasini's average return are lower by only 10 percent while its standard deviation is higher by more than 20 percent.

The security with the lowest return in this category is Dunlop Kenya and is ranked fourteenth overall with a return of 51 percent and a standard deviation of 71 percent. Clearly, the asset offers moderate returns but is still fairly risky. This is especially so when compared to the Standard bank security (best in the category). While Dunlop Kenya's returns are more than 20 percent lower than the Standard's return, its standard deviation exceeds the latter by more than 15 percent. Market conditions may explain the long-term low but risky returns offered by Dunlop Kenya.

Another outstanding security is the Kenya Commercial Bank (KCB) with average returns of 52 percent and a standard deviation of 28 percent during the seven-year period. Since it offers moderate returns and has a very low risk, it may be regarded as an outstanding performer. Though the bank is ranked thirteenth among all the listed securities on the NSE measured by returns, it has the lowest risk in the top thirteen firms. The good performance may be due to favourable banking conditions alluded to earlier as well as the big market size and good management in the log-run. In general, but with the exception of Dunlop Kenya and perhaps Sasini Coffee and Tea, the moderate risk-adjusted returns suggest that the assets in this category may be good for long-term investment by risk-avoiding investors.

The fourth category ranked by returns and risk constitute of 15 companies with average returns of between 26 and 50 percent as shown in Table 6-11. Therefore, the category is offering relatively low returns. The standard deviation varies from 1 percent to 100 for these securities in seven years under consideration periods. Crown Berger with an average return of 50 percent and standard deviation of 77 percent is the best in this category and takes the fifteenth position when compared to all other securities of the NSE by size of return. Though the asset offers low returns, it is very risky suggesting that risk-averse investors in the long-term may not favour it. As it is classified in the industrial and allied sector, the risk-return profile may possibly be due to unfavourable market

competition from imports due to liberalization and low domestic demand and also managerial problems. Kenya Oil Company is the lowest performer in this class with an average return of 29 percent and standard deviation of 21 percent respectively. With regard to all other companies, it is ranked twenty-ninth by the size of returns. Thus the company has a very low risk-return profile. Possibly, the poor performances are industry related like low profits due to international oil price movements and the small market share respectively. Such companies may be good for risk-averse investor in the long term. One should however, be ready to remain contented with the low returns

Of all the NSE securities, which made some returns during the study period, the companies with arithmetic mean lying between 1 and 25 percent offered the lowest positive returns. With twenty-five companies or forty percent of all the securities, the class offering very low returns dominates the NSE as shown on Table 5-10. The best security in the low average return category is Motor Mart Group (Lonhro) with returns of 24 percent and standard deviation of 8 percent. In the whole market, it is ranked thirtieth by return size. Thus the low return is commensurate with the low standard deviation. Such poor performance may be due to the low domestic demand of the commercial and services sector owing to poor economic performance. In the long-term, trade liberalization which has allowed in imports of other vehicles may be another cause of poor the performance.

The worst performer in the category, Ria Vipingo is ranked fifty-fourth overall and delivers an average return of 2 percent in the long-term and a standard deviation of 6 percent. Being in the agricultural sector whose returns are affected by international commodity prices, bad weather and also the possible effects of data manipulation could explain the apparent poor performance by Ria Vipingo. Since the securities in this class yield very low return and very low risk asset, their profiles may not be expected to improve significantly even in overall favourable investment environment. Because of the mixture of sectors from which they are drawn from, the possible cause of the poor performance could also be company specific factors such as the market size, and

management problems. Thus it may not be a good category from which to pick individual companies to invest in.

A further classification of the securities by riskiness for the period under study is also offered on Table 5-10. These analysis looks at the whole market without revealing the identities of the securities. From the observations, four securities with standard deviation of over 100 percent also depict average returns of over 100 percent. Therefore, there are only a few very risky assets and which have very high returns on the Kenyan financial market. This is because the four securities form only seven percent of the whole market. These observations suggest that investing in the most risky securities on the NSE market between 1990 and 1996 may translate into the highest possible returns in the long-term. While the returns are high in the long-term, and therefore appealing, risk-averse investors for their very high risk may shun the investment for fear of losing out.

Only three securities quoted on the NSE market during seven years have standard deviation of between 76 and 100 percent but their average returns vary between a low average of 26 and a high average return of 100 percent. What the results indicate is that despite high risk of the assets in the long term, their returns are not consistently high. Unlike the first group of assets described above, this category is partially inconsistent with the modern portfolio theory. The inconsistencies have implications on the investors in that they may hamper their decision making process.

Six securities or nine percent of the entire market observed in the study period have a standard deviation lying between 51 and 75 percent. Their returns are distributed between low average returns of 26 percent to high average returns of 100 percent. It may, therefore, be argued that the class represents securities on the Kenyan market with moderate risk and returns in this study. Most or half of the securities in this class achieve average returns of between 51 and 75 percent. Therefore, the risk-return profile of the class suggests that assets are moderately risky but they also offer moderate returns. Thus most of the assets in the class may be acceptable to risk-averse investors for long-term holding because their risk and returns are consistent.

Thirteen securities have standard deviations of between 26 percent and 50 percent. Their average returns spread from a low of 1 percent to a high average returns of 75percent. These observations reveal that 20 percent of the market in the seven periods under consideration has moderate risk. These results also show that thirty percent of the securities (4) in this category have medium average return. From the observations, only four securities can attract risk-averse investors looking for long-term investments. The other seventy percent (eleven securities) though have low returns of less than 50 percent. Though the securities low returns and risks seem to fit the requirements that returns be commensurate with risk, the relatively low returns may discourage investors from these securities especially when one take into account that the investments are meant to be long term.

In the classification of securities by returns size, we found that most of the securities on the Kenyan markets have low returns. We further observe from Table 5-10 that 28 securities invested over seven years had risk of between 1 percent and 25 percent. These observations therefore indicate that most of the securities on the NSE market are low risk assets. The average returns are also equally low, falling between 1 and 50 percent. Indications from 46 percent of the securities of entire market are that most of the securities have very low risk. Furthermore, most of the securities (twenty-three) or 83 percent in this class of low risk assets have very low average return of between 1 and 25 percent. Thus these securities may not be attractive to the risk-avoiding investor for holding in the long term. However, five securities or 17 percent in this class of low risk have moderate returns of between 26 and 50 percent and may be considered for investment.

As we stated before, the seven securities giving zero average returns have zero standard deviation as well. Accordingly, eleven percent of all the securities observed over our selected periods carry no risk. Since they have zero risk-return profile, as individual securities they are worthless to long-term risk-averse investors. However, it is not sufficient to decide merely on the basis of individual security risk-return profile. The modern portfolio theory allows the combination of several securities as way of reducing

the risk for a group of securities or portfolios. These may make the above zero return securities useful and is employed below.

The above analysis and ranking of securities based on individual risk-return profile does not indicate the relationship between two or more securities As such, it does not fully exploit the benefits envisaged in the modern portfolio theory. Therefore, it is necessary to compute the covariance of returns and correlation coefficient to realize the benefits of diversification underlying the portfolio theory. The classification of securities established Appendix B(iv) and on Table 5-10 are used as the basis of establishing portfolios for the purpose of covariance analysis. It can therefore be argued that using the tools of the portfolio theory, that is, mean return and risk, the study has generated 5 portfolios or funds from the 61 securities on the NSE market between 1990 and 1996.

Table 5-10: Classification of the NSE securities by average return and standard deviation.

Arithmetic mean class	Standard deviations of return						Total
	Over 100	76-100	51-75	26-50	1-25	0	
0ver 100	4						4
76-100		1	1				2
51-75		1	3	4			8
26-50		1	2	7	5		15
1-25				2	23		25
0						7	7
Total	4	3	6	13	28	7	61

Source data: CBS, 1996:183; NSE various.

Moving a step further, through the application of covariance of returns analysis on the above five portfolios, the study identifies ten possible combinations as shown on Appendix B(v) and Table 5-11 below. Further the covariances are arranged in a descending order. The results of portfolio riskiness exclude the possible combinations of

a portfolio with itself, for example, portfolio one with one. The new combinations are again ordered on the basis of the risk size of the new portfolio combinations with the most risky being on top as shown on Table 5-11.

From Table 5-11, it is clear that eight of the portfolios blend to produce four positive return covariances. Conversely, twelve individual portfolios partnered to generate six negative return covariances. The most risky combinations of portfolios on the NSE in the seven periods of study are portfolios 1,2 with return covariance reaching about 17000 percent. The lowest return covariance of about negative 30,000 percent is by portfolio or fund 1,5. The observations indicate that portfolios 1,2 and combinations 4,5 have very high positive covariances of over 1500 percent. This suggests that each of the resultant blends of portfolios moved consistently in tandem. Therefore they are very strongly related.

Table 5-11: Ranking of the constructed NSE portfolios by covariance of returns

Portfolios	**Covariance of return**
1,2	16610
4,5	1560
3,5	295
3,4	108
2,3	-177
2,4	-978
1,3	-1968
2,5	-3005
1,4	-7835
1,5	-28269

Source data: CBS, 1996:183; NSE, various.

As such, investing in any of the combined investments would be very risky as it suggests they respond to Kenya's investment environment in the same way. This is because when the returns from fund one increased for example, the return of the fund two responded by

increasing in the seven periods of study. Conversely, in the investment period when the mean returns of fund 1 are decreasing, the average return of fund 2 is also decreasing. Thus under good investment conditions in Kenya, the paired portfolios risk-return profiles would be expected to rise rapidly. When the investment climate is not conducive, the funds may be expected to make losses consistently.

Funds 3,5, as well as 3,4 have covariances of between 100 and 300 percent, which are very low as compared to the two above. These results indicate that they move in the same direction in some periods but move counter to each other in other periods. The problem with investing in such funds is the determination of the timings of change of the direction of their movement. Thus of the four funds, 1,2 and 4,5 are particularly risky and may only be invested if they offer very high returns in which case it may be preferred by risk taking investors. The other two funds, 3,4 and 2,5 may be good to hold by risk averse investor.

According to Table 5-11, of the ten constructed funds from the NSE securities in the seven years under review, six of them have negative return covariances. This indicates that all of the funds moved consistently in the opposite direction suggesting that the funds have high risk reducing potential and are therefore, low risk. Fund 1,5 has the highest risk reducing potential with large negative return covariances reaching over 20,000 percent. This indicates that of the NSE market constructed funds; portfolio 1,5 would give the lowest risk in the long term. Also, funds 1,4, and as well as 2,5 with large negative return covarinces of over 3000 percent are clearly low risk.

Though in general the combined funds moved in opposite directions to one another, funds 1,5 as well as 2,3 have low negative return covariances of 28 percent and 178 percent respectively. Such low levels of blending are indications of mixed directions of movement of the funds. The suggestion is that during the period under review, each of the two funds moved counter to each other during some investment period but again moved in the same direction in another investment period. Hence, it can be argued that most of the NSE's constructed funds risk-return profiles behave differently under the same

investment climate. Important too, is the fact that it is possible to reduce the overall risk of the six funds

As we stated before, computing the correlation coefficient standardizes covariance of returns. The derived correlation results are presented on Table 5-12 for the five portfolios. Four portfolios or funds have positive correlation of return suggesting that their returns move in the same direction during the period under study. Of these, funds 3,5 and 4,5 may be said to be perfectly positive correlated. Our results suggest that the portfolios returns are strongly correlated and have no risk reducing potential. This may imply that an in increase in returns of portfolio 3 for example due to favourable market conditions would be expected to lead to a fall in returns of portfolio 5 in the during the period of study.

Two other funds show positive coefficient correlation of 0.2 and 0.05 respectively. The positive correlation suggests that the two have no risk reducing potential and therefore are risky. The correlation coefficient for portfolio one and two, and portfolio three and four are 0.2 and 0.05 respectively. Thus the former are strongly correlated compared to the latter. The positive correlation suggests that the two have no risk reducing potential and therefore are risky. It is further indicates that that portfolio one and two are more volatile than portfolio three and four. Hence the combinations of the portfolios are not good because it will not reduce their risk.

Six portfolios on the other hand show negative correlation coefficient varying between -0.2 and -1.0. This is expected from their negative return covariances. For this reason, it may be argued that most of the derived portfolios or funds have risk reducing potential and therefore are low risk. This is especially notable with portfolios 1,5, and 2,5 which have –1 correlation coefficient. This suggests that portfolios in each of the new fund consistently moved opposite to each other. Our results suggest that they have great risk reducing potential. Further, such perfect negative correlation may indicate temporary price disequilibrium. Such conditions could suggest speculative trading and insider trading among other associated factors.

Portfolio 1,3 has the lowest correlation coefficient among those with negative portfolios. This is against our expectations that it should show high correlation owing to the high covariance of returns. However, this contradiction may be due to the high risk (standard deviation) of portfolio three as is evident in Appendix B(v). Two of them, that is, portfolio 1,4, and 2,4 have equal correlation coefficient of 0.2 while 1,3 has 0.05. This further demonstrate that each of the three identified funds constructed from the NSE securities show some capacity to reduce risk in the long-term with the former showing higher potential than the latter. Thus it may be argued that they are low risk. They should, therefore, be attractive to investors holding other things constant. One of the important factors is return. Below, we relate the portfolio risk with their average returns in an attempt to make better investment decisions.

Table 5-12: Computed correlation coefficient for the derived NSE portfolios

Portfolios	2	3	4	5
1	0.199968455	-0.053525142	-0.192942675	1*
2		-0.039469101	-0.196474438	1*
3			0.049303241	1*
4				*
5				

Source data: CBS, 1996:183; NSE, variuos.

* The covariance of return is likely to be one.

The final stage is ranking of portfolio risk and their respective returns. From Table 5-11 and Appendix B(v), we obtain the covariance of returns and the average returns

respectively to construct Table 5-13. As the Table 5-13 shows the constructed portfolios ranked by the return covariances and respective sizes of their average returns. Using these criteria, the best-generated funds from the NSE securities would be the one that displays the lowest return covariances and the highest mean return. Looking at Table 5-13, there is no outright fund that shows the lowest risk reducing potential coupled with the highest return throughout the seven years under review. From the ranking by covariance in column two, those portfolios ranked from one to four indicate a low risk reducing potential and can, therefore, be said to be risky. In particular, the combined fund 1,2 ranks first by the level of covariance and mean return of about 800 percent. This suggests that although the fund is very risky, it also delivers very high returns.

With the exception of fund 1,2, the other three funds ranked second, third, and fourth respectively by covariances respectively are; 4,5, 3,5 and 3,4. Their mean returns lies between 70 percent and 170 percent. The result suggests that although they have high-risk element, they offers very low returns. From these observations, it may be argued that the three funds when invested in the long term are not only risky but have low returns. The fund ranked fifth by return covariances is 2,3, with mean returns of over 533 percent. The results indicate the combined funds have medium risk and high returns. This implies that the funds may have mixed signals as to the direction of movements of the funds despite clear high returns.

As Table 5-13 shows portfolios 2,4 with average return of 196 percent are ranked sixth both in terms of return covariances and the size of the mean return in the long-term. What the results indicate is that the funds have a moderate risk-reducing potential but low returns. Though the portfolios may be invested because of their risk reducing capacity, the low returns mitigate against such a decision. Funds ranked seven to ten in terms of their return covariances demonstrate a high risk reducing potential. Of these, portfolios 1,3 rank seventh by return covariances and position one in terms of the size of mean return of 976 percent. Portfolio1, 4 as well as 2,5 are ranked ninth and eighth by return covariances. They have mean returns of 290 percent and 270 percent respectively. This implies that the funds have a high risk-reducing potential and medium mean returns in the

long-term. The low risk and medium returns suggest the funds may be reasonable attractive to investors.

Finally, portfolios 1,5 offering returns of 108 percent are ranked tenth by return covariances and ninth by mean return. Therefore, out of all the combinations of portfolios returns generated from the NSE market during the seven year period, portfolios 1,5 has best risk reducing potential although coupled with very low returns. Hence investors interested on holding funds for long-periods and are risk averse may not find it attractive. However, it may be argued that if future expectations are good they may hold this portfolio.

Table 5-13: Combined NSE portfolios risk-return ranked in descending order

Portfolios	Covariances of return rankings	Arithmetic mean return ranking	Combined portfolios arithmetic returns
1 and 2	1	2	762.076
4 and5	2	10	70.70137
3and5	3	7	170.1887
3 and 4	4	8	150.1649
2 and 3	5	3	533.535
2 and 4	6	6	196.2179
1 and 3	7	1	976.731
2 and 5	8	5	270.8932
1 and4	9	4	287.115
1 and 5	10	9	108.220

Source data: CBS, 1996:183; NSE, various.

5.5 Conclusion

From the preceding analysis, it is clear that during the period under review, some of the JSE sectors, which had listed for less than 3 years, exhibited either low or negative returns, although coupled with a low risk. These sectors include Tin, Media, and Paper. However, other sectors that exhibited relatively large negative returns but were very risky are Pharmaceutical and Medical; and Gold West Wits. The Media sector is more notable because it had listed for less than one year of the study period. Since the high risk is accompanied by high absolute returns, risk-loving investors may pursue such sectors. The risk-loving class may consider investing in the first three sectors whose results are presented on Appendix A(v) and Table 5-3. The most visible sector in this category is the Venture capital.

The other two are Gold Rand and Other, and Steel and Allied, respectively. Sectors that may appeal to the risk-averse in this market as indicated in Section 5.4 are Beverages and Hotels, Banking and other Financial Services, and Building and Construction. However, looking at an individual sector alone may not be a sufficient condition upon which to base an investment decision with regard to the said sectors. This is mainly because the information obtained does not show risk-reduction potential were it to be combined with portfolios or funds in question. The JSE sectors that showed high returns did not necessarily fair well when combined with others to form portfolios. As the results show, the portfolios are more appealing. Since the study assumes that investors are risk averse, portfolios 1 and 4, come first followed by 1 and 2, and 1 and 3 in that order of preference. Portfolio 1 and 6 is not considered to be very significant because it appeals to risk-seeking investors only. The combined portfolios 1 and 5, 2 and 5, 3 and 5, 4 and 5, 6 are notable because of their unreliable movement and low returns. Their low risk notwithstanding, they are not considered as being attractive to investors.

At the NSE, it has been noted that the individual securities risk-return profiles, of eight of the securities considered do meet the long-term investment requirements of the risk averse investors. These securities include; Standard Bank, Total Kenya, Sasini Tea, ICDC investment, NIC Bank, CFC Bank, Kenya Commercial Bank and Dunlop Kenya. On the basis of the risk-reducing potential and return of the constructed portfolios, the study identifies portfolios 1 and 3 as the best for long-term investment. Others that seem to qualify in this regard are funds 1 and 4 as well as 2 and 5 respectively. Fund 2 and 3 does not give a clear direction because of its medium return covariances and, therefore, a further analysis may be required to make a more informed decision. Similarly, fund 1 and 5 may not qualify for holding in the long-term because of its very low returns despite the accompanying low risk.

On the NSE portfolios', funds 4,5; 3,5; and 3, 4 are deemed to be very risky and yield low returns in the long –term and therefore, are not good for risk averse investors. Fund 1,2 is, however, good for risk-seekers because of its very high risk and very high returns. The ranking of portfolios on the basis of covariance of return and size of return and the use of the modern portfolio premise suggest that investments in the period of study should have been made in the four portfolios whose risk levels and return share equal rankings. That is, the returns are commensurate with risk.

There are a few factors that may have influenced the outcome of our analysis. Firstly, our failure to eliminating de-listed stocks while automatically including new listings in the sectors and portfolios may have made our results to incorporate some survivorship bias. The latter basically refers to a situation where the prices of the de-listed securities or sectors continue to influence the market and thus the prices of other stocks Furthermore, our analysis in terms of sector returns, it is possible we ignored individual companies whose risk-return profile may not conform to that of the sector or industry. However, our results are largely consistent with the prevailing situation of the markets during the seven-year period of the study.

Finally, the results of our empirical analysis of the portfolios appear to further demonstrate the importance of using the modern portfolio theory. The theory provides a preliminary method of identifying portfolios without necessarily having prior information on other aspects of the investment environment such as the economic, political, market expectations or specific fundamental factors of the sectors. Moreover, the method does not require one to establish existing or potential investors or their present or future behaviour. However, it may be prudent to build on the modern portfolio theory by considering the above factors in order to arrive at a better decision. Using the tools of and the basic application of the portfolio theory, the study has been able to rank individual sectors on the JSE and NSE markets on the basis of their risk-return profile. It has further derived possible portfolio combinations and established the rankings of portfolios on the basis of their risk reducing potential and returns.

In this Chapter, the analysis, and findings are limited to the quantitative element of JSE sectors and NSE sectors. In the next chapter, we re-evaluate our research findings especially with regard to suitability or unsuitability of various portfolios.

Arising from this, we give some recommendations and after drawing our conclusions, we offer suggestions of areas that may require further research.

CHAPTER 6. CONCLUSIONS AND RECOMMENDATIONS

6.1 Introduction

In the entire study, the concept of investment management has been presented as being a composite of several processes or activities. Broadly, investment management entails decision making in the selection of financial assets (securities) and funds that meet predetermined objectives (Jones, 1994.5). At the centre of investment management is the risk-return concept. Orthodox financial theories have been popular since the 1960s because they simultaneously measure quantitative inputs; return, risk and correlation between different assets (Lamm, 2000:26). Our study largely applied the modern portfolio theory to the SA and Kenyan markets in an effort to obtain risk-return profiles of their individual assets (sectors).

As pointed out in chapter 2, the MPT's use of the quantitative tools of measurement combined with its power of diversification which is quite evident in the construction of portfolios or funds for the two markets were some of the theory's attributes considered to be appealing for our purposes. Further more, the theory has been useful in the ranking of sectors and funds for decision-making purposes. One could have gone further to alter the size and composition of the existing funds (portfolios) or even construct new ones if we specific investor's objective in mind. In this regard, various funds would have to be designed to meet diverse investors needs. As we observed in chapter 1, there are many funds but mutual funds happen to be well developed especially in SA.

An analysis of investment management may not be complete by quantitative measurements only. For this reason the study also explored the possible underlying investment environment in both markets in order to take care of factors that would otherwise have been left unaccounted for, yet having a profound impact on the risk-return profile of the two markets. There are various economic, political and even market factors that appear to define the investment climate in the two markets. Kenya's securities returns as we observed may have been affected by donor relations while SA's foreign and cross-listing of companies may have been important factors in this regard.

Important too are the specific company and industry factors, and individual stock markets characteristics such as the companies pyramiding observed in both markets, and Kenya's few traders who affect the securities prices and movement through speculative tendencies (see chapter 4). In section 6.2 an attempt is made to re-examine some of the key research findings outlined in chapter 5. The aim is to highlight the important factors for which recommendations and conclusions are made in subsequent sections of this chapter. We also take the position of an investment manager especially in determining which portfolio would be beneficial to invest in.

6.2 An appraisal of the research findings

Key among some of the broad results that we obtained from our analysis of the SA and Kenyan markets is the fact that only a few sectors (eight percent) of all the listed JSE sectors exhibited high risk-return profiles (see section 5.4). That is, the returns were found to lie between 31 and 160 and risk ranged between 24 and 425 percent. We identified Venture Capital as being the leading sector with returns of 156 percent and standard deviation of 425 percent. Furthermore, it was also to be far above the others in terms of its returns and risk which were5 and 20 times respectively higher than the one offering the lowest risk-return profile in this category.

The implication is that the sector returns are highly volatile. Possible reasons for these results were partly explained by the fact that the sector was found to have listed for a very short period by the time of carrying out this study. The tendency of a venture capital to invest in risky but sectors promising very high returns may also give an insight to its volatility. Thus the sector would be considered to be attractive to risk-loving investors. In the class of high risk, it offers the highest returns and therefore may be said to be consistence with MPT.

The second and third and the fifth ranked sectors in terms of risk-return profiles are the Gold Rand and Others and Steel and Allied. These may appeal to risk lovers and so may Bank and Other Financial services.

The former returns are 36 and 33 percent while the risks are 78 and 92 percent are respectively. Both are primary export products and hence, the good returns may be attributable to high export prices. The three sectors may also have experienced strong domestic demand as the economy expanded.

The opening of the South African economy in the early 1990s to the rest of the world market may also have led to an improvement of exports of both gold and steel. The high risk, however, may be due to fluctuations in the exchange rates and the international market prices of these products. The estimated lifespan of the mines could also contribute to the high risk. This seems to be clear from the second and third (Gold Rand and Others, and Steel and Allied) which is in agreement with the MPT in that they offer higher returns for higher risks. But the fifth ranked (Bank and Other Financial Services) sectors may be said to be inconsistent with the modern portfolio theory as it is more risky that the fourth ranked sector, that is Beverages, Hotels and Leisure sector.

Ranked fourth and fifth respectively in terms of risk-return profiles are the Beverage, Hotel and Leisure; and Banks and Other Financial Services. They have high returns of 33 percent and 31 percent but low risks of and 24 percent and 27 percent respectively. The implications are that the sectors may be good long-term investments by risk averse investors. High returns for the former may be attributed to growing domestic demand for consumer goods and as well as a good performance by the tourism industry during period under study. The sector may also be classified as being a cyclical industry sector whose returns improved with the rising stock market prices. As for the latter, restored confidence in SA may have improved demand for bank credits for long-term capital investment.

Good monetary policies may have also encouraged banks to investment. Equally, domestic investors may have invested in the existing investment funds. The low risk in both sectors may indicate the confidence in political and economic stability in the foreseeable future.

While the Beverages, hotel and Leisure show consistency with the MPT, Banks and Other Financial services does not as we have already noted above. Therefore, it may be argued that in the class of high risk-return sectors of the JSE, only the latter appears to defy the portfolio theory for having higher risk coupled with low returns.

The study also found out that 27 percent of all the sectors appeared to post moderate returns of between 21 and 30 percent but with diverse risks lying between 1 and 100 percent. Most of them had a low risk of between 26 and 50 percent implying that they fit the requirement of the portfolio theory. However, two sectors; Other Metals and Development Stage were found to have exceptionally high risks of 90 and 76 percent respectively. As such they appear to defy the modern portfolio theory, as they are low return, high-risk sectors. Their returns were 22 and 29 percent respectively. Probably, the fluctuations in the world market prices could explain the high risk of the former while the latter may be due to the short period of listing by the time of this study.

The Building and Construction with a return and risk of 29 and 48 percent respectively, may appeal to risk-seekers especially if it could be viewed as being a cyclical industry sector. Three others; Electronics, Electricity and Battery; Insurance; and Financial sectors with returns of 29,28, and 26 percent and risks of 18, 21 and 16 percent respectively may appeal to risk averse investors. The returns may be good because the sectors appeared to serve the middle to high-income earners whose incomes are generally stable. The sectors' returns too appear to depend on a stable and growing economy a condition that seems to have been met in the case of South Africa

32 percent of all the JSE sectors were found to offer returns of between 11 and 20 percent. In addition, it was also found that 84 percent of these had equally low risk of risk of less than 50 percent. This led us to conclude that most of the JSE sectors in the period of study had a low risk-return profile. Since these sectors are considered to offer low returns, having low risk then qualify them to be said to have met our theory's criteria of low risk low return. Hence, risk seekers may not be overly interested in such sectors. Conversely, risk-avoiding investors may prefer all the said sectors except for the Coal, Gold Klerksdorp, and the Gold O.F.S ranked 27, 29, and 32 respectively, in terms of average returns. Interestingly, all the sectors are mining based. The high-risk low returns could be explained by poor expectations by investors about the future prices of the underlying minerals. Another reason may be associated with the stabilising inflation rates during the period under study. For this reason, investors may have moved out of the mineral stocks viewed as defensive stocks in times of unstable inflation rates.

Looking at risk, four outstanding sectors for the risk averse are the Industrial Holdings; Chemicals and Oils; Metal and Minerals; and Stores which were ranked 24, 25,26, and 28 in terms of average returns. Their risk lies between 19 and 26 percent. Since the sectors seem to widely represent the intermediate goods, it may be argued that their relatively low returns may be due to the time lag of adjusting to the expanding economy. According to our results in section 5.4, we categorised sectors offering mean returns of between 10 and 1 percent as being very low risk. While these sectors may appeal to investors, two securities may be disqualified because they displayed exceptionally high risk of 91, 51 and 50 percent for their very low return of 4, 1 and 8 percent respectively. They are Gold Evender sectors, Motor sectors, and Platinum sectors which are ranked 46, and 48 and 44 overall on the JSE during the period of study. The trend exhibited by the three therefore appear to contradict the assumption that sectors offering low returns should equally show low risk.

It is suggested that the low returns in the gold sector may be explained by high operational costs of mining and low output, prices fluctuations and expectations of the future lifespan of the mines coupled with obsolete technology may explain the high-risk (Financial Mail Survey, 2000:203). The platinum industry may have been suffering because of the price adjustment in the export markets. Motor sector's poor performance and high risk is surprising especially in view of the relatively steady growing economy in period under study. From its price fluctuations and low dividends yields (see Appendix B (i)), it may be suggested that the sector specific factors such as restructuring played a crucial role. For the remaining sectors in this category that are investible, we observe that the Development Capital Stock, Property Loan Stock, and Sugar are leading with returns close to 10 percent but risk varying from 25, 10 and 23 percent respectively.

Moreover, our study found that the 5 sectors of the JSE ranked 50 to 54 in terms of risk-return profiles to have zero returns and risk free. As we observed in section 5.4, they are not beneficial as individual investments though they are risk free. From the composition of the sectors, that is, Healthcare, Information Technology, Retail, Telecommunication and Services the results may be explained mainly by their short listing period of less than one year, as captured by our study period of study. Hence the results should be treated with caution because of the effects of data manipulation process as we stated in section 5.2.

The last category of classification by risk-return profile of individual sectors also had 5 sectors. Unlike all the other JSE sectors, the study found that the 5 had negative returns. Pharmaceutical and Medical; and Gold West Wits sectors were noted not only because of their extremely large negative returns of 12 percent and 25 percent respectively, but their relatively high risks of 54 and 43 percent. We thus note their apparent deviation from the MPT that very high risk should be accompanied by very high returns.

The high volatility of the gold sector could be attributed to both poor international market prices and exchange rates, and uncertainty over continued future survival of the sector. What is surprising are the results of the Pharmaceutical and Medical sector which may be termed as defensive industry as we discussed in chapter 1and therefore expected to show low risk and low returns. Since their performance does not seem to be explained by the business cycle, them we could attribute it to the specific-industry problem.

The modern portfolio theory helped us to construct the portfolios or funds from the above individual risk-return profiles of the period under review. Additionally, the theory enabled us to rank the derived portfolios risk in relation to their returns. However, unlike the case for individual sectors considered above, it may not be possible to capture the underlying environment of the portfolios not only because of the size of the composition, but also because of the diversity of the sectors therein.

Thus, we have to contend with the portfolios rankings and their implications to the investors. As our results showed (see table 6-7), we generated 15 possible portfolios from the JSE. In view of these findings, the four portfolios may, therefore, be said to be high risk-return portfolios. Of these four, portfolio 1,6 may not appeal to investors much as it is the most risky while giving the lowest returns of 25 percent. Thus in view of MPT"s diversification requirement, the portfolio failure to inability to diversify, may explain the low returns. What emerged from the results is that those portfolios with low risk reducing potential are the ones that offered high returns. This was evident from the observation that the portfolio 1,6; 1,2; 1,4; and 1,3 ranked first to fourth respectively in terms of return covariances also gave the highest returns among all the generated portfolios.

From modern portfolio theory perspective, they portfolios are may be said not to be diversifiable as the high covariances mean high risk, as we discussed in chapter 2. However their returns, which vary between 25 and 42 percent did follow the order of their risk size.

The other three, 1,2; 1,4;and 1,3 in the order of their risk sizes gave returns of 42, 32, and 37 percent respectively, making them more preferable than the former. The next five portfolios were viewed as having relatively low risk reducing potential and, therefore, risky. They are portfolio 4,6; 2,6; 3,6; 2,4 and 3,4 ranked fifth to ninth in terms of portfolio risk potential. Unlike the four high risk-return portfolios mentioned above, the most risky portfolios (fifth, sixth and seventh) in this category were found to have low returns of less than 10 percent. These funds may not be good for investors. These portfolios do not seem to benefit from diversification as required by MPT that the essence of combining portfolios is to reduce risks. But portfolios ranked eighth and ninth may be considered as they showed better returns of 16 and 11 percent respectively in addition to relatively low risk. Portfolio 2,3 ranked tenth by portfolio risk size and sixth by average returns (24 percent) may be the most favoured by the risk-averse investors. At this position, it shows very low risk but good returns. The large size of the portfolio with 35 sectors and from different industries may explain the low risk-high returns. Thus portfolios ranked eight to eleventh are conforming to MPT because of their low risk (return covariance) imply they benefit from diversification.

The last four portfolios constructed from the JSE showed equal ranking by return covariances. They area also the lowest in risk terms. Two of these with equal return covariances, portfolios 4,5; and 5,6 produced negative returns, and therefore, may not be considered for investment. The other two; 2,5; and 3,5 showed positive returns. The latter however showed very low return of only 3 percent. Thus despite portfolios (3,5) displaying high diversification and therefore benefiting from diversification may not be good for investment because of the very low returns. But the former (2,5) show in moderate returns of 16 percent coupled with the high diversification (low risk) potential not only conform to MPT but may be invested for its good returns. From our findings of in section 5.5 (see table 6-11), less than 1 percent (four) of all the NSE securities had high risk-return profiles. This means that most of the market is not very risky.

Therefore, the (four) securities could be invested by risk lovers except the leading one, Limuru Tea.This is because the security was viewed to be extreme since its profile was 200 percent above the second ranked. The other three; Brooke Bond, BOC Kenya and BAT may be regarded as being appropriate for investment. The favourable weather, quality produce and a profitable export market may have accounted for the high return in the tea sector.

In the category of securities regarded as having a relatively high risk-return profile, are Barclays Bank and East African Cables securities ranked fifth and sixth respectively (see Appendix B (iv)). Both are deemed to be good for the risk seekers though good the former may be better than the latter because of its marginally lower risk and higher returns than the former. The large market size enjoyed by the underlying banking and electrical goods companies coupled with a relatively better economic growth then, may explain the good returns. Rising inflation after 1992 elections could have favoured the banks returns' as we indicated in section 5.5. While the high risk may have been associated with fear of collapse of the small banks, and the rising interest rates in the banking sector in the mid 1990s, competition from importers may explain the high risk factor in the Cable security. They too like the above four securities are consistence with the MPT as their relatively high returns are commensurate with their relatively high risks.

The other securities in this category are from the industrial sector. Trade liberalisation and hence increased exports coupled with the creation of export processing zones in the early 1990s may have enabled them to boost production and exports. Underlying company specific factors like good management could also explain high returns. The high risk may also be partly explained by weather, export market price fluctuations as well as foreign exchange fluctuations. Furthermore, the fear of cheap imports occasioned by trade liberalisation (see chapter 3) could have increased the risk of the two industrial securities. Even the breaking up of BOC Kenya and BAT Kenya monopolies through the licensing of other competitors may have added to the risk factor. Part of the risk may also have come the from poor donors relations. The above four securities of the NSE were identified as having high risk-return profiles and thus conform to the MPT that high risk assets should give high returns.

The third category in terms of the risk-return criterion consists of 13 percent of all the NSE securities and was deemed as being the best for risk-averse investors. They included those securities ranked from seventh to fourteenth as indicated on table 6-11 and Appendix B iv. While all the sectors could be preferred by the risk-averse investors, Sasisni Coffee and Tea; and Dunlop Kenya may not because of its high risk. Hence showing inconsistence with MPT. They could, however, be attractive to the risk-seeker investor. The good performance as well as high risk may the same as those that we explained earlier regarding the underlying tea and industrial sectors. Dunlop's risk may have further been aggravated by reduced consumer goods demand if it is taken to be a cyclical stock.

The next group of securities that we labelled as class four in terms of risk-return size, showed low return of 26 to 50 percent. We, however, found that all the 15 assets did not displayed low risk. As such, we eliminated Crown Burger exhibiting a relatively higher risk. It may thus be said to defy the theory that low return assets should also saw low risk Of the remaining securities, Kenya Power and Lighting, East African Packaging, Nation Newspapers and the Diamond Trust are particularly outstanding for their low risks of less than 25 percent. They therefore seem to agree with the concept of MPT that low return assets should also display low risk

We also found that most of the assets on the NSE markets (forty percent) offered very low returns of 1 to 25 percent (see section 5.5). Similarly, most showed equally low risks of 1 to 25 percent. However, Eaagads Ltd and Firestone East Africa were excluded for showing a relatively higher risk of over 30 percent. We also rejected Rea Vipingo, National Bank of Kenya (NBK), TPS Serena and Kenya Hotels for giving very low returns of 2 percent. Vipingo's low returns may be explained from the underlying dwindling opportunities in the sisal market that had collapsed in the 1980s as synthetic fibres gained prominence.

Since the banking industry was doing well as we stated before, the exceptionally low returns offered by National Bank (NBK) may be associated with specific company factors such as management. It is instructive that the government was the majority shareholder at the time. Equally, the low risk may be due to the confidence that the government would always support the bank. The other two (TPS Serena and Kenya Hotels) are in the tourism sector. Political violence since the early 1990s, and poor infrastructure and competition from other African countries may explain the low returns. It is however surprising that the assets turned out not being as risky as may have been expected. This may be due to market related factors such as low trading in the sectors. As we stated in section 5.5, Motor Mart/Lonhro and Hatchings Breimer were particularly appealing for their very low risk of less than 9 percent.

The last category offered zero returns and risk and, therefore, could not be invested. We have indicated that the short period of listing, and problems associated with data processing could possibly explain the dismal performance. Notably affected by these conditions are Kenya Airways whose listing was in 1996 while Theta group lacked data as observed in Appendix B (i.)

Applying a further quantitative input of the modern portfolio theory (return covariance), on the 61 securities of the NSE enabled us to construct and rank 10 portfolios or funds. We noted from table 5-12 that the portfolios with high risk did not necessarily have the highest returns. Unlike the individual securities risk-return profiles, it is not easy to explain the underlying investment environment. This is due to the same reasons that we pointed out earlier including the fact that the many number of securities and diversity in industries make the task prohibitive. According to our findings in section 5.5 (see table 6-11), portfolio 1,3 may be taken as the being the best. Its number seven position in terms of risk reducing potential (low return covariances) means that it is low risk. Its position is further enhanced by the large size of return (976 percent) which is the highest. The good performance may be due to the large numbers of securities and their composition. From Appendix B v, it is clear that about forty percent of the portfolios' 25 securities are from the banking industry, and some of the good performers identified earlier in the industrial and agricultural sector. This could explain the improved

The low risk which shows the power of diversification could, however, not be explained by the relative high risk and moderate risk securities in the portfolio. The other portfolios that were considered to be viable were 1,4; and 2,5, respectively. They displayed the power of diversification envisaged by modern portfolio theory in that fund 1,4 was made up of high risk–return assets and very low return-risk assets. Also, fund 2,5 also is made up of relatively high risk-return securities and zero return and risk free assets on the other hand.

6.3 Recommendations on the choice of assets and portfolios in the two markets

Although Venture capital sector in the JSE is appealing because of its high returns, it is likely that an investment manager would caution potential investors about the high volatility. They may, however, invest in the other three high-risk assets, that is the Gold Rand and Others, the Steel and Allied, and the Building and Construction because they are not as volatile. Beverage, Hotels and Leisure; and Banks and Other Financial Services could be good for the risk-averse investors because they provide their high returns coupled with a low risk. Of the two, however, the former appears to be better because if its lower risk. In the third category, one may recommend Industrial holdings to the risk averse investors, as it appears to have the highest returns and the lowest risk. In the fourth category, or the very low risk-return category, the sector that may be picked is Development capital as it leads in terms of risk-return profile.

Of the sectors with moderate risk-return profiles, high-risk investors may prefer Other Metals and Development stage despite their moderate returns especially if they expect their returns to improve in future. In addition they may assume that the risk-laden Building and Construction sector would eventually become lucrative due to economic recovery. However, risk-averse have three sectors in which they could invest in. These are the, Electronics, Electricity and Battery, Insurance as well as the Financial sectors. Most of them may prefer the latter because it bears the lowest risk.

In the fifth category of the JSE, no sector may be selected because as indicated earlier, they exhibited zero returns during the period under review. However, they may be important for portfolio or fund constructions together with other sectors because of they are risk free. As observed in chapter 5, these sectors may not be beneficial as individual investments in the long-term. For all of them late listing as well as absence of data may be assumed have been responsible for the low return. In the sixth category no investment is recommended because they give negative returns. For this last category that give negative returns, it would not be advisable to invest in any of its sectors, no sectors should be invested. However, both sectors offering zero returns and negative returns are important in portfolio construction because of their risk reducing potential.

Among the portfolios derived from the SA market, we recommended portfolio 1,2; 1,4; and 1,3 with returns 42, 32, and 37 percent. From the three, 1,3 may be the most appealing because it had the most risk reducing potential and relatively high returns as compared to portfolio 1,2. Out of the five portfolios ranked fifth to ninth in terms of risk, 2,4 and 3,4 were considered good for investors as they were deemed to have some risk-reducing capacity. Among the portfolios with lowest risk or highest risk reducing potential, on the JSE, 2,5 is recommended as it emerged with the highest return of 15 percent.

The Kenyan market was also first categorised on risk-return basis of individual securities. On the first category of the NSE securities that are regarded as the high risk-return securities, it is only Limuru Tea that may not be acceptable because of its extreme risk relative to the others.

The other three identified in section 6.2 may appeal to risk seeking investors. Both securities (see table 5-11) in the second class that are classified as relatively high-risk return may be invested in. Though Sasini Coffee and Tea; and Dunlop Kenya were fitted in the third category of relatively high return securities, their exceptionally high risk led to their exclusion from the class of the best assets for risk avoiding investors. Although all the others are almost equally good, Kenya Commercial Bank was notable for having the lowest risk.

Out of the four assets identified in section 6.2 as outstanding in the low risk-return category, Diamond Trust lead the pack for its very low risk of 12 percent. In the very low return risk category, Motor Mart Group was viewed as being the most appropriate for having the highest returns and very low risk of 8 percent.

From the 10 portfolios or funds we constructed from the NSE stocks, the portfolio 1,3 was regarded as being the most appealing not only because of its low risk but also because of the high returns it was offering. As we have stated, its large number of securities and the diversification of the different sectors could explain the good performance. From section 5.5 and 6.2 we rejected portfolio 1,2 despite its high returns because of its inability to reduce risk which may serve to indicate that securities with high risks as these ones do not benefit from diversification.

6.4 Conclusions

In the study of investment management in Kenya and SA, the theory and practice has been encountered. In our study, SA emerges as a market with well developed funds industry such as mutual, closed-ends and index funds. These types of funds (mutual, closed-end etc) depend to some extent on the objectives of the investors. In Kenya we found that the investment management underdevelopment has more to do with the late establishment (year 1999) of the enabling Act. One of the basic but central objective of investing is size of the return size. Some of the fundamentals surrounding the security and fund returns size in SA and Kenya and which in turn influence investment decisions are their respective stock markets. The risk and return may be influenced by many factors such as influence of the business and market cycles on cyclical, defensive and growth stock and underlying companies and industries.

Other factors may appear peripheral but may influence the decisions making in investment management. In chapter 3, we highlighted some of these changes in the stock markets due to changes in the information technology. They were observed to have increased investors' awareness and had led to proliferation of many funds. An explicit impact on the stock market has been the reduced trading and settlement cycles for example by JSE to t + 5 after trade. These have had implications on investment returns in the sense that it's cut down on transaction costs. As we have observed in chapter 4, other stock market factors that may determine return and risk are low trading or illiquidity and shallow markets.

Behind the securities and fund selection are various theories. Though evidence in chapter 4 showed that most managers use traditional methods especially the fundamental analysis in decision-making, the orthodox financial theories were theoretically appealing because of incorporating risk. Moreover, the theories offer quantitative tools of measurement of risk. Modern portfolio theory is crucial because of its emphasis on measuring total returns, risk and correlation of returns between different assets as we discussed in chapter 2. With the application of MPT we obtained the returns and risk of individual sectors and securities of the JSE and NSE and ranked them by their risk-return profiles. By ranking them, we were able to ascertain their viability. The theory has also enabled us to construct and rank portfolios or funds and thus make informed investment decisions as we did in chapter 5.

By individual sector's risk-return classification only a few sectors were found to have very high-risk return profiles on the JSE. Similarly, few securities on the NSE were also found to have high-risk return profiles. Most of the JSE sectors were found to have low risk-return profiles. On the NSE, most of them were found to be very low risk return profiles. Furthermore, we were able to suggest portfolios that could be either invested in or rejected altogether. For example we cited portfolio 1,4 and 3,4 as being the most appealing for the JSE and NSE respectively. However, these were mainly based on quantitative data and therefore, we require an in-depth evaluation of the underlying investment environment as depicted by economic, political, behavioural, weather and global factors.

The global oil prices for example could explain volatility on the JSE and the NSE stocks. The effect on the stock prices thus affects the ultimate returns and hence the behaviour of investment managers as observed in chapter 3. The political landscape on the other hand in the 1990s, and the relatively stable and growing economy had an important bearing on returns and risk of stock and funds in SA (Bhana, 1992; 32). In Kenyan markets, good weather, mixed economic and political shifts factors contributed to the risk-return profiles of securities and funds returns (Economic Survey, 1999:87). In addition we observed that specific-sectors or security factors such as the concentration of companies, transaction

costs, and the underlying companies fundamental like earnings are also influential. Moreover the behaviour of the investors and other markets participants also affects returns. As we discussed in chapter 4, the 1997 Asian markets meltdown partially contributed to the decline of the JSE markets in 1998. In Kenya, we observed trading in only a few stocks, speculative trading and insider trading filters down to affect return and risks of the assets and funds.

The broad coverage of the study produced various findings. The identified sectors (securities) and funds in both markets produced spin-offs that could form the basis of future study. The identified categories of sectors or securities profiles and funds that have now been identified could be now be picked and compared. Finally, the investment management analysis for the SA and Kenyan markets is evident from quantitatively derived risk-return profiles of sectors and funds and their ranking. The application of the underlying environment of investment to identified sectors and portfolios or fund complemented the quantitative results to enable one to make the requisite investment decision.

6.5 The limitations of the research

Finally, the limited time of the study and insufficient financial resources inhibited the study from visiting and seeking more clarification from the NSE and JSE markets and selected industries. For these reasons, we could not include the comments on the analysis from the practitioners on the constructed securities and portfolios profiles. The lack of resources further curtailed our efforts to obtain complete data for the two markets. This forced us to cut the period of study from 10 to 7 years.

6.6 Suggestions for further research

In section 6.2 and 6.3, three sectors were found to be good for the high-risk investors on the SA market. Similarly three sectors were recommended for the risk averse investors on the JSE market. In the Kenyan market, five securities and six securities were observed to be good for risk-seekers and risk-averse investors respectively. It is suggested that a regression analysis using year-by-year returns should be made to establish the respective

sectors and securities betas and thus the individual sector relationship with their entire market. This may be used predict to future returns and risks. By using regression analysis to this historical data to predict the future outcome of any of these sectors or securities will facilitate better understanding of the sectors. Moreover, the prediction may guide investors in the decision making process regarding the targeted sector.

Portfolio 2,5 on the SA market and 1,3 on the Kenyan market were identified as the most ideal. It is suggested that the same portfolios be constructed for a shorter period preferably 3 years and then on longer period, say 10 years. The objective will be to further test portfolios for consistency in their performance. It will also assist in establishing the movement of sectors or securities in relation to one another over time. With smaller portfolios, it may be possible to compare the portfolio on SA with the Kenyan one by adjusting other factors like inflation rates in the two countries for the seven-year period.

Further research on the sectors, securities and portfolios identified for investment in both markets need to be done using a different weight (other than the one used in the study of weight by numbers). This may be based on the market capitalization and liquidity in the South African market. The results could provide more understanding of their profiles and hence the decision making.

APPENDIX A (i): COMPUTATION OF JOHANNESBURG STOCK EXCHANGE SECTORS TOTAL RETURNS FOR THE PERIOD 1990 TO 1996

	1990				
SECTORS	Index prices[1]		Capital income[2]	Dividend[3]	Total returns[2]
All share	3194	2720	-14.84032561	3.816	-11.02432561
Mining producers	3403	2465	-27.56391419	3.9	-23.66391419
All Gold	2184	1201	-45.00915751	4.417	-40.59215751
Metals and Minerals	2273	1823	-19.79762429	5.067	-14.73062429
Mining Financial	4660	3329	-28.56223176	2.942	-25.62023176
Financial and Industrial	3249	3382	4.093567251	3.892	7.985567251
Financial	1804	1942	7.649667406	4.767	12.41666741
Industrial	2923	3018	3.250085529	3.642	6.892085529
Coal	2235	2673	19.59731544	4.475	24.07231544
Diamonds	11669	12003	2.862284686	0.558	6.420284686
Gold Rand and other	736	352	-52.17391304	4.708	-47.46591304
Gold Evender	2148	1233	-42.59776536	4.708	-37.88976536
GOLD Klerksdorp	6837	3224	-52.84481498	4.783	-48.06181498
Gold O.F.S	1222	642	-47.46317512	4.742	-42.72117512
Gold West Wits	2932	1862	-36.49386085	3.292	-33.20186085
Curtailed operations	0	0	0	0	0
Copper	601	707	17.63727121	12.608	30.24527121
Manganese	2531	3333	31.68708021	4.475	36.16208021
Platinum	5859	3920	-33.09438471	4.117	-28.97738471
Tin	74	36	-51.35135135	2.642	-48.70935135
Other Metals	133.2	85	-36.18618619	7.583	-28.60318619
Mining houses	4953	3528	-28.77044216	2.95	-25.82044216
Mining Holdings	1320	953	-27.8030303	2.933	-24.8700303
Exploration			-	0	-
Banks and other financial s	1619	1782	10.06794317	4.467	14.53494317
Insurance	1369	1590	16.1431702	3.192	19.3351702
Investment trusts	1755	1801	2.621082621	2.742	5.363082621
Redevelopment	-	-	-	0	-
Property	379	333	-12.13720317	7.567	-4.570203166
Property Trusts	170	152	-10.58823529	10.367	-0.221235294
Property Loan Stock	395.9	402.3	1.616569841	11.5	13.11656984
Industrial Holdings	3017	2975	-1.392111369	2.275	0.882888631
Beverage, Hotels S Leisure	5442	6680	22.74898934	3.017	25.76598934
Building and Construction	1904	1973	3.62394958	5.5	9.12394958
Chemicals and Oils	927	946	2.049622438	4.392	6.441622438
Clothing, footwear and text	900	672	-25.33333333	6.85	-18.48333333
Development stage	-	-	-	0	-
Electronics, Electrical and I	940	825	-12.23404255	4.558	-7.676042553
Engineering	1007	1010	0.297914598	5.017	5.314914598
Food	3658	3968	8.474576271	2.6	11.07457627
Furniture and Household g	322	454	40.99378882	7.6	48.59378882
Media	-	-	-	0	-
Motor	2442	2303	-5.692055692	5.508	-0.184055692
Packaging and printing	-	-	-	4.533	-
Paper and Packaging	4483	4172	-6.93731876	4.533	-2.40431876
Paper	-	-	-	0	-
Pharmaceuticals and Medic	682	623	-8.651026393	3.383	-5.268026393
Printing and Publishing	3224	4076	26.42679901	5.192	31.61879901
Steel and Allied	1076	829	-22.95539033	7.525	-15.43039033
Sugar	2645	2093	-20.86956522	4.908	-15.96156522
Stores	2413	3122	29.3825114	3.208	32.5905114
Transportation	7942	12366	55.70385293	2.858	58.56185293
Development capital	-	-	-	0	-
Venture capital market	-	-	-	0	-
Healthcare			-		-
Information technology			-		-
Retail			-		-
Telecommunications			-		-
Services					
Source data: JSE Actuaries 1990-1996			-		-

2. Capital income and total returns are own computation

3. Capital Income , dividends and total returns are in percentage form

APPENDIX A (i): COMPUTATION OF JOHANNESBURG STOCK EXCHANGE SECTORS TOTAL RETURNS FOR THE PERIOD 1990-1996

			1991		
SECTORS	Price index		Capital incor	Dividend income	Total returns
All share	2555.5	3440.3	34.6234	3.516	38.139361
Mining producers	2279.4	2765.9	21.3433	4.275	25.618336
All Gold	1088	1130.7	3.92463	4.417	8.341632
Metals and Minerals	1625.6	1936.2	19.1068	5.383	24.489791
Mining Financial	3051.2	3982.8	30.5322	3.216	33.748250
Financial and Industrial	3238.2	4645	43.4439	3.208	46.651889
Financial	1881.1	2605.5	38.5094	4.342	42.851383
Industrial	2881.6	4169.6	44.6974	3.708	48.405390
Coal	2562.2	3655.3	42.6626	4.125	46.787556
Diamonds	11624.1	16399.9	41.0853	6.45	47.535331
Gold Rand and other	301.7	319.8	5.99934	5.525	11.524337
Gold Evender	1065	903.4	-15.174	5.883	-9.290709
GOLD Klerksdorp	3001.1	2735.9	-8.8368	5.017	-3.819760
Gold O.F.S	593.2	606	2.15779	4.65	6.807788
Gold West Wits	1665.4	1902.7	14.2488	3.683	17.931829
Curtailed operations	0	0	0	0	0.000000
Copper	640.3	828.1	29.33	11.05	40.380002
Manganese	3094	4219.2	36.3672	3.967	40.334162
Platinum	3421.4	3872.7	13.1905	5.008	18.198507
Tin	34.9	31	-11.175	0	-11.174785
Other Metals	80	47	-41.25	7.642	-33.608000
Mining houses	3245.7	4500.1	38.6481	3.1	41.748057
Mining Holdings	865	950.4	9.87283	3.567	13.439832
Exploration			-	0	-
Banks and other financial services	1692.7	2652.8	56.72	3.892	60.612033
Insurance	1567.5	2361.7	50.6667	2.808	53.474667
Investment trusts	1718.9	1624.4	-5.4977	3.608	-1.889702
Redevelopment			-	0	-
Property	337.6	418.1	23.8448	5.367	29.211787
Property Trusts	148.4	162.8	9.7035	10.45	20.153504
Property Loan Stock	399.3	431.5	8.06411	11.108	19.172112
Industrial Holdings	2815.8	4257.6	51.2039	2.317	53.520921
Beverage, Hotels & Leisure	6403.4	9373.9	46.3894	2.475	48.864418
Building and Construction	1958.8	2885.8	47.3249	4.27	51.594893
Chemicals and Oils	865.6	1187.8	37.2227	4.167	41.389736
Clothing, footwear and textiles	622.3	569.8	-8.4364	5.52	-2.916445
Development stage			-		-
Electronics, Electrical and Battery	769.8	959.6	24.6558	4.175	28.830755
Engineering	964.7	1432.5	48.4918	3.992	52.483759
Food	3681.3	5324.4	44.6337	1.958	46.591689
Furniture and Household goods	442.6	357.3	-19.272	6.017	-13.255481
Media			-	0	-
Motor	2329.7	4012.9	72.2496	3.542	75.791646
Packaging and printing			-	3.683	81.189495
Paper and Packaging	3950.8	5697.3	44.2062	3.683	47.889237
Paper			-	0	-
Pharmaceuticals and Medical	620	101.5	-83.629	2.317	-81.312032
Printing and Publishing	4189.8	9671.8	130.842	3.692	134.533568
Steel and Allied	813.3	873.2	7.36506	6.533	13.898056
Sugar	1987.9	3064.1	54.1375	4.45	58.587532
Stores	3099.9	4077.3	31.53	2.242	33.772049
Transportation	12342.6	22104.3	79.0895	2.1	81.189495
Development capital	-	-	-	0	-
Venture capital market	-	-	-		-
Healthcare	-	-	-		-
Information technology	-	-	-		-
Retail	-	-	-		-
Telecommunications	-	-	-		-
Services	-	-	-		-

1. Source data: JSE-Actuaries 1990-1996
2. Capital income and total returns are own computation
3. Capital income , dividends and total returns are in percentage form

APPENDIX A (i): COMPUTATION OF JOHANNESBURG STOCK EXCHANGE SECTORS TOTAL RETURNS FOR THE PERIOD 1990 TO 1996

SECTORS	Price	index	1992 Capital income	Dividend income	Total returns
All share	3442.8	5893	71.16881608	3.392	74.58081808
Mining producers	2912.4	2009.6	-30.99848922	4.775	-26.22348922
All Gold	1246.1	798.8	-35.89599551	5291	5255.104004
Metals and Minerals	1922.4	1895.4	-1.404494382	4.6	3.195505618
Mining Financial	4068.3	3315.7	-18.4991274	3.483	-15.0161274
Financial and Industrial	4899.2	5036	2.792292619	2.883	5.675292619
Financial	2738.4	3191	16.5278995	3.85	20.3778995
Industrial	4401.9	5572.8	26.59987733	2.592	29.19187733
Coal	3851.2	2093.7	-45.63512671	5.183	-40.45212671
Diamonds	17075.7	10362.6	-39.31378188	4.458	-34.85576188
Gold Rand and other	349.6	218.5	-37.5	8.5	-31
Gold Evender	901.2	598.5	-33.5885488	5.05	-28.5385486
GOLD Klerksdorp	3094.8	174	-43.51815949	6.675	-36.84315949
Gold O.F.S	668.3	428.8	-35.84480463	8.7	-27.14480463
Gold West Wits	2091	1419.7	-32.10425634	4.108	-27.99625634
Curtailed operations	0	0	0	0	0
Copper	783.9	734.2	-6.3400944	10.758	4.4179056
Manganese	4359.8	3305	-24.19377038	3.533	-20.88077036
Platinum	3785.3	5335.6	40.95580271	4.0833	45.03910271
Tin	19.2	11.7	-39.0625	0	-39.0625
Other Metals	55.6	18.2	-67.28618705	9.575	-57.69118705
Mining houses	4555.7	3498.9	-23.19731326	3.342	-19.85531326
Mining Holdings	998.2	965.3	-3.295932679	4.107	0.811067321
Exploration	-	-3012.4		0	
Banks and other financial service	2888.3	3012.4	5.097163591	3.133	8.230163591
Insurance	2477.1	3571.1	44.16454725	2.508	46.67254725
Investment trusts	1635.6	1796.8	9.855710443	3.175	13.03071044
Rredevelopment	-			0	
Property	414	343.6	-17.00483092	8.292	-8.712830918
Property Trusts	164	155.7	-5.06097561	11.017	5.95602439
Propert Loan Stock	419.5	363.7	-13.30154946	12.542	-0.759549484
Industrial Holdings	4626.7	4522.5	-2.252145157	2.033	-0.219145157
Beverage,Hotels & Leisure	9880.6	9586.3	-0.769103688	2.442	1.672896632
Building and Construction	3045.8	2478.6	-18.62236522	3.975	-14.84736522
Chemicals and Oils	1263.3	1177.8	3.73	3.73	7.46
Clothing, footware and textiles	609.9	378.3	-37.97343827	5.458	-32.51543827
Development stage	-			-	
Electronics,Electrical and Battery	1029.4	1299.3	26.21915679	3.75	29.96915679
Engineering	1683.3	1618.8	-3.831759045	3.275	-0.556759045
Food	5705.3	6439.5	12.86873609	1.608	14.47873809
Furniture and Household goods	359	301.3	-16.0724234	5.842	-10.2304234
Media	-			-	
Motor	4549.9	3138.2	-31.02705554	3.192	-27.83505554
Packaging and printing	-			3.575 -	
Paper and Packaging	`5878.8	5859.7	-0.29097468	3.575	3.28402532
Paper	-			0 -	
Phamaroeuticals and Medical	1087.5	1482.8	36.34942529	2.167	38.51642529
Printing and Publishing	10099.4	9935.1	-1.626829317	2.333	0.706170683
Steel and Alllied	832.5	341.5	-58.97897898	6.75	-52.22897898
Sugar	3325.6	2624.1	-21.09393794	7.6	-13.49393794
Stores	4188.8	4380.7	4.586257938	2.5	7.086257938
Transportation	25699.3	40221.9	56.50971038	1.45	57.95971038
Development capital	-	-		-	-
Venture capital market	-	-		-	-
Healthcare	-	-		-	-
Information technology	-	-		-	-
Retail	-	-		-	-
Telecommunucations	-	-		-	-
Services	-	-		-	-

1. Source data: JSE-Actuaries 1990-1996
2. Capital income and total returns are own computation
3. Capital Income , dividends and total returns are in percentage form

APPENDIX A (i): COMPUTATION OF JOHANNESBURG STOCK EXCHANGE SECTORS
TOTAL RETURNS FOR THE PERIOD 1990 TO 1996

			1993		
SECTORS	Price Index		Capital income	Dividend income	Total return
All share	4754.6	5888.9	23.39418668	3	26.394187
Mining producers	2178.6	3869.5	77.61406408	3.675	81.289064
All Gold	903.7	2164.2	139.482129	3.808	143.29013
Metals and Minerals	1772.1	2308.1	30.13373963	3.6	33.73374
Mining Financial	3534.7	6281.6	77.71239426	3.025	80.737394
Financial and Industrial	5242.7	6422.1	22.49604212	2.75	25.246042
Financial	388.2	4037.4	19.93939754	3.5	23.439398
Industrial	5536.1	6984.4	26.16101588	2.475	28.636016
Coal	2210.2	3082.2	39.45344313	5.6	45.053443
Diamonds	12047.6	18652.6	54.82419735	3.391	58.215197
Gold Rand and other	227.9	764.7	235.5419043	4.867	240.4089
Gold Evender	586.9	1722.2	193.440109	4.008	197.44811
GOLD Klerksdorp	2039.4	5957.9	192.1398451	4.283	196.42285
Gold O.F.S	521.7	1299	148.9936745	4.7	153.69367
Gold West Wits	1570	311.9	-80.13375796	3.075	-77.05876
Curtailed operations		0	0	0	0
Copper	839.1	662.5	-21.04635919	10.317	-10.72936
Manganese	2812.8	4113.7	46.24928896	2.9	49.149289
Platinum	4034.1	5429.5	34.59011923	2.775	37.365119
Tin	14	15.7	12.14285714	0	12.142857
Other Metals	21.6	31.9	47.68518519	4.75	52.435185
Mining houses	3777.4	6947.5	83.92280405	3.208	87.130804
Mining Holdings	993.7	1629.8	64.01328369	3.183	67.196284
Exploration			-		-
Banks and other financial services	3169.3	4142.9	30.71971729	2.892	33.611717
Insurance	3900.9	4345	11.38455228	2.308	13.892552
Investment trusts	1732.4	2301.1	32.82729162	2.208	35.035292
Redevelopment			-	0	-
Property	340.2	381.3	12.08112875	13.108	25.189129
Property Trusts	154	155	0.649350649	11.958	12.607351
Property Loan Stock	362.9	375.6	3.499586883	13.1	16.599587
Industrial Holdings	4616.2	5481	18.73402366	2.017	20.751024
Beverage, Hotels & Leisure	9468.8	14496.6	53.0985975	2.475	55.573598
Building and Construction	2643.3	4854.9	83.6681421	4.117	87.785142
Chemicals and Oils	1322.9	1168.8	-11.64865069	4.092	-7.558851
Clothing, footwear and textiles	370.2	591.7	59.83252296	6.4	66.232523
Development stage			-		-
Electronics, Electrical and Battery	1408.5	1599.3	13.54632588	3	16.288326
Engineering	1641.6	2099	27.86306043	3.45	31.31306
Food -	6692.2	7907.2	18.15546457	1.742	19.897465
Furniture and Household goods	363.9	746.7	105.1937345	3.917	109.11073
Media	0		-		-
Motor	3357.9	3292.4	-1.950623902	2.667	0.7163761
Packaging and printing			-	3.35	-
Paper and Packaging	5880.8	6237.5	6.065501292	3.35	9.4155013
Paper			-	0	-
Pharmaceuticals and Medical	1677	1897.8	13.16636852	1.75	14.916369
Printing and Publishing	9862.2	10785.8	9.365050394	2.333	11.69805
Steel and Allied	395	1082.8	169.0632911	4.25	173.31329
Sugar	2550.8	2896.1	13.54583235	4.357	17.902832
Stores	5008.1	6775.1	35.2828418	2.325	37.607842
Transportation	40221.9	38994.4	-	1.475	-
Development capital	-	-	-	-	-
Venture capital market	-		-		-
Healthcare	-		-		-
Information technology	-		-		-
Retail	-		-		-
Telecommunications	-		-		-
Services	-		-		-

1. Source data: JSE-Actuaries 1990-1996
2. Capital Income and total returns are own computation
3. Capital Income, dividends and total returns are in percentage form

APPENDIX A (i): COMPUTATION OF JOHANNESBURG STOCK EXCHANGE SECTORS TOTAL RETURNS FOR THE PERIOD 1990 TO 1996

			1994		
SECTORS	Price index	Price index	Capital income	Dividend income	Total returns
All share	5054	6228.4	23.23460161	2.25	25.48460161
Mining producers	3633	4238.3	16.66758423	3.06	19.72758423
All Gold	1939	2023.3	4.374516379	3.942	8.318516379
Metals and Minerals	2215	3649.9	64.78103837	2.158	66.93903837
Mining Financial	5866	7272.9	23.99031659	1.85	25.84031659
Financial and Industrial	6420	8067.8	25.67058164	2.075	27.74558164
Financial	4116	5107.5	24.08590656	2.975	27.06090656
Industrial	8599	7921.6	-7.877660193	1.775	-6.102660193
Coal	3154	7914.9	150.9320905	2.767	153.6990905
Diamonds	18310	17030.7	-6.987908379	2.817	-4.170908379
Gold Rand and other	661.2	766.3	15.8953418	5.833	21.7283418
Gold Evender	1518	1438.3	-5.250329381	4.508	-0.742329381
GOLD Klerksdorp	5568	4869.6	-12.54624475	4.067	-8.479244747
Gold O.F.S	851.2	702.1	-17.51644737	4.733	-12.78344737
Gold West Wits	2832	3295.6	16.37416575	3.208	19.58216575
Curtailed operations	0		0	0	0
Copper	717.7	872.2	21.52710046	8.475	30.00210046
Manganese	4219	8016.4	89.99810391	1.808	91.80610391
Platinum	4983	7816	56.85330122	1.725	68.57830122
Tin	0	0		0	
Other Metals	34.6	105.1	203.7572254	5.092	208.8492254
Mining houses	6288	8384.2	33.32803257	1.667	134.9950326
Mining Holdings	1652	1720.2	4.159854678	2.333	6.492854678
Exploration	0	0			
Banks and other financial services	4142	5396.6	30.29600657	2.675	32.97100657
Insurance	4429	5764.1	30.14744067	2.05	32.19744067
Investment trusts	2684	2974.9	10.84656085	2.1	12.94656085
Redevelopment				0	
Property	387.9	537.7	38.61820057	6.042	44.66020057
Property Trusts	163.2	153.7	-5.821078431	10.025	4.203921569
Property Loan Stock	382.1	411.4	7.668149699	10.95	18.6181497
Industrial Holdings	5620	6262.4	11.42862227	1.467	12.89562227
Beverage, Hotels & Leisure	13441	15645.6	16.40291945	1.833	18.23591945
Building and Construction	4373	7906	80.81189251	2.667	83.47889251
Chemicals and Oils	1159	1820.7	57.05166911	3.592	60.64366911
Clothing, footwear and textiles	700.5	1224.9	74.8608137	3.225	78.0858137
Development stage					
Electronics, Electrical and Battery	1479	1862.4	25.8973839	2.108	28.0053839
Engineering				2.442	
Food				1.85	
Furniture and Household goods	744.2	1170.8	57.32330019	2.142	59.46530019
Media				0	
Motor	3517	3682.4	4.702871766	2.417	7.119871766
Packaging and printing				1.242	
Paper and Packaging	6555	10760.4	64.15310216	1.242	65.39510216
Paper				0	
Pharmaceuticals and Medical	1790	2235.8	24.90502793	1.925	26.83002793
Printing and Publishing				2.333	
Steel and Allied	1060	2168.7	104.5557442	1	105.5557442
Sugar				0	0
Stores	6916	9474.7	37.00078082	1.342	38.34278082
Transportation	39675	41910.8	5.634487956	1.567	7.201487956
Development capital	-	-	-	-	-
Venture capital market	-	-	-	-	-
Healthcare	-	-	-	-	-
Information technology	-	-	-	-	-
Retail	-	-	-	-	-
Telecommunications	-	-	-	-	-
Services	-	-	-	-	-

1. Source data: JSE-Actuaries 1990-1996
2. Capital Income and total returns are own computation

3. Capital income, dividends and total returns are in percentage form

APPENDIX A (i): COMPUTATION OF JOHANNESBURG STOCK EXCHANGE SECTORS TOTAL RETURNS FOR THE PERIOD 1990-1996

		1995			
SECTORS	Price index		Capital income	Dividend income	Total returns
All share	6870.9	6657.5	-3.105852217	2.45	-0.655852217
Mining producers	3438.8	3370.3	-1.991973944	3.48	1.488026056
All Gold	1507	1343.5	-10.84936961	4.6	-6.249369608
Metals and Minerals	2912.6	2369.9	-18.63283664	2.75	-15.88283664
Mining Financial	6007.4	6860.6	14.2024836	2.208	16.4104836
Financial and Industrial	5185	9565.7	84.487946	2.233	86.720946
Financial	4547	6783.3	49.18187816	2.925	52.10687816
Industrial	8599	7921.6	-7.877880193	2.042	-5.835880193
Coal	7522.8	6898	-8.305418195	2.433	-5.872418195
Diamonds	14958	19798.5	32.35972483	3.175	35.53472483
Gold Rand and other	523	414.8	-20.68833652	7.31	-13.37833652
Gold Evender	1146	697.1	-39.17102967	8.375	-30.79602967
GOLD Klerksdorp	3772	2897.8	-23.17603393	4	-19.17603393
Gold O.F.S	851.2	702.1	-17.51644737	4.625	-12.89144737
Gold West Wits	2394.9	244.4	-89.794981	4.342	-85.452981
Curtailed operations	95.9	78.9	-	7.378	-
Copper	839.1	592.5	-29.38863068	13.375	-16.01363068
Manganese	6856.1	6427	-6.258880171	1.65	-4.608660171
Platinum	5826.2	475.6	-91.83687481	2.3	-89.53687481
Tin	0	0	-		-
Other Metals	93.8	60.5	-35.5010881	3.075	-32.4260661
Mining houses	6841.7	7984.4	16.70198927	2.058	18.75998927
Mining Holdings	1470	1503.6	2.285714286	3.342	5.627714288
Exploration			-		-
Banks and other financial services	4758.3	8022.3	68.59592712	2.342	70.93792712
Insurance	5088.8	7375.3	44.93200755	2.408	47.34000755
Investment trusts	2683.8	2974.9	10.84656085	2.275	13.12156085
Redevelopment			-	0.4	-
Property	531.7	545.3	2.557833365	5.042	7.599833365
Property Trusts	150.6	153.4	1.859229748	11.217	13.07622975
Property Loan Stock	394.2	388.5	-1.445988514	11.575	10.12903349
Industrial Holdings	5620.1	6262.4	11.42862227	1.83	13.25862227
Beverage, Hotels & Leisure	13884	20624.4	48.55010876	2.175	50.72510876
Building and Construction	7307.9	9272.7	26.88597271	2.317	29.20297271
Chemicals and Oils	1563.3	1513.8	-3.188378814	3.167	0.000621186
Clothing, footwear and textiles	1172.3	1317.2	12.36031732	3.475	15.83531732
Development stage			-		-
Electronics, Electrical and Battery	1706.2	2795.1	63.82018521	1.916	65.73618521
Engineering			-	2.275	-
Food			-	2.087	-
Furniture and Household goods	1099.4	1419	29.07040204	2.383	31.45340204
Media			-	0.987	-
Motor	3648.7	4828.4	32.33206347	2.625	34.95706347
Packaging and printing			-	1.667	-
Paper and Packaging	9751	10956.7	12.36488565	1.667	14.03188565
Paper			-	0	-
Pharmaceuticals and Medical	2100.4	2.283	-99.89130642	2.283	-97.60830642
Printing and Publishing			-	1.175	-
Steel and Allied	1958.9	1506.5	-23.0945939	2.2	-20.8945939
Sugar			-	0	-
Stores	8184.2	10317	26.05996921	1.775	27.83496921
Transportation	39675	41910.8	5.634487956	1.867	7.501487956
Development capital	-	134.6	-	1.59	-
Venture capital market	89.3	63.7	-	1.1	-
Healthcare			-		-
Information technology			-		-
Retail			-		-
Telecommunications					-
Services			-		-

1. Source data: JSE-Actuaries 1990-1996
2. Capital Income and total returns are own computation
3. Capital income, dividends and total returns are in percentage form

APPENDIX A (i): COMPUTATION OF JOHANNESBURG STOCK EXCHANGE SECTORS TOTAL RETURNS FOR THE PERIOD 1990-1996

			1996		
SECTORS	Price	index	Capital income	Dividend income	Total returns
All share	6251	6658	6.510958247	2.275	8.785958247
Mining producers	3377	3980	17.85608528	3.06	20.91608528
All Gold	6932	8039	15.9694172	2.733	18.7024172
Metals and Minerals	2373	2578	8.638853772	3.608	12.24685377
Mining Financial	6932	8039	15.9694172	-	-
Financial and Industrial	9589	9754.4	1.724893107	2.208	3.932893107
Financial	6796	7567	11.34490877	2.533	13.87790877
Industrial	8009	7922	-1.086277937	2.1	1.013722063
Coal	7726	1025.6	-86.725343	3.2	-83.525343
Diamonds	22266.4	24306.3	9.161337262	2.567	11.72833726
Gold Rand and other	521.6	463.2	-11.19631902	4.475	-6.721319018
Gold Evender	697	-	-	1.682	-
GOLD Klerksdorp	4308.3	3604.2	-16.34287306	3.15	-13.19287306
Gold O.F.S	843.9	749.1	-11.23355848	2.333	-8.900558478
Gold West Wits	2953.9	2700.2	-8.588645519	2.475	-6.113645519
Curtailed operations	80	135	68.75	23.616	92.366
Copper	657.7	945.4	43.74334803	15.417	59.16034803
Manganese	7169.9	7633.6	6.467314746	2.492	8.959314746
Platinum	5222.2	4321.9	-17.2398606	2.808	-14.4318606
Tin	0	0	-	0	-
Other Metals	65.5	67.8	3.511450382	3.025	6.536450382
Mining houses	9181.6	9229.6	0.5227847	1.975	2.4977847
Mining Holdings	1763.7	1771.9	0.464931678	2.292	2.756931678
Exploration	87	172	97.70114943		97.70114943
Banks and other financial services	8331.4	8522.1	2.288931032	2.025	4.313931032
Insurance	8221.8	8480.6	3.147729208	2.108	5.255729208
Investment trusts	2654.5	3199	20.51233754	2.583	23.09533754
Redevelopment	100	105	5	0.39	5.39
Property	595.1	509	-14.46815661	4.483	-9.985156612
Property Trusts	154.3	120.8	-21.71095269	13.125	-8.58595269
Property Loan Stock	383.9	304.5	-20.68246939	13.567	-7.115469393
Industrial Holdings	5500.8	7450.9	35.4512071	1.867	37.3182071
Beverage, Hotels & Leisure	13883.8	20624.4	48.55010876	2.267	50.81710876
Building and Construction	9894.4	5999.4	-39.36570181	2.758	-36.60770181
Chemicals and Oils	1660.7	2226.7	34.08201361	2.55	36.63201361
Clothing, footwear and textiles	1503.2	911.7 '	-39.34938797	4.383	-34.96638797
Development stage	-	200	-		-
Electronics, Electrical and Battery	3031.1	3907.3	28.90699746	1.417	30.32399746
Engineering	2764	2383	-13.78437048	2.375	-11.40937048
Food	8518	8232	-3.35759568	2.183	-1.17459568
Furniture and Household goods	1569.5	1357.2	-13.52660083	2.408	-11.11860083
Media	8323	7943	-4.56566142	-	-
Motor	55513.3	4158.4	-92.50918248	2.883	-89.62618248
Packaging and printing	9365.1	10083.6	-	2.567	-
Paper and Packaging	11013	-	-	2.567	-
Paper	9515	8687.6	-	4.03	-
Pharmaceuticals and Medical	2801.5	3054.6	9.034445833	1.708	10.74244583
Printing and Publishing			-	0.867	-
Steel and Allied	1548.6	1526.1	-1.452925223	4.092	2.639074777
Sugar			-	0	-
Stores	10933.1	7749.7	-29.11706482	1.908	-27.20908482
Transportation	38443.2	51680.3	34.4328776	1.842	36.2748776
Development capital	124.2	207	66.66666667	1.292	67.95866667
Venture capital market	80.3	981	1121.668742	0.3	1121.968742
Healthcare	-	-	-	-	-
Information technology	-	-	-	-	-
Retail	-	-	-	-	-
Telecommunications	-	-	-	-	-
Services	-	-	-	-	-

1. Source data: JSE-Actuaries 1990-1996
2. Capital Income and total returns are own computation
3. Capital Income, dividends and total returns are in percentage form

Appendix A(ii): THE JSE SECTORS COMPUTED RETURNS AND STANDARD DEVIATIONS FOR THE PERIOD 1990 TO 1996

	Annual total returns in percentages								Computed statistics					
	1990	1991	1992	1993	1994	1995	1996	Total returns	Maximum	Minimum	Range	Arithmetic Mean	Geometric mean	Deviation
Sectors														
Venture capital market	0	0	0	0	0	-27.56741	1121.969	1094.40133	-27.56741	1121.9687	1149.5362	156.343047	0	425.9248334
Gold Rand and other	4.708	11.5243	-31	240.4089	21.7283	-13.37834	15.2884	249.279644	-31	240.4089	271.4089	35.61137769	20.99323317	92.12316137
steel and Allied	7.525	13.8981	-52.229	173.3133	105.556	-20.89459	2.639075	229.807593	52.22898	173.31329	225.54227	32.82965617	24.63745953	78.58774751
Beverage, Hotels & Leisure	3.017	48.8644	1.6729	55.5736	18.2359	50.72511	50.81711	228.906049	1.672897	55.573597	57.246494	32.70086417	18.13167967	24.11982347
Banks and other financial services	4.467	60.612	8.23016	33.61172	32.971	70.93793	4.313931	215.143779	4.313931	70.937927	75251858	30.73482553	18.5496978	27.13158078
Building and Construction	5.5	51.5949	-14.647	87.78514	83.4789	29.20297	-36.6077	206.306833	36.6077	87.785142	124.39284	29.47240473	31.75543159	47.77440721
Electronics, Electrical and Battery	4.558	28.8308	29.9692	16.28833	28.0054	65.73619	30.324	203.711804	4.558	65.736185	70.294185	29.10168628	23.16642995	18.76247623
Insurance	3.192	53.4747	46.6725	13.69255	32.1974	47.34001	5.255729	201.824944	3.192	53.474667	56.666667	28.8321348	18.93862763	21.2989503
Development stage	0	0	0	0	0	0	200	200	0	200	200	28.57142857	0	75.5928946
Financial and Industrial	3.892	46.6949	5.67529	25.24604	27.7456	86.72095	3.932893	199.864644	3.892	86.720946	90.612946	28.55209201	15.80339936	30.16723299
Transportation	2.858	81.1895	57.9597	-1.57682	7.20149	7.501488	36.27488	191.408239	-1.57682	81.189495	82.766315	27.34403411	12.25682545	32.02041985
Financial	4.767	42.8514	20.3779	23.4394	27.0609	52.10688	13.87791	184.481373	4.767	52.106878	56.873878	26.35448191	21.1757895	16.338779
AN share	3.816	38.1394	74.5608	26.39419	25.4846	-0.655852	8.785958	176.525072	-0.655852	74.560816	75.216668	25.2178674	12.2779204	25.82196545
Furniture and Household goods	7.6	-13.255	-10.2304	109.1197	59.4653	31.4534	-11.1186	173.024932	-13.25548	109.11073	122.36622	24.71784739	21.79825101	45.85400669
Manganese	4.475	40.3342	-20.661	49.14929	91.8061	-4.60866	8.959315	169.454439	-20.66077	91.806104	112.46687	24.20777705	18.32827331	38.55114526
Mining houses	2.95	41.7481	-19.8553	87.1308	34.995	18.75999	2.497785	168.226355	-19.85531	87.130804	106.98612	24.03233639	16.6138978	34.82711913
Mining Financial	2.942	33.7482	-15.0161	80.73739	25.8403	16.41048	15.96942	160.631734	-15.01613	80.737394	95.753522	22.94739055	18.75139373	29.99327624
Printing and Publishing	5.192	134.534	0.70617	11.69805	2.333	1.175	0.867	156.504789	0.706171	134.53357	135.23974	22.35782696	3.89962538	49.61862715
Other Metals	7.583	33.608	-57.691	52.43519	208.849	-32.42607	6.53645	151.678608	-57.69119	208.84923	266.54041	21.66837255	31.96880804	90.0835414
Paper and Packaging	4.533	47.8892	3.28403	9.415501	65.3951	14.03189	2.567	147.115751	2.567	65.395102	67.962102	21.01653588	10.67635382	25.17109055
AN Gold	4.417	8.34163	-30.605	143.2901	8.31652	524937	18.70242	146.21333	-30.605	143.29013	173.89512	20.88761855	14.82060943	56.21650226
Industrial Holdings	2.275	53.5209	-0.21915	20.75102	12.8956	13.25862	37.31821	139.800251	-0.219145	53.520921	53.740066	19.97146441	8.618829008	19.33493631
Chemicals and Otis	4.392	41.3897	-3.038	-7.55665	60.6437	0.000621	36.63201	132.4634	-7.556651	60.643669	68.20032	18.9233429	3.44501561	26.80684274
Metals and Minerals	5.067	24.4898	3.19551	33.73374	66.939	-15.88284	12.24685	129.789092	-15.88284	66.939038	82.821875	18.54129887	15.04117393	26.61524392
Mining producers	3.9	25.6183	-26.223	81.28	81.28906	19.7276	1.488026	20.91609	126.715606	-26.22349	81.289064	107.51255	18.10222949	14.43778015
Stores	3.208	33.772	7.08626	37.60784	38.3428	27.83497	-27.2091	120.642814	-27.20908	38.342781	65.551866	17.23468776	18.82704689	24.22620761
Coal	4.475	46.7876	-40.452	45.05344	153.699	5.872418	-83.5253	120.165201	-83.52534	153.69909	237.22443	17.16645734	31.19812322	75.77032855
Copper	12.61	40.38	4.41791	-10.7294	30.0021	-16.01363	59.16035	119.825366	-16.01363	59.160348	75.173979	17.1179094	18.29468731	27.4757246
Gold Klerksdorp	4.783	3.8198	-36.843	196.4228	5.47924	-19.17603	-13.1929	119.694774	-36.84316	196.42285	233.266	17.09925342	16.12628677	80.14965025
Diamonds	3.558	47.5353	-34.856	58.2152	-4.17091	35.53472	11.72834	117.544921	-34.85576	58.215197	93.070959	16.79213153	17.93348864	32.45519394
Industrial	3.642	48.4054	29.1919	28.63602	5.10266	2.042	1.013722	106.828345	-6.10266	48.40539	54.508051	15.2611922	7.86502852	20.16864328

Source data: JSE-Actuaries 1990-1996

Appendix A (ii): THE JSE SECTORS COMPUTED RETURNS AND STANDARD DEVIATIONS FOR THE PERIOD 1990 TO 1996

	Period returns							Computed statistics						
	1990	1991	1992	1993	1994	1995	1996	Total returns	Minimum	Maximum	Range	Arithmetic mean	Geometric mean	Deviation
Sectors														
Gold O.F.S	4.742	6.80779	-28.945	153.6937	-12.7834	-12.8915	-8.90056	101.72341	-28.9446	153.6937	182.6383	14.53192	15.45538161	62.52860448
Mining Holdings	2.933	13.4398	0.81107	67.19628	6.49285	5.627714	2.756932	99.257684	0.811067	67.19628	68.00735	14.17967	5.783436499	23.73189779
Investment trusts	2.742	-1.8897	13.0307	35.03529	12.9466	13.12156	23.09534	98.081759	-1.8897	35.03529	36.92499	14.01168	9.893985341	12.29670558
Clothing, footwear and textiles	6.85	-2.9164	-32.515	66.23252	78.0858	15.83532	-34.9664	96.605382	-34.9664	78.08581	113.0522	13.80077	21.0970701	44.22857351
Property	7.567	29.2118	-8.7128	25.18913	44.6602	7.599833	-0.98516	95.529962	-9.98516	44.6602	54.64536	13.64714	14.91780218	20.2866024
Exploration	0	0	0	0	0	-10.3093	97.70115	87.391871	-10.3093	97.70115	108.0104	12.48455	0	37.77289013
Food	2.6	46.5917	14.4767	19.89746	1.85	2.067	-1.1746	86.308294	-1.1746	46.59169	47.76629	12.32976	5.52286466	16.97029225
Curtailed operations	0	0	0	0	0	-10.3488	92.366	82.017201	-10.3488	92.366	102.7148	11.71674	0	35.77149964
Engineering	5.017	52.41338	-0.5568	31.31306	2.442	2.275	-11.4094	81.56469	-11.4094	52.48376	63.89313	11.6521	6.033232781	22.17899121
Development capital	0	0	0	0	0	1.59	67.95867	69.548667	0	67.95867	67.95867	9.935524	0	25.59266184
Property Loan Stock	11.5	19.1721	-0.7595	16.59959	18.6181	10.12903	-7.11547	68.143863	-7.11547	19.17211	26.28758	9.734838	8.685972692	10.1031048
Sugar	4.908	58.5875	-13.494	17.90283	0	0	0	67.904427	-13.4939	58.58753	72.08147	9.700632	0	23.45374621
Platinum	4.117	18.1985	45.0391	37.36512	58.5783	-89.5369	-14.4319	59.329295	-89.5369	58.5783	148.1152	8.475614	26.64871368	49.87735625
Property Trusts	10.37	20.1535	5.95602	12.60735	4.20392	13.07623	-8.58595	57.778078	-8.58595	20.1535	28.73946	8.254011	9.579845716	9.069512674
Gold Evender	4.708	-9.2907	-28.539	197.4481	-0.74233	-30.796	-98.318	34.470493	-8.318	197.4481	295.7661	4.924356	17.74478145	91.60996825
Packaging and printing	4.533	3.683	3.575	3.35	1.242	1.667	10.2391	28.289102	1.242	10.2391	11.4811	4.0413	3.297428103	2.970735222
Motor	5.508	75.7916	-27.835	0.716376	7.11987	34.95706	-9.6262	6.6317192	-89.6262	75.79165	165.4178	0.947388	15.17944107	51.39596903
Redevelopment	0	0	0	0	0	0.4	5.39	5.79	0	5.39	5.39	0.827143	0	2.017545657
Healthcare		0	0	0	0	0	0	0	0	0	0	0	0	0
Information technology		0	0	0	0	0	0	0	0	0	0	0	0	0
Retail		0	0	0	0	0	0	0	0	0	0	0	0	0
Telecommunications		0	0	0	0			0	0	0	0	0	0	0
Services		0	0	0	0			0	0	0	0	0	0	0
Media	0	0	0	0	0	0.967	-4.56566	3.5986614	-4.56566	0.967	5.532661	-0.51409	0	1.822557781
Paper	0	0	0	0	0	0	-4.66574	-4.6657436	-4.66574	0	4.665744	-0.66653	0	1.763485307
Tin	2.642	-11.175	39.063	12.14286	0	0	0	35.452428	-39.0625	12.14286	51.20536	-5.06463	0	16.46020631
Pharmaceuticals and Medical	3.383	-81.312	38.5164	14.91637	26.83	-97.6083	10.74245	-84.532071	-97.6083	38.51643	136.1247	-12.076	23.89364593	54.26927648
Gold West Wits	3.292	17.9318	-27.996	-77.0588	19.5822	-85.453	-6.11365	-155.81565	-85.453	19.58217	105.0352	-22.2594	20.05061956	43.41451521

Source data: JSE-Actuaries 1990-1996

APPENDIX A (iii): RANKING JSE SECTORS BY ARITHMETIC MEAN AND STANDARD DEVIATION

Sectors	Percentage Arithmetic mean	Percentage Standard deviation
Venture capital market	156.343047	425.9248334
Gold Rand and other	35.61137769	92.12316137
steel and Allied	32.82965617	78.58774751
Beverage, Hotels & Leisure	32.70086417	24.11982347
Banks and other financial service:	30.73482553	27.13158078
Building and Construction	29.47240473	47.77440721
Electronics, Electrical and Battery	29.10168628	18.76247623
Insurance	28.8321348	21.2989503
Development stage	28.57142857	75.5928946
Financial and Industrial	28.55209201	30.16723299
Transportation	27.34403411	32.02041985
Financial	26.35448191	16.338779
All share	25.2178674	25.82196545
Furniture and Household goods	24.71784739	45.85400669
Manganese	24.20777705	38.55114526
Mining houses	24.03233639	34.82711913
Mining Financial	22.94739055	29.99327624
Printing and Publishing	22.35782696	49.61862715
Other Metals	21.66837255	90.0835414
Paper and Packaging	21.01653588	25.17109055
All Gold	20.88761855	56.21650226
Industrial Holdings	19.97146441	19.33493631
Chemicals and Oils	18.9233429	26.80684274
Metals and Minerals	18.54129887	26.61524392
Mining producers	18.10222949	32.91942664
Stores	17.23468776	24.22620761
Coal	17.16645734	75.77032855
Copper	17.1179094	27.4757246
GOLD Klerksdorp	17.09925342	80.14965025
Diamonds	16.79213153	32.45519394
Industrial	15.2611922	20.16864328
Gold O.F.S	14.53191501	62.52860448
Mining Holdings	14.17966915	23.73189779
Investment trusts	14.0116799	12.29670558
Clothing, footwear and textiles	13.8007689	44.22857351
Property	13.64713741	20.2866024
Exploration	12.48455301	37.77289013
Food	12.32975631	16.97029225
Curtailed operations	11.71674304	35.77149964
Engineering	11.65209857	22.17899121
Development capital	9.93552381	25.59266184
Property Loan Stock	9.734837598	10.1031048
Sugar	9.700632355	23.45374621
Platinum	8.475613511	49.87735625
Property Trusts	8.254011101	9.069512674
Gold Evender	4.924356068	91.60996825
Packaging and printing	4.041300248	2.970735222
Motor	0.947388456	51.39596903
Redevelopment	0.827142857	2.017545657
Healthcare	0	0
Information technology	0	0
Retail	0	0
Telecommunications	0	0
Services	0	0
Media	-0.514094489	1.822557781
Paper	-0.666534795	1.763485307
Tin	-5.064632565	16.46020631
Pharmaceuticals and Medical	-12.07601016	54.26927648
Gold West Wits	-22.25937799	43.41451521

Source data: JSE-Actuaries 1990-1996

APPENDIX A (iv): CONSTRUCTED PORTFOLIOS FROM THE JSE SECTORS

Portfolio 1	Mean return 1	Standard deviation 1
Venture capital market	156.343047	425.9248334
Gold Rand and other	35.61137769	92.12316137
Steel and Allied	32.82965617	78.58774751
Beverage, Hotels & Leisure	32.70086417	24.11982347
Banks and other financial services	30.73482553	27.13158078

Portfolio 2	Mean return 2	Standard deviation 2
Building and Construction	29.47240473	47.77440721
Electronics, Electrical and Battery	29.10168628	18.76247623
Insurance	28.8321348	21.2989503
Development stage	28.57142857	75.5928946
Financial and Industrial	28.55209201	30.16723299
Transportation	27.34403411	32.02041985
Financial	26.35448191	16.338779
All share	25.2178674	25.82196545
Furniture and Household goods	24.71784739	45.85400669
Manganese	24.20777705	38.55114526
Mining houses	24.03233639	34.82711913
Mining Financial	22.94739055	29.99327624
Printing and Publishing	22.35782696	49.61862715
Other Metals	21.66837255	90.0835414
Paper and Packaging	21.01653588	25.17109055
All Gold	20.88761855	56.21650226
Excluding all share Index	25.33759785	40.81803126

Portfolio 3	Mean return 3	Standard deviation 3
Industrial Holdings	19.97146441	19.33493631
Chemicals and Oils	18.9233429	26.80684274
Metals and Minerals	18.54129887	26.61524392
Mining producers	18.10222949	32.91942664
Stores	17.23468776	24.22620761
Coal	17.15645734	75.77032855
Copper	17.1179094	27.4757246
GOLD Klerksdorp	17.09925342	80.14965025
Diamonds	16.79213153	32.45519394
Industrial	15.2611922	20.16864328
Gold O.F.S	14.53191501	62.52860448
Mining Holdings	14.17966915	23.73189779
Investment trusts	14.0116799	12.29670558
Clothing, footwear and textiles	13.8007689	44.22857351
Property	13.64713741	20.2866024
Exploration	12.48455301	37.77289013
Food	12.32975631	16.97029225
Curtailed operations	11.71674304	35.77149954
Engineering	11.65209857	22.17899121

Portfolio 4	Mean return 4	Standard deviation 4
Development capital	9.93552381	25.59266184
Property Loan Stock	9.734837598	10.1031048
Sugar	9.700532355	23.45374621
Platinum	8.475613511	49.87735525
Property Trusts	8.254011101	9.069512674
Gold Evender	4.924356068	91.60996825
Packaging and printing	4.041300248	2.970735222
Motor	0.947388456	51.39596903
Redevelopment	0.827142857	2.017545657

Portfolio 5	Mean return 5	Standard deviation 5
Healthcare	0	0
Information technology	0	0
Retail	0	0
Telecommunications	0	0
Services	0	0

Portfolio 6	Mean return 6	Standard deviation 6
Media	-0.514094489	1.822557781
Paper	-0.666534795	1.763485307
Tin	-5.064632565	16.46020631
Pharmaceuticals and Medical	-12.07601016	54.26927648
Gold West Wits	-22.25937799	43.41451521
	-40.58065	23.54600822

Source data: JSE-Actuaries 1990-1996

APPENDIX B (i): COMPUTATION OF THE NSE COMPANIES RETURNS FOR 1990 - 1996

			1990		
SECTORS	Prices		Capital income	Dividend income'	Total returns
AGRICULTURE	High	Low			
Brook Bond	50	44.5	5.5	16.218	21.716
Eaagads	5	3.5	1.5	1.470588235	2.970588235
Gorge Williamson	15.2	11	4.2	23.07692308	27.27692308
Kakuzi Tea & Coffee	17	11.75	5.25	48.93333333	52.18333333
Kopchorua Tea	15	15	0	13.33333333	13.33333333
Limuru Tea	200	200	0	20.5	20.5
Olepajet	5	3	2	31.25	33.25
Sasini	23	12	11	3.571428871	14.57142857
R. Vipingo	0	0	0	-	0
Theta Group	-	-	0	-	0
COMMERCIAL &SERVICES					
A. Baumann	9	3.5	5.5	8	13.5
African Tours & Hotels	10	7.5	2.5	0	2.5
Car & General	12.5	5 ...	7.5	2.857142857	10.35714286
CMC Motors	15	6	9	8.571428571	17.57142857
Express Kenya	52	42.5	9.5	12.27513228	21.77513228
Hutchings & Bleimer	9	5	4	18.71428571	22.71428571
Kenya Airways			0	-	0
Kenya Hotels			0		0
Motor mart/Lonhro	35	22.5	12.5	15.04424779	27.54424779
Marshals East Africa	15	13.5	1.5	10.52631579	12.02631579
Nation Group	13	10.5	2.5	11.05382979	13.56382979
Pearl Drycleaners	10	6	5	10.41668667	15.41886867
Philips International /King fisher			0		0
Standard Newspapers	5.5	3	2.5	0.73	3.23
TPS Serena			0	-	0
Uchumi	-	-	0	8.3	8.3
FINANCE & INVESTMENTS					
Barclays Bank	105.3	30	75.3	2.761166482	78.0811648
CFC Bank	20.5	18	2.5	6.329113924	8.829113924
Chancery Investment.			0	0	0
City Trust	11	4.5	6.5	86.88868887	73.15886887
Diamond Trust	37	26.25	10.75	4.42687747	15.17687747
Housing Finance Company	-	-	0	1.68	1.88
ICDC Investment	11	9.25	1.75	10.75081728	12.50081728
Jubilee Insurance	27.5	19.5	8	3.647388421	11.64736842
Kenstock			0	0	0
KCB Bank	42.5	29	13.5	13.61958042	27.11956042
Kenya Finance Bank	30	18	12	18.68868687	28.66886867
National Bank of Kenya			0		0
NIC Bank	22	20	2	5.952380952	7.952380952
Regent Asset Africa			0	-	0
Pan African Insurance	12	7.5	4.5	15	19.5
Standard Bank	30	20	10	18	28
INDUSTRIAL AND ALLIED					
Athi River Mining					0
Bamburi Cement	4	2.5	1.5	-	1.5
BAT Kenya			0	14.95081967	14.98081967
BOC Kenya			0		0
Carbacid East Africa	30	16.25	13.75	4.324324324	18.07432432
Crown-Berger			0		0
Dunlop Kenya	15	7.5	7.5	2.688886887	10.18668687
East Africa Cables	20	7.5	12.5	8.928571429	21.42857143
East Africa Packaging	30	20	10	13.6	23.6
East Africa Portland	5.5	4	1.5	-	1.6
Firestone East Africa			0	-	0
East Africa Breweries	27.5	20	7.5	8.333333333	15.83333333
East African Oxygen	13	11.9	1.1	-	1.1
Kenya National Mills	8.5	5.5	3	7.857142857	10.85714286
Kenya Oil Company	2.5	2	0.5	0.356556556	0.855656668
Kenya Power & Lighting	37	31	8	4.136470588	10.13847059
Total Kenya	31	14.5	18.5	5.941304348	22.44130435
Unga Group	10.2	9	1.2		1.2
Kenya Orchard	7.5	3	4.5	33.33	37.83

Notes
1. Source: Nairobi stock exchange 1993 - 1998
2. Income and capital are own computation
3. Capital Income, dividend income and total returns are expressed as percentages

APPENDIX B (i): COMPUTATION OF THE NSE COMPANIES RETURNS FOR 1990 - 1996

SECTORS	High Prices	low	1991 Capital income	Dividend income	Total return
AGRICULTURE					
Brook Bond	80	49.5	30.5	16.988	47.488
Eaagads	4	4	0	1.5625	1.5625
Gorge Williamson	21.5	12.6	9	18.75	27.76
Kakuzi Tea & Coffee	17.5	16.5	2	26.5050241	28.5060241
Kapchorua Tea	20	15	5	10	18
Limuru Tea	200	200	0	16.5	16.6
Olepajet	3.76	3	0.75	-	0.76
Sasini	35	20	16	22.22222222	37.22222222
R. Vipingo			0	-	0
Theta Group	1.5	-	0	-	0
COMMERCIAL &SERVICES					
A.Baumann	7.5	5	2.5	12	14.6
African Tours & Hotels	12.5	9.75	2.75	0	2.75
Car & General	12.5	6.6	6	2.631878947	8.831578947
CMC Motors	15	6	9	9.047619048	18.04761905
Express Kenya	52	15	37	8.970149264	42.97014925
Hutchings & Bleimer	9	4	5	14.56855658	19.56656656
Kenya Airways			0	-	0
Kenya Hotels			0		0
Motor mart/Lonhro	38	31.5	6.5	18.68633094	25.18633094
Marshalls East Africa	15	15	0	10	10
Nation Group	12	9	3	14.28571429	17.28571429
Pearl Drycleaners	7.5	6.75	0.75	8.771929826	9.621929825
Philips International /King fisher			0		0
Standard Newspapers	3.5	3.25	0.25		0.25
TPS Serena			0	-	0
Uchumi	-	-	0	7.042263521	7.042263521
FINANCE & INVESTMENTS					
Barclays Bank	63	38.5	24.5	5.888868867	30.18888887
CFC Bank	25	17.75	7.25	4.117647089	11.36764706
Chancery Investment			0	0	0
City Trust	15.75	9	6.75	4.848484848	11.59848486
Diamond Trust	36	25	10	4.888688667	14.88688887
Housing Finance Company	-	-	0	2.013333333	2.013333333
ICDC Investment	14	11	3	7.072	10.072
Jubilee Insurance	35	26.5	9.5	2.846280992	12.34628099
Kenstock			0		0
KCB Bank	36	25	11	12.52622951	23.52622981
Kenya Finance Bank	14.75	9	5.75	16.67	22.42
National Bank of Kenya			0		0
NIC Bank	26	10	16	6.756756757	22.75876676
Regent Asset Africa			0	-	0
Panafrica Insurance	18.5	10	8.5	11.66688887	20.18888887
Standard Bank	24.5	19.5	5	9.659090909	14.66909091
INDUSTRIAL AND ALLIED					
Athi River					
Bamburi Cement	7.25	2.6	4.75	0	4.75
BAT Kenya	82.5	71	11.5	10.22801303	82.6
BOC Kenya			0		0
Carbacid East Africa	25	20	5	5.565655556	25
Crown-Berger			0	-	0
Dunlop Kenya	15	14	1	2.068966617	16
East Africa Cables	26	15	10	6.25	25
East Africa Packaging	28	26	2	12.69259259	28
East Africa Portland	4.5	2.25	2.25	-	4.5
Firestone East Africa			0	-	0
East Africa Breweries	23.5	16	7.6	12.6	23.6
East African Oxygen	22	12	10	-	22
Kenya National Mills	6.6	4	2.5	-	6.5
Kenya Oil Company	4.25	2	2.25	2.016	4.25
Kenya Power & Lighting	40	27	13	7.426866672	40
Total Kenya	20	16	5	35	20
Unga Group	10	5	5	-	10
Kenya Orchard	6	3	3	20.83	6

Notes

1. Source: Nairobi stock exchange 1993 - 1998
2. Capital income and dividend income are own computation
3. Capital Income, dividend income and total returns are expressed as percentages

APPENDIX B (i): COMPUTATION OF THE NSE COMPANIES RETURNS FOR 1990 -1996

SECTORS	Prices		1992 Capital income	Dividend income	Total return
AGRICULTURE	High	Low			
Brook Bond	107.5	80	27.5	16.08879088	43.58579088
Eaagads	3	-	3	2.083333333	5.083333333
Gorge Williamson	28.5	13	15.5	14.28671429	29.78571429
Kakuzi Tea & Coffee	40.5	16.75	23.75	13.97379913	37.72379913
Kapchorua Tea	19.75	16.5	3.25	11.03448276	14.28448276
Limuru Tea	230	-	0	26.96662174	26.96862174
Olepajet	4.5	3.75	0.75	30.3030303	31.0530303
Sasini	42.5	28	14.5	14.18439716	28.68439718
R. Vipingo			0	0	0
Theta Group	-	-	0	-	0
COMMERCIAL &SERVICES					
A.Baumann	15	8.75	6.25	8.458859619	14.70686962
African Tours & Hotels	13.5	12	1.5		1.5
Car & General	7.5	6	1.5	3.703703704	5.203703704
CMC Motors	11.5	9.75	1.75	10.35294118	12.10294118
Express Kenya	25	18	7	9.302325581	16.30232658
Hutchings & Bleimer	12	4.75	7.25	6.906906907	14.15690891
Kenya Airways			0	-	0
Kenya Hotels	8.5	-	8.5		8.5
Motor mart/Lonhro	43	32.5	10.5	22.7480918	33.2480916
Marshalls East Africa	14	10	4	12.5	16.5
Nation Group	15	10	5	14.4	19.4
Pearl Drycleaners	8	4.75	1.25	12.09302326	13.34302326
Philips International /King fisher			0		0
Standard Newspapers	3.5	2	1.5	-	1.5
TPS Serena			0	-	0
Uchumi	26.6	17.75	7.75		7.75
FINANCE & INVESTMENTS					
Barclays Bank	52	36	17	11.49425287	28.49425287
CFC Bank	30.5	19.75	10.75	3.980099602	14.7300995
Chancery Investment			0	0	0
City Trust	16.25	13.65	2.6	4.013377926	6.613377926
Diamond Trust	49	23	26	3.888888889	29.88888889
Housing Finance Company	16	15	1	2.012903226	3.012903226
ICDC Investment	14.5	11.5	3	6.215384618	9.216384615
Jubilee Insurance	43.5	31	12.5	1.879194631	14.37919463
Kenstock			0	0	0
KCB Bank	31	20	11	19.60784314	30.60784314
Kenya Finance Bank	14.75	11	3.75	20	23.75
National Bank of Kenya			0		0
NIC Bank	26	17.75	7.25	8.187134503	15.4371345
Regent Asset Africa			0	-	0
Panafrica Insurance	28	20	8	7.291688887	15.29166667
Standard Bank	24.5	18.75	5.75	13.838	19.386
INDUSTRIAL AND ALLIED					
Athi River					
Bamburi Cement	10.5	6.26	4.25	0	4.25
BAT Kenya	100	77	23	10.6779881	33.6779681
BOC Kenya			0		0
Carbacid East Africa	31.5	25.5	8	4.386964912	10.38596491
Crown-Berger	-	-	0	-	0
Dunlop Kenya	25.5	17.5	8	2.954646455	10.96454645
East Africa Cables	18.5	14.5	4	7.575757576	11.57575758
East Africa Packaging	29.5	26.5	4	14.54545455	18.54545455
East Africa Portland	10.5	6.25	4.25	-	4.26
Firestone East Africa			0	-	0
East Africa Breweries	33	18.5	14.5	10.57692308	26.07692308
East African Oxygen	21	15	8	-	6
Kenya National Mills	3.75	2.5	1.25	17.6	18.85
Kenya Oil Company	4.25	2	2.26	20.224	22.474
Kenya Power & Lighting	22.5	15	7.5	7.697068887	15.19708887
Total Kenya	62	29.5	32.6	8.695862174	41.19565217
Unga Group	6	3.75	2.25	0.0896	2.3398
Kenya Orchard	3	3	0	8.21	8.21

Notes
1. Source: Nairobi stock exchange 1993 - 1998
2.Capital Income and dividend income are own computation
3. Capital Income, dividend Income and total returns are expressed in percentages

APPENDIX B (i): COMPUTATION OF THE NSE COMPANIES RETURNS FOR 1990 -1996

1993

	Prices			Dividend income	Total return
SECTORS					
AGRICULTURE	High	Low	Capital income		
Brook Bond	730	105	625	2.34	627.34
Eaagads	3	--	3	31.66666667	34.66666667
Gorge Williamson	207.5	24	183.5		183.5
Kakuzi Tea & Coffee	110	40	70	1.9	71.9
Kapchorua Tea	-	-	3.25	12.12	15.37
Limuru Tea	1000	230	770	22	792
Olepajet	13.25	6.5	7.75	9.09	16.84
Sasini	262.5	40.5	222	6.600660066	228.6006601
R. Vipingo			0	-	0
Theta Group	-	-	0	-	0
COMMERCIAL &SERVICES					
A.Baumann	17.75	9.75	8	10.90909091	18.90909091
African Tours & Hotels	16	10.5	5.5	0	6.5
Car & General	9.5	7.5	2	7.73	9.73
CMC Motors	14.5	10	4.5	8.979591837	13.47959184
Express Kenya	65	22	43	11.49426287	54.49425287
Hutchings & Bleimer	-	-	7.25	16.67	23.92
Kenya Airways			0	-	0
Kenya Hotels	-		8.5		8.5
Motor mart/Lonhro	36.5	29	7.5	0	7.5
Marshalls East Africa	14	9	5	4.85	9.85
Nation Group	19.75	12.75	7	2.3	9.3
Pearl Drycleaners	7	5	2	5.31	7.31
Philips International /King fisher			0	0	0
Standard Newspapers	3.75	1.75	2	-	2
TPS Serena			0	-	0
Uchumi	29	17.5	11.5	20.25	31.75
FINANCE & INVESTMENTS					
Barclays Bank	132.5	42	90.5	3.190184049	93.69018405
CFC Bank	58	26.5	31.5	3.190184049	34.69018405
Chancery Investment			0		0
City Trust	16	12	4	4.285714286	8.285714286
Diamond Trust	65	32.5	32.5	2.26	34.76
Housing Finance Company	15.75	8.5	7.25	3.62	10.87
ICDC Investment	19	11.75	7.25	6.58436214	13.83436214
Jubilee Insurance	92	90	2	5.15	7.16
Kenstock			0		0
KCB Bank	50	21.5	28.5	10	38.5
Kenya Finance Bank	14.25	11	3.25	20	23.25
National Bank of Kenya			0		0
NIC Bank	51	24	27	7.87	34.87
Regent Asset Africa			0	-	0
Panafrica Insurance	35	20	15	2.94	17.94
Standard Bank	95	26	69	4.31	73.31
INDUSTRIAL AND ALLIED					
Athi River				-	
Bamburi Cement	29	10	19	5	24
BAT Kenya	270	100	170	5.43	175.43
BOC Kenya			0		0
Carbacid East Africa	64	31	33	3.529411765	36.52941176
Crown-Berger	20.5	13.75	6.75	8.49	15.24
Dunlop Kenya	51	24	27	58.33	85.33
East Africa Cables	38	15	23	4.716981132	27.71698113
East Africa Packaging	82	28	54	7.272727273	61.27272727
East Africa Portland	16.5	5	11.6	4.545454545	16.04545455
Firestone East Africa			0	-	0
East Africa Breweries	66	30	36	7.291686667	43.29188867
East African Oxygen	50	27.5	22.5	-	22.5
Kenya National Mills	12	3	9	7.333333333	16.33333333
Kenya Oil Company	24.5	2.76	21.75	20.83	42.58
Kenya Power & Lighting	23.5	15.5	8	-	8
Total Kenya	175	33.5	141.5	12.32227488	153.8222749
Unga Group	14.25	4.75	9.5	0.0933	9.5933
Kenya Orchard	-	-	0	7.02	7.02

Notes
1. Source: Nairobi stock exchange 1993 - 1998
2.Capital income and dividend income are own computaion
3. Capital income, dividend income and total returns are expressed as percentages

APPENDIX B (i) : COMPUTATION OF THE NSE COMPANIES ANNUAL RETURNS FOR 1990-1996

1994

SECTORS	Prices High	Low	Capital income	Dividend income	Total return
AGRICULTURE					
Brook Bond	730	441	289	1.86	290.86
Eaagads	3	3	0	95	95
Gorge Williamson	263	260	3	1.92	4.92
Kakuzi Tea & Coffee	183	180	3	1.64	4.64
Kapchorua Tea	217	217	0	2.76	2.76
Limuru Tea	1160	230	930	5.15	935.15
Olepajet	17.5	5.5	12	1.65	13.65
Sasini	321	262.5	58.5	3.42	61.92
R. Vipingo			0	-	0
Theta Group	-	-	0	0	0
COMMERCIAL &SERVICES					
A.Baumann	61	60	1	2.5	3.5
African Tours & Hotels	78		78	0	78
Car & General			0	5.95	5.95
CMC Motors	50	38.25	11.75	1.98	13.73
Express Kenya	86	83.5	2.5	5.24	7.74
Hutchings & Bleimer	12	-	7.25	16.67	23.92
Kenya Airways			0		0
Kenya Hotels	7	6.5	0.5	0	0.5
Motor mart/Lonhro	50	36.5	13.5	15.63	29.13
Marshalls East Africa	26	9	17	4.85	21.85
Nation Group	72	17.5	54.5	2.32	56.82
Pearl Drycleaners			0	6.49	6.49
Philips international /King fisher			0		0
Standard Newspapers	21	8.5	12.5	0	12.5
TPS Serena			0	-	0
Uchumi	64.5	25.5	39	8.93	47.93
FINANCE & INVESTMENTS					
Barclays Bank	250	105	145	5.52	150.52
CFC Bank	125	26.5	98.5	2	100.5
Chancery Investment			0	0	0
City Trust	38	17.75	20.25	2.155559547	22.40555955
Diamond Trust	152	110	42	1.72	43.72
Housing Finance Company	51	13.25	37.75	2	39.75
ICDC Investment	163	41.5	121.5	7.64	129.14
Jubilee Insurance			0	2.41	2.41
Kenstock			0	0	0
KCB Bank	100	25.5	74.5	7.96812749	82.46812749
Kenya Finance Bank	39.75	33	6.75	0	6.75
National Bank of Kenya			0		0
NIC Bank	156	51	105	3.15	108.15
Regent Asset Africa			0	-	0
Panafrica Insurance	44	41	3	4.03	7.03
Standard Bank	152.5	30	122.5	5.03	127.53
INDUSTRIAL AND ALLIED					
Athi River				-	
Bamburi Cement	74	58	16	1.25	17.25
BAT Kenya	815	265	550	1.79	551.79
BOC Kenya			0	3.13	3.13
Carbacid East Africa	182	31	151	1.89	152.89
Crown-Berger	28.25	25	3.25	9.91	13.16
Dunlop Kenya	220	24	196	5.6	201.6
East Africa Cables	64	18.5	45.5	5.71	51.21
East Africa Packaging	156	153	3	3.225806452	6.225806452
East Africa Portland	60	6	54	2	56
Firestone East Africa			0	4.59	4.59
East Africa Breweries	165	66	99	2.82	101.82
East African Oxygen	177.5	93.5	84		84
Kenya National Mills	59	30.5	28.5	6.96	35.46
Kenya Oil Company	76	25	51	8.21	59.21
Kenya Power & Lighting	94	20.5	73.5	6.288209607	79.78820961
Total Kenya	280	204	76	0.68	76.68
Unga Group	88	70	18	6.15	24.15
Kenya Orchard	-	-	0	5.71	5.71

Notes

1. Source: Nairobi stock exchange 1993-1998
2.Capital income and dividend income are own computaion
3. Capital income, dividend income and total returns are expressed as percentages

APPENDIX B (i) : COMPUTATION OF THE NSE COMPANIES ANNUAL RETURNS FOR 1990-1996

SECTORS	Prices		1995		
AGRICULTURE	High	Low	Capital income	Dividend income	Total return
Brook Bond			289	0.63	289.53
Eaagads			0	1.4	1.4
Gorge Williamson			3	0.95	3.95
Kakuzl Tea & Coffee			3	2.13	6.13
Kapchorua Tea			0	0.74	0.74
Limuru Tea			930	1.62	931.62
Olepajet			12	1.04	13.04
Sasini			58.5	4.72	63.22
R. Vipingo			0		0
Theta Group			0	0	0
COMMERCIAL &SERVICES					
A.Baumann			1	3.33	4.33
African Tours & Hotels			78	0	78
Car & General			0	5.1	5.1
CMC Motors			11.75	5.1	16.86
Express Kenya			2.5	11.19	13.69
Hutchings & Bleimer			7.25	8	15.25
Kenya Airways			0	0	
Kenya Hotels			0.6	0	0.5
Motor mart/Lonhro			13.5	15.47	28.97
Marshalls East Africa			17	7.25	24.25
Nation Group			54.5	2.32	58.82
Pearl Drycleaners			0	7.73	7.73
Philips International /King fisher			0	0	
Standard Newspapers			12.5	0	12.5
TPS Serena			0		
Uchumi			39	11.83	50,83
FINANCE & INVESTMENTS					
Barclays Bank			145	6.37	150.37
CFC Bank			98.5	1.67	100.17
Chancery Investment			0	0	0
City Trust			20.25	0	20.25
Diamond Trust			42	3.08	46.08
Housing Finance Company			37.75	1.67	39.42
ICDC Investment			121.5	10.88	132.16
Jubilee Insurance			0	3.7	3.7
Kenstock			0	0	
KCB Bank	100	25.5	74.5	9.125475285	83.62547529
Kenya Finance Bank			6.75	0	6.75
National Bank of Kenya			0	6.69	6.69
NIC Bank			105	5.71	110.71
Regent Asset Africa			0	0	0
PanafricaInsurance			3	4.03	7.03
Standard Bank			122.5	9.43	131.93
INDUSTRIAL AND ALLIED					
Athl River			-		
Samburi Cement			3.88	3.88	
BAT Kenya			16	5.62	21.62
BOC Kenya			650	4.12	554.12
Carbacid East Africa			0	2.67	2.67
Crown-Barger			161	10.63	161.83
Dunlop Kenya			3.25	23.44	26.69
East Africa Cables			196	5.88	201.66
East Africa Packaging			45.5	3.61	49.11
East Africa Portland			3	1.83	4.83
Firestone East Africa			54	11.11	85.11
East Africa Breweries			0	7.25	7.25
East African Oxygen			99		99
Kenya National Mills			84	6.38	89.38
Kenya Oil Company			28.5	7.02	35.52
Kenya Power & Lighting			51	3	54
Total Kenya			73.5	1.48	74.96
Unga Group			76	6.85	82.85
Kenya Orchard			18		18

Notes: 1. Source: Nairobi stock exchange 1993–1998

2.Capital income and dividend income are own computation

3. Capital income, dividend income and total returns are expressed as percentages

APPENDIX B (i) : COMPUTATION OF THE NSE COMPANIES ANNUAL RETURNS FOR 1990-1996

			1996		
SECTORS	Prices				
AGRICULTURE	High	Low	Capital income	Dividend income	Total return
Brook Bond			289	1.13	290.13
Eaagads			0	2.57	2.57
Gorge Williamson			3	1.52	4.52
Kakuzi Tea & Coffee			3	2.26	5.26
Kapchorua Tea			0	0.86	0.86
Limuru Tea			930	1.62	931.62
Olepajet			12	0.97	12.97
Sasini			58.5	4.2	62.7
R. Vipingo			0	15.74	15.74
Theta Group			0	0	0
COMMERCIAL &SERVICES					
A.Baumann			1	5	6
African Tours & Hotels			78	0	78
Car & General			0	0	0
CMC Motors			11.75	3.97	15.72
Express Kenya			2.6	5.91	8.41
Hutchings & Bleimer			7.25	0	7.25
Kenya Airways			0	0	
Kenya Hotels			0.5	0	0.5
Motor mart/Lonhro			13.5	6.67	20.17
Marshalls East Africa			17	10.32	27.32
Nation Group			54.5	2.5	57
Pearl Drycleaners			0	0	0
Philips International /King fisher			0	0	0
Standard Newspapers			12.5	0	12.5
TPS Serena			0	18.28571429	18.28571429
Uchumi			39	12.82	51.82
FINANCE & INVESTMENTS					
Barclays Bank			145	10.1	156.1
CFC Bank			98.5	2.63	101.13
Chancery Investment			0	0	0
City Trust			20.25	6.25	26.6
Diamond Trust			42	3.48	45.48
Housing Finance Company			37.75	2.63	40.38
ICDC Investment			121.5	9	130.5
Jubilee Insurance			0	5.88	
Kenstock			0	0	5.88
KCB Bank			74.5	8.743169399	83.2431694
Kenya Finance Bank			6.75		6.75
National Bank of Kenya			0	11.11	11.11
NIC Bank			105	5.54	110.54
Regent Asset Africa			0	0	0
Panafrica Insurance			3	2.94 5.94	
Standard Bank			122.6	7.73	130.23
INDUSTRIAL AND ALLIED				-	
Athi River				-	
Bamburi Cement				4.27	4.27
BAT Kenya			16	9.52	25.52
BOC Kenya			550	5.15	555.15
Carbackl East Africa			0	3.18	3.18
Crown-Berger			151	13.63 164.63	
Dunlop Kenya			3.25	7.04	10.29
East Africa Cables			196	8	204
East Africa Packaging			45.5	5.07	50.57
East Africa Portland			3	1.1	4.1
Firestone East Africa			54	9.09	63.09
East Africa Breweries			0	18.8	18.8
East African Oxygen			99		99
Kenya National Mills			84	6.4	90.4
Kenya Oil Company			28.5	8	36.5
Kenya Power & Lighting			51	3.28	54.28
Total Kenya			73.5	3.85	77.35
Unga Group			76	12.27	88.27
Kenya Orchard			18		18

Notes

1. Source: Nairobi stock exchange 1993 - 1998
2. Capital income and dividend income are own computaion
3. Capital Income, dividend income and total returns are expressed as percentages

APPENDIX B (ii): COMPUTED NSE SECURITIES' RETURNS, STANDARD DEVIATION,

Period returns

SECTORS	1990	1991	1992	1993
AGRICULTURE				
Brook Bond	21.7	47.488	43.6	627.3
Eaagads	2.97	1.5625	5.08	34.67
George Williamson	27.3	27.75	29.8	183.5
Kakuzi	52.2	28.506	37.7	71.9
Kapchorua	13.3	15	14.3	15.37
Limuru Tea	20.5	16.5	27	792
Olepajet Limited	33.3	0.75	31.1	16.84
Sasini Tea & Coffee	14.6	37.222	28.7	228.6
R. Vipingo	0	0	0	0
Theta group	0	0	0	0
	186	174.78	217	1970
COMMERCIAL &SERVICES				
A.Baumann	13.5	14.5	14.7	18.91
African Tours & Hotels	2.5	2.75	1.5	5.5
Car & General	10.4	8.6316	5.2	9.73
CMC Motors	17.6	18.048	12.1	13.48
Express Kenya	21.8	42.97	16.3	54.49
Hutchings & Bleimer	22.7	19.556	14.2	23.92
Kenya Airways	0	0	0	0
Kenya Hotels	0	0	8.5	8.5
Motor mart/Lonhro	27.5	25.186	33.2	7.5
Marshalls East Africa	12	10	16.5	9.85
Nation Group	13.6	17.286	19.4	9.3
Pearl Drycleaners	15.4	9.5219	13.3	7.31
Philips international/King fisher	0	0	0	0
Standard Newspapers	3.23	0.25	1.5	2
TPS Serena	0	0	0	0
Uchumi	8.3	7.0423	7.75	31.75
	168	175.74	164	202.2
FINANCE &INVESTMENT				
Barclays Bank	78.1	30.167	28.5	93.69
CFC Bank	8.83	11.368	14.7	34.69
Chancery Investment	0	0	0	0
City Trust	73.2	11.598	6.61	8.286

Note: Source: NSE 1993-1998.

AND GEOMETRIC MEAN

Computed statistics

1994	1995	1996	Total returns	Minimum	maximum	Arithmetic mean	Geometric mean	Standard deviation
1.86	290	290	1321.649791	1.86	627.34	188.807113	64.01581126	229.728647
95	1.4	2.57	143.2530882	1.4	95	20.46472689	5.998912952	34.97812037
1.92	3.95	4.52	278.7026374	1.92	183.5	39.81466248	14.60609676	64.57140707
1.64	5.13	5.26	202.3431566	1.64	71.9	28.90616522	15.09464208	26.88276428
2.76	0.74	0.86	62.34781609	0.74	15.37	8.90683087	4.990827039	7.031411338
5.15	932	932	2724.346522	5.15	931.62	389.1923602	85.08333904	466.2342888
1.65	13	13	109.5530303	0.75	33.25	15.6504329	8.655372944	12.78302221
3.42	63.2	62.7	438.418708	3.42	228.6007	62.631244	33.58674893	76.55055247
0	0	15.7	15.74	0	15.74	2.248571429	15.74	5.949160805
0	0	0	0	0	0	0	0	0
113	1309	1326	5296.354749	113.4	1970.217	756.622107	430.3738049	760.6218595
3.5	4.33	6	75.44575053	3.5	18.90909	10.77796436	9.044207584	6.057871543
78	78	78	246.25	1.5	78	35.17857143	11.51940548	40.07407576
5.95	5.1	0	44.97242551	0	10.35714	6.424632215	7.183020832	3.559194708
13.7	16.9	15.7	107.5015806	12.10294	18.04762	15.35736866	15.20806457	2.282711511
7.74	13.7	8.41	165.38186	7.74	54.49425	23.62598	18.49675211	18.10489258
23.9	15.3	7.25	126.7667482	7.25	23.92	18.10953545	16.92481672	6.225584595
0	0	0	0	0	0	0	0	0
0.5	0.5	0.5	18.5	0	8.5	2.642857143	1.552921751	4.007433569
29.1	29	20.2	171.7486703	7.5	33.24809	24.53552433	22.52770524	8.518856218
21.9	24.3	27.3	121.7963158	9.85	27.32	17.39947368	16.12074977	7.148197676
56.8	56.8	57	230.1895441	9.3	57	32.88422058	25.88410146	22.664379
6.49	7.73	0	59.81161975	0	15.41667	8.544517107	9.463502	5.010401185
0	0	0	0	0	0	0	0	0
12.5	12.5	12.5	44.48	0.25	12.5	6.354285714	3.349647587	5.814590433
0	0	18.3	18.28571429	0	18.28571	2.612244898	18.28571429	6.911350364
47.9	50.8	51.8	205.4222535	7.042254	51.82	29.34603622	21.0243644	21.30948788
308	315	303	1636.552483	164.2137	314.82	233.7932118	224.6732029	71.10698706
151	150	155	686.4022701	28.49425	155.1	98.05746715	80.58503878	55.69245277
101	100	101	371.4170445	8.829114	101.13	53.05957779	33.97128394	45.24357337
0	0	0	0	0	0	0	0	0
22.4	20.3	26.5	168.8198033	6.613378	73.16667	24.11711475	17.76814437	22.8879547

APPENDIX B (ii): COMPUTED NSE SECURITIES' RETURNS, STANDARD DEVIATION, AND GEOMETRIC MEAN

	Period returns					
	1990	1991	1992	1993	1994	1995
Sectors						
FINANCE & INVESTMENT						
Diamond Trust	15.2	14.667	29.9	34.76	43.7	45.1
Housing Finance Company	1.68	2.0133	3.01	10.87	39.8	39.4
ICDC Investment	12.5	10.072	9.22	13.83	129	132
Jubilee Insurance	11.6	12.346	14.4	7.15	2.41	3.7
Kenstock	0	0	0	0	0	0
Kenya Commercial Bank	27.1	23.526	30.6	38.5	82.5	83.6
Kenya Finance Bank	28.7	22.42	23.8	23.25	6.75	6.75
National Bank of Kenya	0	0	0	0	0	6.59
NIC Bank	7.95	22.757	15.4	34.87	108	111
Regent Asset Africa	0	0	0	0	0	0
Panafrica Insurance	19.5	20.167	15.3	17.94	7.03	7.03
Standard Bank	26	14.659	19.4	73.31	128	132
	310	195.76	211	391.2	820	838
INDUSTRIAL AND ALLIED						
Athi River Mining	0					
Bamburi Cement	1.5	4.75	4.25	24	17.3	3.66
BAT Kenya	15	82.5	33.7	175.4	552	21.6
BOC Kenya	0	0	0	0	3.13	554
Carbacid East Africa	18.1	25	10.4	36.53	153	2.67
Crown-Berger	0	0	0	15.24	13.2	162
Dunlop Kenya	10.2	15	11	85.33	202	26.7
East Africa Cables	21.4	25	11.6	27.72	51.2	202
East Africa Packaging	23.6	28	18.5	61.27	6.23	49.1
East Africa Portland	1.5	4.5	4.25	16.05	56	4.83
Firestone East Africa	0	0	0	0	4.59	65.1
East Africa Breweries	15.8	23.5	25.1	43.29	102	7.25
East African oxygen	1.1	22	6	22.5	84	99
Kenya National Mills	10.9	6.5	18.9	16.33	35.5	89.4
Kenya Oil Company	0.86	4.25	22.5	42.58	59.2	35.5
Kenya Power &Lighting	10.1	40	15.2	8	73.5	54
Total Kenya	22.4	20	41.2	153.8	76.7	75
Unga Group	1.2	10	2.34	9.593	24.2	82.9
Kenya Orchards	37.8	6	8.21	7.02	5.71	18
	191	317	233	744.7	1378	1405

Source:NSE 1993-1998

1996	Cumulative returns	Minimum	Maximum	Computed statistics Arithmetic m	Geometric m	Standard deviation
45.5	228.772433	14.66667	45.48	32.6817762	29.7713324	13.431541
40.4	137.1262366	1.68	40.38	19.5894624	9.50498409	19.2025365
131	437.422364	9.215385	132.16	62.4889092	32.1819989	63.7359558
5.88	57.51284404	2.41	14.37919	8.21612058	6.93973605	4.61005463
0	0	0	0	0	0	0
83.2	369.0904252	23.52623	83.62548	52.7272036	45.9364513	28.7824501
6.75	118.3366667	6.75	28.66667	16.9052381	14.0697779	9.70598743
11.1	17.7	0	11.11	2.52857143	8.55657058	4.51118029
111	410.4162722	7.952381	110.71	58.630896	38.6539735	48.5531955
0	0	0	0	0	0	0
5.94	92.89833333	5.94	20.16667	13.2711905	11.7901802	6.37543511
130	523.0450909	14.65909	131.93	74.7207273	53.0779463	55.0575928
853	3618.959784	195.7598	852.7832	516.994255	434.755766	306.377118
	0	0	0	0	0	0
4.27	59.68	1.5	24	8.52571429	5.70179858	8.5562002
25.5	905.4887858	14.95082	551.79	129.355541	58.0397524	194.679469
555	1112.4	0	555.15	158.914286	98.7459978	270.331291
3.18	248.729701	2.67	152.89	35.5328144	15.5771144	53.1483372
165	354.56	0	164.63	50.6514286	48.0563472	77.0729638
10.3	360.0312121	10.16667	201.6	51.4330303	25.9351421	71.4992728
204	542.4913101	11.57576	204	77.4987586	44.7951633	86.4184659
50.6	237.3239883	6.225806	61.27273	33.9034269	27.4052216	20.0042586
4.1	91.22545455	1.5	56	13.0322078	6.53767597	19.5161853
63.1	132.79	0	65.11	18.97	26.6158477	30.8806898
18.8	235.5719231	7.25	101.82	33.6531319	24.6981236	32.0196472
99	333.6	1.1	99	47.6571429	22.2382102	44.3227503
90.4	267.7804762	6.5	90.4	38.2543537	25.0706784	36.4161474
36.5	201.3895556	0.855556	59.21	28.7699365	15.9886579	20.9869456
54.3	255.1135373	8	73.5	36.444791	27.0584237	25.7057313
77.4	466.4492314	20	153.8223	66.6356045	53.560647	45.9378315
88.3	218.4029	1.2	88.27	31.2004143	12.495657	37.9113485
18	100.77	5.71	37.83	14.3957143	11.3458116	11.645753
1420	5689.086285	191.4742	1420.4	812.726612	602.889688	579.003781

APPENDIX B (iii): COMPUTED STATISTICAL DATA BY COMPANIES ON THE NSE MARKET

Sectors	Cumulative return	Minimum return	Maximum return	Range	Mean return	Geometric mean	Standard deviation
AGRICULTURE							
Brooke Bond	1321.649791	1.88	827.34	629.2	188.807113	64.01581126	229.728847
Eaagads	143.2530882	1.4	95	96.4	20.46472689	5.998912952	34.97812037
Gor Williamson	278.7026374	1.92	183.5	185.42	39.81488248	14.80809878	64.57140707
Kakuzi	202.3431588	1.64	71.9	73.54	28.90818522	15.09484208	28.88276428
Kapchorua	62.34781609	0.74	15.37	16.11	8.90683087	4.990827039	7.031411338
Limuru Tea	2724.346522	5.15	931.62	938.77	389.1923802	85.08333904	488.2342888
Olepajet Limited	109.5530303	0.75	33.25	34	15.6504329	8.655372944	12.78302221
Sasini Tea & Coffee	438.418708	3.42	228.8008801	232.021	62.631244	33.58674893	76.55055247
R. Vipingo	15.74	0	15.74	15.74	2.248571429	15.74	5.949160805
Theta group	0	0	0	0	0	0	0
COMMERCIAL & SERVICES							
A.Baumann	75.44575053	3.5	18.90909091	22.4091	10.77796436	9.044207584	6.057871543
African Tours & Hotels	246.25	1.5	78	79.5	35.17857143	11.51940548	40.07407576
Car & General	44.97242551	0	10.35714286	10.3571	6.424632215	7.183020832	3.559194708
CMC Motors	107.5015806	12.10294118	18.04761905	30.1506	15.35736888	15.20808457	2.282711511
Express Kenya	165.38188	7.74	54.49425287	62.2343	23.62598	18.49675211	18.10489254
Hutchings & Bleimer	126.7667482	7.25	23.92	31.17	18.10953545	18.92481672	6.225584595
Kenya Airways	0	0	0	0	0	0	0
Kenya Hotels	18.5	0	8.5	8.5	2.642857143	1.552921751	4.007433589
Motor mart/Lonhro	171.7486703	7.5	33.2480916	40.7481	24.53552433	22.52770524	8.518856218
Marshalls East Africa	121.7963158	9.85	27.32	37.17	17.39947368	16.12074977	7.148197878
Nation Group	230.1895441	9.3	57	88.3	32.88422058	25.88410146	22.884379
Pearl Drycleaners	59.81161975	0	15.41888887	15.4167	8.544517107	9.463502	5.010401185
Philips international /King Fisher	0	0	0	0	0	0	0
Standard Newspaper	44.48	0.25	12.5	12.75	6.354285714	3.349647587	5.814590433
TPS Serena	18.28571429	0	18.28571429	18.2857	2.612244898	18.28571429	6.911350384
Uchumi	205.4222535	7.042253521	51.82	58.8623	29.34603622	21.0243844	21.30948788
FINANCE &INVESTMENT							
Barclays Bank	688.4022701	28.49425287	155.1	183.594	98.05746715	80.58503878	55.69245277
CFC Bank	371.4170445	8.829113924	101.13	109.959	53.05957779	33.97128394	45.24357337
Chancery Investment	0	0	0	0	0	0	0
City Trust	168.8198033	6.613377926	667	79.78	24.11711475	17.76814437	22.8879547
Diamond Trust	228.772433	14.68886667	45.48	60.1467	32.68177615	29.77133243	13.43154096
Housing Finance Company	137.1262388	1.68	40.38	42.06	19.58946237	9.50498409	19.20253649
ICDC Investment	437.422364	9.215384615	132.16	141.375	62.48890915	32.18199888	63.73595576
Jubilee Insurance	57.51284404	2.41	14.37919463	16.7892	8.216120578	6.939736047	4.610054632
Kenstock	0	0	0	0	0	0	0
Kenya Commercial Bank	369.0904252	23.52622951	83.62547529	107.152	52.72720361	45.93645128	28.78245009
Kenya Finance Bank	118.3388887	6.75	28.88888867	35.4167	18.9052381	14.06977791	9.705987434
National Bank of Kenya	17.7	0	11.11	11.11	2.528571429	8.556570575	4.511180291
NIC Bank	410.4162722	7.952380952	110.71	118.882	58.63089603	38.65397353	48.55319553
Regent Asset Africa	0	0	0	0	0	0	0
Panafrica Insurance	92.89833333	5.94	20.18888887	26.1067	13.27119048	11.79018015	6.375435113
Standard Bank	523.0450909	14.65909091	131.93	146.589	74.72072727	53.07794633	55.05759281
INDUSTRIAL AND ALLIED							
Athi River Mining	0	0	0	0	0	0	0
Bamburi Cement	59.68	1.5	24	25.5	8.525714286	5.70179858	8.556200202
BAT Kenya	905.4887858	14.95081967	551.79	566.741	129.3555408	58.03975237	194.6794693
BOC Kenya	1112.4	0	555.15	555.15	158.9142857	98.74599776	270.3312913
Carbacid East Africa	248.729701	2.67	152.89	155.56	35.53281443	15.57711443	53.1483372
Crown-Berger	354.56	0	164.63	164.63	50.65142857	48.05634722	77.07296379
Dunlop Kenya	360.0312121	10.18888887	201.6	211.767	51.4330303	25.93514214	71.49927276
East Africa Cables	542.4913101	11.57575758	204	215.576	77.49875859	44.79518331	86.41846591
East Africa Packaging	237.3239883	6.225806452	61.27272727	67.4985	33.9034269	27.40522163	20.00425859
East Africa Portland	91.22545455	1.5	56	57.5	13.03220779	6.537675971	19.5181853
Firestone East Africa	132.79	4 0	65.11	65.11	18.97	26.6158477	30.88068976
East Africa Breweries	235.5719231	7.25	101.82	109.07	33.65313187	24.69812361	32.01984716
East African oxygen	333.6	1.1	99	100.1	47.65714286	22.23821015	44.32275026
Kenya National Mills	267.7804762	6.5	90.4	96.9	38.25435374	25.0706784	36.41614744
Kenya Oil Company	201.3895556	0.855555556	59.21	60.0656	28.76993651	15.98865785	20.98694564
Kenya Power & Lighting	255.1135373	8	73.5	81.5	36.44479104	27.05842369	25.70573125
Total Kenya	488.4492314	20	153.8222749	173.822	88.63560449	53.56064704	45.93783145
Unga Group	218.4029	1.2	88.27	89.47	31.20041429	12.49565696	37.9113485
Kenya Orchard	100.77	5.71	37.83	43.54	14.39571429	11.34581162	11.64575296

Source: NSE 1993-1998.

APPENDIX B (iv): COMPUTED NSE SECURITIES BY AVERAGE RETURN AND STANDARD DEVIATION RANKED IN DESCENDING ORDER

Security	Arithmetic mean	Standard deviation
Limuru Tea	389.1923602	466.2343
Brooke Bond	188.807113	229.7286
BOC Kenya	158.9142857	270.3313
BAT Kenya	129.3555408	194.6795
Barclays Bank	98.05746715	55.69245
East Africa Cables	77.49875859	86.41847
Standard Bank	74.72072727	55.05759
Total Kenya	66.63560449	45.93783
Sasini Tea & Coffee	62.631244	76.55055
ICDC Investment	62.48890915	63.73596
NIC Bank	58.63089603	48.5532
CFC Bank	53.05957779	45.24357
Kenya Commercial Bank	52.72720361	28.78245
Dunlop Kenya	51.4330303	71.49927
Crown-Berger	50.65142857	77.07296
East African Oxygen	47.65714286	44.32275
Gorge Williamson	39.81466248	64.57141
Kenya National Mills	38.25435374	36.41615
Kenya Power & Lighting	36.44479104	25.70573
Carbacid East Africa	35.53281443	53.14834
African Tours &Hotels	35.17857143	40.07408
East Africa Packaging	33.9034269	20.00426
East Africa Breweries	33.65313187	32.01965
Nation Newspaper	32.88422058	22.66438
Diamond Trust	32.68177615	13.43154
Unga Group	31.20041429	37.91135
Uchumi	29.34603622	21.30949
Kakuzi	28.90616522	26.88276
Kenya Oil Company	28.76993651	20.98695
Motor mart/Lonhro	24.53552433	8.518856
City Trust	24.11711475	22.88795
Express (K) Ltd	23.62598	18.10489
Eaagads Limited	20.46472689	34.97812

Source: NSE 1993-1998

APPENDIX B (iv): COMPUTED NSE SECURITIES AVERAGE RETURN AND STANDARD DEVIATION RANKED IN DESCENDING ORDER

	Arithmetic mean	Standard deviation
Housing Finance Company	19.58946237	19.20253649
Firestone East Africa	18.97	30.88068976
Hutchings & Bleimer	18.10953545	6.225584595
Marshalls E. A Ltd	17.39947368	7.148197676
Kenya Finance Bank	16.9052381	9.705987434
Olepajet Ranch Limited	15.6504329	12.78302221
CMC Motors	15.35736866	2.282711511
Kenya Orchard	14.39571429	11.64575296
Pan Africa Insurance	13.27119048	6.375435113
East Africa Portland	13.03220779	19.5161853
A.Baumann Ltd	10.77796436	6.057871543
Kapchorua	8.90683087	7.031411338
Pearl Drycleaners	8.544517107	5.010401185
Bamburi Cement	8.525714286	8.556200202
Jubilee Insurance	8.216120578	4.610054632
Car & General	6.424632215	3.559194708
Standard Newspaper	6.354285714	5.814590433
Kenya Hotels	2.642857143	4.007433569
TPS Serena	2.612244898	6.911350364
National Bank of Kenya	2.528571429	4.511180291
176	2.248571429	5.949160805
Theta group	0	0
Kenya Airways	0	0
Philips international /King fishe	0	0
Chancery Investment	0	0
Kenstock	0	0
Regent Asset Africa	0	0
Athi River Mining	0	0

Source data: NSE 1993-1998

APPENDIX B (v): CONSTRUCTED PORTFOLIOS OF NSE SECURITIES BY RETURN AND STANDARD DEVIATION

PORTFOLIOS

Portfolio 1	Arithmetic mean	Standard deviation
Limuru Tea	389.1923602	466.2342888
Brooke Bond	188.807113	229.728647
BOC Kenya	158.9142857	270.3312913
BAT Kenya	129.3555408	194.6794693

Portfolio 2	Arithmetic mean	Standard deviation
Barclays Bank	98.05746715	55.69245277
East Africa Cables	77.49875859	86.41846591
Standard Bank	74.72072727	55.05759281
Total Kenya	66.63560449	45.93783145
Sasini Coffee & Tea	62.631244	76.55055247
ICDC Investment	62.48890915	63.73595576
NIC Bank	58.63089603	148.5531955
CFC Bank	53.05957779	45.24357337
KCB Bank	52.72720361	28.78245009
Dunlop Kenya	51.4330303	71.49927276

Portfolio 3	Arithmetic mean	Standard deviation
Crown-Berger	50.65142857	77.07296379
East African Oxygen	47.65714286	44.32275026
Gorge Williamson	39.81466248	64.57140707
Kenya National Mills	38.25435374	36.41614744
Kenya Power & Lighting	36.44479104	25.70573125
Carbacid East Africa	35.53281443	53.1483372
African Tours & Hotels	35.17857143	40.07407576
East Africa Packaging	33.9034269	20.00425859
East Africa Breweries	33.65313187	32.01964716
Nation Group	32.88422058	22.664379
Diamond Trust	32.68177615	13.43154096
Unga Group	31.20041429	37.9113485
Uchumi	29.34603622	21.30948788
Kakuzi	28.90616522	26.88276428
Kenya Oil Company	28.76993651	20.98694564

Portfolio 4	Arithmetic mean	Standard deviation
Motor mart/Lonhro	24.53552433	8.518856218
City Trust	24.11711475	22.8879547
Express Kenya	23.62598	18.10489258
Eaagads Limited	20.48472689	34.97812037
Housing Finance Company	19.58946237	19.20253649
Firestone East Africa	18.97	30.88068976
Hutchings & Bleimer	18.10953545	6.225564595
Marshalls East Africa	17.39947368	7.148197676
Kenya Finance Bank	16.9062381	9.705987434
Olepajet Ranch Limited	15.6504329	12.78302221
CMC Motors	15.35736866	2.282711511
Kenya Orchard	14.39571429	11.64575296
Panafrica Insurance	13.27119048	6.375435113
East Africa Portland	13.03220779	19.5161853
A.Baumann	10.77796436	6.057871543
Kapchorua	8.90683087	7.031411338
Pearl Drycleaners	8.544517107	5.010401185
Bamburi Cement	8.525714286	8.558200202
Jubilee Insurance	8.216120578	4.610054632
Car & General	6.424632215	3.559194708
Standard Newspapers	6.354285714	5.814590433
Kenya Hotels	2.642857143	4.007433589
TPS Serene	2.612244898	6.911350364
National Bank of kenys	2.528571429	4.511180291
R. Vipingo	2.24857142	5.949160805

Portfolio 5	Arithmetic mean	Standard deviation
Theta group	0	0
Kenya Airways	0	0
Philips International /King fisher	0	0
Chancery Investment	0	0
Kenstock	0	0
Regent Asset Africa	0	0
Athi River Mining	0	0

Source data: NSE 1993-1998

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