

DECLARATION

" DETERMINING THE INFLUENCE OF MACRO-ECONOMIC INDICATORS ON STOCK MARKET INDICATORS. "

HAS NOT BEEN PRESENTED IN ANY OTHER UNIVERSITY

SIGNED [Signature] DATE 8th January 2001
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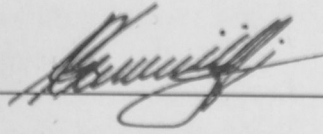
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THIS MANAGEMENT RESEARCH PROJECT IS SUBMITTED IN PARTIAL FULFILLMENT OF THE REQUIREMENTS FOR THE DEGREE OF MASTERS OF BUSINESS ADMINISTRATION AT THE UNIVERSITY OF NAIROBI.

SEPTEMBER 2000

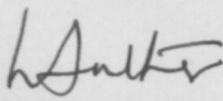
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DEDICATION

I would like to dedicate this paper to my Lord and Saviour Jesus Christ without whom none of this would ever have been remotely possible.

I would also like to dedicate this paper to my parents, Charles and Maureen Muriithi, for their support throughout my schooling.

I would also like to thank a good friend, Elsie Kabogo, for her constant support and encouragement throughout this programme.

And, like above and those I may have overlooked, I always say heartfelt appreciation and may God truly bless you all.

ACKNOWLEDGEMENTS.

PAGE

I would like to thank my supervisor Mr. Otieno Odhiambo Luther, for his constant supervision and patience throughout this project.

I would also like to thank my colleagues in the MBA programme, for their support and incisive criticisms and helpful comments, special mention goes to my Finance classmates.

I would also like to thank a good friend, Elsie Kabogo, for her constant support and patience throughout this programme.

To all the above and those I may have overlooked, I convey my heartfelt appreciation and may God richly bless you all.

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ABSTRACT

This study sets out to determine the influence of the Macro-economic indicators on the Stock market indicators from a strictly investment perspective as well as to examine the role of the stock market in creating viable means to investment in the economy,

The major theories under consideration in this study are the Capital Market Theory, Investment Theory, and Efficient Market hypothesis. The model of **Canonical correlation** analysis was found to be the best tool in analysing the two sets of indicators. It is superior to multiple regression analysis, since it allows for correlation of more than one Y variable with many X variables.

Three Macro-economic indicators were considered suitable for gauging investment activity i.e. Interest (overdraft) rates, Treasury bill rates and Inflation rates. On the other hand three stock market indicators were seen as optimal in their representation of stock market activity i.e. Stock market index, Market capitalization and Turnover.

This study found that Macro-economic indicators do exert a significant level of influence on the Stock Market activity. Furthermore, this study found underlying perceptions of investors in the local market; such as their preoccupation with selected indicators. This study also sought to account for recent trends at the Nairobi Stock Exchange.

This study recommends a strong and concerted effort by all stakeholders in policy formulation and implementation; that is directed towards promotion of an active capital market. However, to achieve economic growth, other inputs such as labour, technology, natural resources and management approach should be incorporated, since Finance alone will not lead to economic growth. The overall effect being to create a more stable macro-economic environment, that results in a lower price of credit (risk) and ultimately improve investor confidence and economic growth.

Further research in this area, should incorporate more variables into the model, to explain a higher level of variance. An inter-sectors study should be carried out to check for mis-allocation of resources and remedy the situation. This study may also be carried out annually to monitor trends to help in assessing improvements or the lack thereof.

CHAPTER ONE

INTRODUCTION

1.1 Background

In the recent past notable developments have taken place in the field of finance, the major one being the establishment of stock markets in emerging economies.

The role of the stock market is classified into 3 categories, (Kitchen, 1986) and (Reilly, 1995) :-

- A source for financing investment.
- A signaling mechanism to managers regarding investment decisions.
- Catalyst for corporate governance.

The focus of this study being the signaling role of the stock market as regards investment in the economy.

1.1.1 Advantages of stock markets.

Stock markets enables companies raise fresh capital both initially, by going public (Initial public offerings- IPO's) and subsequently by secondary issues (rights issue or placement of stock). Thus stock market provide additional capital to industrial, service and utility firms that may find it difficult to raise fresh equity, they can thus expand more rapidly. For example, a firm nearing its borrowing limits has only two ways to raise fresh capital: from retained earnings or equity issue. Equity issue is faster e.g. a firm issuing shares at P/E ratio of 10 is effectively obtaining 10 times its current annual earnings immediately. If earnings remained constant it would take 10 years to raise equivalent

funds through retention, assuming no distribution of dividends during the same period - Reilly (1995).

Developing countries have high debt/equity ratios; a firm's ability to raise new equity capital may help it overcome gearing constraints when it wishes to expand. If profits are high a firm can afford high debt/equity ratios, if profits fall the firm may be forced into liquidation, Kitchen (1986).

Stock market provides government alternative means of selling bonds and raising capital. This is only good if the government uses the funds efficiently for the benefit of the economy. The downside is that the government may crowd out the private sector by starving it of fresh capital by offering more competitive terms or rigging new issues.

Stock market provides savers and financial institutions with a further outlet for their funds. Investors have different risk-taking capacities and preferences. This requires that investors are offered a range of risks and a corresponding range of expected returns. Thus the stock market enables investors to select a portfolio that gives the risk-return combination, which is to their liking. It thus helps them diversify their investments and reduce risk.

Stock market provides a hierarchy of rates of return (cost of capital) between equities, corporate bonds and government stock. Firms and government raising new capital have to pay a rate of return that reflects both rate of return on alternative investments and risk associated with the undertaking; this improves allocation of capital. This is vital for a capital market that is otherwise repressed, or where cost of borrowing is not related either to demand for capital or riskiness of investment to be made.

Stock market may be a vehicle to bring about indigenous ownership and provide a means for state corporations to go public. Stock market may also bring foreign capital into a country from foreign portfolio investors wishing to diversify internationally.

1.1.2 Disadvantages of stock markets

They encourage unequal distribution of wealth by enabling those who are wealthy to increase their wealth without working for it; this view is however political rather than financial or economic, as it is the governments duty to consider effective taxation as another way to encourage redistribution of income.

Stock markets may encourage rash speculation by individuals and firms, apart from collapse, it can ruin and destabilize the national economy; though, careful regulation can help reduce this problem, Kitchen (1986).

Stock markets may provide opportunity for dishonest activity. Where there is a conflict of interest, examples of dishonest activity include; market rigging, insider dealing, issuing false and misleading prospectuses, selling over-priced securities. This can be reduced by effective and careful regulation by the government. The authorities overseeing Capital market development, together with the financial intermediaries, should introduce stricter codes of ethics to uphold integrity in the Financial system. This self-regulatory role should lead to improved investor confidence.

Stock markets may allocate funds to activities expected to show greatest financial profit, these may not be the most preferable from national point of view e.g. alcoholic beverages and tobacco industries. Markets in developing countries (as well as prices) are severely distorted. Distortion of the stock market may lead to deterioration in resource

allocation and not its improvement. However, the government does retain the authority to prohibit private sector investment if they believe it not to be in national interest.

If benefits of the stock market are to be realized, authorities need formulate and implement responsible policies and actively promote capital market development. Investors need to be made aware of the functioning of the stock market, the risk and possible returns.

A well functioning securities market requires a mix of short-term and long-term investors to keep the market fluid. This implies a reasonably widespread distribution of income and wealth within the country and a large middle-class. Countries with skewed income and wealth are unlikely to have a right mix of investors to keep the market active and fluid, as is the case in Kenya.

Kitchen (1986) and Reilly (1995), concur that the most important factor determining willingness to buy and hold securities is the elusive "**investor confidence**." Investors need to have confidence in the macro-economic performance of the economy (market risk). Doubtful growth prospects and inflation fears are bad for stock markets. The stock market cannot possibly hope to sustain investment if the macro-economic factors remain unstable i.e. in other words there is a significant association between macro-economic factors and stock market indicators.

Investors need confidence in the firm's products and markets, its management, and its integrity in information disclosure. Well managed firms earn good returns. Investors also need to have confidence in the integrity of the operation of the stock market and its members, confidence is required in reporting accounts and auditing standards, any suggestion of malpractice deters investors,

Reilly (1995) gives four attributes of a good stock market as:

- Availability of information - the investor can access timely information about volume and prices of past transactions and current bids and offers and information on prevailing supply and demand.
- Liquidity - ability of an asset to be bought or sold quickly and expected prices should be fairly certain (assuming no new information is available). It should also have price continuity i.e. unless new information is available, prices should not change by more than a given percentage.
- Transaction costs - lower costs as a percentage of trade, creates a more efficient market (internal efficiency).
- The investor wants current market price to reflect all available supply and demand factors in the market (if these conditions change, then price should change accordingly (informational efficiency).

1.2 STATEMENT OF THE PROBLEM

Investment decisions are vital in corporate settings as well as to individual investors. The Nairobi stock exchange is currently the most prominent investment vehicle for investment in Kenya.

What is not clear is whether investment decisions taken by investors in this country have any association whatsoever with the macro-economic indicators.

This paper seeks to establish any such association.

1.3 OBJECTIVES OF THE STUDY

The aim of this study is to show whether investors investing at the Nairobi Stock Exchange (NSE) base their investment decisions on the Macro-economic indicators. Specific objectives are: -

- a) To determine to what extent the macro-economic indicators influence the stock market indicators.
- b) To determine to what extent the stock market activity leads to a misallocation of resources in the economy i.e. if we can only account for a small proportion of variance in total returns, and the larger proportion is explained by unknown factors, this could signal a misallocation of resources.

1.4 SIGNIFICANCE OF THE STUDY

The assumption in this study is that changes in the macro-economic variables cause changes in the stock market variables. Thus, policy makers in private or public sectors, as well as investors can follow trends in the economy and determine to what extent these macro-economic indicators affect their likely returns at the Nairobi Stock Exchange.

This study will provide future research with focus on the other roles of the stock market and why its development is critical to an emerging market. At firm level decision-making will be more focused towards the stock market and prevailing macro-economic conditions as opposed to previous speculative investments.

This study should bring about more in-depth financial sector reform by bringing out the important role played by the stock market in emerging markets.

CHAP If we can only account for small variations of total returns and the larger proportion is explained by other factors, this could signal a misallocation of resources. This study will highlight the need to effectively manage the macro-economic indicators to bring about stability in the financial system that translates to lower cost of credit and heightened investors' confidence, and ultimately economic growth.

One view sees the financial market as having a major role to play in development of the real economy. It merely provides legitimate opportunities for the private sector to make use of money. The "casino hypothesis" of the financial system implies that the government can safely ignore it, and in some cases it may be seen as harmful to growth and distribution of income (this view is mainly held by socialist countries).

Benjamin (1975) sees the stock market as a "distraction". If managers are concerned about market value of the firm in the long run, while undertaking investment decisions they should ignore share prices in the short run, if they do not reflect the firm's long term prospects.

Another view is that "stock market matters for investment", Fischer and Merton (1984). Even if the objective of managers is to maximize the wealth of existing shareholders, they should respond to market valuation even when this deviates from the true value of the firm. This is because the role of the stock market is to value the firm as well as to provide liquidity.

The assumption under a fluctuation in share price would also depend on the firm. For instance if a firm is willing to add a lower amount than implied by the market value of the firm's stock price, then the firm should raise new shares.

CHAPTER TWO

2.0 LITERATURE REVIEW

Current literature offers two contrasting views on the stock market role with respect to investment decisions in the economy.

One view sees the financial market as having a minor role to play in development of the real economy. It merely provides legitimate opportunities for the private sector to make/lose money. This "**casino hypothesis**" of the financial system implies that the government can safely ignore it, and in some cases it may be seen as harmful to growth and distribution of income (this view is mainly held by socialist countries).

Bosworth (1975), sees the stock market as a "**sideshow**", If managers are concerned about market value of the firm in the long run, while undertaking investment decisions they should ignore share prices in the short run, if they do not reflect the firm's long term prospects.

The other view is that "**stock market matters for investment**", Fischer and Merton, (1984). That if the objective of managers is to maximize the wealth of existing shareholders, they should respond to market valuation even when this deviates from the true value of the firm. This is because the role of the stock market is to value the firm as well as to provide finance.

The assumption is that a fluctuation in share price would alter cost of capital to the firm. For example if investors are willing to accept lower returns than justified by the true value of the firm or stock prices are too high, then firms should issue new shares and

invest until the marginal product of capital equals that lower cost of capital. This strategy would maximize the wealth of existing shareholders.

A further argument is that lack of developed financial system restricts economic growth, that government policy should be directed towards encouraging the growth of the financial system, (**Development hypothesis**), Kitchen (1986).

This means achieving a certain combination of growth and distribution of income per head that is seen as satisfactory. Unless the financial system does this it is seen as neutral or even worse a waste of resources leading to inflation and building up of debt (with no means to service the debt), leading to panics, crises and collapse. This **Development hypothesis** sees the financial system as a necessary input in the development process and therefore a necessary risk to be taken.

However, the availability and efficient use of finance can never be a sufficient condition for economic growth, but should be seen as only one of a number of necessary inputs such as natural resources, labour, markets, management, technology, entrepreneurial ability, Kitchen (1986). In the mid 70's leading writers agreed that financial development is important and leads to economic development, Gupta (1984).

The reverse direction of causality can be argued that economic growth leads to financial sector development but little research has proven this.

The financial intermediary is vital in the transfer of savings to investors, and for the intermediary to be effective it must attract both lenders and savers. i.e.

- a) Provide an incentive to save - savers can now invest in a financial investment that offers a return as opposed to consuming their funds or investing directly.

- b) Increase volume of investment - investors will have access to savings other than their own, thus increasing funds available for investment.
- c) Improve the efficiency of investment - development of markets in money and financial instruments will tend to channel funds to more productive investments.

Kitchen (1986), notes that the financial sector has an inherent tendency to allocate resources to investors with the best security, rather than those with the best investment schemes: this therefore questions the notion that the financial sector allocates resources completely efficiently but nevertheless is better than any alternative mechanism.

He further argues that the financial sector is important in economic development and that a fragmented or inefficient financial sector is just as much a constraint on economic growth as an inefficient transport or power sector.

Another role for financial intermediaries is **maturity transformation**. Savers prefer short-term to long-term savings due to less risk and less loss of liquidity while investors prefer long-term funds for physical assets longer periods to service debt, this maturity transformation role enables needs of investors and savers to be met simultaneously.

Another role is **risk transfer** - individual savers will be reluctant in undertaking physical investments themselves or even lend directly. Since there will be a loss of liquidity on their part and the savers may not possess the know-how, financial or legal muscle to protect their investment, thus use of financial intermediaries in whom they have confidence and perceive to be sound. These institutions then provide finance to many investors and diversify risk.

By playing these roles of risk transfer and maturity transformation, financial institutions play a vital role in increasing the mobilization of savings and thereby raising the level of investment and hopefully the rate of economic growth.

An organized stock market will also ensure to some extent that a company issuing stock is reputedly managed and those making the market (brokers) are also reputable: this increases the confidence of savers and perceived risk of investing in these stocks is reduced, resulting in economic development.

2.1 Capital Market Theory

It is also known as the modern portfolio theory, based on the relationship between Risk and expected Return.

Markowitz (1952), demonstrated that diversification of security holdings reduced Risk, unless returns to securities are perfectly positively correlated, thus the rationale for more listings at the Nairobi Stock Exchange.

Capital market theory relates an investors expected return to the risk of the investment, i.e. at zero risk the investor obtains risk-free rate of return, and as his willingness to take risks increases so does his required rate of return increase.

Sharpe (1963), divided total risk into two components:

- Market risk - systematic or undiversifiable risk.
- Specific risk - unsystematic or diversifiable risk.

Therefore, the expected return on a diversified portfolio depends upon the level of market risk that is accepted.

2.2 The '**beta**' coefficient is used to measure sensitivity of the price of an individual share to a change in the overall market as represented by the index; the performance varies proportionally with the beta coefficient.

Capital market theory has powerful implications for investment on stock exchanges, and for capital investment decision taking in both the private and public sectors. Since the market only compensates investors for market risk, given that specific risk can be diversified away, thus, opportunities exist to diversify away risk at the stock exchange and receive compensation for market risk. This assumes that the stock exchange does indeed offer those opportunities for risk reduction, that is the essence of this study.

Given an efficient market - we see that the only efficient way to invest is to divide ones portfolio between the market portfolio and risk-free investments.

Kitchen (1986) argues that the security market line represents the relation between expected return and beta value of all securities in the market, in equilibrium every security will find itself located along the line.

In an efficient market - the security market line (SML) represents the equilibrium prices of securities in the market. If a security strays above the SML by offering higher return than is commensurate with that level of risk, it will be immediately bought and its price will rise until its expected return falls to its equilibrium level. If another security falls below SML by offering lower returns than is commensurate with that level of risk, this security will be sold, its price will fall until expected return rises to its equilibrium value.

2.2 Investment Theory

Theories of investment posit a direct link between the stock market and investment decisions in the economy.

Investment theory asserts the need to diversify in order to minimize risk.

Individuals give up immediate possession of savings for a future larger amount of money that will be available for future consumption. This trade-off of present consumption for a higher level of future consumption is the reason for saving i.e. what one does with savings to make them increase over time is **investment**, Reilly (1995).

The rate of exchange between future consumption and current consumption is the pure rate of interest. This interest rate is established in the capital market by a comparison of the supply of excess income available (savings) to be invested and the demand for excess consumption (borrowing) at a given time.

In a risk-free environment savers will expect only the pure/real rate of interest and assume a general constant price level in the economy; however inflation is always present, thus the investor will require a higher a higher rate of return to compensate for a change in prices. Furthermore if the future payment from the investment is uncertain, the investor will demand an interest rate that exceeds real rate of interest and inflation, this excess is the risk premium. Risk premium is usually taken as the difference between annual returns on companies quoted on the stock market and return on government bonds, Reilly (1995)

Investment is therefore current commitment of funds for a period of time in order to derive future payments that will compensate the investor for:

- Time the funds are committed.

- The expected rate of inflation.
- The uncertainty of future payment.

The above three components form the required rate of return/interest rate.

Real risk-free rate - this rate assumes no inflation and no uncertainty about future cash flows, thus an investor in an inflation free environment and no uncertainty would demand real risk-free rate on the investment.

This rate is influenced by two factors (subjective and objective)

Subjective - an individual's time preference for consumption of income. This varies from one individual to another.

Objective - the set of investment opportunities available in the economy. These investment opportunities are determined by the long-run real growth rate of the economy.

In rapid economic growth, opportunities are many and thus positive rates of return. Those supplying funds will demand higher rates of return when growth is higher, those seeking funds to invest should be willing to pay higher rates of return due to high growth rate. Thus a positive relationship exists between real growth rate in the economy and risk-free rate. The factors that determine risk-free rate change gradually over long-term.

Nominal risk-free rate - this means the real rate of interest that is adjusted for changes in the general price level, as opposed to nominal rates of interest that are stated in money terms. Nominal rates of interest are determined by real rates of interest plus other factors such as expected rate of inflation and monetary environment.

Two factors influence nominal risk-free rate:

- Relative ease or tightness in the capital market.
- Expected rate of inflation.

However evidence has shown that the nominal rate of interest is not stable in long or short run despite real risk-free rate being stable.

Investors see treasury bills as a prime example of a default-free investment since government has unlimited and unrivalled ability to derive income from taxes or creation of money from which to pay interest. Treasury bill rates should ideally only change gradually.

The purpose of the capital market is to bring investors together, those who wish to invest savings and those who need capital to expand (companies) or finance budget deficits (government).

The cost of funds at any time (interest rate) is the price that equates current supply and demand for capital. A change in the relative tightness or ease of capital is a short run phenomenon caused by temporary disequilibrium in the money supply and demand for capital. Disequilibrium could be caused by an unexpected change in monetary policy (a change in growth of money supply) or fiscal policy (a change in the budget deficit).

A change in either policy will result in a change in the risk-free rate of interest, but the change will be short-lived because in the long run the higher or lower interest rates will affect capital supply and demand. A decrease in growth rate of money supply (tightening of monetary policy) will reduce supply of capital and increase interest rates. This increase in interest rates will cause an increase in savings and a decrease in the

demand for capital by corporations and individuals. These changes will bring interest rates back to the long-run equilibrium based on long-run growth rate of the economy.

Sources or fundamentals of risk (uncertainty):

- **Business risk** - the uncertainty of income flows caused by the nature of a firm's business, the greater the uncertainty the higher the required rate of return by the investor.
- **Financial risk** - uncertainty associated with the firm's method of financing its investment, i.e. if it uses only common stock to finance investments, it will incur only business risk. If in addition to common stock the firm borrows money, then they must pay fixed charges before providing income to owners. As a result of this, the equity investor's uncertainty rises because of firm's debt financing, and thus the investor will require a higher rate of return for this financial risk.
- **Liquidity risk** - the uncertainty introduced by the secondary market for an investment, i.e. investors expect that at maturity their assets will be saleable or quickly converted into cash. The harder this is the higher the required rate of return to compensate for this risk.
- **Exchange rate risk** - this is the uncertainty of returns to an investor who acquires securities denominated in a currency different from his/hers. The investor also has to take into account the foreign firm's business and financial risk and the securities liquidity risk. The more volatile the exchange rates between the two countries the higher the required rate of return (risk premium).

- **Country risk** - the uncertainty of returns caused by the possibility of a major change in the political or economic environment of a country, investors putting their funds in unstable economies must add country risk premium to the required rates of return.

The alternative view on risk is that based on the portfolio theory in writings on capital market theory by Markowitz (1952) and Sharpe (1964).

The assumptions here are that investors are rational and achieve profit-maximization objective by holding diversified portfolios of risky assets.

This assumes that the relevant measure of an individual assets risk is its co-movement or covariance with the market portfolio. The only relevant portion of that risk is the systematic risk.

There is a significant relationship between market measure of risk (beta) and fundamentals or risk (business, liquidity, financial etc), the two views are complementary, this seems reasonable since in a properly functioning capital market the market measure of risk should reflect the fundamental risk characteristics of the asset.

2.3 Efficient Market Hypothesis

The main implication of this hypothesis is that share prices reflect all information as soon as it becomes available, this discounts future expectations, and no arbitrage opportunities will exist in an efficient market. This implies efficient allocation of scarce resources within an economy.

Stiglitz (1981), Inefficient capital markets in developing countries tend to be characterized by their small size, with low volume of transactions. This suggests that

reaction of share prices to new information may not be immediate and thus prices may not fully reflect all available information.

Kitchen (1986) adds that the consequences of this will be that a number of share prices may be off the "perfect securities market line". However, even if share prices do reflect the available information, they may be too few in number to form a continuous security market line. Instead the line will appear as a series of unconnected points. A combination of this two phenomenon gives us a scatter diagram of share prices or a picture of a fragmented capital market.

There is also lack of adequate market regulation and inadequate disclosure standards. This gives some firms the opportunity to rig the market and make windfall gains, since access to information is uneven, and thus share prices may not reflect their true risk - return ratios.

They also have poor communication that further restricts the spread of information; this serves to reduce investor confidence in the market.

Drake (1980), called for official regulation and supervision to ensure full disclosure and wide dissemination of information to prevent market rigging and protect share holders. He cautioned that '**regulatory overkill**' may inhibit capital market development.

A financially efficient market is one whose prices fully reflect all available information. An economically efficient market is one which allocates resources in a 'Pareto efficient' way, i.e. no one can be made better off without someone else being made worse off.

Stiglitz (1981) shows that financial markets that are efficient, complete and competitive may not be economically efficient: because

- Transmission of information between shareholders and managers is costly and imperfect, managers may know more about the future prospects than share holders and may withhold this information. The management may not allocate resources to projects that maximize welfare. The shareholders may not tell managers their attitudes to risk, return and projects undertaken
- Objectives of the management and shareholders will not coincide, their views on a good investment may differ. Reality shows shareholders have little control, and that managers that have the most control may fail to efficiently allocate resources, which will be reflected in the share price.

Shares represent the underlying assets of a company, and the price of these shares represents the value that the market places on these assets. Share prices are affected by overall market factors and the movement of the index may be taken as a proxy for expectations about the economy.

The capital market theory as earlier seen compensates the investor for market risk only, if there exists a high degree of uncertainty (risk) this will raise the price of credit in the economy. If this increased uncertainty results in high fluctuations of returns in the stock market (meaning we can only account for a small proportion of total returns), the implication is that savers are not bound to give up current consumption of their funds. This implies a slow-down in economic growth.

The main theme of the efficient market hypothesis is that all information is reflected in share prices, implying an efficient allocation of scarce resources within the economy, therefore if high proportions of returns are explained by external factors this may signal a misallocation of resources in the economy.

2.4 Indicators of stock market development

Stock market index

Investors hold portfolios of many assets, but it is cumbersome to follow progress on each security in the portfolio. It is prudent therefore to observe the entire market under the notion that their portfolios moved the same direction as the aggregate market.

The index is used to observe total returns for an aggregate market, and these computed returns are used to judge the performance of individual portfolios. The assumption is that randomly selecting a large number of stocks from the total market, the investor should be able to experience a rate of return comparable to the market.

In Portfolio and Capital Market theory the implications are that the relevant risk for an individual risky asset is its systematic risk, which is the relationship between the rates of return for a risky asset and the rates of return for a market portfolio of risky assets. Therefore when computing systematic risk for a risky security it is necessary to relate its returns to the returns for an aggregate market index, that is used as a proxy for the market portfolio of risky assets.

Changes in the index reflect a fluctuation in returns of the actively traded firms, it is also seen as an expectation about the economy.

Market capitalization

This indicator is useful in measuring market movements, it measures the total value of an enterprise by aggregating market value of its securities. It is often computed by using the value of equity securities only; i.e. the stock market price per share is multiplied by the number of shares that are outstanding. To reflect the size of the company more accurately the market capitalization measure sometimes includes the value of publicly traded long-term debt or other securities. Market capitalization may fluctuate widely daily. Its limitations is that it is based on trading in a small portion of company's shares that may not necessarily represent what a purchaser of the entire company would have to pay.

Changes occur due to fluctuations in share prices (based on market perception of firm value), it also changes with issuance of new shares or bonuses; this implies more activity at the stock exchange that may signal more investment taking place.

Turnover

This shows the cash inflows and outflows in the stock market. It is based on the actively trading shares and changes occur due to fluctuation in share prices or number of shares traded in a given period.

2.5 Indicators of Economic development

Interest rates

This is the price of credit in the financial market or the earning rate on financial assets. They are usually measured as an annual percentage rate of the amount borrowed. Interest rates are also the earning rates on financial assets, therefore interest rates as prices of credit are equivalent to interest rates as earning rates, it just depends on whether you are borrowing or lending.

Inflation

This is the price index in the economy and forms a vital component of the interest rates. It is thus a vital consideration for investment decisions.

The theoretical relationship between interest rates and inflation is expressed by the **Fisher effect**. He studied the relationship between the two variables - interest rates and expected inflation, and found that investors demand a higher interest rate (an inflation premium) for expected loss of purchasing power over the period of investment.

The productivity of investment in the economy and the preferences of individuals regarding present versus future consumption determine the real interest rate.

Capital market theory assumes nominal interest rates, that they fully reflect all available information on future interest rates. Research has shown a negative relationship between returns and rates of inflation i.e. stocks may not always provide a hedge against inflation.

An increase in the rate of inflation, whether or not it is caused by an increase in money supply, will if interest rates remain at the controlled nominal level, have the effect

of reducing the real rate of interest. Savers will be discouraged from holding money balances when faced with a low or often negative real rate of interest, they will tend to invest in inflation hedges such as gold, jewelry, real estate: in commodities that are non-productive, Kitchen (1986).

Financial repression - the control of interest rates by government distorts actual interest rates from equilibrium interest rates that would exist in a competitive market for money. The restrictions put in place by government tends to discourage the development of financial institutions and instruments leading to incomplete or stunted financial markets. Financial repression theory departs from the point that capital markets are not efficient or in equilibrium, as opposed to the capital market theory, Stiglitz (1981).

Policy recommendations would focus on financial liberalization leading to financial deepening. Locally this liberalization has not moved hand in hand with policies that serve to reduce the risk premium required by investors, i.e. create an environment conducive to investment, hence recent debate on controlling the interest rate. This violates supply and demand factors and investment via the stock exchange will not be efficient and reflect a misallocation of resources.

Kitchen (1986), Liberalization requires that interest rates be freed from the government controls, which will encourage the growth of financial assets and liabilities. This encourages institutional development. It will also encourage individual borrowers/savers to switch from informal to formal sector, thereby integrating the two sectors. This would lead to an increase in the range of financial instruments available, the

end result being to transform a narrow, inefficient and fragmented capital market into a larger more complete and more efficient capital market, this will tend to promote economic development.

Kitchen (1986) further argues that liberalizing interest rates, will not be a sufficient condition to develop the financial sector to the extent that it exerts a substantial influence in investment and economic growth. It needs to be accompanied by an institutional development and strengthening so that alternative competitive markets for savings such as equities, unit trusts, life insurance and pension funds are present.

A policy of liberalization based on the belief that financial development leads to economic development would be a policy of laissez-faire capitalism, for it assumes that financial markets and institutions are the best judges of allocation of investment funds. This may hold in some sectors such as service, agriculture, manufacturing, but is doubtful that it would lead to efficient allocation of resources across a whole economy, especially one with severe price distortions.

Treasury bills

This is the rate at which the government securities are bought and sold.

Bank rates

This is the rate at which commercial banks borrow from the central bank. The central bank may increase the rate and hamper commercial banks ability to create money, this affect money supply and hence interest rates (lending/borrowing rates). If inflation is high the bank rate from the central bank is high, thus commercial banks increase their

lending rates, the effect is to reduce borrowing in money market and ultimately inflation is reduced by having little money in the economy and price levels are lower. There is thus a direct relationship between money supply and price levels.

2.6 Related studies

Munga (1974) conducted a study on the Nairobi Stock Exchange (NSE) with a focus on its history, organization and role in the Kenyan economy. This case study dwelt on the NSE functions, procedures and its members. It further saw the NSE role as passive in providing a market for government, local authorities and public companies. It failed to perform the classical function of a stock exchange; this study relied heavily on the rules and regulations of the NSE and also used primary data from its members and at the time found that political factors played a major role at the NSE.

Simiyu (1992) conducted a study on measuring market performance of the NSE. This study set out to construct an alternative index, it identified the need for alternative performance measures and focused primarily on the NSE index and stock prices, but did not address macro-economic performance measures, but offered the same as a suggestion for further research.

Nyamute (1998) studied the relationship between NSE index and major macro-economic variables, he studied the NSE index as the sole variable for the stock market and Inflation rate. Money supply, Treasury bill rate and exchange rate as the indicators of macro-economic performance. He found that the macro-economic variables do indeed

exert an influence on stock prices. He performed multiple regression analysis on the data, with NSE index being the sole dependant variable. This study had no underlying theories as pertains to investment, diversification or efficiency, thus his findings were not supported by any of the theories. It is possible that the results are affected by the presence of auto-correlation and multi-collinearity i.e. predictive factors such as money supply, interest rates and inflation affect each other as well as reflecting on the response variable.

He found that T-bills and exchange rate were more generally significant than either inflation or money supply. This study deviates from Nyamute's study by assessing more than one stock market indicator and macro-economic indicators. It uses a more complex technique of analysis that allows for the use of numerous dependant variables and independent variables, while at the same time solving the problem of auto-correlation and multi-collinearity. It gives more complete findings in the sense that it accounts for all macro-economic factors as having an impact on all indicators of the stock market, this study addresses major theoretical implications i.e. investment theory, capital market theory and efficiency of the local market.

CHAPTER THREE

3.0 RESEARCH DESIGN AND METHODOLOGY

3.1 INTRODUCTION

This chapter will begin by setting out the relevant hypotheses to be tested. It will subsequently define the sample population and sample frame. The source of the data will then be identified. The selected variables of both macro-economic and stock market variables will be justified and conclude by giving a detailed explanation of the data analysis technique.

3.2 RESEARCH HYPOTHESIS

a) **H₀** The Null hypothesis is that the macro-economic factors do not influence the Stock market indicators (NSE Index, market capitalization, turnover).

H₁ The Alternative hypothesis is that the macro-economic indicators have a significant influence on the stock market indicators.

b) **H₀** The null hypothesis is that the extent of influence of macro-economic indicators on the stock market indicators is not significant.

H₁ The alternative hypothesis is that macro-economic indicators exert a significant level of influence on the stock market indicators.

The level of significance selected is $\alpha = 0.05$.

3.3 SAMPLE POPULATION

The population will consist of all companies quoted on the Nairobi Stock Exchange (NSE) 54 firms.

3.4 SAMPLE FRAME

This will consist of the NSE 20 firms that are actively traded those that make up the NSE 20-share Index. This is because shares represent the underlying assets of a company. The price of these shares represents the value that the market places on these assets. Share prices are affected by overall market factors and the movement of the index may be taken as a proxy for expectations about the economy.

Data to be analyzed will be continuous data, from January 1996 – May 2000, representing a period of 4 1/2 years. The data points will be monthly i.e. 12 data points per year.

3.5 DATA COLLECTION

The required data will be sourced from the Nairobi Stock Exchange and the Central bank of Kenya – monthly reports for the stated periods.

3.5.1 Variables to be used in the study:

- Macro-economic factors: Interest (overdraft) rates, Treasury bill rates, and Inflation rates. (X variables).
- Stock Market indicators: NSE Index, Market capitalization and Turnover. (Y variables).

3.6 DATA ANALYSIS TECHNIQUE

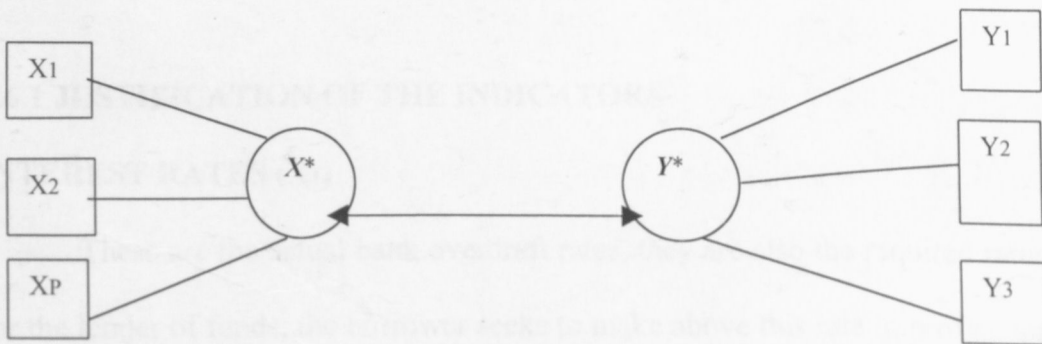
To adequately capture the correlation between Economic indicators - Interest rates, Inflation and Treasury bills; and Stock market indicators – NSE 20 share index, Turnover and Market capitalization. The most appropriate statistical model is the **Canonical Correlation Analysis**.

This model captures both theoretical concepts i.e. the stock market indicators and Economic indicators, these are called the Canonical variables i.e. the economic indicators X^* , and stock market indicators Y^* . The expectation here is that they are strongly correlated, the correlation between the two is called the “**Canonical Correlation**”.

The first canonical variable X^* is measured by $p=3$ indicators i.e. X_1 to X_3 , thus X^* is considered as a linear combination (a weighted sum) of X_1 to X_3 , Y^* the second canonical variable is a linear combination of $q=3$ indicators i.e. Y_1 to Y_3 .

This can be shown diagrammatically;

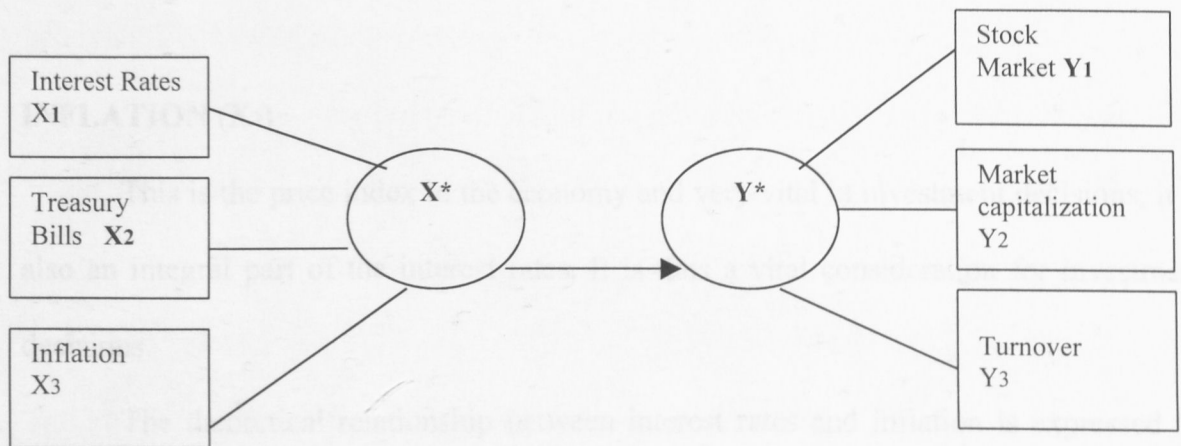
Figure 1



The assertion here is that changes in economic indicators causes changes in the stock market indicators. The units of analysis are the 20 firms comprising the NSE 20-share index.

A further assertion is made that investment activities of those firms as reported in their annual statements of accounts, is captured by the Stock market index. The NSE 20-share index will serve as a proxy for the cash flow statement activities (investments).

Figure 2: Causal diagram showing hypothetical relationships.



All these variables $p = 3$ and $q = 3$ are measured at interval level.

3.6.1 JUSTIFICATION OF THE INDICATORS

INTEREST RATES (X_1)

These are the actual bank overdraft rates, they are also the required rates of return for the lender of funds, the borrower seeks to make above this rate in profits, and thus we use this rate to gauge economic growth or trends. They are usually measured as annual percentage rate of amount borrowed.

TREASURY BILLS (X₂)

This is the rate at which government securities are bought or sold. It has obvious underpinnings as to the state of the economy. If Treasury bill rates are high it indicates huge government domestic borrowing which implies huge budget deficits caused by inefficiency or poor economic governance. When these rates are low it indicates little need by the government for domestic public funds implying efficient use of already collected revenue which shows good economic governance.

INFLATION (X₃)

This is the price index in the economy and very vital in investment decisions, it is also an integral part of the interest rates. It is thus a vital consideration for investment decisions.

The theoretical relationship between interest rates and inflation is expressed by the **Fisher effect**. He studied the relationship between the two variables - interest rates and expected inflation, and found that investors demand a higher interest rate (an inflation premium) for expected loss of purchasing power over the period of investment. The productivity of investment in the economy and the preferences of individuals regarding present versus future consumption determine the real interest rate.

STOCK MARKET INDEX (Y₁)

This index examines total returns for an aggregate market. NSE is computed on a geometric average basis. These computed returns may be used to judge performance of

an individual portfolio. An aggregate stock market index can be used to measure or judge the performance of money managers.

It is thus relevant because in Portfolio and Capital market theory, the implications are that relevant risk for an individual risky asset is its systematic risk. This is the relationship between the rates of return for a risky asset and the rates of return for a market portfolio of risky assets as depicted by the returns for an aggregate market index.

MARKET CAPITALIZATION (Y₂)

This is the summation of number of shares when multiplied by the prices of those shares for all the firms in the stock exchange.

TURNOVER (Y₃)

This shows the cash inflows and outflows in the stock market.

The expectation is that changes in the macro-economic indicators will cause changes in the stock market indicators. The macro-economic indicators reflect present and future expectations about the economy. Investors at the NSE (being the most prominent investment vehicle) are therefore subject to the prevailing economic conditions, thus the need to assess their impact on the stock market indicators.

A legitimate method for examining the correlation between macro-economic variables and stock market variables is an analysis of separate correlations between all six variables i.e. interest rates, treasury bill rates, inflation, index, market capitalization and turnover. For example $\{X_1, Y_1\}$, $\{X_1, Y_2\}$, $\{X_1, Y_3\}$, $\{X_2, Y_1\}$, $\{X_2, Y_2\}$, etc.

We would derive numerous multiple regression equations. This would still be inadequate in capturing the effect of a set of many X variables on a set of many Y variables.

However canonical correlation analysis goes a step further than this examination of separate correlation.

3.6.2 THE MODEL OF CANONICAL CORRELATION ANALYSIS

In Canonical correlation analysis we set out to discover if there is a significant association between a set of X variables and a set of Y variables. For this reason we look for a linear combination X^* of the X set and a linear combination Y^* for the Y set, in such a way that X^* and Y^* are maximally correlated (these are the canonical variables).

In this case they are Economic variables X^* and Stock market variables Y^* .

The correlation ρ between X^* and Y^* is called a **Canonical Correlation**.

To explain the logic of Canonical correlation analysis is by use of **multiple regression analysis**, where there is one dependent variable Y and a set of X independent variables. A linear combination in the form of X^* is sought, i.e. $X^* = a_1x_1 + a_2x_2 + \dots$ so that X^* and Y^* are maximally correlated.

However, in canonical correlation there is an entire set of Y variables, which are also represented by a linear combination in the form of: $Y^* = b_1y_1 + b_2y_2 + \dots$

The two linear combinations (canonical variables) X^* and Y^* are unknown, the weights **a** and **b** are calculated. Canonical correlation analysis aims at determining these weights in such a way that the canonical correlation ρ is as high as possible.

Objective The square of this canonical correlation is the proportion of variance in one set (e.g. Stock market variables) that is explained by the variance in the other set (e.g. economic variables).

Procedure Various pairs of canonical variables can be found. Each pair is uncorrelated with the preceding pair and is calculated each time so that the canonical correlation is maximal. The number of canonical variables is equal to the number of variables in the smallest set i.e. $\min [p,q]$, $p=3$, $q=3$.

In Canonical correlation analysis, one aims to examine to what degree two batteries X variables on the one hand and Y variables on the other, show association as a whole, each battery is replaced by a linear combination. The correlation between these two linear combinations forms the subject of this research.

First In canonical correlation analysis, one controls for the associations within each of the sets, as it is possible that the variables within the X set of Economic variables are also correlated in pairs or otherwise; this could also be the case on the Y set of Stock market variables. This poses the problem similar to multicollinearity in multiple regression analysis. However, Canonical correlation analysis aims to examine the between-correlation and not the within-correlation i.e. Canonical correlation analysis measures to what degree the economic characteristics and the stock market characteristics are correlated, controlling for (i.e. assuming the absence of) within-association's within the economic characteristics and within-association in the stock market characteristics.

Objectives of the canonical correlation technique

We first look for a pair of linear combinations, one from the set of economic variables and one from the stock market variables, in such a way that the correlation between both of the linear combinations is maximal.

We then look for a second pair of linear combinations also maximally correlated but uncorrelated with the first pair. We do this, as many times as there are variables in the smallest set.

Linear combinations are 'canonical variables', the weights are 'canonical weights', maximized correlation's are 'canonical correlation's. We can check to see if the associations between the sets can be generalized for the entire population of firms in the stock exchange. Testing the canonical correlation for significance does this. Since the first canonical correlation is the largest, the following ones are smaller, it is thus sufficient to interpret the ones which give the most significant result.

CHAPTER FOUR

4.0 INTRODUCTION

This study rejects the first null hypothesis, that states: macro-economic factors do not influence stock market indicators and accepts the alternative hypothesis, that the macro-economic indicators do exert influence on the stock market indicators.

4.1 FINDINGS

The original data set (see appendix) was analyzed using the model of canonical correlation analysis and the following algebraic equations derived were:

$$X^*_1 = 0.765x_1 + 0.45x_2 - 0.395x_3$$

$$X^*_2 = 1.615x_1 - 1.32x_2 - 0.96x_3$$

$$X^*_3 = 1.17x_1 - 1.392x_2 + 0.696x_3$$

$$Y^*_1 = 1.068y_1 - 0.111y_2 - 0.467y_3$$

$$Y^*_2 = 0.149y_1 + 0.811y_2 + 0.213y_3$$

$$Y^*_3 = 0.044y_1 - 0.894y_2 + 1.163y_3$$

Note.¹

X^*_1 and Y^*_1 is the first pair of canonical variables which display the highest canonical correlation, 0.73: squared correlation, 0.533 i.e. 53.3% of variance in the stock market variables is caused by variance in the macro-economic variables.

¹ Note: Bank rates were omitted from the list of macro-economic variables as they were found to have an almost perfect positive correlation with the overdraft rates and thus would not alter significantly the results of this analysis.

From the algebraic equations we see that the most weight appears to be attributed to variables X_1 , 0.765 and Y_1 , 1.068 respectively.

The first pair of canonical variables refers predominantly to the relationship between Interest rates (overdraft) and the NSE Index, this relationship is positive. The table of All-correlation's also confirms this.

The second pair of canonical variables X^*_2 and Y^*_2 attributes a large weight to variable X_1 , 1.615 and Y_2 , 0.811 respectively, this refers to the relationship between interest rates and market capitalization, which appears positive. This may suggest that investors are borrowing funds to invest in the stock market. This also presupposes that the stock market will offer higher rates of return than prevailing overdraft rate. The canonical correlation is 0.536: squared correlation, 0.287, i.e. a further 28.7% variance in the stock market variables is caused by variance in macro-economic variables.

Table 1: Eigenvalues and Canonical Correlations

Root No.	Eigenvalue	Pct.	Cum. Pct.	Canon. Cor.	Sq. Cor.
1	1.142	73.409	73.409	0.730	0.533
2	0.402	25.846	99.255	0.536	0.287
3	0.012	0.745	100.000	0.107	0.011

The macro-economic variables explain 82% of the variation in the stock market, (given the variables under study here). The unexplained variance of 18% is caused by other factors.

This study thus rejects the second null hypothesis, and accepts the alternative hypothesis, that states: macro-economic factors exert a significant level of influence on the stock market indicators.

The third pair of canonical variables attributes a large weight to X_1 , 1.17 and Y_3 , 1.163 respectively, which shows a positive relationship between interest rates and turnover. This seems to complement the earlier findings, since turnover is a function of volume of shares traded at the NSE. The canonical correlation's is 0.107: squared correlation is 0.011, which in this analysis is considered insignificant for interpretation.

Table 2: Separate correlation's

	X_1	X_2	X_3	Y_1	Y_2	Y_3
X_1	1.000	0.861	0.599	0.570	-0.143	-0.096
X_2	0.861	1.000	0.492	0.498	-0.285	-0.219
X_3	0.599	0.492	1.000	0.056	-0.378	-0.224
Y_1	0.570	0.498	0.056	1.000	0.236	0.400
Y_2	-0.143	-0.285	-0.378	0.236	1.000	0.562
Y_3	-0.096	-0.219	-0.224	0.400	0.562	1.000

This table represents the other legitimate approach discussed earlier in analyzing the original data set. However method of canonical correlation goes a step further than this analysis of separate correlation.

Table 3: all-correlation's

	X ₁	X ₂	X ₃	Y ₁	Y ₂	Y ₃	X* ₁	X* ₂	X* ₃	Y* ₁	Y* ₂	Y* ₃
X ₁	1.000	0.861	0.599	0.570	-0.143	-0.096	0.917	-0.096	0.388	0.670	-0.054	0.043
X ₂	0.861	1.000	0.492	0.498	-0.285	-0.219	0.914	-0.404	-0.039	0.675	-0.203	0.021
X ₃	0.599	0.492	1.000	0.056	-0.378	-0.224	0.287	-0.647	0.706	0.209	-0.345	0.080
Y ₁	0.570	0.498	0.056	1.000	0.236	0.400	0.634	0.220	0.028	0.867	0.418	0.271
Y ₂	-0.143	-0.285	-0.378	0.236	1.000	0.562	-0.090	0.518	-0.026	-0.126	0.966	-0.227
Y ₃	-0.096	-0.219	-0.224	0.400	0.562	1.000	-0.094	0.389	0.071	-0.129	0.726	0.675
X* ₁	0.917	0.914	0.287	0.634	-0.090	-0.094	1.000	0.000	0.000	0.730	0.000	0.000
X* ₂	-0.096	-0.404	-0.647	0.220	0.518	0.389	0.000	1.000	0.000	0.000	0.536	0.000
X* ₃	0.388	-0.039	0.706	0.028	-0.026	0.071	0.000	0.000	1.000	0.000	0.000	0.107
Y* ₁	0.670	0.675	0.209	0.867	-0.126	-0.129	0.730	0.000	0.000	1.000	0.000	0.000
Y* ₂	-0.054	-0.203	-0.345	0.418	0.966	0.726	0.000	0.536	0.000	0.000	1.000	0.000
Y* ₃	0.043	0.021	0.080	0.271	-0.227	0.675	0.000	0.000	0.107	0.000	0.000	1.000

This table represents a superior analysis to the previous one and shows the combined overall effect of macro-economic factors on the stock market variables.

From the algebraic equations derived earlier, the scores of canonical variables were calculated: first, the entire data set was standardized (macro-economic and stock market data). These scores were then substituted into the algebraic equations to derive a canonical variable score for each period in the entire data set. (See appendix for standardized scores of original data set and standardized scores of canonical variables).

The table of All-correlation's is then derived to present the correlation's between canonical variables and the original variables, to offer us the possibility of better interpretation of the canonical variables. (See appendix for coefficients of all-correlation's, used to develop table 3).

Interest rates

The prevailing overdraft rates seem to have the most significant impact on the stock market variables. The canonical variables, (see table 3); the overdraft rate exhibits a positive relationship with the stock market index variables. When correlated in isolation the relationship between overdraft rates and NSE index remains positive while the relation between overdraft rates and market capitalization and turnover are negative. This is because the introduction of overdraft rates has an overwhelming effect in perceptions in the local stock market. Investors tend to place a great deal of weight on overdraft rates as well as the NSE index as the major proxies for investment in the economy and little weight or consideration is attached on the other stock market variables.

Treasury bills

The second canonical correlation, treasury bills, is uncorrelated with the first canonical correlation, interest rates; it is however calculated each time to ensure the canonical correlation is maximal. In this case Treasury bills are the most dominant variables and the canonical correlation, 0.536; squared correlation, 0.287, which represents the degree of variance in the stock market that is caused by variance in the macro-economic variables.

From the table of all correlation's, we note that Treasury bills are indeed strongly positively correlated with the overdraft rates at 0.86, and exhibit a correlation of 0.5 with inflation. This is expected since overdraft rates are pegged on prevailing Treasury bill rates. The lower correlation with inflation reflects little consideration with regard to inflation in setting overdraft rates.

When the macro-economic canonical variables are introduced into the equation we note that overdraft rates show the highest positive correlation with X^*_1 , 0.914 canonical variable; while exhibiting a negative correlation with X^*_2 , -0.404 and with X^*_3 , - 0.039, (on the Treasury bills and inflation respectively).

This shows that investors place greater emphasis on overdraft rates while undertaking investment decisions, as opposed to treasury bills and inflation.

A similar scenario emerges when stock market canonical variables are introduced into the equation, the first Y^*_1 (NSE index) exhibits a high correlation with treasury bills, 0.675 and subsequently weak correlation's with Y^*_2 , (Market Capitalization) -0.203 and Y^*_3 , (turnover) 0.021. The higher correlation is associated with the NSE index as the dominant variable showing that the investors in this market place most emphasis on the NSE index as a proxy for investment in the economy.

It is vital to note that where both macro-economic variables and stock market variables were introduced to the canonical correlations from the correlations between individual variables, the canonical correlation variables exhibited higher coefficients particularly as regards interest rates (overdraft) and the NSE index. Interestingly enough previously positive correlations between the other variables, treasury bills, inflation, market capitalization and turnover either turned negative or dropped significantly. This reflects the investor's traits in this market i.e. their preoccupation with overdraft rates and the NSE index as main determinants of their investment decisions in the economy.

Inflation

The third canonical correlation X^*_3 (inflation) is uncorrelated with the previous two canonical correlation's. In this case inflation was taken as the dominant variable; the canonical correlation, 0.107; squared correlation, 0.011, this is a very low variance which in canonical correlation analysis is considered insignificant for interpretation.

However, inflation is a critical variable in any economy and its low coefficient here is simply because local investors pay little or no regard to inflation in their investment decisions.

This can be justified by examining the table of all-correlation. It shows a significantly high correlation between inflation and the other two macro-economic indicators i.e. with overdraft rates, 0.6 and with treasury bills, 0.5. The correlation's of individual stock market variables with inflation, presents a different picture i.e. very low (negligible) correlation's with the, NSE index, 0.056, market capitalization, -0.4 and turnover, -0.2, this suggests that activity in the Nairobi stock exchange does little if anything to incorporate inflation.

On further examination and introduction of the macro-economic canonical variables we observe low correlation's between inflation, X_3 with X^*_1 (overdraft rates), 0.3, and high negative correlation with X^*_2 (treasury bills), -0.65, but a significantly high positive correlation with X^*_3 (inflation), 0.706. The introduction of the other two variables served to reduce inflation coefficient regressed on itself from 1 to 0.706.

The effect of the stock market canonical variables Y^*_1 (index), 0.209, Y^*_2 (market capitalization), -0.345 and Y^*_3 (turnover), 0.080. This result suggests that investment in

the Nairobi stock exchange does little to incorporate inflationary tendencies in the macro-economic environment.

NSE Index

There exists a significant positive relation between NSE index and overdraft rates, 0.57 and with treasury bills, 0.498, but very weak relationship between NSE index and inflation, 0.056; when the variables are correlated individually. It shows that inflation is not considered a major factor in investment decisions in the Kenyan stock market. The overdraft rates and treasury bills play a pivotal role in investment decisions the NSE.

The NSE index has a low correlation with the market capitalization, 0.236, but slightly stronger relation with turnover, 0.4.

The weak relation between NSE index and market capitalization is due to the low trading activity and few firms quoted that are actively trading. The composition of market capitalization at the Nairobi Stock Exchange is such that less than 10 % of the firms account for over 40% of market capitalization. Thus, any movement by few percentage points gives an impression of market recovery, since NSE index is biased towards companies with large capitalization. This statistical distortion may account for the low correlation between NSE index and market capitalization. The other possible explanation is that not many listed companies sell new shares.

The introduction of macro-economic canonical variables causes a higher positive correlation with X^*1 , 0.634, (Interest rates), showing once again the preoccupation with interest rates in investment decisions at the stock exchange, the subsequent correlation's with X^*2 , 0.22 (treasury bills) and X^*3 , (inflation), 0.028 are thus significantly lower.

The stock market canonical variables Y^*_1 , (index) reduced the correlation of the NSE index on its own from 1 to 0.867 due to the inclusion on the other variables (market capitalization and turnover).

The correlation of market capitalization and the NSE index increases from 0.236 to 0.42, showing that investors use the NSE index as the major determinant of investment activity at the stock exchange and not market capitalization or turnover.

Market capitalization

There are weak negative correlation's between market capitalization and all macro-economic variables when the variables are correlated individually, showing that quoted firms at the NSE do not issue shares based on the prevailing rates of macro-economic variables. There is however a significant positive correlation between market capitalization and turnover, 0.562. This suggests that as market capitalization increases so to does the turnover.

On further examination, we note that the macro-economic canonical variables show weak correlation's especially X^*_1 , (interest rates), -0.09 and X^*_3 , (inflation), -0.03, however, X^*_2 (treasury bills) exhibits significant positive correlation, 0.52 i.e. between market capitalization and treasury bills. This shows that investors may opt not to invest in shares traded at the stock exchange but rather invest in treasury bills whose yield will presumably be higher than prevailing returns at the stock exchange.

The stock market canonical variables similarly show weak negative correlation's with market capitalization on Y^*_1 , (NSE index), -0.126 and on Y^*_3 , (turnover), -0.227,

however Y^*_2 (market capitalization), has a high positive correlation with individual variable market capitalization.

Turnover

This stock market variable reflects weak negative correlation's with all macro-economic variables when correlated individually i.e. with overdraft rates, -0.096; treasury bills, -0.219; inflation, -0.224. A possible interpretation is that activity represented by turnover at the stock market has little to do with the macro-economic variables, in other words investment activity/decisions at the bourse does not reflect prevailing macro-economic conditions as represented by the three macro-economic variables under consideration here.

When correlated with the other stock market variables, we find a weak but positive correlation with the NSE index, 0.4 and a higher positive correlation with market capitalization, 0.562. Ideally the turnover should reflect or capture all movements in the index, but this is not the case here.

When macro-economic canonical variables are observed we note low correlation's between turnover and X^*_1 (overdraft rates), -0.094 and X^*_3 (inflation), 0.071. A higher positive correlation with X^*_2 (Treasury bills), 0.4; showing that despite low trading activity as reflected in the index, investors opt to invest in treasury bills as alternative investments. As earlier seen we note that high yield on treasury bills makes the attractive options to investors. This causes an adverse effect on investment in shares at the stock market.

This claim is further justified by observing the effect of stock market canonical variables that show Y^*_1 (NSE index) as having a very weak negative correlation, -0.129 with turnover. While on the other hand Y^*_2 (market capitalization), 0.726 and Y^*_3 (turnover), 0.675 when correlated with turnover.

From Table 3, we see the matrix for all-correlation's between the six variables and the three canonical variables. The quadrant above and to the left is the original correlation matrix i.e. correlation's between the three macro-economic variables and the three stock market variables.

The quadrant below and to the right contains the correlation's between the canonical variables i.e. between X^*_1 and Y^*_1 , 0.730; (overdraft rates and NSE index), X^*_2 and Y^*_2 , (treasury bills and market capitalization), 0.536: and X^*_3 and Y^*_3 , (inflation and turnover), 0.107. We can also observe that the second pair is indeed uncorrelated with the first pair and third pair of canonical variables, and the third pair is also uncorrelated with the previous two pairs of canonical variables.

The quadrant below and to the left (or above and to the right) contains the "structure correlation's" i.e. the correlation's between the original variables and the canonical variables, as interpreted earlier.

4.2 SUMMARY OF FINDINGS AND INTERPRETATIONS

THEORETICAL IMPLICATIONS

4.2.1 CAPITAL MARKET THEORY

The main theme of this theory is that holding a diversified portfolio reduces risk; that the stock market provides opportunities for investors to reduce risk. However, at the stock market these investors will only be compensated for market risk. The other risk component (specific risk) can be diversified away depending on the prowess of the portfolio managers. The implication is that the stock market itself will indeed award returns commensurate with that portion of risk that could not be diversified away.

From the study carried out here, we can see that the stock market in the past five years has only been able to account for 82% variance of total returns; based on the macro-economic variables under consideration, implying that the remaining 18% of returns is explained by other factors.

The obvious question would be that if the NSE can only account for 82% variance in total returns, is that level of variance acceptable to investors. Investors at the NSE should look for other factors to explain the seemingly high level of variance that is unexplained.

One of the fundamental tenets of finance is that majority of investors are risk averse i.e. they are only willing to undertake investments with least level of risk and highest level of return. This could be one explanation for the obsession with the risk free securities locally namely treasury bills, which offer low risk - high return combinations as opposed to investment in the stock market (shares).

4.2.2 INVESTMENT THEORY

This theory asserts the need to diversify ones portfolio in order to reduce risk.

Individuals give up immediate possession / consumption of savings for an anticipated future amount that will be available for consumption in the future; this trade-off provides the basis for saving, what happens to those savings over time is investment.

Investors investing locally in the past five years would only account for 82% of variance of their returns in the prevailing macro-economic conditions, given the variables under consideration in this study.

The investors should assess this percentage of variance and whether it is adequate to compensate them for:

- Time funds were committed
- The expected rate of inflation
- The uncertainty over future payment.

Having taken into account the above, they can at that point decide whether to make any future investments given the past performance i.e. will the prevailing returns at the NSE compensate for all the components of risk incurred (market measure of risk - beta, and fundamentals of risk)

In essence the NSE has not provided investors with a viable means of risk diversification, this is because the percentage of unaccounted/unexplained variance appears too high. This would imply that investors attach huge risk premiums (based on the observed variables in the study) while undertaking investment decisions but projects

or investment opportunities that are bound to offer commensurate high returns for this high risk premiums are simply not available locally.

5.0 CONCLUSIONS

4.2.3 EFFICIENT MARKET HYPOTHESIS

This theory implies that share prices reflect all information as soon as it becomes available and discounts future expectations and no arbitrage opportunities exist in the efficient market; this implies efficient allocation of scarce resources within an economy.

The macro-economic variables in this study fail to account for 18% variance in total returns at the stock market. This level of unexplained variance appears too high, and an inference can be made, that access to information is uneven and that share prices do not reflect their true Risk – Return ratios.

The assertion here is that share prices are affected by overall market factors and the movement of the index may be taken as a proxy for expectations about the economy. This signals a misallocation of resources, given that a high degree of variance of total returns is explained by other factors. The resultant effect of misallocation of resources would be the erosion of investor confidence in the market, which would lead to slow down in economic growth. (The distortion of share prices on its own can cause a misallocation of scarce resources).

CHAPTER FIVE

5.0 CONCLUSIONS

Nairobi Stock Exchange presents investors with a serious predicament, in that it is failing in its role as a financial intermediary, given that it does not provide potential and current investors with incentives to save (which would provide adequate funds for investment opportunities). This is because the unexplained variance appears too high for a rational risk-averse investor. From the appendix of data analysis output; variance in dependent variables as explained by canonical variables for canonical variables one and two is approximately 81%. The variance in covariates (macro-economic variables) as explained by canonical variables one and two at approximately 78%, the difference of which is the unexplained variance in the stock market returns.

Given the above it is therefore difficult to increase volume of investment, since investors will lack access to funds other than their own. Given that the stock market does not provide incentive to save, thus being unable to raise volume of investment, it becomes difficult to improve efficiency of investments currently being undertaken.

These findings paint a bleak picture of the current state of the stock market in Kenya, issues such as high percentage of unexplained/unaccounted for variance in the stock market have direct implications on the risk - return ratios, investors would attach to investment opportunities locally. This would lead to a higher cost of credit in the market and this would apriori presuppose the availability of investment opportunities that offer a rate of return higher than prevailing price attached to credit in the economy.

This depicts a worse scenario as regards economic growth in this country, this would fortify the argument that lack of a developed financial system restricts economic growth.

Another implication of concern would be the allocation of scarce resources in the economy, seeing that the stock market presents the most viable means of investment (for lack of any alternative investment mechanism in Kenya), we can assert that with high variances in total returns that are unaccounted for, at best reflects a misallocation of already scarce resources, this has an adverse effect on investor confidence, since the willingness to buy and hold/trade in securities at the stock market is severely eroded, this would explain the recent down-turn in major indicators of the Nairobi stock exchange.

In conclusion however, this study has established that macro-economic indicators have a significant influence on stock market variables, thus we can reject the null hypothesis that states macro-economic indicators have no influence on the stock market indicators and accept the first alternative hypothesis.

The second null hypothesis is also rejected and we accept the alternative hypothesis that states - that macro-economic indicators exert a significant level of influence on the stock market indicators.

This study is of the opinion that " Stock market does matter for investment". However, on the basis of few systematic studies that have been done, it is unlikely that stock markets are going to be a panacea for solving the problem of savings mobilization, investment and growth which developing countries face.

The most favourable contribution of the stock market would be in the liberalization of capital markets, in that they simply present alternative choices for institutions, savers and firms faced with banking cartels or repressed interest rates.

Evidence shows that NSE is at best a fragmented capital market. There are too few shares trading to form a continuous security market line i.e. securities at NSE do not reflect their true risk-return ratios. The implications on investment paint a dim picture of investment prospects and potential at the Nairobi Stock Exchange.

5.1 RECOMMENDATIONS

The prevailing circumstances are not beyond reproach, but to effect any meaningful turnaround, will require unwavering commitment from the government in the formulation and implementation of responsible policies that actively promote capital market development in this country.

Given that financial system development leads to economic growth, the government should seek ways of achieving certain combination of growth and distribution of income per head that is seen as satisfactory.

However, it is important to note that the availability and efficient use of finance can never be a sufficient condition for economic growth but should be seen as only one a number of necessary inputs; such as - natural resources, labour, management approach, technology and promotion of entrepreneurial ability.

The government must, as a matter of urgency address the fundamentals of risk i.e. business, financial, liquidity, exchange rate and country risk. By the legislation and introduction of punitive measures and regulations on firms seen to be contributing to

uncertainty in the market. This legislation must be accompanied by efficient and effective regulation, by that arm of the government charged with that responsibility, Capital Markets Authority.

An ethics board should be instituted to govern all market participants. To ensure adherence to generally accepted professional principles, to rid this country of the debilitating effects of corruption at all levels.

This study is of the opinion that if these measures are incorporated we will see a more stable macro-economic environment. Given its significant influence on the stock market variables, it will serve to bring more stability in the stock market. This will greatly reduce uncertainty and lower the price of credit in the Kenyan economy, this will have the resultant effect of bringing about financial system development and by extension much needed economic growth.

This will also dispel the current debate for financial repression i.e. controlling of interest rates, which is fundamentally ill conceived. It assumes that all investors fall into one risk class and thus deserve uniform rates of interest; this will distort actual rates from the equilibrium interest rates that would exist in a competitive market for money. The restrictions that would be put in place by government will discourage development of financial institutions and instruments and lead to incomplete or stunted financial markets. Repressed interest rates assumes that the period of time funds are committed is irrelevant, this will cause undue uncertainty in the Capital market, since longer loss of liquidity will not be adequately compensated for increased or perceived risk.

The policy recommendation here should be that of financial liberalization leading to financial deepening, coupled with the earlier recommendations, they would reduce the

risk premium required by investors and create a conducive environment for investment activity.

5.2 LIMITATIONS

The most obvious limitation is in regard to the number of firms listed at the Nairobi Stock Exchange as being too few, the data collected may not capture events taking place in the broader economy, nevertheless it was used to represent the market as a whole.

The assumption of uni-directional causality i.e. that Macro-economic indicators cause or influence changes in the stock market indicators; in a market as small as this one, it would be unrealistic to expect activity at the Stock market to influence Macro-economic indicators as would be the case in more developed economies.

The applicability of Capital market theory to less efficient markets, such as the Kenyan one; is uncertain, nonetheless its intuitive appeal still remains, in the approach to issues in portfolio management and investment.

5.3 SUGGESTIONS FOR FURTHER RESEARCH

Future research in this area may consider adding more variables to both sides under consideration i.e. Macro-economic indicators and Stock market indicators, with the aim of raising the current unexplained level of variance to a higher percentage. Other factors may have caused the seemingly high unexplained variation, in stock market indicators as influenced by macro-economic factors, issues such as sample selectivity and issues in modeling of the data analysis technique

This research may be furthered by undertaking it in the wider East African region, to compare our competitive advantage, if any, as regards investment, this would probably give a clearer picture as to why investors are opting to invest elsewhere and not in Kenya.

This research could be broken-down and carried out in the four sectors we currently have at the Nairobi Stock Exchange, to help pin-point which sector represents the highest mis-allocation of resources and give direction to government policy makers on steps to be taken to remedy this anomaly.

A case in point would be the agricultural sector. It has been common to hear that "our agricultural sector is the back-bone of the Kenyan economy", yet at the Stock exchange this sector only represents approximately 10% of total Market capitalization, this situation is obviously in need of quick remedial action.

This study could possibly be carried out annually, to observe the trends of variance either upwards or downwards of explained variance in the Stock market and the policy and investment implications this may have on our economy. The results could also be incorporated into the budget-making process with focus being on investment promotion and not empty rhetoric.

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APPENDICES

Original Data set

PERIOD	NSE Index	Market cap (Mn-KShs)	Turnover (Mn-KShs)	Over Draft Rates (%)	Treasury Bills (%)	Inflation (%)
Jan-96	3409.4	103163.82	250.66	27.9	21.3	5.68
	3230.08	98148.55	250.20	28	26	5.40
	3041.79	89822.83	304.54	28.4	26.7	8.24
	3019.2	94377.01	306.62	28.5	24.2	8.21
	3031.02	95931.62	188.16	28.4	22	7.82
	3144.33	104210.40	394.21	28.6	21.7	9.70
	3150.08	103969.90	287.17	27.9	21.8	11.20
	3073.88	103029.51	391.06	28	21.6	11.00
	3089.83	102026.46	301.76	28	22.5	10.40
	3055.97	100069.50	497.83	28.4	24.3	10.80
	3042.06	97333.40	354.24	28.9	21.1	11.40
	3114.11	98945.92	388.56	28.9	21.6	11.14
	Jan-97	3476.67	113607.79	521.20	28.7	21.6
3473.99		117231.00	642.28	28.4	21.4	9.65
3354.72		113861.41	669.11	28.5	21.4	7.33
3288.84		120045.72	468.99	28.2	21.1	7.35
3460.55		126697.10	539.89	28.9	20.4	6.93
3530.43		128367.36	751.12	28.5	19.4	4.76
3466.92		128447.21	556.54	27.7	18.5	4.58
3403.22		125483.65	424.58	27.4	19.7	5.74
3447.41		123027.97	497.56	29	26.2	6.79
3314.85		118551.14	400.99	29.7	27.1	6.53
3046.6		109016.54	346.68	30.3	26.8	5.30
3115.14		114310.80	355.07	30.4	26.4	5.42
Jan-98		3377.34	124322.05	266.51	30.4	26.3
	3362.23	123969.45	485.81	30.4	26.3	10.62
	3213.3	115004.40	445.78	30.8	26.7	12.30
	3015.01	107276.51	209.08	29.3	27	12.26
	3016.44	119818.38	357.11	30.7	26.4	10.80
	2907.55	118653.40	420.75	29.6	25.5	11.35
	2868.22	115883.56	391.51	30.2	24.7	11.43
	2862.66	115909.12	413.22	30.6	23.9	9.77
	2810.32	111463.80	419.93	29.8	22.5	8.37
	2733.68	109001.76	249.21	29.7	20.6	8.29
	2583.73	104922.25	404.30	28.8	17.6	7.95
	2962.06	129021.42	520.67	26.7	12.5	7.72
	Jan-99	2983.48	129450.54	520.67	23.9	10.7
2988.88		127099.24	352.30	22.9	8.9	2.54
2815.29		120181.14	516.18	21.1	8.8	2.26
2767.89		117051.60	653.89	20.9	9	2.47
2760.05		117616.03	508.76	20.5	9.6	4.51
2756.43		119014.69	449.10	20.9	11.3	5.04
2744.55		119833.50	373.75	21	14.5	4.89
2493.5		112126.62	535.23	22	14.8	5.92
2428.09		108585.71	376.48	22.5	15.8	6.57
2309.33		105091.05	161.27	23.1	17.6	6.58
2294.12		105031.28	225.84	24.8	18.1	7.25
2303.18		106737.96	248.22	25.7	20	7.6
Jan-00		2301.07	106279.57	322.61	25.9	20.3
	2294.96	109913.57	238.54		14.8	7.7
	2233.18	118867.87	359.96	24.1	11.3	8.4
	2162.2	115184.88	302.46	24	12.4	8.2
May-00	2052.9	109017.39	387.69	23.9	11.2	8.2

Standardized scores for original data set

zinfation	zmktcap	zindex	zoverdraft	zt-bills	zturnover
-0.81712	-0.76099	1.16967	0.25574	0.2046	-1.16153
-0.92735	-1.46742	0.71622	0.28818	0.98868	-1.16511
0.19067	-2.30581	0.24009	0.41792	1.10545	-0.74277
0.17886	-1.82707	0.18297	0.45036	0.68839	-0.72661
0.02533	-1.69066	0.21286	0.41792	0.32137	-1.64728
0.76543	-0.857	0.49939	0.48279	0.27133	-0.04586
1.35593	-0.88121	0.51393	0.25574	0.28801	-0.87777
1.2772	-0.97591	0.32124	0.28818	0.25464	-0.07034
1.041	-1.07692	0.36157	0.28818	0.40479	-0.76438
1.19846	-1.27398	0.27595	0.41792	0.70507	0.75948
1.43467	-1.54951	0.24077	0.5801	0.17123	-0.35651
1.33231	-1.38713	0.42297	0.5801	0.25464	-0.08977
0.74968	0.08931	1.33978	0.51523	0.25464	0.94111
0.74574	0.45417	1.333	0.41792	0.22128	1.88215
-0.16757	0.11485	1.0314	0.45036	0.22128	2.09067
-0.1597	0.73761	0.86481	0.35305	0.17123	0.53533
-0.32504	1.4074	1.29902	0.5801	0.05445	1.08637
-1.1793	1.57559	1.47572	0.45036	-0.11237	2.72805
-1.25016	1.58363	1.31512	0.19087	-0.26251	1.21577
-0.7935	1.2852	1.15404	0.09356	-0.06232	0.19018
-0.38015	1.03792	1.26579	0.61254	1.02204	0.75738
-0.48251	0.58711	0.93058	0.83959	1.17218	0.00684
-0.96672	-0.37302	0.25225	1.0342	1.12214	-0.41526
-0.91948	0.16011	0.42557	1.06664	2.72366	-0.35005
-0.29748	1.16823	1.0886	1.06664	1.03872	-1.03834
1.1276	1.13272	1.05039	1.06664	1.03872	0.66606
1.78897	0.22995	0.67379	1.19638	1.10545	0.35495
1.77322	-0.54824	0.17237	0.70985	1.1555	-1.48469
1.19846	0.71472	0.17599	1.16395	1.05541	-0.3342
1.41498	0.5974	-0.09936	0.80715	0.90526	0.16041
1.44648	0.31848	-0.19882	1.00177	0.7718	-0.06684
0.79298	0.32106	-0.21288	1.13151	0.63834	0.10189
0.24185	-0.12658	-0.34523	0.87202	0.40479	0.15404
0.21035	-0.37451	-0.53903	0.83959	0.08782	-1.1728
0.07651	-0.78531	-0.91821	0.54767	-0.41266	0.03256
-0.01404	1.64145	0.03848	-0.13349	-1.26347	0.93699
-0.75807	1.68467	0.09264	-1.04169	-1.56375	0.93699
-2.05325	1.44789	0.1063	-1.36605	-1.86404	-0.37158
-2.16347	0.75124	-0.33266	-1.94989	-1.88072	0.9021
-2.0808	0.4361	-0.45252	-2.01476	-1.84735	1.97238
-1.27772	0.49294	-0.47235	-2.14451	-1.74726	0.84443
-1.06907	0.63378	-0.4815	-2.01476	-1.46366	0.38075
-1.12812	0.71624	-0.51154	-1.98233	-0.92981	-0.20487
-0.72264	-0.05984	-1.14638	-1.65797	-0.87977	1.05015
-0.46676	-0.41641	-1.31178	-1.49579	-0.71294	-0.18366
-0.46282	-0.76832	-1.61209	-1.30118	-0.41266	-1.85627
-0.19906	-0.77433	-1.65055	-0.74977	-0.32924	-1.35443
-0.06128	-0.60247	-1.62764	-0.45784	-0.01228	-1.18049
0.17492	-0.64863	-1.63298	-0.39297	0.03777	-0.60233
-0.02191	-0.28269	-1.64843		-0.87977	-1.25573
0.25366	0.619	-1.80465	-0.97682	-1.46366	-0.31205
0.17492	0.24813	-1.98414	-1.00925	-1.28015	-0.75894
0.17492	-0.37294	-2.26053	-1.04169	-1.48034	-0.09653

Standardized Canonical scores.

X*1	X*2	X*3	Y*1	Y*2	Y*3
0.6104735	0.9273833	-0.55430292	1.87611196	-0.69028795	-0.61906885
1.03166695	0.0506091	-1.68450756	1.47191295	-1.33152927	-0.01163577
0.74184665	-0.9672964	-0.91711368	0.85923462	-1.99244851	1.20811659
0.5836512	-0.353049	-0.30683112	0.7375436	-1.60925917	0.79640383
0.45431995	0.2264156	0.05924904	1.1842775	-1.69027976	-0.39497076
0.189088	-0.31326255	0.71991222	0.64989214	-0.63038607	0.73479598
-0.21034675	-1.2688459	0.84203316	1.05661014	-0.82505075	-0.21043185
-0.1694483	-1.0968261	0.87164292	0.48425911	-0.75858067	0.80479268
-0.0085818	-1.0682721	0.49823892	0.86266034	-0.98232113	0.08970162
0.1635986	-1.4062732	0.34163712	0.08144922	-0.83031199	2.03435516
-0.04586465	-0.6664453	1.43889516	0.59562814	-1.29671451	0.98123469
0.03210205	-0.6782809	1.25154588	0.64762598	-1.08106091	1.15430239
0.21261535	-0.22372115	0.7701375	0.98147326	0.47251406	1.07361811
0.1247175	-0.3330592	0.69997968	0.49426708	0.96784682	1.84156447
0.51029155	0.596109	0.10227072	0.11244396	0.69213466	2.37415491
0.41021825	0.49746415	0.06356514	0.59174326	0.84108369	0.00121709
0.5966698	1.1770259	0.37669476	0.72379717	1.56635219	0.06238959
0.7597824	2.0077878	-0.13745256	0.12717912	2.07876042	1.82907637
0.52169925	1.85492185	-0.28137954	0.66100064	1.73923582	0.05604057
0.3569619	0.9951218	-0.35606136	1.00104346	1.2547575	-0.8770117
1.07867035	0.0051033	-0.97059228	0.88295814	1.19167777	0.00862722
1.3603588	0.27186985	-0.98518122	0.92549595	0.61625955	-0.4759759
1.6779804	1.1170594	-1.024842	0.50473464	-0.35338435	-0.1383685
2.4048212	-0.9899068	-3.183324	0.6002099	0.11869849	-0.53152141
1.4009082	0.637094	-0.40497552	1.51785605	0.88846951	-2.20408864
0.8380016	-0.7309828	0.58688016	0.68503458	1.21701481	-0.19180674
0.70604005	-1.2444515	1.10610132	0.52832162	0.36248851	0.23687831
0.36258835	-2.08114345	0.45622962	0.93829603	-0.73517848	-1.22898363
0.89196455	-0.66388355	0.72681894	0.2646948	0.53467583	-1.01989072
0.46591965	-1.24977675	0.66906966	-0.24733935	0.50385409	-0.35189061
0.54230445	-0.78953825	1.10447538	-0.21647676	0.21442618	-0.37120412
0.83963105	0.22351905	0.9872115	-0.31057613	0.25036311	-0.17789629
0.75372005	0.6418135	0.62512332	-0.42659194	-0.12128513	0.27712092
0.5987171	1.03807945	1.00647846	0.01358417	-0.63384948	-1.05287178
0.2030491	1.35574865	1.26844758	-0.90868439	-0.76676442	0.69953318
-0.66513555	1.46567245	1.5927951	-0.57867864	1.53652834	-0.37604381
-1.2011427	1.10956785	0.43034598	-0.52563318	1.5796496	-0.41229945
-1.0728125	2.22548205	-0.43259682	0.12634047	1.11093095	-1.721884
-1.4834192	1.41040925	-1.16918418	-0.85994922	0.7518366	0.3628967
-1.5506829	1.1822326	-1.2339948	-1.45279992	0.70636856	1.88409366
-1.92211775	0.06961075	-0.9661839	-0.95353495	0.50925778	0.52060033
-1.77765575	-0.295499	-1.0639272	-0.76240183	0.52335183	-0.14497307
-1.48928955	-0.89111855	-1.8102021	-0.53015307	0.46101387	-0.90109013
-1.37880075	-0.82259075	-1.2181425	-1.70811165	0.00434109	1.22438069
-1.28073215	-1.02653045	-1.08252678	-1.26899031	-0.57228331	0.10095564
-0.9982858	-1.1123873	-1.2700806	-0.76955051	-1.25869444	-1.54289589
-0.64310335	-0.58518415	-0.55747458	-1.04431796	-1.16240717	-0.95557527
-0.331568	-0.6643732	-0.56122992	-1.12015652	-0.9825659	-0.90591785
-0.35271895	-0.85242615	-0.39060642	-1.3907366	-0.89764924	-0.19248569
#VALUE!	#VALUE!	#VALUE!	-1.14271874	-0.74234815	-1.28022005
-1.50611	0.1109533	1.07108268	-1.85034785	0.1666495	-0.99570475
-1.41723715	-0.10806395	0.72289062	-1.79217897	-0.25605765	-1.1917776
-1.53213925	0.10379625	0.9636003	-2.32777019	-0.6598342	0.12168065

DATA ANALYSIS OUTPUT

SPSS for MS WINDOWS Release 6.0

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***** Analysis of Variance *****

Multiple Tests of Significance (S = 3, N = 1/2, N = 22)

52 cases accepted.
 0 cases rejected because of out-of-range factor values.
 1 case rejected because of missing data.
 1 non-empty cell.
 1 design will be processed.

Eigenvalues and Canonical Correlations

Root No.	Eigenvalue	Prop.	Cum. Prop.	Canon. Cor.	Sq. Mul.
1	1.142	73.409	73.409	.730	.833
2	.492	31.646	105.055	.336	.287
3	.012	.745	105.800	.107	.011

UNIVARIATE REGRESSION (Cont.)

Univariate F-tests with (3,48) D.F.

Variable	Sq. Mul.	F	Adj. R-Sq.	Hypoth. MS	Error MS	F
NSINDEX	10.75	11.55	113943.274	3587.27745	13.18365	
MCY_CAP	27.49	29.17	171675367.2	39174800.31	5.18440	
TURNOVER	18.52	11.73	46079.60419	14032.67384	3.17381	

Variable Sig. of F

NSINDEX	.000
MCY_CAP	.001
TURNOVER	.012

New canonical coefficients for DEPENDENT variables

Variable	Canonical No.	1	2	3
NSINDEX	1	.003	.000	.000
MCY_CAP	1	.003	.000	.000
TURNOVER	1	.004	.002	.000

* * * * * Analysis of Variance -- design 1 * * * * *

EFFECT .. WITHIN+RESIDUAL Regression

Multivariate Tests of Significance (S = 3, M = -1/2, N = 22)

Test Name	Value	Approx. F	Hypoth. DF	Error DF	Sig. of F
Pillais	.83155	6.13565	9.00	144.00	.000
Hotellings	1.55624	7.72359	9.00	134.00	.000
Wilks	.32906	7.21046	9.00	112.10	.000
Roys	.53324				

Eigenvalues and Canonical Correlations

Root No.	Eigenvalue	Pct.	Cum. Pct.	Canon Cor.	Sq. Cor
1	1.142	73.409	73.409	.730	.533
2	.402	25.846	99.255	.536	.287
3	.012	.745	100.000	.107	.011

EFFECT .. WITHIN+RESIDUAL Regression (Cont.)

Univariate F-tests with (3,48) D. F.

Variable	Sq. Mul. R	Adj. R-sq.	Hypoth. MS	Error MS	F
NSEINDEX	.45175	.41748	1159335.228	87937.27385	13.18366
MKT.CAP	.27649	.23127	471875587.8	77174500.31	6.11440
TURNOVER	.16552	.11336	46027.60419	14503.67984	3.17351

Variable	Sig. of F
NSEINDEX	.000
MKT.CAP	.001
TURNOVER	.032

Raw canonical coefficients for DEPENDENT variables
Function No.

Variable	1	2	3
NSEINDEX	.003	.000	.000
MKT.CAP	.000	.000	.000
TURNOVER	-.004	.002	.009

* * * * * Analysis of Variance -- design 1 * * * * *

Standardized canonical coefficients for DEPENDENT variables
Function No.

Variable	1	2	3
NSEINDEX	1.068	.149	.044
MKT.CAP	-.111	.811	-.894
TURNOVER	-.467	.213	1.163

Correlations between DEPENDENT and canonical variables
Function No.

Variable	1	2	3
NSEINDEX	.867	.418	.271
MKT.CAP	-.126	.966	-.227
TURNOVER	-.129	.726	.675

Variance in dependent variables explained by canonical variables

CAN. VAR.	Pct Var DE	Cum Pct DE	Pct Var CO	Cum Pct CO
1	26.135	26.135	13.936	13.936
2	54.501	80.636	15.634	29.570
3	19.364	100.000	.222	29.792

Raw canonical coefficients for COVARIATES
Function No.

COVARIATE	1	2	3
OVERDRAF	.248	.524	.379
TBILLS	.075	-.220	-.232
INFLATIO	-.154	-.374	.271

Standardized canonical coefficients for COVARIATES
CAN. VAR.

COVARIATE	1	2	3
OVERDRAF	.765	1.615	1.170
TBILLS	.450	-1.320	-1.392
INFLATIO	-.395	-.960	.696

***** Analysis of Variance -- design 1*****

Correlations between COVARIATES and canonical variables
CAN. VAR.

Covariate	1	2	3
OVERDRAF	.917	-.096	.388
TBILLS	.914	-.404	-.039
INFLATIO	.287	-.647	.706

Variance in covariates explained by canonical variables

CAN. VAR.	Pct Var DE	Cum Pct DE	Pct Var CO	Cum Pct CO
1	31.240	31.240	58.586	58.586
2	5.657	36.897	19.720	78.306
3	.249	37.146	21.694	100.000

VARIMAX rotated correlations between canonical variables and COVARIATES
Can. Var.

DEP. VAR.	1	2	3
NSEINDEX	.567	.327	.756
MKT.CAP	.903	.233	.361
TURNOVER	.216	.952	.218

Transformation Matrix

	1	2	3
1	.755	-.021	.655
2	-.483	-.693	.535
3	-.443	.720	.534

Regression analysis for WITHIN+RESIDUAL error term
--- Individual Univariate .9500 confidence intervals
Dependent variable .. NSEINDEX

COVARIATE	B	Beta	Std. Err.	t-Value	Sig. of t
OVERDRAF	110.93670	.88028	28.773	3.856	.000
TBILLS	-3.28831	-.05084	13.619	-.241	.810
INFLATIO	-67.39071	-.44489	20.237	-3.330	.002

COEFFICIENTS FOR ALL - CORRELATIONS

SPSS for MS WINDOWS Release 6.0

- - Correlation Coefficients - -

	X*1	X*2	X*3	Y*1	Y*2	Y*3
X*1	1.0000 (52) P= .	-.0035 (52) P= .980	-.0035 (52) P= .981	.7302 (52) P= .000	-.0011 (52) P= .994	.0005 (52) P= .997
X*2	-.0035 (52) P= .980	1.0000 (52) P= .	-.0096 (52) P= .946	-.0079 (52) P= .956	.5356 (52) P= .000	-.0078 (52) P= .956
X*3	-.0035 (52) P= .981	-.0096 (52) P= .946	1.0000 (52) P= .	-.0007 (52) P= .996	-.0021 (52) P= .988	.1071 (52) P= .450
Y*1	.7302 (52) P= .000	-.0079 (52) P= .956	-.0007 (52) P= .996	1.0000 (53) P= .	.0071 (53) P= .960	.0270 (53) P= .848
Y*2	-.0011 (52) P= .994	.5356 (52) P= .000	-.0021 (52) P= .988	.0071 (53) P= .960	1.0000 (53) P= .	.0022 (53) P= .988
Y*3	.0005 (52) P= .997	-.0078 (52) P= .956	.1071 (52) P= .450	.0270 (53) P= .848	.0022 (53) P= .988	1.0000 (53) P= .
ZINDEX Y1	.6335 (52) P= .000	.2201 (52) P= .117	.0280 (52) P= .844	.8662 (53) P= .000	.4250 (53) P= .002	.2966 (53) P= .031
ZINFLAT X3	.2830 (52) P= .042	-.6534 (52) P= .000	.7083 (52) P= .000	.2091 (53) P= .133	-.3454 (53) P= .011	.0797 (53) P= .570
ZMKTCAP Y2	-.0904 (52) P= .524	.5179 (52) P= .000	-.0260 (52) P= .855	-.1230 (53) P= .380	.9650 (53) P= .000	-.2292 (53) P= .099
ZOVERDRA X1	.9154 (52) P= .000	-.1039 (52) P= .464	.3875 (52) P= .005	.6696 (52) P= .000	-.0537 (52) P= .705	.0430 (52) P= .762
ZTBILLS X2	.9129 (52) P= .000	-.4094 (52) P= .003	-.0386 (52) P= .786	.6748 (53) P= .000	-.2031 (53) P= .145	.0214 (53) P= .879

(Coefficient / (Cases) / 2-tailed Significance)

" . " is printed if a coefficient cannot be computed

- - Correlation Coefficients - -

	X*1	X*2	X*3	Y*1	Y*2	Y*3
ZTURNOVE	-.0938	.3891	.0711	-.1040	.7276	.6757
Y3	(52)	(52)	(52)	(53)	(53)	(53)
	P= .508	P= .004	P= .617	P= .458	P= .000	P= .000

(Coefficient / (Cases) / 2-tailed Significance)

" . " is printed if a coefficient cannot be computed

	ZINDEX	ZINFLAT	ZMKTCAP	ZOVERDRA	ZTBILLS	ZTURNOVE
X*1	.6335	.2830	-.0904	.9154	.9129	-.0938
	(52)	(52)	(52)	(52)	(52)	(52)
	P= .000	P= .042	P= .524	P= .000	P= .000	P= .508
X*2	.2201	-.6534	.5179	-.1039	-.4094	.3891
	(52)	(52)	(52)	(52)	(52)	(52)
	P= .117	P= .000	P= .000	P= .464	P= .003	P= .004
X*3	.0280	.7083	-.0260	.3875	-.0386	.0711
	(52)	(52)	(52)	(52)	(52)	(52)
	P= .844	P= .000	P= .855	P= .005	P= .786	P= .617
Y*1	.8662	.2091	-.1230	.6696	.6748	-.1040
	(53)	(53)	(53)	(52)	(53)	(53)
	P= .000	P= .133	P= .380	P= .000	P= .000	P= .458
Y*2	.4250	-.3454	.9650	-.0537	-.2031	.7276
	(53)	(53)	(53)	(52)	(53)	(53)
	P= .002	P= .011	P= .000	P= .705	P= .145	P= .000
Y*3	.2966	.0797	-.2292	.0430	.0214	.6757
	(53)	(53)	(53)	(52)	(53)	(53)
	P= .031	P= .570	P= .099	P= .762	P= .879	P= .000
ZINDEX	1.0000	.0562	.2359	.5701	.4984	.3995
	(53)	(53)	(53)	(52)	(53)	(53)
	P= .	P= .690	P= .089	P= .000	P= .000	P= .003
ZINFLAT	.0562	1.0000	-.3778	.5988	.4924	-.2238
	(53)	(53)	(53)	(52)	(53)	(53)
	P= .690	P= .	P= .005	P= .000	P= .000	P= .107

(Coefficient / (Cases) / 2-tailed Significance)

" . " is printed if a coefficient cannot be computed

COEFFICIENTS FOR Z - - Correlation Coefficients - -

	ZINDEX	ZINFLAT	ZMKTCAP	ZOVERDRA	ZTBILLS	ZTURNOVE
ZMKTCAP	.2359 (53) P= .089	-.3778 (53) P= .005	1.0000 (53) P= .	-.1432 (52) P= .311	-.2846 (53) P= .039	.5619 (53) P= .000
ZOVERDRA	.5701 (52) P= .000	.5988 (52) P= .000	-.1432 (52) P= .311	1.0000 (52) P= .	.8612 (52) P= .000	-.0960 (52) P= .499
ZTBILLS	.4984 (53) P= .000	.4924 (53) P= .000	-.2846 (53) P= .039	.8612 (52) P= .000	1.0000 (53) P= .	-.2192 (53) P= .115
ZTURNOVE	.3995 (53) P= .003	-.2238 (53) P= .107	.5619 (53) P= .000	-.0960 (52) P= .499	-.2192 (53) P= .115	1.0000 (53) P= .

(Coefficient / (Cases) / 2-tailed Significance)

" . " is printed if a coefficient cannot be computed

COEFFICIENTS FOR SEPARATE CORRELATIONS.

SPSS for MS WINDOWS Release 6.0

- - Correlation Coefficients - -

	INFLATIO	MKTCAP	NSEINDEX	OVERDRAF	TBILLS	TURNOVER
INFLATIO	1.0000 (53) P= .	-.3778 (53) P= .005	.0562 (53) P= .690	.5988 (52) P= .000	.4924 (53) P= .000	-.2238 (53) P= .107
MKTCAP	-.3778 (53) P= .005	1.0000 (53) P= .	.2359 (53) P= .089	-.1432 (52) P= .311	-.2846 (53) P= .039	.5619 (53) P= .000
NSEINDEX	.0562 (53) P= .690	.2359 (53) P= .089	1.0000 (53) P= .	.5701 (52) P= .000	.4984 (53) P= .000	.3995 (53) P= .003
OVERDRAF	.5988 (52) P= .000	-.1432 (52) P= .311	.5701 (52) P= .000	1.0000 (52) P= .	.8612 (52) P= .000	-.0960 (52) P= .499
TBILLS	.4924 (53) P= .000	-.2846 (53) P= .039	.4984 (53) P= .000	.8612 (52) P= .000	1.0000 (53) P= .	-.2192 (53) P= .115
TURNOVER	-.2238 (53) P= .107	.5619 (53) P= .000	.3995 (53) P= .003	-.0960 (52) P= .499	-.2192 (53) P= .115	1.0000 (53) P= .

(Coefficient / (Cases) / 2-tailed Significance)

" . " is printed if a coefficient cannot be computed