THE RELATIONSHIP BETWEEN MACROECONOMIC VARIABLES AND SECTOR-SPECIFIC RETURNS: CASE OF COMPANIES QOUTED AT THE NAIROBI STOCK EXCHANGE

BY

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DECLARATION

I, Kilinda N. Mbashu hereby certify that;

1. Except where due acknowledgement has been made, this project work is mine alone.

2. The project has not been previously submitted in whole or in part to qualify for any other academic award.

Signed................................Date. 3|11|2007.............

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I, Mr. Otieno Luther Odhiambo hereby certify that this project has been presented for examination with my approval as the University of Nairobi supervisor.

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I

<u>DEDICATION</u>

This project is dedicated to my loving wife Liz, brothers, sisters and my parents. May god bless you all.

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I am greatly indebted to a number of persons, without whom, this project work would not have been completed. I wish to covey my sincere gratitude to my family for the patience and understanding during this period. I also wish to thank the management and staff of the School of Business, University of Nairobi, and my fellow students for the time, and moral support they have accorded me all along.

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SHUKRAN

LIST OF ABBREVIATIONS

Alternative Investment Market Segment	AIMS
Arbitrage Pricing Theory	APT
Capital Asset Pricing Model	CAPM
Developed Stock Market	DSM
Efficient Market Hypothesis	EMH
Emerging Stock Market	ESM
Fixed Income Securities Market Segment	FISMS
Future and Options Market Segment	FOMS
Gross Domestic Product	DP
Gross National Product	GNP
Main Investment Market Segment	MIMS
Nairobi Stock Exchange	NSE
Principal Component Analysis	PCA
Purchasing Power Parity	PPP

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ABSTRACT

This study examines the impact of macroeconomic variables, world oil prices, Treasury bill rate and inflation on the performance of shares sectorwise over the period 1996 to 2001. Data is obtained from NSE and other financial intermediaries. The purpose of this study is to investigate the relationship between sector-specific stock returns and the macroeconomic variables.

Using the regression model, we begin by examining the average monthly market returns of the main investment market segment namely Agricultural, Commercial, Financial and Industrial market sectors without considering the effects of macroeconomic variables under study. The analysis of the impact of the macroeconomic variables indicate that the greatest impact varies across the sectors. In the case of agricultural sector, it is the Treasury bill rate while in the commercial, financial and industrial sectors, it is inflation. Generally, the results are consistent with the belief that inflation and the world oil price have negative impact on the returns from the shares across sectors, Charles M. J. and Gautam K. (1996) and Driesprong, et al (2004). Shares at the NSE act as a good hedge against inflation. According to Kwon, Chung S (1997), inflation and interest rate-related variables are not significant factors to the Korean stock market.

The implication is that the investors would not achieve much through diversification. Secondly the efficiency at the NSE might be low such that price differential across the sectors are unobservable. Finally the impact of these variables across the sectors might be uniform.

CHAPTER 1

1.0 INTRODUCTION

1.1 Background

Efficient Market Hypothesis (EMH) explains how security prices should behave under the conditions of perfect market characterised by free availability of information, homogenous investor expectations and zero transaction costs. These conditions sufficiently ensure that prices "fully reflect" what is knowable, obviously when relevant information to the value of a security is reflected in its current price, the same is an unbiased estimate of intrinsic value. Every time new information is released, the price adjusts towards a new value Fama (1980).

The relationship between stock market returns and the fundamental economic activities are well documented (Fama (1970, 1990&1991)). Fama (1981), Huang and Kracaw (1984), Chen, Roll, and Ross (1986), Pearce and Roley (1988), Fung and Lie (1990), Chen (1991), and Wei and Wong (1992)) modeled the relation between asset prices and real economic activities in terms of production rates, productivity, and growth rate of gross national product (GNP), unemployment, yield spread, interest rates, inflation, and dividend yields among others.

A number of studies document that a relationship exists between macroeconomic variables and equity market returns. The performance of the stock market has an impact and is also impacted upon by variables of the economy such as inflation, interest rates, employment/unemployment rates, money supply and exchange rates. The importance of

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building such relationship is that one can rely on economic variables in predicting stock market performance or economic business cycle.

1.1.1 Emerging Stock Markets.

There is evidence to suggest that emerging stock markets (ESMs) are segmented from world capital markets, and as a result local information has increased importance in these markets Harvey (1995b). A consequence of the segmented nature of these markets is that ESM returns are only weakly correlated with the returns from developed stock markets (DSMs). This allows an international investor to enhance the mean-variance efficiency of their portfolio Errunza (1977); Divecha et al (1992). The diversification benefits, however, will be greatest when the factors driving return variation are uncorrelated across markets. The question then is: How do stock markets in emerging markets e.g. Nairobi Stock Exchange (NSE) relate to changes in fundamental economic variables.

Interest in ESMs has grown over the past decade. Given political and economic structures that previously existed, little was known about these markets and international investment levels were low, in part due to high cost barriers to entry. However, since the 1980s, there have been substantial changes in political and economic environments in many regions such as China, Eastern Europe, Latin America and Russia. As a result, emerging markets now represent a feasible investment alternative for international investors and the last decade has witnessed massive capital flows in and out of emerging stock markets.

1.1.2 Arbitrage Pricing Theory

Under the Arbitrage Pricing Theory (APT) it is implied that macroeconomic variables may proxy for pervasive risk factors Roll and Ross (1986); Brown and Otsuki (1991); Priestley (1996); Kryzanowski et al (1997).To date, the literature on asset pricing in emerging markets has focused primarily on either microeconomic effects such as dividend yields and price-to-earnings ratios or the impact of world influences such as the world equity portfolio. Generally, the literature has ignored the potential impact that macroeconomic variables may have on emerging stock market returns.

Chen, Roll and Ross (1986) have argued that stock returns should be affected by any factor that influences future cash flows or the discount rate of those cash flows. In an empirical investigation they found that the yield spread between long and short term government bonds, expected inflation, unexpected inflation, nominal industrial production growth and yield spread between corporate high and low grade bonds significantly explain stock market returns. Fama 1981, 1990; Fama and French, 1989; Schwert, 1990; Ferson and Harvey, 1991 and Black, F. and MacDonald, 1997, generally found a significant relationship between changes in macroeconomic variables, such as industrial production, inflation, interest rates, the yield as well as a risk premium measure and the stock returns.

Literature suggests that a wide range of factors may be relevant. Such variables include goods prices, money supply, real activity, exchange rates, interest rates, political risk, oil prices, the trade sector, and regional stock market indices. However, in emerging markets, there is argument that not all of these variables are either relevant or appropriate. For

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instance, studies incorporating interest rates have found that it is not the interest rate itself that is relevant but the yield and default spread are more likely to influence equity returns Chen, Roll and Ross (1986). Yet, in many emerging markets, there is not an active secondary market for bond issues and government paper. Political risk indices and oil prices have been shown to be only weakly correlated with ESM returns Harvey (1995a); Erb, Harvey and Viskanta (1996). Regional influences are expected to be incorporated into returns if countries are integrated regionally, but the theoretical justification for the empirical link is limited. Moreover, any such link is likely to be driven by fundamental macro factors and a regional index is only useful to the extent that it captures the underlying fundamentals. Hence, at this stage, these variables are excluded from the initial analysis.

1.1.3 Sectoral Return and Macroeconomic Variables

The analysis of sectoral return characteristics does indicate that there are significant differences between sectors in terms of their risk-return relationships Muriuki J. (2003). The portfolio return characteristics do not only differ across sectors but also from one period to the other. The existence of this risk-return difference is a manifestation of the inherent differences in the impact of market conditions on different sectors. Prior research has already suggested that interest rates, inflation rates are possible influences on industry returns Gibson, (1992) Whittington, Saporta and Singh, (1997). To gain a clearer picture of the impact of macro-economic factors on the industry returns of firms quoted at NSE, this study will employ Inflation, Interest Rates and Oil Price as proxies for macroeconomic indicators.

1.1.4 The Nairobi Stock Exchange

The Nairobi stock exchange was established in 1954. The introduction of the trading floor has led to a substantial increase in trading volumes and upward movement in the various indexes. The Nairobi Stock Exchange has been instrumental in enabling the public and private sectors in Kenya to raise large amounts of capital for expansion of new businesses (NSE Manual, 2005).

The NSE thus represents the financial markets in Kenya. It has 51 registered brokers and has about 52 firms listed on the exchange. It deals in ordinary shares and fixed income securities such as preference shares and most recently treasury bounds. The NSE also has some of its shares cross-listed with other stock exchanges in South Africa, Uganda and Tanzania. Both operational and informational efficiencies are key to ensuring that the NSE fulfils its mandate as the capital markets intermediary for Kenya and the world over (NSE Handbook, 2005), hence, the fundamental reforms of the market structure that were undertaken in year 2000. These reforms saw the market recognized into four independent market classes namely:-

   I. The Main Investment Market Segment (MIMS)

  II. The Alternative Investments Market Segment (AIMS)

 III. Fixed Income Securities Market Segment (FISMS)

 IV. Futures and Options Market Segment (FOMS).

1.2 Statement of the Problem

Research findings in the developed markets, especially United States (U.S) and Japan, suggest a relationship between the various economic factors and the stock markets. Although

only a few of such studies have been done in other countries (especially in the developing markets) relative to what has been done in the developed markets, this argument is sustainable.

Kwon, Chung S (1997) used three time series regressions models to find out whether principal economic indicators such as industrial production, inflation, interest rates, yield of corporate and government bonds, trade balance, dividend yield, foreign exchange, oil price, and money supply are significant explanatory factors of stock market returns in Korea and concluded that inflation- and interest rate-related variables are not significant factors to the Korean stock market. Instead, variables related to real economic activities i.e. foreign exchange rates, trade balance, the money supply, oil price and the production index are significant factors.

Driesprong G. et al (2004) also find that the oil effect is less strong for specific oil sectors. Even if the effect is found significant, it tends to be less strong for oil related sectors when compared to the broader market index or other sector indices.

In Kenya many studies have been conducted on the stock market touching on various aspects. Among them are Nyamute (1998) who analysed the movement and/or the changes of the stock price index (i.e. the NSE 20-Share Index) in relation to movements and /or changes in four of the major economic indicators (interest rates, money supply, inflation rate and exchange rates). However Nyamute (1998) did not compute stock returns, and did not carry out sectorial analysis i.e. there has not been any study to test the impact of macroeconomic

variables on the different market segments at the NSE. As the above literature attests to, stock market returns are linked to macroeconomic variables. However, unlike previous studies, various macroeconomic factors are allowed to affect returns by sector differently. Thus, this research complements the existing literature that has primarily focused on overall market returns. This paper fills a void in this line of research and provides insight into the responses of four major sector-specific stock market returns to macroeconomic variables.

The main purpose of this study therefore is to test whether the current macro economic variables (i.e. inflation rate, interest rates and oil price) in Kenya explain stock return differences on the four market sectors.

1.3 Objectives of the Study

To determine whether the impact of macro economic variables varies according to industry.

1.4 Hypothesis Testing

The following hypothesis shall also be tested:

Ho: $\beta_1 = \beta_2 = \beta_3 = 0$

Industry stock returns do not depend on macro economic variables

HA: $\beta_1 \ddagger \beta_2 \ddagger \beta_3 \ddagger 0$

Industry stock returns depend on macro economic variables

1.5 Importance of the Study

The study will be of use to the following parties:

1. Financial analysts – The study will provide guidance on how best to construct investment portfolios across market industries.

2. Capital market intermediaries - The study will provide important market industry/ sector return characteristics that can be used in designing optimal investment selection for their clientele.

3. Asset manager/Fund managers - The study will provide guidance on how to place investor funds in a combination of high yield returns across the different market sectors.

4. Academic - The study will give a good insight to scholars who may want to further research on the effect of macro-economic variables on industry returns.

5. Policy – makers – Government authorities that are in a position to influence macro-economic variables. These parties would gain a deeper appreciation of the impact of their decisions on the industry returns of the business community.

CHAPTER 2

2.0 LITERATURE REVIEW

Common stocks are expected to hedge inflation; therefore, in a perfect market, return on common equity should keep pace with the rate of inflation. Following the seminal work of Bodie (1976), this proposition has been extensively tested in the context of the Fisher hypothesis (Fisher 1930), which originally postulated that the market rate of interest comprises the expected real rate of interest and expected inflation. This hypothesis, when applied to stock markets, postulates a positive one-to-one relation between stock returns and inflation.

Interest rates affect things such as loans and mortgages, but they also have an effect on the markets as well. As rates change, the demand for different types of investments will change as well. During periods of low interest rates, stocks are considered more attractive than bonds and other fixed interest investments-the price the banks and other institutions are willing to pay to borrow your money has gone down. Similarly, periods of high interest rates are considered bad for stocks because safer investments earn higher returns.

The empirical evidence on the issue of whether the Fisher hypothesis holds in stock markets is far from conclusive. For instance, event studies, which look at the effects of inflation announcements on stock returns, report a negative relation between inflation and stock returns (e.g., Amihud 1996). Short-horizon studies that use monthly data covering what is typically 10 to 15 years also report either a negative or an insignificant relation between stock returns and inflation (e.g., Jaffe and Mandelker 1976). In contrast, the long-horizon

studies (e.g., Boudoukh, Richardson and Whitelaw 1994) and studies that tests for cointegration between stock and commodity price indexes (e.g. Ely and Robinson 1997) find a positive and significant relation between stock returns and inflation but report a commodity price elasticity of less than unity. One exception is Anari and Kolari (2001), who reported the commodity price elasticity of stock returns to be above unity

2.1 Macro-economic Variables

Macroeconomics is concerned with the behaviour of the economy as a whole with booms and recessions, the economy's total output of goods and services and the growth of output the rates of inflation and employment/unemployment, the balance of payments, and the exchange rates. Macroeconomics focuses on the economic behaviour and policies that affect consumption and investment, the dollar and the trade balance, the determinants of changes in wages, and price, monetary policies, the money stock, the federal budget, interest rates, and the national debt.

There are several theoretical justifications to expect a relationship to exist between the macroeconomic variables and stock returns. Exploring each variable in turn, Monetary Portfolio Theory suggests that changes in money supply alters the equilibrium position of money, thereby altering the composition and price of assets in an investor's portfolio e.g. Cooper (1974); Rozeff (1974). In addition, changes in money supply may impact on real economic variables, thereby having a lagged influence on stock returns Rogalski and Vinso (1977). Both of these mechanisms suggest a positive relationship between changes in money supply and stock returns.

Common stock is traditionally viewed as a hedge against inflation, due to the fact that equity represents a contingent claim on the realm assets of the firm. In the presence of inflation, the value of the contingent claims will be revised upward. Therefore, proportionate increases in prices should not affect the real rates of return on equity, Day (1984). However; the monetary assets of the firm (i.e. cash, securities, receivables and debt) will be independent of fluctuations in the price level. Hence, it is only the real component of the firm that will be hedged against changes in inflation, Hong (1977). Surprisingly, empirical tests have found a negative relationship to exist between inflation and nominal stock returns Fama and Schwert (1977); Gultekin (1983). In light of the lack of agreement between the theory and evidence, it is difficult to predict the direction of the relationship between stock returns and inflation in ESMs. This is particularly so for some of the East and Central African countries which have experienced periods of high inflation over our sample period.

It is widely accepted that current stock levels are positively related to future levels of real activity, as measured by GDP or industrial production. Intuitively this finding seems justified since returns are a function of the future cash flow stream, which is highly dependent upon future economic conditions. However, a number of studies have documented a relationship between past (or current) production and stock returns Fama (1984); James, Koreisha and Partch (1985); Schwert (1990); Harris and Opler (1990); Ferson and Harvey (1996). Fama (1984) found a relationship between concurrent measures of US stock returns and industrial production that was positive and highly significant. James, Koreisha and Partch (1985) investigated the relationship between the lagged change in US industrial production and the

return on the S&P 500 index using monthly data from 1962 to 1981. They found that current stock returns were related to industrial production lagged by two periods.

Under perfect purchasing power parity conditions, exchange rates will adjust to reflect relative inflation levels, and the law of one price will be upheld. Hence, exchange rate risk will not be separately priced. However, in the short-to-medium term, deviations from purchasing power parity (PPP) have been reported for a number of industrial countries, Stockman (1980); Adler and Lehman (1983); Frenkel (1981). Under these conditions, deviations from PPP will be priced to the extent that they represent exchange rate risk that must be borne by investors Jorion (1991); Dumas and Solnik (1995). Therefore, an exchange rate variable is included as a local risk factor.

Macroeconomic variables similar to those in this study have been used in a number of studies. Bailey and Chung (1995) found that the exchange rate against the US dollar was able to explain a significant amount of the variation in monthly Mexican equity returns over the 1986 to 1994 period. Bailey and Chung (1996) also examine the Philippine equity market over the 1982 to 1993 period. Regressions of monthly returns against a country return index, the exchange rate per US dollar, the black market exchange rate premium, and a credit risk variable were able to explain an average of thirty-five percent of return variation across industries.

Darrat and Mukherjee (1987) found a causal relationship between annual Indian stock returns and a number of macroeconomic variables over the 1948 to 1984 period. They found

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evidence of a relationship between returns and changes in money supply, the price level and long-term interest rates. Oyama (1997) used Principal Components Analysis (PCA) to identify the sources of monthly return variation in the Zimbabwe stock market. The principal components were found to be significantly correlated with the variables money supply, short-term interest rates, commodity prices and an exchange rate variable.

2.2 Inflation

Inflation is defined as a persistent increase in general price levels in an economy over time Brealey et al, (1991). Inflation effectively reduces the purchasing power of a currency. Low or moderate level of inflation in a country can have a positive effect on the business sector in that they can act as an incentive to production. High level of inflation however can harm a company's profitability by affecting the cost of inputs as well as reducing final demand for its output.

Inflation is likely to influence stock prices directly through changes in the price level and through the policies designed to control it. Deflation should have a negative impact on share prices. Inflation also influences the risk free rate and discount rate thus determining the value of future cash flows.

Inflation is expected to have an impact on the stock market returns. Kaul (1990) notes that research evidence from major economies (U.S, Canada. U.K and Germany) show a very significant negative relationship between stock returns and changes in the expected inflation.

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Inflation is taken as "bad news" for the stock market; that is, when inflation rises, stock prices should fall since inflation erodes people's wealth, hence reduces their propensity to invest (Kanniainen and Kurikka (1984). Hasbrouck (1984) also arrived at the negativity relationship conclusion between stock returns and inflation in his study of the relationship between stock returns, inflation and economic activity.

The relationship between inflation and the returns in the stock market was also examined by Jaffee and Mandelker (1976), with a view of investigating the effectiveness of stocks as a hedge against inflation and found that there existed a significant negative relationship between the returns on the market portfolio of stocks and inflation.

However, Kwon, Chung S (1997) in his empirical study of the effects of macroeconomic variables on stock returns in developing markets contradicts this finding and states that the inflation –and interest rate-related variables are not significant factors to the Korean stock market. Pattison (1971) also found the relationship between inflation rates and aggregate equity prices to be significantly positive.

2.2.1 The Oil Price

Oil is the lifeblood of modern economies. Oil is one of the most important macro economic factors in the World economy. In fact, the crude oil market is the largest commodity market in the world (Levin et. al., 2003). As countries urbanize and modernize their demand for oil increases significantly. Future oil demand is difficult to predict but is generally highly

correlated with the growth in industrial production. Consequently, countries experiencing rapid economic growth are the ones most likely to dramatically increase their demand for oil.

Increases in oil demand without offsetting increases in supply lead to higher oil prices. Higher oil prices act like an inflation tax on consumers and producers by, one, reducing the amount of disposable income consumers have left to spend on other goods and services and two, raising the costs of non-oil producing companies and in the absence of fully passing these costs on to consumers, reducing profits and dividends which are key drivers of stock prices. Oil price volatility increases risk and uncertainty which negatively impacts stock prices and reduces wealth and investment.

There exists published research on the relationship between energy prices and stock prices. However, most of the research has focused on the developed countries. Chen, Roll and Ross (1986) found that interest rates, inflation rates, bond yield spreads, and industrial production have risk that is priced in the stock market. They did not, however, find any evidence that oil price risk is rewarded by the stock market. Hamo (1989) found no evidence for the pricing of an oil price factor. Kaneko and Lee (1995) found some evidence in favour of oil price factor impacting stock returns. Ferson and Harvey (1995) find evidence that oil price risk factor does have a statistically significant but different impact on the 18 equity markets that they study.

Jones and Kaul (1996) using the producer index for fuels as a measure of oil prices, find a relationship between oil prices and stock market returns. After including future industrial

production into the analysis, however, they find that the reaction of Canadian and U.S. stock prices to oil price shocks can be completely accounted for by the impact of these shocks on real cash flows.

Huang, Masulis and Stoll (1996) using a vector autoregression approach, find that oil futures returns do lead some individual oil company stock returns but oil futures returns do not have much impact on broad based market indices like the S&P 500.

Sadorsky (1999) estimates a vector autoregression model with monthly data to study the relationship between oil prices changes and real stock returns in the U.S. He finds that oil price changes and oil price volatility both play important roles in affecting real stock returns. After 1986, oil price movements explain a larger fraction of the forecast error variance in real stock returns than do interest rates. There is evidence that oil price volatility shocks have asymmetric effects on the economy. In particular, positive oil price shocks have greater impact on stock returns and economic activity than do negative oil price shocks.

Faff and Brailsford (1999) found a positive and significant impact of oil prices on the Oil and Gas and Diversified Resources industries and a negative and significant impact of oil prices on the Paper and Packaging, and Transportation industries in Australia.

Papapetrou (2001) uses a multivariate vector autoregression model to study the dynamic interaction between oil prices, real stock prices, interest rates, and real economic activity in

Greece. His empirical results show that changes in oil prices influence real activity and employment.

Hammoudeh and Eleisa (2004) study the relationship between oil prices and stock prices for Bahrain, Kuwait, Oman, Saudi Arabia, and the United Arab Emigrates. Using daily data they found that only Saudi Arabia stock market has a bi-directional relationship between oil prices and stock prices.

Increase in oil prices have been held responsible for recessions, periods of excessive inflation, reduced productivity and lower economic growth Robert B. and Lutz K. (2004).

2.2.2 Interest Rates

Interest rates represent the cost of borrowing capital for a given period of time. Borrowing is significant source of finance for many firms (Brealey et al, 1991). However, prevailing interest rates are of much concern to many firms because of indexing of interest rates to inflation in some borrowing arrangements, since interest rates continue to affect the firm for the whole period that the borrowing arrangement is outstanding (Fischer 2003). For saving and other financial intermediates, interest rates represent both a compensation for the loss in the value of loaned capital arising chiefly from inflation as well as a profit margin to compensate the lender for the default risk he exposes himself to during the loan period. Higher interest rates deter prospective borrowers and increase the default risk of a loan portfolio already held, thus high interest rates may adversely affect financial institutions

whose chief activity is lending funds, hence phenomenon of bad debts as observed in early 1999 (Waciira W, 1999).

Empirical evidence suggests that stock returns across market sectors are not uniform. Fama and French (1992, 1996), found that much of the cross sectional variation in equity returns can be explained such as market capitalization, price to earnings ratios, change in operating earnings and book to market ratios. They examine many of these factors simultaneously and conclude that size and book- to- market explain the majority of the cross sectional variation in stock returns.

2.3 Macroeconomic Variables and Stock Market Returns

2.3.1 Evidence outside Kenya

The relationship between stock market returns and fundamental economic activities in the U.S. are well documented Fama (1970, 1990, and 1991). In recent years, numerous studies Fama (1981), Huang and Kracaw (1984), Chen, Roll, and Ross (1986), Pearce and Roley (1988), Fung and Lie (1990), Chen (1991), and Wei and Wong (1992) modeled the relation between asset prices and real economic activities in terms of production rates, productivity, growth rate of GNP, unemployment, yield spread, interest rates, inflation, dividend yields, etc.

The U.S. and Japan stock markets are quite sensitive to inflationary variables such as change in unexpected inflation, expected inflation, the risk premium, and term structure; Burmeister and Wall (1986), Hamao (1988) and Chen (1991).

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Kwon, Chung S (1997), found that the Korean stock market is more sensitive to foreign exchange, trade balance, the money supply, and the production index, suggesting that the Korean market is more sensitive to international trading activities rather than inflation or interest rate variables and therefore different strategies are required to invest successfully in the Korean stock market.

Charles M. and Gautam K. (1996) found that changes that precede most economic series have detrimental effect on output and real stock returns in the U.S., Canada, Japan, and the United Kingdom during the postwar period. They add that, the postwar oil shocks appear to have generated volatility in the Japanese and U.K. stock markets that is "excess" of what can be explained by existing rational models.

Chen, Roll and Ross (1986) have argued that stock returns should be affected by any factor that influences future cash flows or the discount rate of those cash flows. In an empirical investigation they found that the yield spread between long and short term government bonds, expected inflation, unexpected inflation, nominal industrial production growth and yield spread between corporate high and low grade bonds significantly explain stock market returns. Fama 1981, 1990; Fama and French, 1989; Schwert, 1990; Ferson and Harvey, 1991 and Black, Fraser and MacDonald, 1997, generally found a significant relationship between changes in macroeconomic variables, such as industrial production, inflation, interest rates, the yield as well as a risk premium measure and the stock returns.

2.3.2 Evidence from Kenya

In Kenya many studies have been conducted on the stock market touching on various aspects. Among them are Munga (1974) who studied the history of the NSE; Omasa (1989) applied some of the asset pricing models on the NSE to test their predictive ability. Asienwa (1992) measured the relationship between investment ratios of the quoted companies on the NSE and the performance of their stock prices on the exchange. Simiyu (1992) developed an alternative stock index to the existing (official) NSE Index to measure the performance of the stock prices overtime. Iraki (1996) explored the possibility of the development of trading in futures contracts at the stock exchange. Nyamute (1998) analysed the movement and/or the changes of the stock price index (the NSE 20-Share Index) in relation to movements and /or changes in four of the major economic indicators (interest rates, money supply, inflation rate and exchange rates). However this study focused on the general stock market.

This test involves four markets as classified in the MIMS sector at the NSE. First, for each market, a number of variables are identified that are able to explain a 'significant' portion of return variation for that market. Second, from these variables a number of factors are extracted by principal components analysis (PCA). Third, these factors are then regressed against the equity returns for each market, and a test is performed to determine to which factors the markets have similar exposures. The analysis commences with the earlier identified variables, i.e. Inflation, interest rates and oil price.

2.4 Industry Risk

Risk is the quantifiable likelihood of loss or less-than-expected returns. There are two fundamental types of risk:

- Systematic Risk - These are market risks that cannot be diversified away. Interest rates, recessions and wars are examples of systematic risks.Systematic risk influences a large number of assets. A significant political event, for example, could affect several of the assets in your portfolio.

- Unsystematic Risk - Unsystematic risk is sometimes referred to as "specific risk". This kind of risk affects a very small number of assets. An example is news that affects a specific stock such as a sudden strike by employees. Diversification is the only way of protection against unsystematic risk.

Risk should be an integral component of investment decision making process. This is because the existence of the diversifiable and the undiversifiable risks are a significant input in investment decisions. Unsystematic risk affects specific assets hence the variation of risks from one industry to another.

Beta is a measure of a stock's volatility in relation to the market. By definition, the market has a beta of 1.0, and individual stocks are ranked according to how much they deviate from the market. A stock that swings more than the market over time has a beta above 1.0.

Beta is a key component for the capital asset pricing model (CAPM), which is used to calculate cost of equity. The cost of capital represents the discount rate used to arrive at the present value of a company's future cash flows. All things being equal, the higher a

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company's beta is, the higher its cost of capital discount rate. The higher the discount rate, the lower the present value placed on the company's future cash flows. In short, beta can impact a company's share valuation.

A stock's price variability is important to consider when assessing risk. Indeed, if you think about risk as the possibility of a stock losing its value, beta has appeal as a proxy for risk.

Beta is the only relevant measure of a stock's risk. It measures a stock's relative volatility - that is, it shows how much the price of a particular stock jumps up and down compared with how much the stock market as a whole jumps up and down.

Beta is found by statistical analysis of individual, daily share price returns, in comparison with the market's daily returns over precisely the same period. Fischer Black, Michael C. Jensen and Myron Scholes (1972) confirmed a linear relationship between the financial returns of stock portfolios and their betas. They studied the price movements of the stocks on the New York Stock Exchange between 1931 and 1965.

Besides, beta offers a clear, quantifiable measure, which makes it easy to work with. Sure, there are variations on beta depending on things such as the market index used and the time period measured, but broadly speaking, the notion of beta is fairly straightforward to understand. It's a convenient measure that can be used to calculate the costs of equity used in a valuation method that discounts cash flows.

Techniques designed to improve the prediction of beta estimates based upon fundamental firm characteristics can be traced at least as far back as the study of Beaver Keltler and Scholes (1970).

Several subsequent fundamental analysis studies are renewed in Ehon and Gruber (1991). Some of the variables that were consistently examined and were found to be significant include coverage, dividends, earnings variance, firm size and industrial classification.

Chan and Chen (1991) found that firm distress as measured by a cut in dividends of fifty percent or more, and coverage are significant determinants of return at virtually all size levels. Numerous studies have dealt with the general topic of stock prices and economic activity. Inflationary impacts are the focus of the conflicting results of Fama (1981), Geske and Roll (1983) and Stalz (1964). Bulmash and Trivoli (1991) developed a three – stage model to describe the time lags that transpire between economic conditions and effect on stock prices hence returns for portfolio managers faced with the decision of which securities to buy under a given set of economic circumstances more specified information is needed concerning which macro-economic variables are priced. Visscher, Moore and Kok (1981) found continued price adjustment up to 60 days following utility rate decisions. Continued post settlement information flows or inefficient in corporation of settlement of information as cited two potentials for the value of the public information several days following its original dissemination.

Abell and Krueger (1991) found that at least one macro-economic descriptor could be used to explain equity returns in eleven of fifteen industries over the 1980 – 1986 period. Using significant macro-economic variables and the 1986 values of these variables, Abell and Krueger were able to improve forecasts of subsequent betas in eight of the eleven industries.

Among the extensions of the research of Abell and Krueger and Rahbar (1992) are a more comprehensive investigation of the predictive power of the variable beta model, inclusion of lagged independent variable values to reflect the speed with which several macroeconomic variables are reported to the public. Greater attention is paid to the assumptions of the models and an updating of the sample period. Burnie and Gunay (1993) studied the effect of macro economic factors such as inflation, exchange rate, money supply and unemployment rate among other variables to returns.

CHAPTER 3

3.0 RESEARCH METHODOLOGY

The study is an empirical question whether principal economic indicators such as inflation, oil price and interest rates are significant explanatory factors of stock market returns.

3.1 The Population of Interest

The population of interest consists of all the companies quoted at the NSE and classified under the various market sectors on the entire period. Appendix 1 gives details of the companies quoted at the Nairobi stock exchange as at 1st April 1996. Long-span data are exposed to various policy changes and economic shocks that may induce structural shifts and, therefore, the period of analysis will entail 6 years only spanning from April 1996 to December 2001.

3.2 Data Collection Method

The study will entail use of secondary data, which will be obtained from Nairobi stock Exchange or other financial intermediaries. Where data is not available from Nairobi Stock Exchange, the researcher will refer to financial statements published by companies under study. Such data will include: movement in share prices, dividends period, and share price index.

3.3 Variables of the Study

The macroeconomic variables used are monthly data for the same time period as the stock market data (April 1996 – December 2001), selected from various issues of the monthly

bulletin published by the Central Bank of Kenya. This study will consider inflation rate, interest rate and the oil price.

3.4 Data Analysis

The data collected will be analyzed using linear regression and correlation analysis to test the relationship between stock market returns and macroeconomic variables and other selected variables which are assumed to fit the Nairobi stock market. The problem of non-normality will be dealt with by using the approach outlined by Frecka and Hopwood (1983.) This method entails removal of outliers from the data and to improve the validity of the result, the items in the population will be grouped according to the industry classifications that will enable intersector companies to be made. Such an approach is also a means of minimizing deviations from normality Buijink and Jegers, (1986) as quoted by Vintanen and Yiliolli (1989). The firms are grouped in portfolios by size in an attempt to identify the impact on stock market returns since size has been shown to be strongly correlated with expected returns (Kwon, Chung S 1997). In addition, firms are grouped by industrial sectors in order to observe the effect of change in each macroeconomic variable on the various industrial groups and to explain the information content of each variable over time.

The industry classifications currently in use are the following:-

- ◆ Agricultural sector
- ◆ Commercial and Services
- ◆ Finance and Investment, and
- ◆ Industrial and Allied

Then subsequently applying a natural logarithm transformation. The significance of each of the independent variables will be tested at a confidence level of 95%.

Monthly return (R_j) of an individual stock will be obtained as follows;-

$$R_j \quad = \quad \frac{(P_1 - P_0)}{P_0} + D_i \quad \ldots\ldots\ldots\ldots (1) \quad \text{For all sectors}$$

Where:

R_j = return on asset j

P_1 = Price of share at period t-o

P_0 = Price of share at period t-1

D_i = dividend paid during the period.

The above returns will further be investigated by the use of regression model suggested below.

$$\text{IND } (R)^* = \beta_0 + \beta_1 X_1 + \beta_2 X_2 + \beta_3 X_3 \ldots \beta_n X_n \ldots\ldots\ldots\ldots (2)$$

Where IND $(R)^*$ = is the return for the *ith* industry

X_1 is the month on month annual percentage change in the average rate of inflation.

X_2 is the percentage change in the oil price (monthly average).

X_3 is the percentage change in the monthly interest rate on 91-day treasury bills.

CHAPTER 4

4.0 DATA ANALYSIS AND FINDINGS

4.1 Introduction

The results of the analysis are represented in this chapter. The objective of this study was to determine whether the impact of macro economic variables varies   according to industry. The monthly data for the period April 1996 to December 2001 are used in this data. The data used in the analysis is in appendix 2. The year 2002 was an election year that turned out to be a regime change and therefore left out. The variables of this study include:

AvrAgr   - Agricultural Sector monthly average returns per share.

AvrComm   - Commercial Sector monthly average returns per share.

AvrIndustrial - Industrial sector monthly average returns per share.

AvrFinancial - Financial sector monthly average returns per share.

MrkAvr   - Market monthly average return per share.

World OP   - World Oil Prices per month.

Tbill   - 91 Day Treasury bill Monthly Average.

NSE Index   - 20 Share Nairobi Stock Exchange.

Inflation   - Monthly inflation rates.

4.2 Descriptive Statistics

The sector with the highest mean return per share (5.9%) was industrial and the one with the lowest was commercial. The industrial sector was the riskiest with a standard deviation of 13.98%. The results are summarized in table 1 below.

Table1:   Monthly Sectorial and Market Returns 1996 -2001

Variable	N	Mean	StDev	Minimum	Maximum
AvrAgr	69	-0.029	1.17	-2.488	5.537
AvrComm	69	0.01	1.12	-2.11	3.318
AvrIndu	69	0.059	1.398	-2.901	4.506
AvrFin	69	-0.034	1.14	-1.857	3.635
MrkAvr	69	0.001	0.86	-1.507	2.365

The sector with the highest return is agriculture (5.537) while the one with the lowest return is industrial (-2.901). The data confirm that the sectors considered riskiest has the highest return.

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4.2.1 Correlation of Sector Returns

The Pearson product moment correlation coefficient is calculated to measure the degree of linear relationship between sector returns and the market as a whole. The correlation co-efficient assumes a value between -1 and +1. If one variable tends to increase as the other decreases, the correlation co-efficient is negative and in an investment portfolio perspective offer substantial diversification benefit.

Table 2: Correlations: AvrAgr, AvrComm, AvrIndu, AvrFin, MrkAvr

```
          AvrAgr  AvrComm  AvrIndu   AvrFin
AvrComm    0.289
           0.016

AvrIndu    0.241   0.198
           0.046   0.103

AvrFin     0.337   0.381    0.600
           0.005   0.001    0.000

MrkAvr     0.644   0.631    0.752    0.814
           0.000   0.000    0.000    0.000


Cell Contents: Pearson correlation
               P-Value
```

In table 2 above, all variables (returns) are positively correlated, with the highest correlation of + 0.60 between financial sector and industrial sector. All variables are again positively correlated with the market, the financial sector having a high correlation of +0.814 that is statistically significant ($p = 0.000$), not most $p -$ values are smaller than 0.05. There is sufficient evidence that the correlations are not zero.

4.2.2 Macro Economic Indicators

The macro economic indicators' impact on sector returns under study include world oil prices; t-bill rates and inflation rates. The mean prices of macro economic indicators are summarized in table 3 below.

Table 3: Descriptive Statistics: Monthly WorldOP, Tbill, NseIndex, MrkAvr

Variable	N	Mean	StDev	Minimum	Maximum
WorldOP	69	19.766	5.734	9.41	30.642
Tbill	69	17.643	6.278	8.8	36.4
NseIndex	69	2615.4	628.5	1420.7	3486.4
MrkAvr	69	0.001	0.86	-1.507	2.365

4.3   Market and Sector Return

The next inquiry is the extent to which individual sector returns impact on the NSE 20 share index. This requires running a regression with NSE index as dependent variable and sector returns as independent variables. The results are summarized in table 4 below.

Table 4: Regression Analysis: NseIndex versus AvrAgr, AvrComm, AvrIndu, AvrFin

```
The regression equation is
NseIndex = 2607 + 70.2 AvrAgr + 106 AvrComm + 117 AvrIndu - 78.0 AvrFin

Predictor          Coef      SE Coef          T          P
Constant        2606.93        73.73      35.36      0.000
AvrAgr            70.23        68.42       1.03      0.309
AvrComm          105.87        72.80       1.45      0.151
AvrIndu          116.82        66.35       1.76      0.083
AvrFin           -78.01        87.47      -0.89      0.376


S = 610.0        R-Sq = 11.3%      R-Sq(adj) = 5.8%


Analysis of Variance

Source              DF           SS          MS         F         P
Regression           4      3043223      760806      2.04     0.099
Residual Error      64     23818036      372157
Total               68     26861259
```

The industrial and commercial sector have the largest coefficients and likely to have the largest impact on the NSE index i.e. they are market movers. The financial sector return has a negative coefficient i.e. move the market in opposite direction. However, all variables put together have a p-value of 0.099 i.e. less than 0.10 and therefore useful in predicting market index.

4.4 Agricultural Sector Returns and Macro Economic Indicators

The impact of macro-economic variables in agricultural sector is captured in table 5 below, through a regression equation. The return from investment in share in the agricultural sector is the dependent variable and the macro economic variables as independent variables. Inflation rate (0.00505) and t-bill rates (0.02813) have positive co-efficient suggesting that as the value of these two variables increase, the returns from investments in agricultural sector experience an increase. However, the t-value of inflation (0.11) and t-bill (0.83) suggest that statistically they might not be different from zero.

The co-efficient of world oil prices has a negative sign (-0.00978) negatively on the value of the assets in the agricultural sector. This suggests adverse effect of increase of oil prices in this sector.

Overall the p-value of the regression equation of 0.508 is above the critical p-value of 0.10; confirm low predictive value of the equation.

Table 5: Regression Analysis: AvrAgr versus WorldOP, Inflation, Tbill

```
The regression equation is
AvrAgr = - 0.366 - 0.0098 WorldOP + 0.0050 Inflation + 0.0281 Tbill

Predictor          Coef     SE Coef           T        P
Constant        -0.3663      0.9043       -0.41    0.687
WorldOP        -0.00978      0.02971      -0.33    0.743
Inflation       0.00505      0.04659       0.11    0.914
Tbill           0.02813      0.03377       0.83    0.408

S = 1.176      R-Sq = 3.5%      R-Sq (adj) = 0.0%

Analysis of Variance

Source            DF          SS          MS        F        P
Regression         3       3.246       1.082     0.78    0.508
Residual Error    65      89.909       1.383
Total             68      93.155
```

4.5 Commercial Sector Returns and Macro economic Variable

Table 6 below, is a summary of the test on hypothesized relationship between macroeconomic variables and returns from the shares in the commercial sector. Inflation has

a positive co-efficient, indicating that as inflation increases, the investors in shares in this sector expect additional compensation. It also implies the use of investment in shares as a hedge against inflation.

The interest rate in t-bill has a negative co-efficient suggesting that investors shift their investments between commercial sector and t –bills as fortunes on those two assets (commercial and t –bills) change. The same applies to world oil prices i.e. as oil price increases there is adverse movement in the returns from investments in commercial sectors because the operating costs will go up.

Table 6: Regression Analysis: AvrComm versus WorldOP, Inflation, Tbill

```
The regression equation is
AvrComm = - 0.148 - 0.0071 WorldOP + 0.0636 Inflation - 0.0074 Tbill

Predictor          Coef      SE Coef          T          P
Constant        -0.1480       0.8608      -0.17      0.864
WorldOP        -0.00709       0.02828      -0.25      0.803
Inflatio        0.06364       0.04434       1.44      0.156
Tbill          -0.00736       0.03214      -0.23      0.820


S = 1.120       R-Sq = 4.4%       R-Sq (adj) = 0.0%

Analysis of Variance

Source             DF           SS          MS          F          P
Regression          3        3.783       1.261       1.01      0.396
Residual Error     65       81.470       1.253
Total              68       85.252
```

Overall the statistics show the relationship to be spurious. This is because t-values for individual variable and a p – value 0.396, the co-efficient of independent variables are not strong enough as to be useful in explaining returns from the commercial sector. This means that other factors not captured by regression explain variations in the sectors returns.

4.6   Industrial sector Returns and Macro- economic Variables

The summary of regression results, in which returns from industrial sector is the dependant variable and world oil prices, inflation, and t- bills are independent variable are summarized in table 7 below.

The coefficients of world prices and t-bills each have a negative sign. The shares in the industrial sector, just like the agricultural sector represents investments in real productive sector and the signs are as expected. We expect increase in share prices to increase manufacturing costs and reduce its returns.

Table 7:   Regression Analysis: AvrIndu versus WorldOP, Inflation, Tbill

```
The regression equation is
AvrIndu = 1.47 - 0.0525 WorldOP + 0.0747 Inflation - 0.0496
Tbill

Predictor          Coef     SE Coef          T        P
Constant          1.468       1.075       1.37    0.177
WorldOP        -0.05246     0.03532      -1.49    0.142
Inflation       0.07467     0.05540       1.35    0.182
Tbill          -0.04955     0.04015      -1.23    0.222

S = 1.399      R-Sq = 4.3%      R-Sq (adj) = 0.0%

Analysis of Variance

Source          DF          SS          MS        F        P
Regression       3       5.773       1.924     0.98    0.406
Residual Error  65     127.136       1.956
Total           68     132.909
```

At the same time increase in returns on t-bills reduces the earning from the sector because borrowing by firms in this sector become expensive. Inflation has a positive sign suggesting that investors are compensated for changes in Inflation. Furthermore, the t – value of the regression coefficients improves significantly, when compared to those in the earlier equations, but again are not statistically significant.

4.7   Financial Sector Returns and Macro Economic Variables

The result of the regression in which the dependant variable is return from the financial sector, and the dependant variables are macro economic variables is summarized in table 8.

The co –efficient of world oil prices and the t- bills is negative and statistically insignificant and interpreted as in the section above.

Table 8:   Regression Analysis: AvrFin versus WorldOP, Inflation, Tbill

```
The regression equation is
AvrFin = 0.361 - 0.0077 WorldOP + 0.0293 Inflation - 0.0249 Tbill

Predictor         Coef      SE Coef          T        P
Constant        0.3609       0.8926       0.40    0.687
WorldOP        -0.00766      0.02932      -0.26    0.795
Inflatio        0.02929      0.04598       0.64    0.526
Tbill          -0.02495      0.03333      -0.75    0.457

S = 1.161      R-Sq = 1.0%      R-Sq(adj) = 0.0%

Analysis of Variance

Source            DF          SS          MS        F        P
Regression         3       0.845       0.282     0.21    0.890
Residual Error    65      87.601       1.348
Total             68      88.446
```

4.8 Summary of Findings

The coefficients are summarized in the table below. The coefficient with the greatest impact varies across the sectors. In the case of agricultural sector it is t-bill rate. In the commercial, industrial and financial sector it is inflation.

Sector		World Oil Price	Inflation	TBill	R-Square	p-Value
Agriculture:	B-Coefficient:	-0.0098	0.0051	0.0281		
	t -value :	-0.33	0.110	0.830	3.5%	.508
Commercial:	B-Coefficient:	-0.0071	0.064	-0.007		
	t-value:	-0.25	1.44	-0.23	4.4%	.396
Industrial:	B-Coefficient:	-0.052	0.075	-0.050		
	t-value:	-1.49	1.35	-1.25	4.3%	.406
Financial:	B-Coefficient:	-0.008	.29	-0.025		
	t-value:	-0.26	.64	-0.75	1.0%	.890

The r-squares are low and the p-values suggest weak association between the sector share returns and macro economic variables.

CHAPTER 5

5.0 Conclusions

This study examined the impact of macro economic variables, world oil prices, t-bills and inflation on the performance of shares, sectorwise over the period 1996 to 2001. Monthly data was used.

It has been established that inflation and world oil prices have negative impact on the returns from the shares across the sectors. Charles M. J. and Gautam K. (1996) found that oil prices have detrimental effect on output and real stock returns in the U.S., Canada, Japan, and the United Kingdom during the postwar period. Similarly, Driesprong, G. et al (2004), find that higher oil price predicts lower stock returns.

The second finding is that shares at the NSE act as a good hedge against inflation i.e. as inflation increases the returns from the share increase. However, the level of association is weak across the sector. Kwon, Chung S (1997) in his empirical study of the effects of macroeconomic variables on stock returns in developing markets also found that the inflation and interest rate-related variables are not significant factors to the Korean stock market. Pattison (1971) also found the relationship between inflation rates and aggregate equity prices to be significantly positive.

The implication is that the investors would not achieve much through diversification. Secondly the efficiency at the NSE might be low such that price differential across the sectors are unobservable. Finally the impact of these variables across the sectors might be uniform.

5.1   Recommendations For Further Research

The issues arising from the study include the justification of classification of the shares listed at NSE into agriculture, commercial, financial and industrial. It does not make much sense classifying these forms if the classification fails to capture risk differentials. This requires further research.

The capacity of both investor and corporate managers to incorporate information relating to macro economic variables is another area for further research.

5.2   Limitation Of This Study

The short period for research made it difficult collecting large data set that is appropriate for a study such as this one. The study assumed a linear relationship while it is possible that the relationship might be non-linear. Advanced statistical models should be used in future studies.

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APPENDICES

Appendix 1: list of companies quoted at N.S.E. as at 1st April 1996

AGRICULTURAL SECTOR

Brooke Bond

Kakuzi Ord.

Rea Vipingo Plantations

Sasini Tea & Coffee Ltd.

COMMERCIAL SECTOR

African Lakes corporation

CMC Holdings ltd

Hutchings Bierner

Kenya airways ltd

Marshalls (East Africa) ltd

Nation media Group ltd

Car and General (Kenya) ltd

Tourism Promotion Services ltd

Uchumi supermarket ltd.

FINANCE AND INVESTMENT

Barclays bank of Kenya ltd

C.F.C bank Ltd

Diamond Trust Bank Kenya

Equity Bank Ltd

Housing Finance Co.

I.C.D.C Investment Co. Ltd

Jubilee Holdings Ltd

Kenya Commercial Bank

National Bank of Kenya Ltd

NIC Bank Ltd

Pan African Insurance Company ltd

Standard Chartered Bank ltd

INDUSTRIAL SECTOR

Athi River Mining

B.O.C Kenya Ltd

Bamburi Current Ltd

British American Tobacco Kenya ltd

Carbacid Investment Ltd

Crown Berger

E.A. Cables Ltd

E.A. Portland cement

East African Breweries

Kenya Oil Co. Ltd

Kenya Power & Lightning Ltd

KenGen Ltd.

Mumias Sugar Company

Olympia Capital Holdings Ltd

Sameer Africa Ltd

Total Kenya Ltd

Unga Group Ltd

Average monthly returns

MonthYr	AvrAgr	AvrComm	AvrIndu	AvrFin	WorldOP	USAOP	Inflation	Tbill	NseIndex	MrkAvr
04/01/96	-0.17058	-0.25571	-0.811	-0.92112	20.81	21.14	7.3	24 16	2973.56	-0.5396
05/01/96	0.62488	-0.04911	0 458849	2.529585	20.29409	21.28533	7.2	21.96	3026.14	0.89105
06/01/96	0.248357	0.501901	0.976352	0.159232	20.29409	21.43067	9.7	21.85	3091.1	0.47146
07/01/96	-0 06264	0.946377	0.563294	-0.15725	20.29409	21.576	11.2	21.76	3145.79	0.322446
08/01/96	-0.14432	-0.43335	-0.30566	0.062835	20.29409	21.72133	11	21.60	3108.98	-0.20512
09/01/96	0.176739	-0.73561	-0.63494	-1.40746	20.29409	21.86667	10.4	22.50	3062.39	-0.65032
10/01/96	-0.08152	1.984471	-0.23101	0.17953	20 29409	22.012	10.8	24 30	3038.57	0.462868
11/01/96	0.515354	-0.68843	0.740305	-0.98539	20.29409	22.15733	11.4	21.10	3031.5	-0.10454
12/01/96	-0.26753	0.276687	0.282267	-0.16019	20.29409	22.30267	10.8	21.60	3078.99	0.032807
01/01/97	1.584377	1.472029	0.346224	1.823655	22.786	22.448	10.9	21.60	3412.52	1.306571
02/01/97	-0.01476	1.882605	4.505578	2.706414	20.0775	19.5825	11.9	21.40	3484.4	2.26996
03/01/97	-1.07437	-0.00894	0.615925	0.44394	18.6075	17.96	15.7	21.40	3412.09	-0.00586
04/01/97	-0.32584	-1.17174	-0.50506	-0.75878	16.9525	16.6375	16.1	21.10	3307.43	-0.69036
05/01/97	0.05206	1.272084	0.397111	0.210858	17.982	17.59	17.2	20.40	3380 53	0.483028
06/01/97	0.406219	3.318486	0.62589	1.23602	16.9175	16.765	12.8	19 40	3460.46	1.396654
07/01/97	-1.03028	0.80306	0.491164	1.056484	17.175	16.9525	8.9	18.50	3486.39	0.330108
08/01/97	1.519912	-0.26156	1.037572	-0.61084	17.48	17.344	7.7	19.70	3418.17	0.421271
09/01/97	3.117772	0.696051	-0.40629	-0.68794	17.246	16.89	8.8	26.20	3447.12	0.679898
10/01/97	-1.07835	-0.35119	-1.05801	-1.24142	18.692	17.928	8.7	27.10	3361.72	-0.93224
11/01/97	-2.48847	-0.85781	-0.58571	-0.94589	18.1075	17.21	8.2	26.80	3187.68	-1.21947
12/01/97	0.618323	0.986548	-1.34126	-0.40426	16.3525	15.655	8.3	36.40	3074.23	-0.03516
01/01/98	1.700412	3.283169	0.625185	0.767891	13.956	13.626	11.3	26.30	3278.37	1.594164
02/01/98	1.71083	-1.55709	2.516682	2.248551	12.69	12.465	12.3	26.30	3365.94	1.229743
03/01/98	0.966212	-1.47227	-0.20042	-0.45727	11.4425	11.265	8.1	26.70	3288.81	-0.29094
04/01/98	-0.38372	-0.77615	0.097276	-1.45366	12.0725	12.075	7	27.00	3077.28	-0.62906
05/01/98	-0.28613	-0.46993	-1.25606	-1.7153	12.436	12.456	4.6	26.40	2987.95	-0.93185
06/01/98	0.616638	-0.05639	0.394046	1.132887	10.99	10.8575	7.4	25.50	2971.11	0.521794
07/01/98	-0.27149	-0.3294	0.822824	-0.45193	11.182	11.014	11.7	24.70	2869.75	-0.0575
08/01/98	1.196973	-0.74933	-0.99855	-0.60561	11.3425	11.0725	5.2	23.90	2879 8	-0.28913
09/01/98	0.248313	-0.82482	-0.22483	-0.60662	12.065	11.875	4	22.50	2808 74	-0.35199
10/01/98	-0.49125	0.11083	-0.99292	-1.75415	12.478	12.134	3.3	20.80	2763.92	-0.78187
11/01/98	-0.81512	0.176181	-2.90092	-0.26901	11.0775	10.4975	3	17.60	2604.09	-0.95222
12/01/98	0.887779	0.889333	3.66348	-0.2568	9.41	8.765	2.5	12.50	2735.82	1.295949
01/01/99	0.560644	2.159944	3.104449	3.635345	10.27	9.752	-1.1	10.70	3043.34	2.365095
02/01/99	0.01707	-0.82542	2.248727	0.930989	9.705	9.2775	-0.5	8.90	2953.98	0.592842
03/01/99	-0.20084	-0.14959	-1.01636	-0.7358	11.6975	11.5375	1.2	8 80	2888.43	-0.52565
04/01/99	-0.23125	0.340783	-1.41759	-1.0869	14.654	14.674	1.4	9.00	2789.96	-0.59874
05/01/99	-0.14713	-0.76084	-0.54532	-0.64882	15.035	15.1525	2.1	9.60	2755.26	-0.52553
06/01/99	0.091874	-0.53499	-0.48733	0.767665	15.53667	15.41	1.8	11.30	2768.46	-0.0407
07/01/99	-0.16224	-1.88356	3.585421	0.386714	17.758	17.34	4.35	14.50	2772.73	0 481584
08/01/99	-1.27123	-0.12163	-0.29431	0.14922	19.51	19.0725	6.9	14.80	2651.4	-0.38449
09/01/99	-1.55426	-0.80409	-1.39912	-1.23204	21.495	21.0675	7.2	15.80	2432.98	-1.24738
10/01/99	-0.4325	1.565983	-0.61021	-0.59406	21.632	21.008	8.2	17.60	2365.06	-0.0177
11/01/99	-0.36581	-0.64089	-0.95917	0.67302	23.335	22.65	8.3	18.10	2289.57	-0.32321
12/01/99	-0.93406	0.393238	1.547489	-0.54078	24.43	23.718	8	20.00	2296 34	0.116472
01/01/00	0.165266	0.197668	0.835343	0.087379	24.5475	24.19	8.7	20.30	2301.32	0.321414
02/01/00	-1.51779	-0.76214	-0.7957	-0.23957	26.4425	26.2125	5.7	14.80	2266.34	-0.8288
03/01/00	-1.36771	0.433923	0.512666	-0.12308	26.558	26.784	3.4	11.30	2223.74	-0.13605
04/01/00	-0.67337	-1.18236	0.669141	0.170782	23.126	23.206	4.1	12.40	2202.67	-0.25395
05/01/00	-0.08699	0.458817	0.190566	-0.30867	26.3775	26.015	5.2	11.20	2119.81	0.06343
06/01/00	-0.45361	-0.69019	-1.56699	-0.54848	28.434	27.974	8.3	10.23975	2049.06	-0.81482
07/01/00	-0.58802	0.935021	-1.63756	-1.09972	27.21	26.4175	8.4	9.7366	2032.57	-0.59757
08/01/00	-0.75333	0.105032	-0.09224	-0.14079	27.1025	26.925	7.6	9 477	2012.39	-0.22033
09/01/00	0.271404	0.017659	-0.18808	-0.09594	30.642	30.052	7.1	10.38375	1988.67	0.001262
10/01/00	2.05861	-1.58541	0.985172	-0.07554	29.785	29.095	6.6	10.66912	2028.16	0.34571
11/01/00	0.192167	-0.107	-1.10265	0.833559	30.345	29.5575	7.7	11.16725	1926.02	-0.04598
12/01/00	-0.45532	-0.21531	-0.5497	-1.85727	22.85	22.2475	7.5	12.7455	1893.08	-0.7694
01/01/01	-1.60934	-1.14093	0.010209	-1.05347	23.4475	23.16	6	14.7352	1894.42	-0.94838
02/01/01	5.537491	1.305127	-0.0463	1.578958	25.3775	24.2375	5.2	15.29725	1912.97	2.093819
03/01/01	-0.50993	-1.14969	-0.90731	0.589776	23.154	22.176	3.9	14.92225	1875.29	-0.49429
04/01/01	-0.99545	-0.86342	-0.36949	-1.05536	24.03	22.7	3.6	12.8992	1803.99	-0.82093
05/01/01	-0.74498	-1.0708	-0.67986	-0.50412	25.83	24.3375	2.1	10.609	1699.22	-0.74994
06/01/01	0.76682	1.457484	-1.33222	-0.69581	25.584	23.948	2	12.056	1619.85	0.049068
07/01/01	-0.35137	-1.0104	-0.16851	0.799076	23.225	22.22	1.7501	12.8732	1635.1	-0.1828
08/01/01	-0.90037	1.115652	-0.96758	0.090562	24.194	23.128	1.5076	12.83875	1564.69	-0.16543
09/01/01	-1.35151	-2.11005	-1.04786	-1.51909	23.8475	22.7725	1.2423	12.39325	1454.52	-1.50713
10/01/01	-0.36639	-0.39425	-1.4758	-1.22658	19.46	18.4425	1.0614	11.6286	1441.32	-0.86575
11/01/01	0.569312	1.401229	3.991256	2.796199	30.345	29.5575	0.9381	11.4975	1468.09	2.189499
12/01/01	-1.43079	-0.76915	-0.67327	0.854979	24.212	23.638	0.8541	11.281	1420.68	-0.50456