THE IMPACT OF FISCAL AND MONETARY POLICIES ON STOCK MARKET PERFORMANCE IN KENYA: AN EMPIRICAL ANALYSIS.

BY

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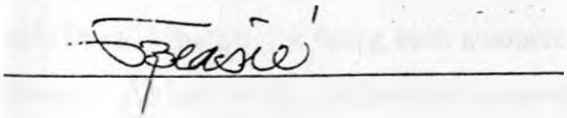
DECLARATION

This research paper is my original work and has not been presented for a degree in any other university.

ROSEMARY W. NGIGI

This research has been submitted for examination with our approval as university supervisors.



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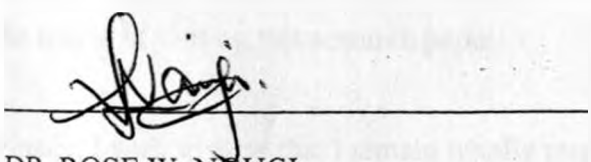

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DEDICATION

To my beloved parents,

Mr. and Mrs. James Ngigi Muchiri, and to my beloved siblings,

Ashii, Sarah, and Johnie.

ABSTRACT

Motivated by growing theoretical and empirical evidence, which shows that stock markets play a vital role in boosting long-run economic growth, governments the world over have instituted measures aimed at enhancing stock market operations. However, if any stock market is to play its allocative role properly, alot more needs to be done on the macroeconomic policy framework front. Specifically, both fiscal and monetary policies formulation should be geared towards enhancing the efficacy with which resources are mobilized through the stock market. To this end, this study investigated the impact of fiscal and monetary policy actions on stock market performance in Kenya. It sought to answer the question on the nature and extent of the impact of monetary and fiscal policies on the performance of the NSE. It further sought to determine which specific components of these policies (anticipated or unanticipated), affect the NSE performance.

The study proceeded by first testing for stationarity and cointegration of the variables used in the estimation process. Having specified the fiscal and monetary policies error correction models, it went on to determine the anticipated and unanticipated components of the same, by use of the general-to-specific model specification and reduction. The values for the anticipated and unanticipated fiscal and monetary policies attained thereof, were then used in the estimation of the stock market performance function, as measured by the stock price index.

The empirical results attained showed that both anticipated monetary policy actions, and unanticipated fiscal policy actions affect the stock market negatively, whilst unanticipated monetary policy adjustments affect it positively. Anticipated fiscal policy actions on the other hand, were found to have no impact on the stock market. These findings suggest that policy makers need to exercise considerable caution regarding fiscal-monetary policy stance and stock market regulation in Kenya

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CHAPTER ONE

INTRODUCTION

1.1 Background

Following a prominent line of research (Goldsmith, 1969; Mckinon, 1973; Shaw, 1973; among others), a well functioning financial system is regarded critical for sustained economic growth. An important function of financial institutions in the process of economic development, especially in the context of developing countries, is that of financial intermediation, through which domestic resources are allocated to productive enterprises in the formal sector (Inanga and Emenuga, 1996). These institutions constitute players in both the money and capital markets, among them; banks, non bank financial institutions, insurance companies, building societies, pension funds, mutual funds, and stock markets.

The traditional paradigm of financial intermediation in most less developed countries (LDCs), has been that of bank based finance, backed by cheap funds from the public sector (Dailami and Atkin, 1990; Emenuga, 1997). A growing dissatisfaction with this paradigm however, has seen the ushering in of an era of broad-based capital markets development, characterized by a growing emphasis on the role of the stock market in financial intermediation. The new thinking has mainly been motivated by a growing theoretical and empirical evidence, which shows that stock markets play a significant role in boosting long-run economic growth (See Demirguc-Kunt & Levine, 1996; Levine & Zervos, 1996; Ejaz Ghani, 1992; Feldman & Kumar, 1995; and Boyd & Smith, 1996; among others). Specifically, stock markets, as an arm of capital markets, are central institutions in long term financial intermediation (Inanga & Emenuga, 1995). By providing capital for long term investments, and by improving the efficiency of resource allocation through competitive pricing,

stock markets are well placed to facilitate the creation, management, distribution and sustenance of wealth in a given economy (Kihumba, 1998). Efficacy in so doing however is dependent upon various factors, among them, macroeconomic policy actions.

Cognizance of the foregoing facts, coupled with increasing uncertainties associated with other domestic and foreign sources of finance, has prompted governments in many LDCs to institute measures aimed at facilitating and enhancing domestic savings mobilization through the stock market. Consequently, various macroeconomic policy reforms have been undertaken, top on the reform agenda being foreign exchange policy and tax policy reforms. Transaction costs in securities trading have also been revised downwards.

In Kenya, taxes on capital gains were scrapped in 1985. A decade later, in 1995, measures to open up the Kenyan stock market to foreigners were implemented. Total foreign investment in a company's equity was raised to a maximum of 40%, while individual foreigners were permitted to hold up to 5% of a company's equity. In the following year, 1996, taxes on interest and dividend income were reduced to a minimum of 5% for locals and 10% for foreigners. Transaction costs have been revised over time, and now stand at 2%, the lowest rate in Sub-Saharan Africa (SSA). These policy reforms were premised on the effects that taxation and foreign exchange policy have on the stock market activities. Tax treatment of interest and dividend income for instance, has the effect of altering the opportunity cost of funds perceived by borrowers. A reduction in opportunity cost tends to depress the level of activity in equity markets, and to increase the reliance on debt finance (Boyd & Smith, 1995; 1996).

It is note-worthy that with the exception of taxation policy, the influence of the other fiscal and monetary policy actions, has been given little relevance in the endeavour to enhance stock market performance in Kenya, among other LDCs. Government spending, and monetary policy actions, do however impact on interest rates, inflation, and business cycles, all of which have an important impact on financial markets and institutions (Mishkin, 1998). As a consequence of these effects, imbalances in these macroeconomic policies, may precipitate stock market performance imbalance. However, the nature of expectations - rational or otherwise - formed by agents in the securities markets does affect both the extent and nature of policy impact on the stock market. Resultantly, macroeconomic policy implications on stock markets differ across economies, due to among other factors, differences in economic policies pursuits and the nature of expectations formed by market participants. There is therefore, a need to address this issue in country specific studies. This need forms the basis for this study.

1.2 The Nairobi Stock Exchange

The NSE, which was founded in 1954 and registered under the Companies Act in 1991, is increasingly assuming a major role in resource mobilization for long term investments. Between 1984 and 1997, the Exchange helped raise over Kshs. 5.8 billion, in initial public offers, private placings and second public issues. The government, by issuing various types of bonds through the NSE, has also been able to raise funds for economic activities. To enhance its role in resource mobilization, plans are underway to improve the NSE's infrastructure. These include the adoption

of electronic trading so as to enhance stock trading, as well as the implementation of a Central Depository System, so as to speed up the settlement process.

The growth in the number of listed companies at the NSE has been almost stagnant, registering a meager 0.7% in the period 1995-1997, a rate among the lowest in Sub-Saharan Africa. This compares unfavourably to growth rates recorded by other stock markets in Africa, with as high a growth rate as 77.8% being registered in Namibia in the same period. The Exchange has nevertheless registered a remarkable growth in its performance indicators, namely, annual turnover, market capitalization, and the share price index, though these indicators are still low by international standards.

Between 1990 and 1994, annual turnover registered a remarkable 1239 percentage increase, up from Kshs. 234 million to Kshs 3.08 billion respectively. Similarly, market capitalization registered a significant increase up from 10.9 billion in 1990 to 136 billion in 1994, whilst the NSE 20-share index, which is regarded as the leading stock market performance indicator, rose by a 175 percentage point between 1990 and 1993. In the subsequent period, the turnover and market capitalization registered marginal fluctuations in between years, and at the close of 1999, stood at Kshs. 5 billion and Kshs 106 billion respectively. The NSE 20-share index on the other hand, continued its upward trend into 1994, and in February the same year, reached a peak high of 5137. This performance indicator however, took a downward trend thereafter, to record a low of 2303 at the close of 1999.

Economic policies in place have in the recent past, been associated with the current decline in the performance of the NSE. It has been argued for instance, that the high level of interest rates prevailing in the recent past, have continued to favour the money market instruments especially treasury bills, at the expense of equity (CMA, 1999). The graphs in appendix I figures 1 and 2, evidence some correlation between the NSE performance indicators and fiscal and monetary policy variables, such as money supply, inflation, interest rate and budget deficit. The co-movements among these variables appear especially strong in the time period beginning 1991.

1.3 Statement Of The Research Problem.

Pursuant to the economic liberalization policy, the Kenyan economy has been undergoing major macroeconomic policy adjustments, among them, the liberalization of the financial sector. This has significantly affected the determination of some policy variables such as commercial bank interest rate, thereby impacting heavily on the cost of borrowing for investment. Resultantly, bank financing has become highly inaccessible to the private sector, leading to a growing emphasis on alternative sources of finance for long term investment. The NSE, being one such source, has consequently gained significant importance and focus as a source for the same. However, if the NSE is to play its allocative role properly, the implications of the factors affecting it, macroeconomic policies among them, must be well determined and appropriately addressed.

Studies on the stock market in Kenya have mainly focused on the influence of isolated policy variables on stock market behaviour (See Kagume, 1991; Runyenje, 1984; Nyamute, 1998; and Onyancha, 1998). Other studies have focused on the history and development of the NSE (See

Chacha, 1998; and Munga, 1974). Studies on informational efficiency of the NSE on the other hand, have mainly focused on the pricing effect of past stock prices and end of year corporate earnings news (See for instance Njuguna, 1998). No study however, focuses on the impact that aggregate fiscal and monetary policy actions may have on stock market performance. Further, none has attempted to determine whether such impact arises from anticipated policy changes, or unanticipated ones. An understanding of how policy actions affect the stock market is certainly pivotal to the formulation of economic policies aimed at enhancing stock market efficiency in resource mobilization.

It is necessary therefore, that questions appertaining to policy implications on stock market performance in Kenya be answered. These questions include; how and to what extent do economic policies, and in particular, monetary and fiscal policy, impact on the performance of the NSE? What components (anticipated or unanticipated) of both these policies affect the stock market? Does the stock market (NSE) anticipate policy adjustments? In what way can these policies be used to facilitate enhanced stock market performance? This study seeks to address these very important issues.

1.4 Objectives Of The Study.

The broad objective of this study is to analyze the impact of macroeconomic policy on stock market performance in Kenya. The specific objectives are:

- Determine the monetary policy and fiscal policy structure in the period under study.

- Specify and estimate the model of interaction between the NSE and fiscal and monetary policy structure, within the context of anticipated and unanticipated policy effects
- Draw appropriate policy recommendations.

1.5 Significance Of The Study.

The study will attempt to shed light on the influence of monetary and fiscal policy actions on the Kenya stock market. Specifically, the effects of both anticipated and unanticipated policy on the NSE will be determined. The results attained will help determine whether systematic government policy influences the NSE's activities, and hence, will in the future, aid the policy formulation process aimed at enhancing the efficiency of the NSE in resource mobilization. Individual/institutional investors, who seek to maximize gains from investments, will also benefit from the findings, as these (findings) will facilitate a more knowledgeable and better informed investment decision making process. Further, the study will add to the wealth of existing literature on the subject of stock market operations and their determinants, while at the same time, provide a basis for future research on the same.

1.6 Organization Of The Study

The rest of this study is organized into four chapters. Chapter Two considers the theoretical and empirical literature relevant to our research topic. Chapter Three discusses the methodological approach to our research problem. Presentation and interpretation of empirical findings is done in Chapter four. On the basis of the study's objectives, and empirical findings, Chapter Five

concludes the research paper and considers the policy implications of the research findings. References and appendices close the study.

CHAPTER TWO

LITERATURE REVIEW

2.1 Monetary and Fiscal Policy Variables and Stock Market Behaviour.

The monetary portfolio hypothesis, first proposed by Brunner (1961), postulates that changes in money supply result in changes in the equilibrium position of money with respect to other assets in the portfolio of investors. Investors then adjust the proportion of the asset portfolios represented by money balances. However, since all money balances must be held, the system does not adjust until changes in the prices of various assets lead to a new equilibrium. Consequently, share prices, among other asset prices, change till a new equilibrium is attained. Blanchard (1981) supported the contention that money supply affects the stock market, when he asserted that under fixed prices conditions, a monetary expansion would result in an outward shift of the value of the stock market. He argued that the high money supply would lower interest rates, hence the cost of capital. This lower cost would in turn lead to a higher stock market value, among other economic variables such as spending and output. In the flexible price condition, Blanchard argued that changes in money would be neutral with respect to the value of the stock market, but would lead to a proportionate increase in stock prices.

Theory on the effect of inflation on stock markets postulates that it is significant and negative. According to Feldstein (1980), inflation affects expected real net return from holding shares, consequently affecting share values. An increase in inflation reduces the expected real net return from shares, thereby depressing their value. This, he argued, occurs due to the interaction of inflation with the tax system, a contention that was also supported by Summers (1981).

Contributing to this theory, Eugene Fama (1981), associated high rates of inflation with changes in real variables that reduce the return on capital. Pindyck (1984) on the other hand, argued that increases in expected inflation, together with concurrent increase in the variance of inflation, should have only a small and possibly positive effect on share values. He argued that increased volatility of inflation, increases the riskiness of nominal bonds - relative size of the effect again depending on tax rates and other parameters – but on the overall, this would make bonds relatively riskier, and should therefore increase share values. Later, Boyd & Smith (1996), came in and in support of the conjecture that inflation adversely affects stock prices, asserted that besides reducing the real returns on shares, inflation lowers cost of funds to borrowers, thereby increasing reliance on debt as opposed to equity. Consequently, stock market operations are depressed.

On the theory of the effects of interest rates on the stock market, Boyle (1990) postulated that interest rates increase the opportunity cost of holding money, and therefore, its velocity. This in turn adversely affects the nominal price of stocks. He further argued that high nominal interest rates induce substitution from stocks into bonds, thereby driving stock prices down. In line with this argument, Friedman (1988) had earlier on asserted that portfolio substitution effects cause the positive relationship between money velocity and deflated stock prices. He observed that a fall in stock prices reflects a substitution from stocks to safe assets due to changes in interest rates.

Literature on the effect of tax on stock market variables revolves around the effect that the same have on the opportunity cost of funds perceived by borrowers. According to Boyd & Smith (1995, 1996), tax treatment of interest and dividend income alters the opportunity cost of borrowed funds. This reduction in opportunity cost increases reliance on debt finance, thereby depressing stock

market activities. They continue to argue that given the quantity of external finance required, and given the constraints on the availability of certain kinds of finance, firms will raise external funding in the lowest cost strategy. The lowest cost financing strategy however depends on among other factors, tax laws in place, which in many instances, give debt financing an advantage over equity financing. These, they argue, ultimately affects stock markets operations in an adverse manner. Taxation as discussed earlier, also plays a significant role in the determination of the extent to which inflation impacts on stock market variables, price inclusive. Feldstein 1980, Pindyck 1984, and Boyd & Smith 1996, all attribute the effects of inflation on stock market variables, to the way that inflation interacts with the tax system in place.

Studies conducted on the impact of money supply on stock markets yield mixed results. Mookerjee (1987) employs a bivariate vector autoregressive (BVAR) model to test for granger-causality between stock prices (SP) and money supply (M) in a multi-country study involving ten developed countries. The following BVAR model is estimated:

$SPt = aj\ SPt\text{-}j + bi\ Mt\text{-}i + ut$.....(1)

$Mt = cj\ SPt\text{-}j + di\ Mt\text{-}i + vt$.....(2)

Where, u and v are not correlated.

A stock price index, narrow money (M1), and broad money (M2) are used for the period 1975:1m to 1985:3m. The results of the study reveal that in three of the countries under study, namely; Switzerland, Japan and Italy unidirectional causality from M1 to stock prices is experienced. Results for the UK showed a feedback between stock prices and M1; while the remaining countries

in the sample show independence (no causality). When M2 is swapped into the model, the UK, Netherlands, Canada, Italy and Japan experience unidirectional causality from stock prices to money supply. Bidirectional causality is not found for any country. As an extension to this study, Hashemzadeh and Taylor (1988) use weekly data on the Mookerjee (1987) BVAR model. After expanding each equation by including four period lags and eight period leads, they find a bidirectional causality between the money supply (M1) and stock prices (SP). Extending these studies to emerging stock markets (ESMs), Cornelius (1991) uses monthly series for the stock price index, M1(narrow money) and M2 (M1 plus time deposits), on India, Korea, Malaysia, Mexico, Taiwan, and Thailand. The results show that M1 does not Granger-cause stock prices and vice-versa with the exception of Korea; similar results are obtained using M2, except for Thailand. These studies however, focus on money stock as the only determinant of stock prices behaviour, ignoring other policy variables indicative of the monetary policy stance.

Studies on the effects of inflation on the stock market, with the exception of a few, support the contention that inflation adversely affects the stock market. In a study comprising of panel data from nine countries, namely; the USA, Japan, UK, Switzerland, France, Germany, Netherlands, Belgium, and Canada, Bruno (1983) tested the hypothesis that real returns are independent of inflationary expectations. He tested the following Fisherian model:

$$Rt = Co + C1_{It} + C3(It_{+1} - It) + Ut$$

where I is inflation and R is real returns.

The results attained for each of the countries rejected the null hypothesis that real returns are independent of inflationary expectations. It was found that stock returns are negatively related to inflation. Similarly, Friend and Hasbrouck (1982), found that the inflation has an effect on share values, but that this effect depends on the way that nominal interest rate changes in response to changes in the expected inflation rate.

In contrast, Geske & Roll (1982), proposed a reverse causality model, in which inflationary expectations are caused by movements in stock prices. They argued that a fall in stock prices leads to a fall in economic activity, and consequently, a fall in government revenues. The government therefore runs a deficit, and therefore takes inflationary measures to finance the deficit. They undertook several regressions after which they concluded that the link between inflation and stock returns is through inflationary expectations and more specifically revision in expectations.

Singh and Talwar (1982) on the other hand tested the effects of both fiscal and monetary policy on the stock prices in the Toronto stock exchange. They argued that authorities use both fiscal policy and monetary policy to regulate economic activity, and hence, stock prices must reflect changes in both these policies. They used a step wise procedure based on Akaike's final prediction error (FPE) criterion, to estimate the lead time between monetary and fiscal policies and stock prices. They employed the Granger causality concept to fit multiple autoregressions. The proxy for net posture of fiscal policy was taken to be the government expenditure deficit, and M1 for the stock of money supply. The end of quarter discount rate was used as a proxy for interest rate. Their findings showed that stock markets anticipate money changes and that the influence of interest rates when

separated from that of money supply was found to be negligible on stock prices. Stock prices were found to have a bidirectional relationship with both monetary and fiscal policies. In a contrast outcome, Flannery and James (1984), found that changes in interest rates are among the leading factors affecting the fluctuations in the banks' stock prices, in their study on bank stocks in the New York Stock Exchange. All the above studies were however done in developing countries.

Studies conducted in Kenya with the aim of determining the effects of policy variables on the stock market have yielded conflicting results. Kagume (1991) used data spanning the period 1973 to 1989, in a study aimed at analyzing the determinants of stock market prices in Kenya. He expressed stock prices as being influenced by the level of the demand for quasi money, real incomes, expected returns from stocks, and changes in money supply. He estimated the respective impacts of the independent variables on stock prices using the ordinary least squares estimation procedure. The results of his regression analysis indicated that changes in money supply do not significantly affect stock prices. Decomposing changes in money supply into its components – domestic credit (DC) and net foreign assets, it was found that DC going to the public sector was negatively correlated to stock prices, whereas that to the private sector is positively related to stock prices. Net foreign assets were found to be negatively correlated to stock prices, as was inflation. The effects of inflation were however found to be of no significant effect.

Similarly, Nyamute (1998) estimated the relationship between the NSE price index, and various macroeconomic variables, namely, inflation, money supply, Treasury bill rates, and exchange rate. He employed data for the period 1992:1m to 1997:12m, in the estimation of a multiple regression model specified as follows:

$$S(t) = \beta 0 + \beta 1 P(t-n) + \beta 2 M(t-n) + \beta 3 I(t-n) + \beta 4 R(t-n) + \varepsilon i$$

Where S (t) is the NSE – 20 share index at period t and P, M, I and R are inflation, money supply, Treasury bill rates, and exchange rate respectively. The results of his regression analysis showed that all the variables in the model have an impact on the performance of the stock exchange. Inflation, money supply, and treasure bill rates were found to be negatively correlated to the price index, whereas exchange rate was found to be positively correlated to the same (index). These studies however, did not fully recognize the role of fiscal policy in influencing stock prices.

2.2 Policy Adjustments and Stock Market Behaviour.

The literature on the relationship between stock market variables, and the impact on the same, of anticipated and unanticipated policy adjustments, evokes the rational expectations theory. As shown in studies by Lucas 1975, 1978; Sargent and Wallace 1975, 1976; and Barro, 1976; the policy implication of rational expectations is that no systematic macroeconomic policy, whether monetary or fiscal, no matter how ingeniously formulated and how effectively implemented, can have a lasting impact upon real economic variables. Hence, only unanticipated policy actions can influence the market's real variables; anticipated policy changes will have been taken into account by private economic agents and will evoke no further macroeconomic outcomes.

Blanchard (1981) developed an economic model for analyzing the effect of fiscal and monetary policy adjustments on the stock market, under rational expectations. In his analysis, he

postulated that the announcement of monetary expansion is itself expansionary. Under fixed prices, this would cause the stock market to jump at time t0, in anticipation of lower interest rates and higher profits after time t1, when the policy will be effected. Spending and output will also increase between the announcement and the implementation. As money stock is still constant, the short-term rate also increases, though it is anticipated that there will be lower short–term rates after time t1. As the period of lower rates comes closer, the stock market increases, but stops after the policy implementation, upon which short-term rates fall to maintain portfolio balances. He however argues that the effect of anticipated fiscal policy under fixed price condition, would have an ambiguous effect on the stock market. This is so since anticipated expansionary fiscal policy would increase output and profits, as well as interest rates. The stock market would therefore decrease if the policy adjustment were perceived to be bad news, and would increase if the policy adjustments were perceived to be good news. In the bad news case, Blanchard argued that the stock market value would decline due to anticipated increase in short-term interest rates, which would more than offset expected profits after policy implementation. In the good news case however, expected increase in short–term interest rates is more than offset by expected increase in profits, which causes the stock market to increase.

On the other hand, if prices were perfectly flexible, changes in the level of money supply would be neutral, leaving output and stock market unaffected. Nominal money supply would affect prices proportionately. Following an unanticipated monetary expansion, real balances would be higher as prices cannot adjust instantaneously. This would decrease the nominal interest rates. Prices would however be expected to increase, hence the expected rate of inflation would cause real interest rates to decrease, given the nominal rates. This effect is usually referred to as the

"Mundell effect". Both effects work in the same direction, decreasing the real rate. Over time, real balances decrease and the expected inflation becomes smaller; both effects work again in the same direction, now increasing the real rate. Assuming a "Mundell effect" occurs, the more flexible prices are, the higher the initial rate of inflation and ceteris paribus, the lower the real rate of interest. This lower initial sequence of real interest rates tends to increase the initial jump in the stock market, leading to a higher initial rate of increase in output. On the other hand, if the "Muddle effect" does not take place, the more flexible prices are, the faster the real money stock will return to its previous level. This in turn would cause a faster return of profits and real interest rates to their previous level, thus a smaller initial jump in the stock market.

Contributing to this debate, Boyle (1990) postulated that anticipated monetary expansion would decrease expected real equity returns. He argued that a rise in expected monetary growth decreases the anticipated purchasing power in the next period t1, of real balances chosen in the current period t0. For a risk–averse investor, who seeks to maintain the average level of his consumption stream, and who is also concerned with its volatility, if ρ (measure of the investors sensitivity to volatility) is low, the investor will attempt to maintain average consumption by reducing his demand for the now low yielding balances. The fall in real balances reduces the marginal utility of the commodity. At the margin therefore, the investor is prepared to give up more units of the commodity in exchange for the financial securities, that is, their real prices rise. Equivalently, their expected real returns fall.

Various empirical studies confirm that both unanticipated and anticipated monetary and fiscal policy adjustments do have an impact on the stock market. In a study involving monthly data for the period 1980:01 to 1992:12, Evans and Murinde (1994) did a study on the impact of monetary and fiscal policy actions on the stock market in Singapore by estimating the following model;

$$SP_t = \delta 0 + \sum_{i=0}^{n} \delta 1 iAMt\text{-}i + \sum_{i=0}^{n} \delta 2 iUMt\text{-}i + \sum_{i=0}^{n} \delta 3 iAFt\text{-}i + \sum_{i=0}^{n} \delta 4 iUFt\text{-}I + \varepsilon t$$

Where AM is anticipated monetary growth, UM is unanticipated monetary growth, AF anticipated fiscal action, UF unanticipated fiscal action, and SPt the Straits Time Index. Results of their analysis showed that in general, anticipated and unanticipated monetary policy actions, lagged up to three months, are significant in their effects upon stock prices. In addition, both anticipated and unanticipated monetary policy actions were found to have a positive effect, indicating that anticipated and unanticipated growth in the money supply causes an increment in the real stock value. Anticipated fiscal policy was on the other hand found to be negative, suggesting that an anticipated increase in the budget deficit depresses stock values as private economic agents react to tough fiscal measures.

In a similar study, McMillin and Laumas (1988) analyze the effects of both anticipated and unanticipated fiscal and monetary policy adjustments on the stock market. They use a four step empirical procedure. First, the appropriate lag structure for monetary and fiscal policy variables is determined using Theil's adjusted R-squared. Second, the BVAR equations are estimated. Third, trivariate equations are estimated. The final empirical equation tested is:

$$RSPt = d0 + \sum_{i=0}^{ni} d1,iAMt\text{-}i + \sum_{i=0}^{nl} d2,jUMt\text{-}j + \sum_{i=0}^{nl} d3,iAFt\text{-}i + \sum_{i=0}^{nl} d4,jUF\text{-}j + e3,t$$

The results of the analysis indicated that both anticipated and unanticipated money growth have a significant and positive contemporaneous effect on the real value of the US stock market. However, unanticipated money growth was found to exhibit weaker effects than anticipated ones, leading to the conclusion that stock market participants anticipate the changes in monetary policy. Hancock (1989) also found unanticipated monetary actions to have and influence on the behaviour of stock prices. This finding is however contrary to Loungani, Rush and Tave (1990a, 1990b) who found insignificant results for the anticipated monetary and fiscal actions.

2.3 Overview Of Literature.

Economic theory and empirical evidence reviewed shows that to a large extent, economic policies impact on stock market performance. Theoretical literature shows that money supply has a positive correlation to stock prices, whilst taxation, inflation and interest rates have a negative correlation to the same. The studies on the NSE reviewed, are in conflict with this theoretical contention. Kagume (1991) showed that money supply does not significantly affect stock prices, and that inflation is negatively related to stock prices but of insignificant effect. Nyamute on the other hand showed that inflation, money supply, and treasury bill rate are positively related to stock prices. However, these studies fail to incorporate the market's participants expectations component, an element regarded of great importance in the determination of the extent and nature of impact of both fiscal and monetary policy on stock market behaviour. Besides, these studies also fail to bring out the sum effect of simple aggregate policy variables, and instead, consider the policy variables individually.

A review of empirical literature that incorporates market participants expectations, shows that policy implications on stock market behaviour under rational expectations are highly

indeterminate, and country specific. The literature is therefore inconclusive on how efficiently stock market participants incorporate the information contained in policy changes into stock prices. In particular, there is some controversy over the effect that anticipated as well as unanticipated policy changes have on stock returns. This is presumably due to differences in economic status, the level of awareness of public of stock market operations, and the level of development of the stock market, among other factors. These studies do not however examine the systematic samples, which represent the central location of emerging stock markets, a classification that constitutes stock markets mainly located in LDCs, Kenya among them. This study takes these concerns into consideration, and in so doing, employs the model used by Murinde and Evans (1994).

CHAPTER THREE

METHODOLOGY

In this chapter, we discuss the methodological approach to the research problem and the attainment of the research objectives. First, the estimation models for the fiscal policy and monetary policy are presented, followed by the presentation of the final estimable model for stock market performance. The formal tests for the time series properties of the data are then presented in the estimation technique section. The chapter concludes by looking at the data type and sources.

Model Specification.

In order to test which monetary and fiscal policy components affect stock market behaviour, overall measures of both monetary and fiscal policies are decomposed into their anticipated /systematic and unanticipated/unsystematic elements. This is achieved by first estimating fiscal policy and monetary policy equations, and thereafter, determining the unsystematic components of the same, given the actual observations. The growth rate of money, M1 (narrow money plus demand deposits), is considered the key monetary policy variable, whilst growth in budget deficit is considered the key fiscal policy variable. The macroeconomic variables which are used to augment the monetary and fiscal policy equations are: real GDP at market prices growth, inflation, Treasury Bill rate, real government expenditure growth, and growth in real domestic debt. The NSE is represented by the NSE-20 Share Index. The choice of this NSE performance indicator, is motivated by two factors. One, the NSE turnover ratio is a low frequency variable,

and therefore inappropriate for econometric regression purposes. Secondly, market capitalization is both price and shares listing driven, and hence, may reflect both performance and growth of the Exchange. Representation of the performance of the Exchange by use of the NSE - 20 share index, is therefore deemed appropriate.

The analysis proceed by first estimating the fiscal and monetary policy models, as specified below.

$$Mt = \alpha 0 + \sum_{i=1}^{m} \alpha 1iMt\text{-}i + \sum_{i=1}^{x} \alpha 2iXt\text{-}i + \varepsilon tm \quad \ldots\ldots(1)$$

$$Ft = \beta 0 + \sum_{i=1}^{f} \beta 1iFt\text{-}i + \sum_{i=1}^{y} \beta 2iYt\text{-}i + \varepsilon tf \quad \ldots\ldots(2)$$

Where Mt is the growth in the money supply; Ft is the growth in budget deficit; X and Y represent the macroeconomic variables that augment monetary and fiscal policy equations. Following Blejer M. I. (1993), and Jain C. L. (1981), the augmenting variables X are taken to be growth in real GDP at market prices, real Treasury Bill rate, and growth in real government expenditure, whilst the augmenting variables Y are considered to be inflation and real domestic debt growth. The variables e_{tm} and e_{tf} represent random or unsystematic components of the monetary and fiscal policies respectively and are assumed to be distributed with zero means and finite variances independently both of their own past and the structural disturbances. That is, they are white noise (serially uncorrelated) and stable.

Having specified the monetary and fiscal policy models, the systematic/anticipated parts of monetary and fiscal policies can then be written as their expectations conditional on the information set I_t available at t-i.

$$m_t^e = E(m_t / I_{t-i}) = \alpha 0 + \sum_{i=1}^{m} \alpha 1 iMt\text{-}i + \sum_{i=1}^{x} \alpha 2 iXt\text{-}i \quad \ldots\ldots(3)$$

$$f_t^e = E(f_t / I_{t-i}) = \beta 0 + \sum_{i=1}^{f} \beta 1 iFt\text{-}i + \sum_{i=1}^{y} \beta 2 iYt\text{-}i \quad \ldots\ldots(4)$$

Where E represents expectations notation and I_{t-i} denotes the information set available to economic agents at time t-i. Under rational expectations hypothesis, economic agents are supposed to have accurate knowledge of policy rules and their parameters, hence the unanticipated components of monetary and fiscal policies will be equal to non-autocorrelated disturbances e_{tm} and e_{tf} respectively, that is;

$$e_{tm} = m_t - m_t^e \quad \ldots\ldots(5)$$

$$e_{tf} = f_t - f_t^e \quad \ldots\ldots(6)$$

Having estimated equations (1) and (2) to determine the anticipated monetary and fiscal policy components, and having determined the unanticipated monetary and fiscal policies components following equations (5) and (6), the effects of the same (components) on the stock market are estimated from the following model:

$$SPt = \delta 0 + \sum_{i=1}^{n} \delta 1 iSPt\text{-}i + \sum_{i=1}^{n} \delta 2 iAMt\text{-}i + \sum_{i=1}^{n} \delta 3 iUMt\text{-}i + \sum_{i=1}^{n} \delta 4 iAFt\text{-}i + \sum_{i=1}^{n} \delta 5 iUFt\text{-}i +$$

$$vt \quad \ldots\ldots(7)$$

Where, SPt is the real NSE-20 Share Index; AM denotes the anticipated money growth; UM is unanticipated money growth; AF is anticipated fiscal action; UF denotes unanticipated fiscal action; and vt is a white noise error term.

3.2 Estimation Technique

Time series data is known to be generally non-stationary, a characteristic that leads to spurious regressions which produce results without economic meaning since the customary tests (like t and F ratios) for statistical inference do not hold. The time series properties of the data set are therefore determined by conducting stationarity and cointegration tests. To test for the presence of unit root (non-stationarity) and cointegration, the Augmented Dickey-Fuller (ADF) and Phillips-Perron tests are carried out. The discussion of these tests is presented in the following section. Data sets found to be cointegrated are represented in an Error Correction Model. The validity of initial models reparameterization, as well as that of subsequent model transformations, is assessed and tested at each stage, by use of statistical tests and BARCH diagnostic tests. The BARCH diagnostic tests include; the AR serial correlation test, ARCH Autoregressive Heteroscedasticity Test, Normality test for the distribution of the error terms, and the RESET test for model specification. Recursive Least Squares estimations are also undertaken to test for the stability of the models and parameter estimates over time.

3.2.1 Augmented Dickey Fuller Test.

The Dickey-Fuller test sets out with an assumed data generating process (DGP) which takes the form of a random walk without a drift:

$Yt = \rho Yt\text{-}1 + \varepsilon t$ .....(3.2.1.1)

Where $\varepsilon t \sim iid(0, \sigma^2)$

Subtracting yt-1 from both sides yields;

$\Delta yt = \pi yt\text{-}1 + \varepsilon t$ .....(3.2.1.2)

Running an OLS regression on (3.2.1.2), and testing $\pi = 0$ (which is equivalent to testing if $\rho = 1$) results in a unit root test. A one sided t-test is performed under the following hypothesis: H0: $\pi = 0$ against H1: $\pi < 0$. Not rejecting the null hypothesis ($\pi = 0$) implies that the variable under consideration is integrated of the first order or is non-stationary; formally stated as [yt] ~ I(1). Rejecting the null hypothesis implies that [yt] is not integrated of the first order implying stationarity or higher order integration.

Since the DGP is unknown apriori, Dickey and Fuller obtain other versions of (3.2.1.2) by adding deterministic regressors: a drift and a time trend thus (3.2.1.2) becomes:

$\Delta yt = \alpha + \pi yt\text{-}1 + \beta t + \varepsilon t$ .....(3.2.1.3)

The Dickey Fuller test is sensitive to deviations from the assumption $\varepsilon t \sim iid(0, \sigma^2)$. Assuming the errors to be iid is critical to the simulated distributions for the critical values. If there is autocorrelation in the residual process, the OLS estimated residual will be inappropriate; the residual variance will be biased and inconsistent . Thus the Augmented Dickey-Fuller (ADF) seeks to solve the problem by augmenting the equation (3.2.1.3), with lagged Δyt as follows:

$$\Delta yt = \alpha + \pi yt\text{-}1 + \beta t + \sum_{i=1}^{n} \Delta yt\text{-}1 + \varepsilon t \quad \text{.....(3.2.1.4)}$$

Critical values for testing the null depend on whether the deterministic regressors are included or not.

3.2.2 Phillips-Perron Non-Parametric Test.

The Dickey-Fuller class of tests relies on a parametric approach to deal with serial correlation and heterogeneity, and this may reduce the power of the tests. Phillips – Perron test on the other hand, allows for milder assumptions concerning the distribution of the errors.

In order to perform it, three different models are considered.

$$Xt = \alpha 1 Xt\text{-}1 + \varepsilon t \quad \text{.....(3.2.2.1)}$$

$$Xt = \delta 0 + \alpha 2 Xt\text{-}1 + \varepsilon t \quad \text{.....(3.2.2.2)}$$

$$Xt = \delta 1 + \beta(t\text{-}N/2) + \alpha 3 Xt\text{-}1 + \varepsilon t \quad \text{.....(3.2.2.3)}$$

Where, X is the variable being tested for unit root (this may be in levels or in first differences), $\delta 0$ and $\delta 1$ are constant terms; N is the sample size; and εt is an independent and identically distributed error term with zero mean and constant variance.

3.3 Data Type and Sources.

The study uses monthly time series data covering the period 1990:1 to 2000:5. Data related to stock prices is sourced from the *NSE's annual reports*, *statistical bulletins*, among other records on daily trading, the *CMA annual reports* and the *IMF'S International Financial Statistics (IFS).* Data related to the monetary and fiscal policy variables is obtained from various issues of the *Central Bank of Kenya Review*, *Economic Surveys*, and *Statistical Abstracts.*

CHAPTER FOUR

DATA ANALYSIS AND EMPIRICAL RESULTS

The focus of this chapter is on the analysis of the data and presentation of the empirical results of the models discussed in chapter Three. It starts with various tests, which were performed to ensure presentation of sound econometric models and consequently, valid results. Sections 4.1 and 4.2 report unit root and cointegration tests, respectively. The results for the estimation of the monetary and fiscal policies models are reported in section 4.3, whilst the results for the final estimable model are reported in section 4.4.

4.1: Stationarity Analysis (Unit Root Tests)

Unit root tests were conducted using the Augmented Dickey-Fuller (ADF) and the Phillips-Perron (PP) tests. These was done on levels and first difference for all the variables, and second difference level, for some of the variables. Below, is the presentation of the results attained thereof.

Table 4.1: Unit Root Tests On Levels.

Variable	ADF		Phillips-Perron		ADF/PP
	Statistic	Lag	Statistic	Lag	
Mt	-3..5708	7	-8.7916	7	I(1)/I(0)
Ft	-3..6230	7	-5.2107	7	I(1)/I(0)
GDP	-1.9367	7	-5.5551	7	I(1)/I(0)
TB	-0.1864	5	-0.4650	5	I(1)//I(1)
DD	-1.8094	7	-6.0449	7	I(1)/I(0)
π	-1.8755	7	-1.7456	7	I(2)/I(1)
GE	-3.1393	7	-1.4250	7	I(2)/I(1)
SPt	-1.9594	6	-2.0010	6	I(2)/I(1)

The critical values are:
ADF: 1% = -4.1498 5% = -3.5005 PP: 1% = -4.1249 5% = -3.4889

Table 4.2: Unit Root Tests On First Difference

Variable	ADF		Phillips-Perron		ADF/PP
	Statistic	Lag	Statistic	Lag	
ΔMt	-4.7459	7	-23.1497	7	I(0)/I(0)
ΔFt	-4.4021	0	-4.4021	0	I(1)/I(1)
ΔGDP	-4.4962	5	-11.4403	5	I(0)/I(0)
ΔTB	-4.5802	5	-7.9476	5	I(0)/I(0)
ΔDD	-4.3827	6	-4.1458	6	I(0)/I(0)
Δπ	-2.7719	7	-4.1802	7	I(1)/I(0)
ΔGE	-1.7878	7	-4.4877	7	I(1)/I(0)
ΔSPt	-2.8931	6	-7.7624	6	I(1)/I(0)

The critical values are:
ADF: 1% = -4.1540 5% = -3.5025
PP: 1% = -4.1281 5% = -3.4904

Table 4.1 indicated that all variables are non-stationary in levels. The stationarity results also indicated that the ADF and PP tests sometimes give conflicting results on the order of integration of a variable, revealing the fact that unit root tests have low power in distinguishing between stationary and near stationary variables in the presence of moving average components in the data. Inflation, stock prices, budget deficit and government expenditure, were found to be non-stationary even at first difference, gaining stationarity only on second difference. We therefore concluded that these four variables are integrated of second order. Figure 3 and 4 in Appendix I give the graphs to the stationarity tests.

4.2 : Cointegration Results.

In testing for cointegration, we initially tested for bivariate cointegration between the monetary policy proxy, money supply, and all the regressors in the monetary policy equation. Cointegration tests were then performed on the monetary aggregate, Mt, and all the variables found to be forming a cointegrated relationship with it. Cointegration tests for the fiscal policy equation involved the bivariate cointegration test between budget deficit and inflation, since the only other fiscal policy equation regressor, domestic debt, was found to be integrated of a lower order than the two. The cointegration results show that Mt is cointegrated with Treasury Bill rates and GDP, whilst budget deficit is cointegrated with inflation. Table 4.3 below shows the bivariate cointegration results, whilst table 4.4 shows the cointegration results of the cointegrating vectors in both the fiscal and monetary policy equations.

Table 4.3: Bivariate cointegration results.

	ADF		**PP**	
Variable	Mt	Ft	Mt	Ft
π	-	-5.9069	-	-5.2243
GE	-	-	-	-
GDP	-6.4247	-	-7.1909	-
TB	-8.1315	-	-8.0417	-
DD	-	-	-	-

Critical Values: ADF: 1% = -4.1314 5% = -3.4919
PP: 1% = -4.1281 5% = -3.4904

Table 4.4: Cointegration Results Of The Cointegrating Vectors.

Variable	ADF		Phillips-Perron		Conclusion
	Statistic	Lag	Statistic	Lag	
ECM1	-5.4767	1	-6.8988	1	Cointegration
ECM2	-7.2847	1	-5.2243	1	Cointegration

Critical Values are:
ADF: 1% = -4.1460 5% = -3.4990
PP: 1% = -4.1219 5% = -3.4875
Where ECM1 is the monetary policy equation error correction term, and ECM2 the fiscal policy equation error correction term.

Both the ADF and the Phillips-Perron tests accepted the hypothesis that the variables in the cointegrating equations are cointegrated. We thus proceeded on to re-parameterize equations (3), (4) and (5) as follows.

$$\Delta Mt = \alpha 0 + \sum_{i=1}^{m} \alpha 1i\Delta Mt\text{-}i + \sum_{i=1}^{x} \alpha 2i\Delta Xt\text{-}i + \alpha 3iECM1 + \varepsilon tf \ldots\ldots (6)$$

$$\Delta\Delta Ft = \beta 0 + \sum_{i=1}^{f} \beta 1i\Delta\Delta Ft\text{-}i + \sum_{i=1}^{y} \beta 2i\Delta Yt\text{-}i + \beta 3iECM2 + \varepsilon tf \ldots\ldots (7)$$

$$\Delta\Delta SPt = \delta 0 + \sum_{i=1}^{n} \delta 1i\Delta\Delta SPt + \sum_{i=1}^{n} \delta 2iAMt + \sum_{i=1}^{n} \delta 3iUMt + \sum_{i=1}^{n} \delta 4iAFt +$$

$$\sum_{i=1}^{n} \delta 5iUFt \ldots\ldots (8)$$

We first proceeded to solve for model equations (6) and (7), and thereafter, having determined the anticipated and unanticipated policy components, proceeded on to solve for the final estimable model, equation (8).

4.3 Modelling Mt and Ft by OLS.

Using the general-to-specific modelling procedure, we started with four lags for the variables in the monetary policy equation, and five lags for the ones in the fiscal policy equation. The test for validity of this initial reparameterization, as well as that of the subsequent steps undertaken to solve the model and reduce it to a parsimonious model, was undertaken by use of the BARCH diagnostic tests as well as the tests of significance of the model. The BARCH tests included; the AR test for serial correlation, the ARCH test for autoregressive heteroscedasticity, the Normality test for the distribution of the error terms, and the RESET model specification test. The tests for significance relied upon were the t-value, the F-statistic, and the R^2. The results to the general overparameterized model are reported in Appendix II tables 1 and 2. Tables 4.5 and 4.6 below report the preferred model results for both the policies' equations.

Table 4.5: Mt Preferred Model

Variable	**Coefficient**	Standard Error	t-value	t-prob
C	31.637	12.540	2.523	0.0156
ΔMt_1	-0.38501	0.14445	-2.665	0.110
ΔMt_2	-0.23711	0.093877	-2.526	0.0155
ΔGDP	0.18664	0.043056	4.335	0.0001
ΔTB_3	-1.4570	0.66879	-2.178	0.0352
ECM1	-0.48657	0.19610	-2.481	0.0173
Q	-61.591	24.169	-2.548	0.0147
Q_1	-63.282	24.007	-2.636	0.0118

$R^2 = 0.79056$ F(7, 41) = 22.109 (0.0000) DW = 2.28
SC = 8.3285

Diagnostic Tests.

AR 1-4 F(4, 37) = 1.3135 (0.2830)
ARCH 4 F(4, 33) = 0.71039 (0.5907)
Normality Chi^2 (2) = 2.2912 (0.3180)
RESET F(1, 40) = 0.030024 (0.8633)

Table 4.6: Ft Preferred Model.

Variable	Coefficient	Standard Error	t-value	t-prob
C	0.93835	1.1005	0.853	0.3986
$\Delta\Delta$Ft_4	-0.20602	0.064326	-3.203	0.0026
$\Delta\Delta\pi$	0.55312	0.22746	2.432	0.0193
ΔDD	0.068584	0.0082363	8.327	0.0000
ECM2	-0.22998	0.032147	-7.154	0.0000

R^2 = 0.83428 F(7, 41) = 54.12 (0.0000) DW = 2.14
SC = 4.34787

Diagnostic Tests.

AR 1-4 F(4, 39) = 0.86072 (0.4960)
ARCH 4 F(4, 35) = 0.59571(0.6681)
Normality Chi^2 (2) = 0.22518 (0.8935)
RESET F(1, 42) = 0.48729(0.4890)

The regression results indicated a high explanatory power for the variations in both Mt and Ft as can be seen from the values of the respective estimations R^2. The model estimated for Mt indicated an explanatory power of approximately 79%, whilst that for Ft indicated an explanatory power of approximately 83%. This indicated that the possible causes in the variations of both Ft and Mt had been well captured. The value of the F-statistic indicated joint significance of the explanatory variables in both the models. The Schwartz Information Criteria (SC), indicated that we had succeeded in reducing both the models without any loss of information. SC for the Mt model fell from 9.2504 to 8.3285, whilst that for the Ft model fell from 5.44617 to 4.34787, on reducing the general models to parsimony.

GDP and Treasury Bill (TB) rates, along side past values of Mt, were found to be the significant in explaining monetary contractions or expansions, and exhibited the expected coefficient signs. Government expenditure however, was found to be insignificant in explaining money supply variations, and was therefore dropped off in the model reduction process. The results indicated that a 1% change in GDP would cause money supply to increase by 0.18% and that a 1% change in third lagged TB rates, would result in a 1.46% fall in money supply. The coefficient to the error term was found to be significant at 5%, and indicated that the speed of adjustment from the past quarter disequilibrium to the current quarter, is approximately 49%. The coefficients to the seasonal dummies lagged up to one, were found to be significant, thereby indicating that the data sets used, exhibited seasonal shocks.

Explanatory variables in the fiscal policy equation found to be significant were; past budget deficit value lagged four times, and current values of the domestic debt and inflation. Both inflation and domestic debt entered the fiscal policy equation with positive coefficient signs. The magnitude of the coefficients indicated that a 1% change inflation would result in a 0.55% change in budget deficit, whilst a 1% change in domestic debt would result in a 0.07% in the same. Budget deficit lagged four times entered the model with a negative sign, with a coefficient magnitude of approximately 0.21. The error correction term was also found to be significant, thereby retaining the long run relationship between budget deficit and inflation. The magnitude to its coefficient indicated that the speed of adjustment from the previous quarter disequilibrium to the current quarter, is about 23%.

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The null hypothesis to all the BARCH diagnostic tests, was rejected. This indicated that there was absence of serial correlation, and autoregressive heteroscedasticity as revealed by the AR and ARCH tests respectively, and that the error terms of the final preferred models were normally distributed, and the models well specified as revealed by the Normality and RESET tests respectively.

To come up with the solved static models, which are a summary of the solved preferred models, dynamic analysis (see the Annex for the formula used) was invoked. The results attained thereof are reported in tables 4.7 and 4.8 below.

4.7: Solved Mt Static Model

Variable	C	ΔGDP	ΔTB	ECM1	Q
Coefficient	19.5	0.1151	-0.8982	-0.3	-76.98
Standard Error	7.122	0.0343	0.4111	0.1507	21.53

4.8: Solved Ft Static Model

Variable	C	ΔΔπ	ΔDD	ECM2
Coefficient	-0.20994	0.55355	0.068631	-0.22793
Standard Error	0.063962	0.22676	0.0082106	0.031957

The solved static models results were consistent with expectations as regards coefficient signs of GDP, Treasury Bill rates, inflation, and domestic debt, all of which were found to have the correct expected signs. As regards significance of the coefficients, all were found to be significant at 5% level, save for the error correction term, ECM1, in the Mt model. As thus, this

error correction term was disregarded in the later computation of the anticipated monetary policy component.

The stability of the models, was tested by re-estimating the models recursively. The graphical results are reported in Appendix I Figures 4 to 7. The results indicated that the coefficient estimates for both the models are relatively stable. The one-step residuals and one-step Chow tests, indicated that the monetary policy model is fairly stable, but that it fails to explain monetary variations in the period around the first quarter of 1999. The results for the fiscal policy model on the other hand, showed that failed to explain fiscal stance in 1992, and between 1997 and 1999.

Having estimated the Mt and Ft equations, we then proceeded on to ascertained the anticipated values for the same variables, as specified in equations (9) and (10) below. The specification followed the preferred model results reported above, with a slight modification for the Ft model, which entailed re-estimation of Ft without the constant term, which as reported above, had been found to be insignificant. The Mt model error correction term was also dropped, as the solved static model results revealed that it is not significant at 5% level.

$$\Delta Mt = 31.637 - 0.38501\Delta Mt\_1 - 0.23711\Delta Mt\_2 + 0.18664\Delta GDP - 1.4570\Delta TB\_3 - 61.591Q - 63.282\ Q\_1 \quad (9)$$

$$\Delta\Delta Ft = -0.20994\Delta\Delta Ft\_4 + 0.55355\ \Delta\Delta\pi + 0.068631\Delta DD - 0.22793ECM2\_1 \quad (10)$$

The values attained from the above specification were regarded as the anticipated policies components. The unanticipated components were obtained by deducting the estimated components from the actual observations of both Mt and Ft. The values of these variables are reported in Appendix II Table 4. As expected, these four variables exhibited stationarity on testing. The stationarity results are reported in Appendix II Table 5.

Having therefore ascertained the values of both the anticipated and unanticipated policy components, we then proceeded on to estimate the final estimable model. This estimation is covered in the following section.

4.5 Modelling SPt by OLS.

Using the general-to-specific estimation procedure, we began with six lags for all the regressors in the model, thereby obtaining the general overparameterized model. The validity of this reparameterization was tested by use of the joint tests of significance R^2 and the F-statistic, together with the BARCH diagnostic tests, all of which indicated validity. The reduction of the model proceeded in a stepwise fashion, with the validity of each step being tested by use of the BARCH diagnostic tests and tests of significance. The general overparameterized model results are reported in Appendix II Table 3. In table 4.9 below, we report the results of the preferred model attained.

Table 4.9: SPt Preferred Model Results.

Variable	Coefficient	Standard Error	t-value	t-prob
ΔΔSPt_1	-0.72647	0.092056	-7.892	0.0000
ΔΔSPt_2	-0.34699	0.12238	-2.835	0.0078
ΔΔSPt_3	-0.25490	0.095356	-2.673	0.0116
AMt_1	-1.3513	0.26092	-5.179	0.0000
AMt_4	-0.53905	0.16703	-3.227	0.0028
AMt_5	0.95501	0.24932	3.830	0.0005
UMt_2	-0.60517	0.15471	-3.912	0.0004
UMt_6	0.85770	0.17490	4.904	0.0000
AFt	-4.6546	0.84517	-5.507	0.0000
AFt_1	5.4546	0.74155	7.356	0.0000
AFt_3	-5.0089	1.0801	-4.638	0.0001
AFt_4	3.4458	1.1163	3.087	0.0041
AFt_5	-1.5650	0.74887	-2.090	0.0444
AFt_6	2.0908	0.65380	3.198	0.0030
UFt	-2.9096	1.0147	-2.867	0.0072
UFt_3	-1.9740	1.1307	-1.746	0.0902
UFt_6	-2.0882	0.83671	-2.496	0.0177

$R^2 = 0.8855$ DW = 2.37 SC = 8.53438

Diagnostic Tests

AR 1-4 F(4, 29) = 0.91389 (0.4690)
ARCH 4 F(4, 25) = 0.77754 (0.5503)
Normality $Chi^2(2)$ = 0.65535 (0.7206)
RESET F(1, 32) = 2.2297 (0.1452)

The preferred model results indicated that the model estimated had a high explanatory power. Approximately 89% of the variations in stock market performance were explained by the explanatory variables in the model. The value of the Schwartz Information Criteria dropped

from 9.70733 in the general overparameterized model, to 8.53438 in the preferred model, indicating that we were able to attain a parsimonious model without any loss of information.

The first, fourth and fifth lags of anticipated monetary expansions or contractions were found to significantly affect the performance of the NSE. The first and fourth lags entered the model with negative coefficients, whilst the fifth lag was found to be positively signed. Unanticipated monetary policy adjustments were also found to have a significant impact on the NSE performance, with the second lag affecting it positively, whilst the sixth lag was found to affect it negatively. On the other hand, almost all the lagged variables of the anticipated fiscal policy component were found to be significant. Only the second lag variable was found to be insignificant, and was therefore dropped in the reduction process. Current, third and sixth lags of unanticipated fiscal policy were all found to negatively impact on the performance of the NSE. Also found to be of significant effect on the NSE's performance, were the past levels of performance of the same. The results indicated that performance for up to the third previous quarter, impacted negatively on current levels of the NSE performance. Solving the preferred model by dynamic analysis yielded the following long-run static model.

5.0: SPt Solved Static Model

Variable	AMt	UMt	AFt	UFt
Coefficient	-0.4017	0.1085	-0.1019	-2.994
Standard Error	0.1085	0.08847	0.5874	0.8056

The results indicated that anticipated monetary actions and unanticipated fiscal policy actions affect the NSE performance negatively. Unanticipated monetary policy actions and anticipated

cal policy actions have no significant impact on the performance of the NSE. A 1% change in ticipated monetary adjustments was found to cause a 0.40% change in the performance of the SE. Similarly, a 1% increase in unanticipated fiscal policy actions was found to cause a 2.99% ecline in the NSE performance, and vice versa. These results may be interpreted as follows:

- Monetary adjustment pronouncements (anticipated monetary actions), cause economic agents to increase spending and output, in anticipation of lower interest rates and higher profits after time t1, when the policy action will be implemented. As money stock is still constant, the short-term interest rates increase, though it would be expected that they will fall after time t1. In the Kenyan scenario, the increase in short-term rates would seem to overshoot the long-run rate, thereby causing economic agents to switch their investments from the NSE, to interest bearing assets. Consequently, the performance of the NSE is negatively affected.
- Unanticipated monetary policy adjustments on the other hand, would be expected to cause real balances to rise, and nominal interest rates to decline. Further, as commodity prices adjust upwards, inflation would rise, thereby causing a decline in real interest rates. This would inevitably cause a switch from interest bearing assets to shares at the NSE, thereby affecting its performance positively. However, this theory does not apply to the Kenyan scenario, since as indicated by the results, unanticipated monetary actions do not have any significant impact on the NSE.
- The ultimate effect of both anticipated and unanticipated fiscal policy actions on the performance of a stock market, is mainly driven by among other factors, the extent to which, the negative substitution effect of a fiscal policy adjustment, offsets or is offset by the positive income effect of the same. The negative substitution effect is as a result of

variations in interest rates due to changes in fiscal deficit financing sources, whilst the positive income effect is as a result of variations in government spending. If the negative substitution effect is greater than the income effect, the net effect of a fiscal policy adjustment will be negative, and vice versa. Following the results attained, it appears that for the Kenyan case, the negative substitution effect of an unanticipated fiscal adjustment is greater than the income effect of the same. This may be explained by the fact that in the past, the Kenyan government has been financing its budget deficit through excessive borrowings from the domestic financial market, thereby driving interest rates up. High interest rates precipitate a switch of investments from the shares to interest bearing government stocks, causing a stock market decline. Additionally, high levels of interest rates impede credit accessibility to the private sector, thereby affecting the performance of the same, and ultimately, the performance of the shares listed at the NSE. On the other hand, increased government expenditure causes the levels of income to rise and the stock market to shift upwards. However, it would appear that the decline in the performance of the NSE, due to increased interest rates, more than offsets the increase in the performance of the same, thereby rendering the overall effect of a unanticipated fiscal policy adjustment negative.

- The result that anticipated fiscal actions have no impact on the performance of the NSE, may be indicative of lack investor confidence in government policies, probably due to time inconsistency in the same. Hence, participants at the NSE do not incorporate government policies pronouncements, in their decision making process.

Having attained the results to the final estimation, we then went on to assess the stability of the estimated model, by use of Recursive Least Squares Estimation. The graphics to this estimation are reported in Appendix II Figure 7. The one-step residual results indicated model stability, whilst the one-step chow test indicated that the model explained stock price variations in the entire sample period, save for the period around 1995.

CHAPTER FIVE

CONCLUSIONS AND POLICY IMPLICATIONS

This chapter presents the conclusions to, and implications of the study undertaken. The chapter is organized into five sections. Section 5.1 gives the conclusions to the study, while the implications of the same are reported in section 5.2. Sections 5.3 give the limitations of the study. The last section, 5.4, gives the suggested areas for further research.

5.1 Conclusions

This study has determined the effects of both fiscal and monetary policy actions on stock market performance in Kenya. Specifically, the effects on the NSE, of both anticipated and unanticipated policy adjustments, were determined. The study commenced with the estimation of the anticipated and unanticipated policy components. The empirical results attained indicate that monetary policy stance in Kenya is mainly driven by growth in real incomes, and open market operations, as reflected by the floating of Treasury Bills, and the variations in their interest rates. Current levels of GDP were found to significantly affect monetary policy actions, whilst Treasury Bill rates were found to affect the same with a lag of three time periods. A 1% change in GDP was found to result in a 0.18% change in money supply, whereas a 1% change in Treasury Bill rates was found to cause a 1.45% change in money supply. The fiscal policy stance on the other hand, is driven by changes in domestic debt stock and inflation. A 1% increase in domestic debt stock, was found to result in a 0.068% increase in budget deficit, whereas a 1% increase in inflation, was found to cause a 0.55% increase in the same (budget deficit).

rt run results to the final estimable model showed that both anticipated and unanticipated nponents of monetary and fiscal policies, affect the performance of the NSE with lags. The g run results, showed that anticipated monetary policy actions, together with unanticipated cal policy adjustments, affect the stock market performance negatively, whereas the nanticipated monetary policy actions and anticipated policy fiscal actions do not affect stock arket performance.

The value of coefficient estimates revealed that a 1% increase in anticipated monetary policy actions, reduces stock market performance by 0.4%, whereas a percentage change in unanticipated monetary policy actions causes a 0.11% change in the performance of the NSE. Changes in anticipated fiscal policy actions on the other hand, as well as those for unanticipated monetary actions, do not, in the long-run, affect stock market performance. The values of the coefficient estimates further revealed that unanticipated fiscal policy adjustments had the higher level of impact on stock market performance in Kenya.

5.2 Policy Implications

The policy implication of the results is that the authorities should lay more emphasis on the role of fiscal policy, and more specifically, the unanticipated component of the same. As earlier discussed, the negative substitution effect of an unanticipated fiscal expansion, more than offsets the positive income effect of the same, thereby affecting the performance of the NSE negatively. To reverse this trend, the government should seek to concentrate more funds on areas that

directly or indirectly affect stock market performance positively. Improvement in roads and power generation for instance, will enhance much needed facilities, thereby reducing companies operational costs, and consequently leading to improved year end results. Subsequently, listed shares will perform better and the performance of the Exchange will rise. The government should also look into other means of fiscal deficit financing other than domestic borrowing. This will help maintain low interest rate levels, thereby facilitating credit accessibility to the private sector. Further, low interest rate levels will keep the substitution effect of high interest rates low.

As has been revealed by the empirical results attained, anticipated fiscal policy does not, in the long run, affect stock market performance in Kenya. This as inferred earlier on, may be due to lack of investor confidence in government policy, as a result of time inconsistency in the same. The Kenyan government should enhance its fiscal policy structure, and ensure that pronounced policy plans are instituted, so as to ensure the return of investor confidence. Further, such policy pronouncements should be favourable to the growth and enhanced performance of the stock market, and should be perceived as good news by investors.

Unanticipated monetary adjustments were found to have no significant impact on the stock market, whereas anticipated monetary actions were found to impact negatively on the same. This indicates that participants at the NSE anticipate monetary changes, and therefore, incorporate them in their decision making process. In this regard, the monetary authorities should announce intended monetary contractions, but institute monetary expansions unexpectedly. This will help avoid the negative effects of pronounced monetary expansions.

3 Limitations of the Study.

The study was limited to a short-time period, since the commencement of serious interest in the NSE took effect in the 1990's. Besides, most of the relevant data on the NSE's operations was only available for the period beginning late 1990. Further, there is scant direct literature available for Kenya on the area covered by the study.

BIBLIOGRAPHY

Barro R. J., (1977), IN: Evans D. and Murinde V., (1994), "The Impact of Monetary and Fiscal Policy Actions on The Stock Market In Singapore", *Financial and Banking Economics Research Group*, Cardiff Business School, FABER/94/3/2/A.

Blanchard O., (1981), "Output, the Stock Market and Interest Rates", *The American Economic Review* pp. 132-143.

Blejer M. I. and Cheasty A., (1993), "How to Measure the Fiscal Deficit; Analytical and Methodological Issues, IMF.

Boyd J. and Smith B., (1996), "The Co-evolution of the Real and Financial Sectors in the Growth Process", *World Bank Economic Review*, 10 (2) pp. 371-396.

Boyle G. W., (1990), "Money Demand and the Stock Market in a General Equilibrium Model with Variable Velocity", *Journal of Political Economy*, Vol 98 (5).

Brunner K., (1961), "Some Major Problems in Monetary Theory", *American Economic Review*, 47-56.

Bruno S., (1983), "The Relation Between Stock Prices and Inflationary Expectations: The International Evidence", *Journal of Finance*, No. 38, pp. 35-48.

Chacha N. R., (1998), "Factors Determining The Development of The Nairobi Stock Exchange", *M. A. Project*, Economics Department, University of Nairobi.

Chaman L. J., (1981), "Contemporary Monetary Economics; Theory and Policy", St. John's University.

Christopher S. A., (1992), "Recent Developments in Econometric Methods: An Application to the Demand for Money in Kenya", *AERC Special Paper* No. 15.

Cornelius P. K. (1991), "Monetary Policy and the Price Behaviour in Emerging Stock Markets, *IMF Working Paper*, WP/91/27.

Dailami M.and Atkin M., (1990), "Stock Markets in Developing Countries: Key Issues and a Research Agenda", *The World Bank Working Papers*, Country Economics Department.

Demirguc-Kunt and Levine R., (1996), "Stock Market Development and Financial Intermediaries: Stylised Facts", *The World Bank Economic Review*, 10 (2) pp 223-240.

overnment Of Kenya , Economic Surveys, 1990-1999, Central Bureau Of Statistics, Ministry of Planning, Nairobi

jaz G., (1992), "How Financial Markets Affect Long-Run Growth: A Cross-Country Study", *The World Bank Working Papers*, Eastern Africa Department. `

:menuga C. E., (1997), "Development of Stock Markets in Sub-Saharan Africa"" *African Development Review*, Vol. 9, No. 1, pp. 156-185.

Evans D. and Murinde V., (1994), "The Impact of Monetary and Fiscal Policy Actions on The Stock Market In Singapore", *Financial and Banking Economics Research Group*, Cardiff Business School, FABER/94/3/2/A.

Fama E. F., (1981) "Stock Returns, Real Activity, Inflation and Money", *The American Economic Review*, 71 (4), 545-65.

Feldman A. R. and Kumar M. S., (1995), "Emerging Equity Markets: Growth, Benefits, and Policy Concerns", *The World Bank Research Observer*, Vol. 10 pp. 181-200

Feldstein M., (1980), "Inflation and the Stock Market", *American Economic Review*, No. 70, 839-47.

Flannery and James, (1984), IN: Nyamute M. N., (1998), "The Relationship Between the NSE Index and Major Economic Variables: Inflation Rate, Money Supply, Treasury Bill Rate, and Exchange Rate", *MBA Project*, Commerce Department, University of Nairobi

Friedman M., (1988), "Money and the Stock Market", *Journal of Political Economy*, 96, 221-45.

Friend and Hasbrouck, (1982), IN: Nyamute M. N., (1998), "The Relationship Between the NSE Index and Major Economic Variables: Inflation Rate, Money Supply, Treasury Bill Rate, and Exchange Rate", *MBA Project*, Commerce Department, University of Nairobi.

Geske R. and Roll R., (1982), "The Fiscal and Monetary Linkage Between Stock Returns and Inflation", *Journal of Finance,* Vol. 38 No 1 pp. 1-48.

Goldsmith, R. W., (1969), Financial Structure and Development, New Haven, Yale University Press.

Hancock D. G., (1989), "Fiscal Policy, Monetary Policy and the Efficiency of the Stock Market, *Economic Letters*, 31, 65-69.

Hashemzadeh N. and Taylor P., (1988), "Stock Prices, Money Supply, and Interest Rates: The Question of Causality", *Applied Economics*, 20 (12), 1603-1611.

IFC Emerging Stock Markets Fact Book, (1994), USA, Washington D. C.

Inga E. L. and Emenuga C., (1995), "Institutional, Traditional and Asset Pricing Characteristics of African Emerging Capital Markets: The Case of The Nigerian Stock Market", *AERC Research Report*, Nairobi, Kenya.

————————, (1996), "Taxation of Financial Assets and Capital Market Development in Nigeria", *AERC Research Paper* No. 47

Kagume J. M., (1991), "The Determinants of Stock Market Prices in Kenya", *MA Project*, Department of Economics, University of Nairobi.

Kihumba J. K. (1998), "Stock Exchange As A Means Of Economic Development" NSE.

Koutsoyiannis A., (1977), "Theory of Econometrics; An Introductory Exposition of Econometric Methods" The Macmillan Press Ltd., HongKong.

Levine R. and Zervous S., (1996) "Stock Market Development and Long-run Growth", *Policy Research Working Paper*, World Bank.

Lucas R. E., (1975), "An Equilibrium Model of the Business Cycle", *Journal of Political Economy*, 83, pp. 1113-44.

Mckinnon, R. I. (1973), "Money and Capital in Economic Development", Brookings Institution,Washington D. C.

McMillin W. D. and Laumas G. S., (1988), "The Impact of Anticipated and Unanticipated Policy Actions on the Stock Market", *Applied Economics*, Vol. 20, No. 3, pp. 375-385.

Mishkin F. S., (1998), "Financial Markets and Institutions", Longman Inc., Massachusets.

Mookerjee R., (1987), "Monetary Policy and the Informational Efficiency of the Stock Market: The Evidence From Many Countries", *Applied Economics*, 19, 1521-1532.

Murinde V., (1994), "Emerging Stock Markets: A Survey of Leading Issues", *Financial and Banking Economics Research Group*, Cardiff Business School, University of Wales.

Mwega F.M., Ngola S. M. and Mwangi N., (1990), "Real Interest Rates and the Mobilization of Private Savings in Africa", *AERC, Research Paper* 2.

Njuguna I. K., (1998), "An Empirical Study of the Efficient Market Hypothesis on the Nairobi Stock Exchange", *M. A. Project*, Economics Department, University of Nairobi.

Njuguna S. N., (1997), Price and Exchange Rate Dynamics in Kenya: An Empirical Investigation (1970-1993), *AERC Research Paper* No. 58.

NSE , (1998), Annual Report and Financials.

———, Monthly Bulletins, Volumes I, II, and III.

———, (1998-1997), Market Updates.

Nyamute M. N., (1998), "The Relationship Between the NSE Index and Major Economic Variables: Inflation Rate, Money Supply, Treasury Bill Rate, and Exchange Rate", *MBA Project*, Commerce Department, University of Nairobi.

Onyancha C., (1999), "Are Foreign Exchange and Stock Markets Related? An Empirical Analysis For Kenya", *M.A. Policy Project*, Economics Department, University of Nairobi.

Pindyck S. R., (1984), "Risk, Inflation, and the Stock Market", *The American Economic Review*, Vol 49, pp. 335-351.

Rose P. S., (1993), Readings on Financial Institutions and Markets, *IRWIN Series in Finance*, Boston.

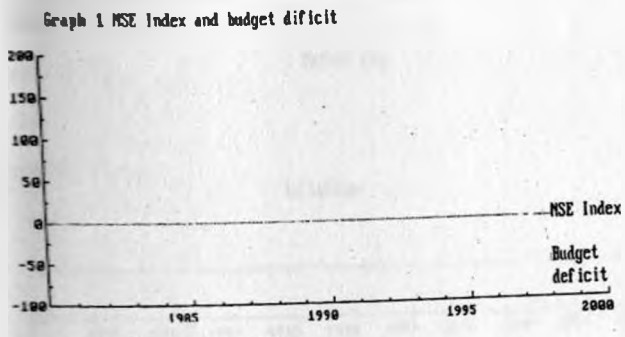
Sargent, T. J. and Wallace, N., (1975), IN: Evans D. and Murinde V., (1994), "The Impact of Monetary and Fiscal Policy Actions on The Stock Market In Singapore", *Financial and Banking Economics Research Group,* Cardiff Business School, FABER/94/3/2/A.

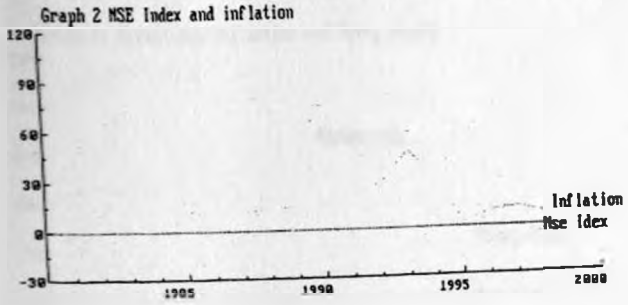
Singh S. P. and Talwar P. P., (1982), "Monetary and Fiscal Policies and Stock Prices", *Journal of Business Finance and Accounting*, Vol. 9 No. 1.

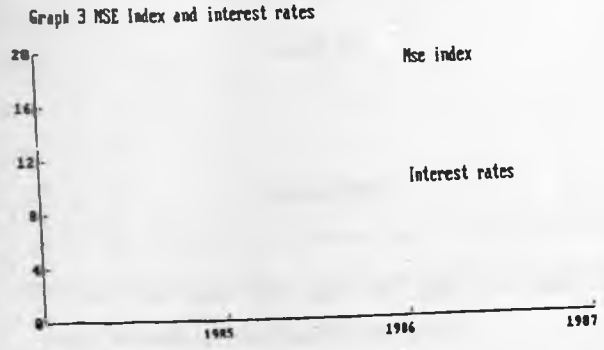
Summers L. H., (1981), "Inflation, the Stock Market, and Owner-Occupied Housings", *American Economic Review Proceedings*, 71, 429-34.

APPENDIX I

Figure 1: Graphs of the NSE Index alongside budget deficit, inflation, Treasury Bill rates and money supply.







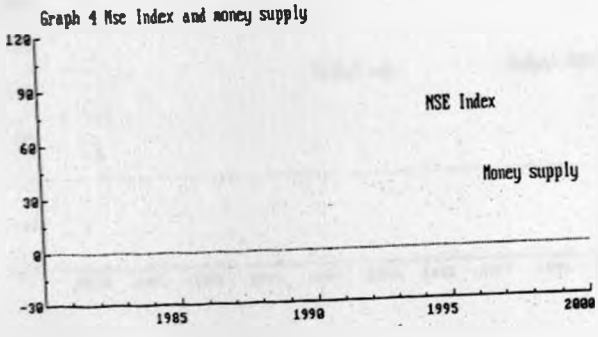
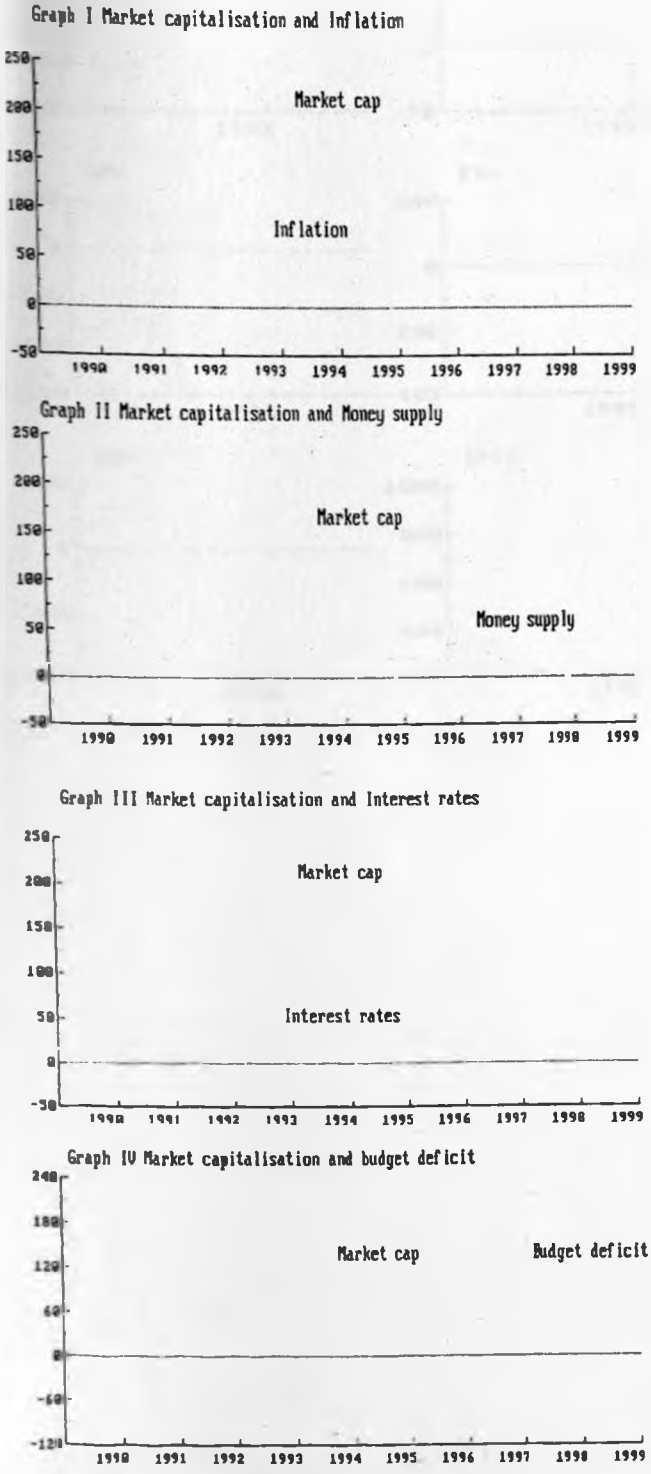
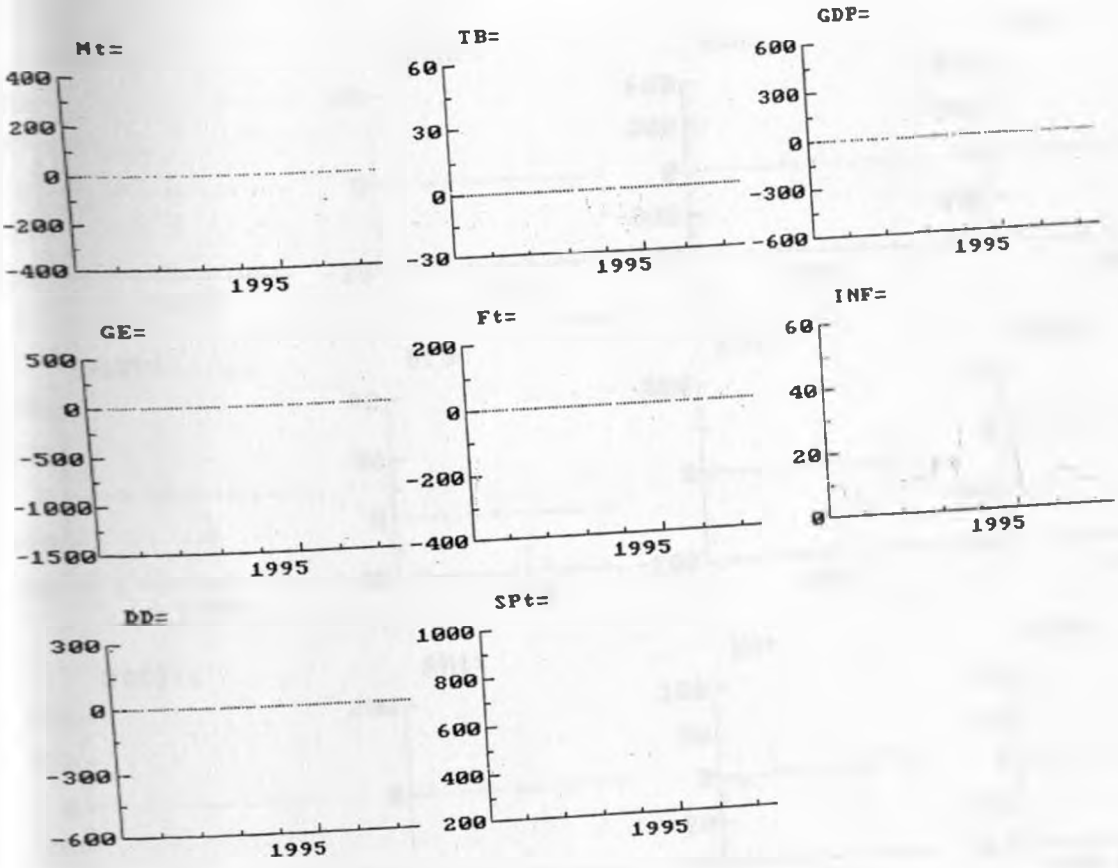


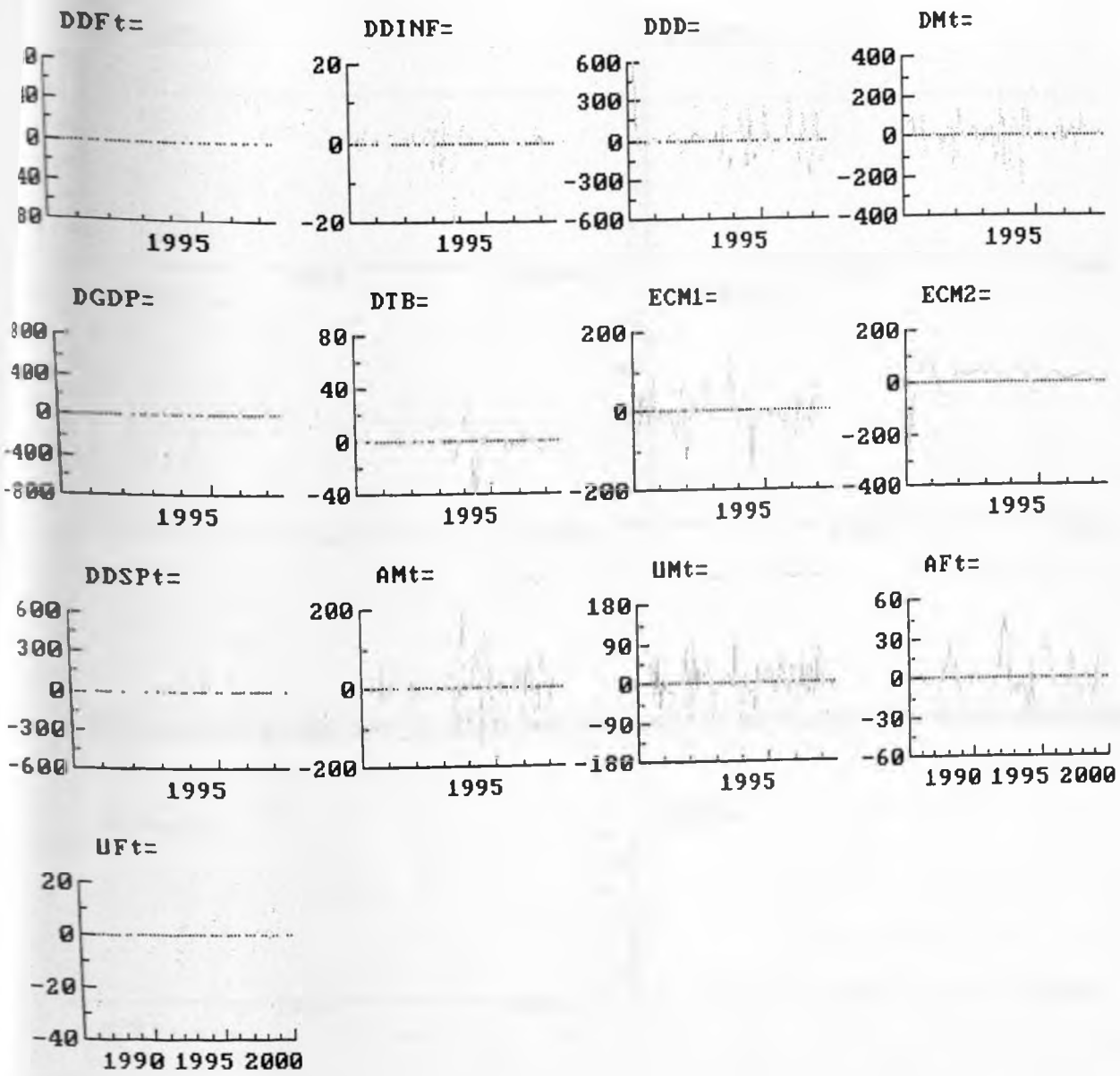
Figure 2: Graphs of market capitalization along side inflation, money supply, Treasury Bill rates and budget deficit.



gure 3: Graphs to the stationarity tests results at levels.



gure 4: Graphs to the stationarity tests results on differencing.



ure 5: Recursive graphs for the coefficient estimates for the monetary policy del estimation.

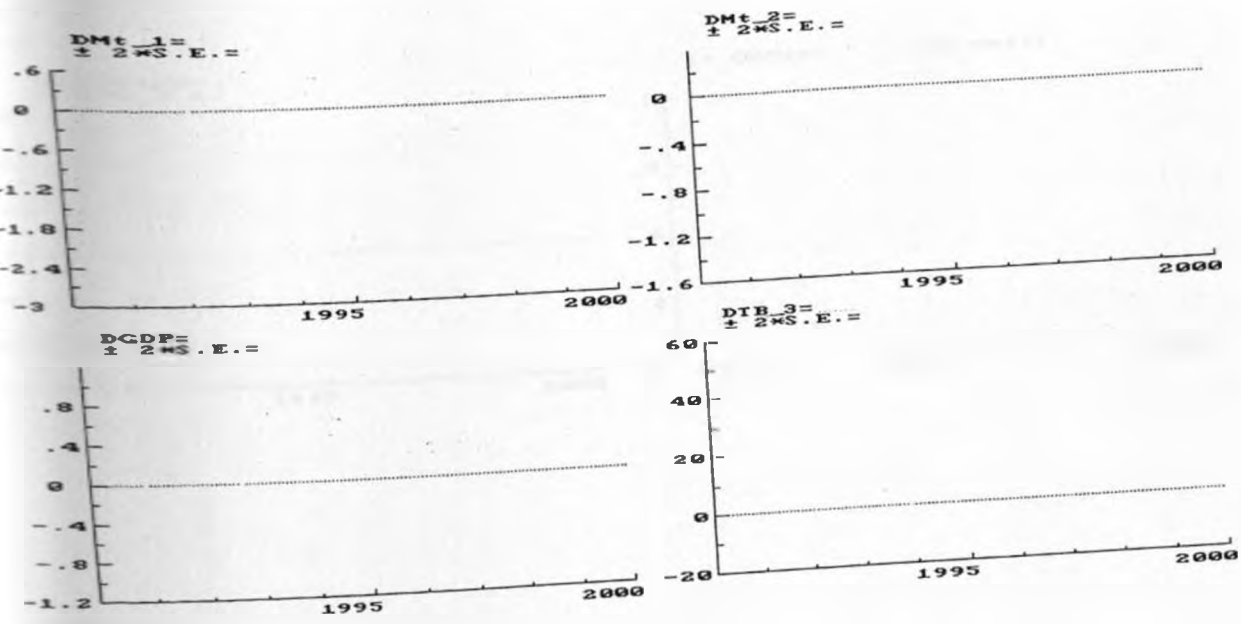
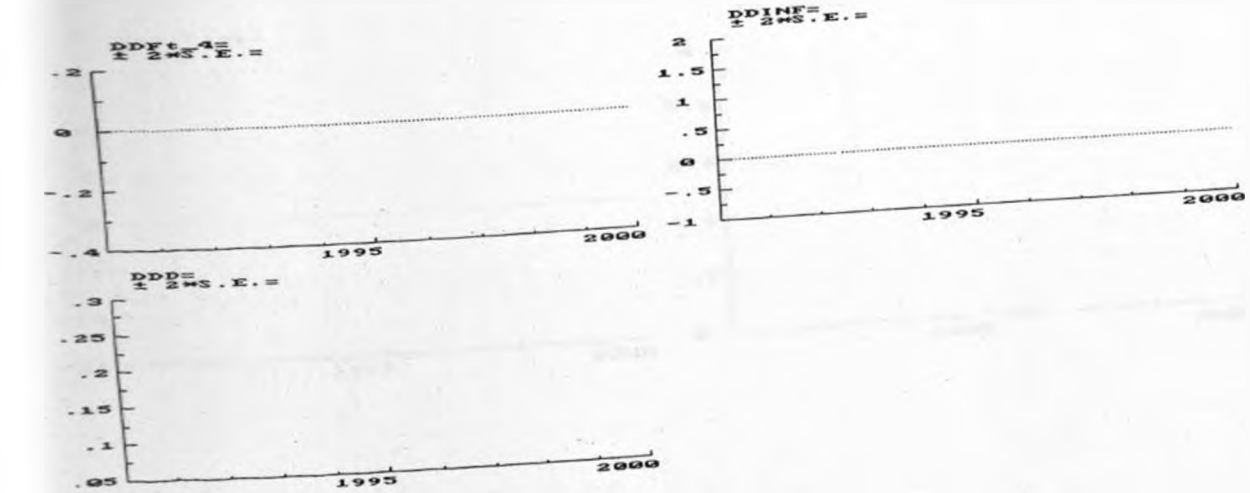


Figure 6: Recursive graphs for the coefficient estimates for the fiscal policy model estimation.



7: One step residual and one-step Chow tests for recursive stability of the monetary model.

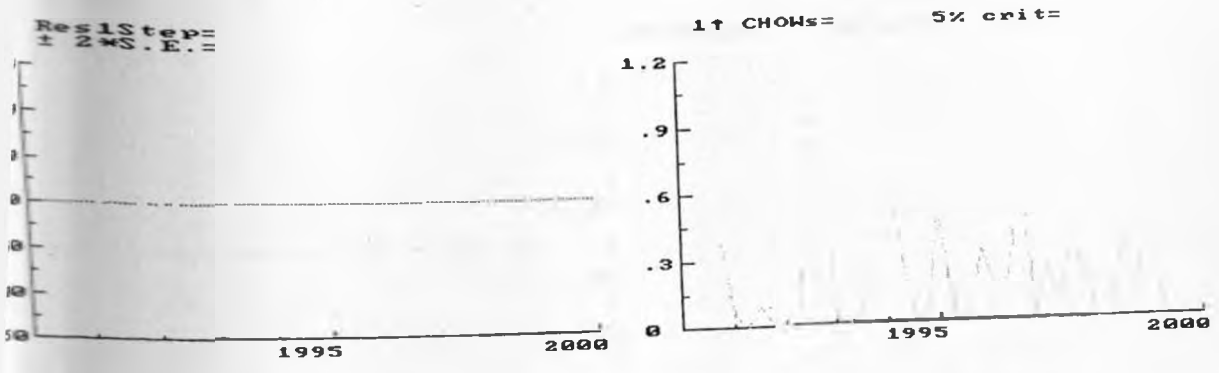
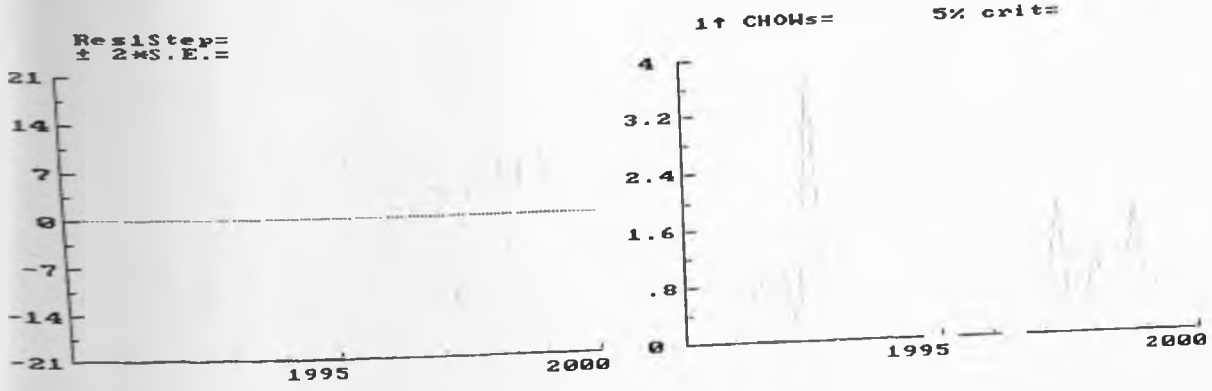
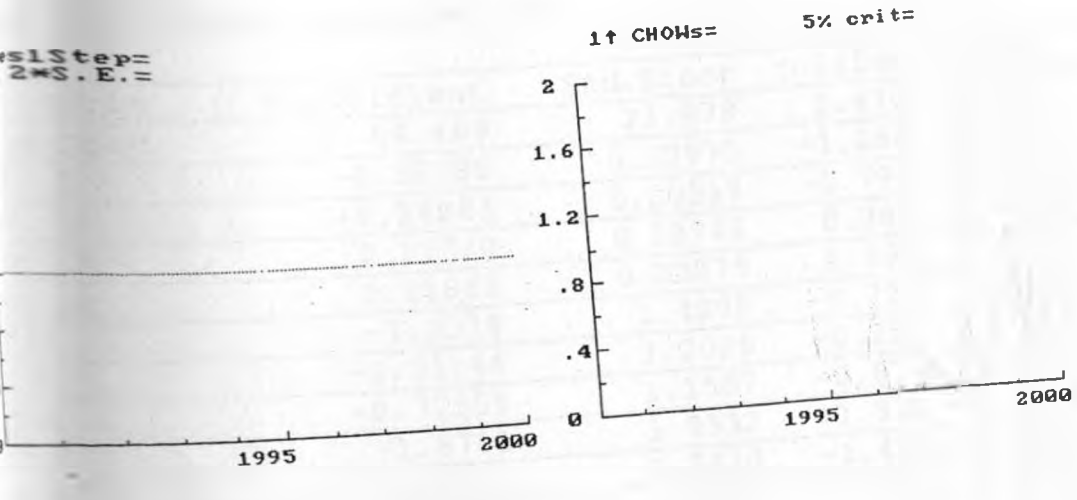


Figure 8: One step residual and one-step Chow tests for recursive stability of the fiscal policy model.



8: One step residual and one-step Chow tests for recursive stability of the stock performance model.



DIX II

.e 1: Modelling Mt by OLS

riable	Coefficient	Std.Error	t-value	t-prob	PartRý
nstant	59.469	23.978	2.480	0.0197	0.1855
ft 1	-0.38386	0.32975	-1.164	0.2546	0.0478
ft 2	-0.24223	0.30519	-0.794	0.4343	0.0228
Mt 3	0.11000	0.28746	0.383	0.7050	0.0054
Mt 4	0.21862	0.22075	0.990	0.3308	0.0351
TB	-1.0378	1.4298	-0.726	0.4742	0.0191
TB 1	-0.31166	1.2026	-0.259	0.7975	0.0025
TB 2	-0.77555	1.1507	-0.674	0.5061	0.0165
DTB 3	-1.8701	1.0332	-1.810	0.0814	0.1082
DTB 4	-1.9117	1.3320	-1.435	0.1627	0.0709
DDGE	0.041888	0.27694	0.151	0.8809	0.0008
DDGE 1	-0.13996	0.26399	-0.530	0.6003	0.0103
DDGE 2	0.15913	0.25358	0.628	0.5356	0.0144
DDGE 3	-0.14096	0.23601	-0.597	0.5553	0.0130
DDGE 4	-0.036383	0.17368	-0.209	0.8356	0.0016
DGDP	0.16185	0.13230	1.223	0.2317	0.0525
DGDP 1	-0.00032858	0.20464	-0.002	0.9987	0.0000
DGDP 2	-0.24127	0.21646	-1.115	0.2748	0.0440
DGDP 3	0.049613	0.18130	0.274	0.7864	0.0028
DGDP 4	-0.12524	0.19102	-0.656	0.5176	0.0157
ECM1 1	-0.74359	0.34433	-2.160	0.0399	0.1473
Q	-64.082	36.740	-1.744	0.0925	0.1013
Q 1	-104.00	41.812	-2.487	0.0193	0.1864
Q 2	-73.964	34.324	-2.155	0.0403	0.1467

R^2 = 0.837646 F(23, 27) = 6.0567 [0.0000] DW = 2.08
Information Criteria: SC = 9.27407;

AR 1- 4F(4, 23) = 0.78926 [0.5440]
ARCH 4 F(4, 19) = 0.40883 [0.8000]
Normality Chiý(2)= 2.4754 [0.2901]
RESET F(1, 26) = 1.2107 [0.2813]

2: Modelling Ft by OLS

iable	Coefficient	Std.Error	t-value	t-prob	PartRý
stant	2.2820	3.2183	0.709	0.4842	0.0176
t 1	0.019942	0.17042	0.117	0.9077	0.0005
ft 2	0.011177	0.15646	0.071	0.9436	0.0002
ft 3	-0.20426	0.16848	-1.212	0.2355	0.0499
ft 4	-0.017397	0.19994	-0.087	0.9313	0.0003
Ft 5	-0.084602	0.14531	-0.582	0.5651	0.0120
DINF	0.25736	0.34407	0.748	0.4607	0.0196
DINF 1	0.24930	0.35868	0.695	0.4927	0.0170
DINF 2	-0.067854	0.36639	-0.185	0.8544	0.0012
DINF 3	-0.14351	0.39816	-0.360	0.7212	0.0046
DINF 4	-0.25923	0.42074	-0.616	0.5428	0.0134
DINF 5	-0.063851	0.39150	-0.163	0.8716	0.0009
DD	0.065738	0.016668	3.944	0.0005	0.3571
DD 1	-0.0060331	0.020654	-0.292	0.7724	0.0030
DD 2	0.0090608	0.021073	0.430	0.6705	0.0066
DD 3	0.022776	0.026356	0.864	0.3948	0.0260
DD 4	-0.015468	0.027472	-0.563	0.5779	0.0112
DD 5	0.023586	0.021877	1.078	0.2902	0.0399
ECM2 1	-0.23638	0.046757	-5.055	0.0000	0.4772
Q	-1.9793	5.0709	-0.390	0.6993	0.0054
Q 1	0.86503	4.8991	0.177	0.8611	0.0011
Q 2	-4.5450	5.0969	-0.892	0.3801	0.0276

R^2 = 0.876255 F(21, 28) = 9.4415 [0.0000] DW = 1.86
Information Criteria: SC = 5.35964;

AR 1- 4F(4, 24) = 0.62702 [0.6478]
ARCH 4 F(4, 20) = 0.19223 [0.9396]
Normality Chiý(2)= 0.53985 [0.7634]
RESET F(1, 27) = 0.11815 [0.7337]

3: Modelling SPt by OLS

ble	Coefficient	Std.Error	t-value	t-prob	R^2
ant	9.1696	77.773	0.118	0.9081	0.0012
	-0.69991	0.28799	-2.430	0.0317	0.3299
2	-0.38923	0.45051	-0.864	0.4045	0.0586
3	-0.29673	0.33447	-0.887	0.3924	0.0616
4	-0.10725	0.28384	-0.378	0.7121	0.0118
5	-0.13169	0.27882	-0.472	0.6452	0.0183
6	-0.018740	0.22516	-0.083	0.9350	0.0006
	0.015203	0.76262	0.020	0.9844	0.0000
1	-1.3384	0.80735	-1.658	0.1233	0.1863
2	0.34230	1.3116	0.261	0.7985	0.0056
3	-0.88302	1.2166	-0.726	0.4819	0.0421
4	-0.68605	1.1634	-0.590	0.5663	0.0282
5	0.11424	1.3012	0.088	0.9315	0.0006
6	0.025762	0.84231	0.031	0.9761	0.0001
	-4.2318	2.6040	-1.625	0.1301	0.1804
1	7.2875	3.4634	2.104	0.0571	0.2695
2	-2.7193	3.6823	-0.738	0.4744	0.0435
3	-2.7675	6.0195	-0.460	0.6539	0.0173
4	2.6432	7.4067	0.357	0.7274	0.0105
5	-1.0815	4.2313	-0.256	0.8026	0.0054
6	1.6219	2.0402	0.795	0.4421	0.0500
	-0.025282	0.37799	-0.067	0.9478	0.0004
1	-0.025403	0.40307	-0.063	0.9508	0.0003
2	-0.81649	0.46548	-1.754	0.1049	0.2041
3	-0.030527	0.56413	-0.054	0.9577	0.0002
4	-0.34847	0.59445	-0.586	0.5686	0.0278
5	-0.081476	0.56802	-0.143	0.8883	0.0017
6	0.65731	0.67181	0.978	0.3472	0.0739
	-1.6036	2.3034	-0.696	0.4996	0.0388
1	1.4371	2.9253	0.491	0.6321	0.0197
2	0.74063	2.6133	0.283	0.7817	0.0066
3	-1.9274	3.4948	-0.552	0.5914	0.0247
4	-0.66190	3.5172	-0.188	0.8539	0.0029
5	2.5518	2.4534	1.040	0.3188	0.0827
6	-1.8753	2.2114	-0.848	0.4130	0.0565
	-33.527	107.62	-0.312	0.7607	0.0080
1	-26.145	114.02	-0.229	0.8225	0.0044
2	19.757	117.65	0.168	0.8694	0.0023

R^2 = 0.922722 F(37, 12) = 3.8725 [0.0076] DW = 2.37

Information Criteria: SC = 9.70733

AR 1- 4F(4, 8) = 1.2915 [0.3503]

ARCH 4 F(4, 4) = 0.052541 [0.9928]

Normality Chi²(2)= 5.2498 [0.0724]

RESET F(1, 11) = 2.0328 [0.1817]

4: Anticipated and Unanticipated Policy Values.

	AMt	AFt	UMt	UFt
2				
3				
4	16.615		80.645	
1	-87.815	4.848	60.293	-29.456
2	-53.563	-6.192	-30.513	-17.122
3	64.753	-17.179	60.204	-2.102
4	-35.720	-16.735	-79.826	-11.625
7-1	-8.605	-13.165	14.698	0.250
7-2	7.107	-14.334	-16.772	-0.687
7-3	41.371	-8.327	-16.527	-8.705
7-4	32.519	7.511	-23.327	-2.084
8-1	-57.320	13.955	-11.737	7.724
8-2	-9.130	23.921	-14.471	9.561
8-3	55.075	19.080	0.357	1.400
8-4	30.480	2.726	84.717	1.407
9-1	-100.518	-14.396	-137.860	-5.998
9-2	37.140	-15.917	100.333	3.147
9-3	39.794	-15.875	-37.946	5.121
9-4	-7.110	-7.344	36.071	4.197
0-1	-44.845	2.860	5.874	7.286
0-2	-25.681	0.689	42.562	9.918
0-3	16.844	-3.719	52.625	5.348
0-4	1.776	-4.845	-86.163	0.204
1-1	-8.194	-20.827	-10.379	1.794
1-2	6.614	-11.736	-8.137	-5.562
1-3	37.857	-4.973	-3.113	-15.382
1-4	43.857	9.312	14.529	8.696
2-1	-158.218	9.341	23.509	-12.313
2-2	-2.271	47.830	-20.725	9.959
2-3	188.151	30.861	123.986	-8.759
2-4	-90.008	-12.859	-61.257	0.228
3-1	-91.031	-4.592	-107.806	-2.695
3-2	36.865	-11.456	24.712	-1.609
3-3	112.018	0.449	-21.989	0.133
3-4	25.619	-8.856	-13.849	5.551
4-1	-193.371	-32.876	-80.556	-7.672
4-2	169.183	11.805	53.332	13.793
4-3	80.560	-22.479	-0.773	-7.814
4-4	-23.598	-1.890	14.071	-2.926
5-1	-108.213	15.955	41.705	-0.312
5-2	21.055	28.459	17.225	9.081

	AMt	AFt	UMt	UFt
3	9.498	19.652	-9.740	-5.377
4	13.195	10.266	-43.547	-5.568
1	-54.561	-13.216	43.637	-0.875
2	-31.011	-15.354	50.530	-0.001
3	44.564	-11.723	-88.884	0.147
4	54.910	-5.927	40.776	3.202
7-1	-107.365	-1.906	33.354	4.545
7-2	35.620	21.801	-28.619	-9.943
7-3	70.417	-0.121	-47.695	2.984
97-4	-2.448	-6.148	75.758	5.956
98-1	-133.350	-17.559	-38.397	11.627
98-2	74.612	6.345	40.168	-3.238
98-3	77.274	-8.156	-64.719	5.813
998-4	-41.078	-26.109	52.093	17.127
999-1	-114.024	-12.867	91.390	7.347
999-2	36.124	17.950	-58.291	-11.788
999-3	64.339	-12.423	-81.446	5.774
1999-4	64.193	-2.756	4.349	-0.568

Table 5: Policy Components Unit Root Tests.

Variable	ADF		Phillips-Perron		Integration
	Statistic	Lag	Statistic	Lag	
AMt	-3.3915	4	-10.6330	5	I(0)
UMt	-3.9224	5	-12.1123	5	I(0)
AFt	-4.4340	5	-4.4916	5	I(0)
UFt	-4.0895	2	-7.8964	5	I(0)

Critical values: 5%=-3.501 1%=-4.15

6: Data used in the study

	INF (%)	M1 (K£M)	BD (K£M)	GDP (K£M)	GE (K£M)	DD (K£M)	TB (%)	SPt
1	11.9						1.864	427.429
2	10.9	-28.160	-283.500	-105.715	-370.127	-370.127	4.000	414.646
3	9.9	6.180	-146.980	125.718	-155.516	214.611	4.640	420.513
4	10.2	96.150	-54.388	191.657	-33.329	122.187	4.730	424.753
6-1	6.3	70.590	13.597	189.127	47.597	80.926	8.970	448.110
6-2	5.6	-9.430	58.267	143.478	95.685	48.088	9.600	462.015
86-3	4.5	115.910	83.656	113.214	128.807	33.122	8.060	474.875
86-4	4.6	24.470	80.685	-63.620	91.372	-37.435	7.670	478.178
987-1	6.2	21.400	64.799	-23.921	82.127	-9.245	6.890	489.048
987-2	6.9	2.200	33.891	37.468	53.291	-28.836	6.470	549.841
987-3	7.8	31.040	-14.048	74.379	-7.356	-60.647	5.620	594.508
987-4	8.6	43.500	-56.561	111.988	-54.344	-46.988	4.820	642.175
988-1	9.3	-13.140	-77.394	12.610	-88.377	-34.032	4.690	659.178
988-2	10.6	-43.110	-64.746	-4.167	-46.099	42.278	3.720	669.304
1988-3	13	22.290	-31.617	-21.249	32.719	78.817	1.500	660.490
1988-4	11.2	154.360	5.645	55.900	129.302	96.584	2.820	651.126
1989-1	10.8	-148.550	22.514	-21.692	123.942	-5.360	3.390	636.780
1989-2	11.1	32.090	26.613	-15.869	92.578	-31.365	3.360	617.180
1989-3	9.4	30.640	19.958	18.887	31.185	-61.393	5.070	603.322
1989-4	10.7	82.410	10.157	-5.805	-46.974	-78.159	3.800	544.517
1990-1	11.5	31.040	10.501	-23.733	-73.630	-26.656	3.000	535.654
1990-2	10.7	57.880	21.453	-22.027	-47.736	25.894	4.760	545.389
1990-3	12.1	203.700	34.033	-125.889	-20.983	26.752	3.420	529.519
1990-4	18.3	69.770	41.972	-127.381	33.168	54.152	-1.620	498.198
1991-1	14.6	22.520	30.878	-82.876	62.374	29.206	2.570	491.206
1991-2	14.2	2.040	2.486	-33.868	60.219	-2.155	3.250	481.135
1991-3	17.4	80.850	-46.262	-66.623	1.391	-58.829	-0.220	457.743
1991-4	11.4	151.620	-77.001	101.297	13.593	12.202	5.910	464.718
1992-1	16.4	60.970	-110.711	-416.038	-206.890	-220.483	1.500	448.156

	INF (%)	M1 (K£M)	BD (K£M)	GDP (K£M)	GE (K£M)	DD (K£M)	TB (%)	SPt
	35.4	43.920	-86.633	-489.453	-234.181	-27.291	-16.640	414.519
	35	597.220	-40.452	178.415	8.966	243.147	-16.570	459.445
	33.6	265.620	-6.902	106.902	8.157	-0.809	-15.460	443.160
	31.9	-58.700	19.360	-277.444	-73.404	-81.561	-6.960	394.255
2	35	279.970	32.557	-512.164	-102.400	-28.996	49.310	385.505
3	39.4	439.440	46.336	-198.405	54.998	157.398	36.290	421.451
-4	45.52	263.210	56.810	99.651	195.747	140.749	-2.050	505.494
-1	50.89	-719.460	26.736	-197.998	35.917	-159.830	-23.230	930.081
-2	49.37	-107.870	22.261	226.263	154.118	118.202	-16.990	797.581
4-3	40.85	206.750	-12.507	300.100	79.825	-74.294	-17.480	842.786
4-4	28.82	159.390	-52.091	286.087	-35.510	-115.334	-10.180	854.494
5-1	16	46.090	-76.032	-2.796	-189.375	-153.865	0.840	812.279
95-2	6.6	117.710	-62.433	126.439	-100.247	89.128	9.790	731.810
95-3	2.4	156.560	-34.558	59.281	-28.934	71.313	18.760	643.065
95-4	1.6	-20.000	-1.986	94.631	76.255	105.189	20.070	706.096
996-1	2.8	22.040	16.495	-30.263	55.881	-20.374	23.880	643.380
996-2	5.3	128.190	19.621	-17.936	11.813	-44.068	16.550	589.541
996-3	7.6	-156.800	11.171	87.939	-53.763	-65.577	15.500	584.220
996-4	9.1	311.380	-0.005	175.750	-110.805	-57.042	12.400	571.319
1997-1	10.7	176.650	-8.543	-155.152	-203.801	-92.996	10.700	592.206
1997-2	12.6	-54.610	-5.221	165.936	-22.457	181.344	6.800	584.507
1997-3	11.9	-20.570	0.963	269.934	158.240	180.697	14.300	594.551
1997-4	11.2	488.520	6.955	129.803	277.687	119.447	15.200	542.504
1998-1	10.6	-227.790	7.015	-274.535	205.694	-71.993	16.100	527.287
1998-2	8.4	155.900	10.182	92.176	333.150	127.457	17.100	473.234
1998-3	8	8.580	11.005	362.304	406.149	72.999	14.500	472.497
1998-4	6.6	238.390	2.847	151.447	179.407	-226.742	6.000	462.429
1999-1	8.1	447.180	-10.831	-252.514	-229.106	-408.513	0.700	456.310
1999-2	6.2	56.430	-18.347	57.593	-338.552	-109.446	5.200	430.973
1999-3		-68.700	-32.512	91.969	-658.991	-320.439		396.168

YEAR	INF (%)	M1 (K£M)	BD (K£M)	GDP (K£M)	GE (K£M)	DD (K£M)	TB (%)	SPt
1992-2	35.4	43.920	-86.633	-489.453	-234.181	-27.291	-16.640	414.519
1992-3	35	597.220	-40.452	178.415	8.966	243.147	-16.570	459.445
1992-4	33.6	265.620	-6.902	106.902	8.157	-0.809	-15.460	443.160
1993-1	31.9	-58.700	19.360	-277.444	-73.404	-81.561	-6.960	394.255
1993-2	35	279.970	32.557	-512.164	-102.400	-28.996	49.310	385.505
1993-3	39.4	439.440	46.336	-198.405	54.998	157.398	36.290	421.451
1993-4	45.52	263.210	56.810	99.651	195.747	140.749	-2.050	505.494
1994-1	50.89	-719.460	26.736	-197.998	35.917	-159.830	-23.230	930.081
1994-2	49.37	-107.870	22.261	226.263	154.118	118.202	-16.990	797.581
1994-3	40.85	206.750	-12.507	300.100	79.825	-74.294	-17.480	842.786
1994-4	28.82	159.390	-52.091	286.087	-35.510	-115.334	-10.180	854.494
1995-1	16	46.090	-76.032	-2.796	-189.375	-153.865	0.840	812.279
1995-2	6.6	117.710	-62.433	126.439	-100.247	89.128	9.790	731.810
1995-3	2.4	156.560	-34.558	59.281	-28.934	71.313	18.760	643.065
1995-4	1.6	-20.000	-1.986	94.631	76.255	105.189	20.070	706.096
1996-1	2.8	22.040	16.495	-30.263	55.881	-20.374	23.880	643.380
1996-2	5.3	128.190	19.621	-17.936	11.813	-44.068	16.550	589.541
1996-3	7.6	-156.800	11.171	87.939	-53.763	-65.577	15.500	584.220
1996-4	9.1	311.380	-0.005	175.750	-110.805	-57.042	12.400	571.319
1997-1	10.7	176.650	-8.543	-155.152	-203.801	-92.996	10.700	592.206
1997-2	12.6	-54.610	-5.221	165.936	-22.457	181.344	6.800	584.507
1997-3	11.9	-20.570	0.963	269.934	158.240	180.697	14.300	594.551
1997-4	11.2	488.520	6.955	129.803	277.687	119.447	15.200	542.504
1998-1	10.6	-227.790	7.015	-274.535	205.694	-71.993	16.100	527.287
1998-2	8.4	155.900	10.182	92.176	333.150	127.457	17.100	473.234
1998-3	8	8.580	11.005	362.304	406.149	72.999	14.500	472.497
1998-4	6.6	238.390	2.847	151.447	179.407	-226.742	6.000	462.429
1999-1	8.1	447.180	-10.831	-252.514	-229.106	-408.513	0.700	456.310
1999-2	6.2	56.430	-18.347	57.593	-338.552	-109.446	5.200	430.973
1999-3		-68.700	-32.512	91.969	-658.991	-320.439		396.168

YEAR	INF (%)	M1 (K£M)	BD (K£M)	GDP (K£M)	GE (K£M)	DD (K£M)	TB (%)	SPt
1999-4		333.230	-50.001	161.573	-1047.05	-388.067		357.231

ANNEX.

Formula for dynamic estimation of all the preferred models.

Suppose one was to estimate a model as stated below:

$$Xt = \alpha 0 + \alpha 1 Xt\text{-}1 + \alpha 2\ Xt\text{-}2 + \alpha 3 Yt + \alpha 4 Yt\text{-}1 + \alpha 5 Yt\text{-}2 + \ldots\ldots + \varepsilon t$$

And attained a preferred model, such that:

$$\alpha 0 \neq \alpha 1 \neq \alpha 2 \neq \ldots\ldots\ldots \neq \alpha n \neq 0$$

But we know that:

$$(1\text{-}\alpha 1\text{-}\alpha 2)Xt = \alpha 0 + (\alpha 3+\alpha 4+\alpha 5)Yt + \ldots + \varepsilon t$$

Therefore;

$$Xt = \alpha 0/(1\text{-}\alpha 1\text{-}\alpha 2) + ((\alpha 3+\alpha 4+\alpha 5)/(1\text{-}\alpha 1\text{-}\alpha 2))Yt + \ldots. + \mu t$$

This last expression gives the dynamic estimation to the preferred model.