

**THE IMPACT OF MONEY SUPPLY AND SELECTED MACRO
ECONOMIC VARIABLES ON STOCK MARKET RETURNS AT
THE NAIROBI STOCK EXCHANGE (NSE)**

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**A Management Research Project Submitted in Partial Fulfillment of the
Requirements of the Masters of Business Administration (MBA)
Degree, University of Nairobi, School of Business.**

September, 2009.

DECLARATION

This Management Research Project is my own original work and has not been presented for a degree in any other university.

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ACKNOWLEDGEMENT

The success of this study was a result of a number of people to whom I am proud to give thanks. Firstly, I am greatly indebted to my supervisor, H. Ondigo from the Department of Accounting School of Business for his tireless efforts in guiding, giving suggestions and comments and for his availability during the period of the research project. You have greatly contributed to the success of this project.

To my Dad, Mum and Charles for your moral, financial, education support and intervention whenever there was difficulty during my MBA studies at the University. Without your support I would not have made it. To all other participants who contributed in one way or another in the completion of this project and who I am not able to mention by name, May God bless you all.

Mostly, my thanks go to God who never abandoned me throughout my journey and who, I believe, will continue to be with me in future.

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ABSTRACT

The purpose of this study was to find out whether or not any meaningful relationship, both direct and indirect, exists between monetary activity (as embodied by money supply, interest rates and GDP) and stock market activity. The need for the study arose due to the increased activity at the Stock Market between the years 2002 to 2006 during which significant rise in both prices and volumes as reflected by gains in both the stock indices and the market capitalization was witnessed. Although the rise in stock prices was to an extent in tandem with earnings growth, there were instances where the general price level rose tremendously without any fundamental backing. Further, the rise in IPO activity led to an increased flow of funds into the stock market. Several studies have been done on the impact of various macroeconomic variables on stock market returns. However, studies such as that by Anokye and Tweneboah (2008) on the role of macroeconomic variables in determining stock market movement at the Ghana Stock Market did not take into account broad money supply aggregates, and another by Nyamute M.N. (1998) did not co-opt the indirect impact of economic output, as measured by GDP, on stock returns. This study therefore is more focused on capturing both the direct impact, if any, of money supply on stock returns and the indirect impact of interest rates and GDP growth trends on stock returns at the Nairobi Stock Exchange.

The study was based on a population of all companies quoted at the Nairobi Stock Exchange (NSE). The study relied on secondary data from the AIG Company and the Central Bank. The AIG index was used because it constitutes a larger stock portfolio of 27 stocks compared to the NSE index's 20 stocks. The findings of the study revealed that that all the three variables contribute significantly to stock returns, though there seems to be a negative relationship between stock returns and excess money supply. The relationship between stock returns and GDP was also found to be negative

CHAPTER 1

1.0 Introduction

1.1 Background

Between the years 2002 to 2006 the Nairobi Stock Exchange has seen a burgeoning of activity which has led to a significant rise in both prices and volumes as reflected by gains in both the stock indices and the market capitalization. Indeed, although the rise in stock prices has to an extent been in tandem with earnings growth, there were instances where the general price level rose tremendously without any fundamental backing. Further, the rise in IPO activity led to an increased flow of funds into the stock market. This may have been occasioned by the general rise in money supply in the economy. Accordingly, the funds flowed to the path with the greatest potential for yielding the highest returns (Schnabl and Hoffmann, 2007). Hence it is probable that the rising money levels might have been channeled into the stock market thereby occasioning a general rise in the price level of both the NSE-20 Index and the AIG Index subsequently giving rise to improved stock returns.

Indeed, the relatively low interest rate regime as indicated by the decline in T-bill rates serves to incline institutional investor preference towards the higher yielding stocks. However, growth in stock prices seems to be fueled by a growing participation of individual members of the public – as shown by the KenGen, Scangroup and Eveready IPOs over-subscription and therefore many refund cheques to individual investors. This, points to a trend of increased money supply in the public arena. Moreover, a closer look at the money supply trends indicates that in recent times M2, money in circulation and in banks, has grown by a whopping 18% in 2006 compared to a 6% growth in GDP (Central Bank of Kenya, 2007), which therefore implies that excess liquidity in public hands is being diverted towards the stock market subsequently pushing the prices to higher levels.

Money supply has generally tended to rise, over the last decade, in keeping with the general growth in Gross Domestic Product (GDP). In deed, money supply should be

expected to keep pace with GDP, but in Kenya growth in money supply has tended to surpass GDP growth especially in the last five years to 2006. This excess growth in money supply may be a major contributing factor in the price inflation witnessed in both the real economy (the market for goods and services) and the capital market. In the capital markets, the rising money supply may have ultimately contributed to interest rate volatility witnessed in that period. In this regard, it is increasingly evident that the stock market may play a leading role in mopping up excess money supply and containing its impact on the market for goods and services.

Global liquidity has become abundant over the past few years mainly owing to extremely accommodative monetary policies in the US, Euro land and Japan between 2002 and 2005. However, since this liquidity “glut” has barely shown up in headline or core consumer price inflation, it is often said that it must have been swept into asset markets and thus has boosted assets rather than consumer price inflation (Deutsche Bank Research, 2007). Consequently, the asset markets such as the stock markets have been acting as global mops of excess liquidity.

It appears that abundant global liquidity has at least partially contributed to well performing stocks and bond markets. However, when looking at fundamentals such as the price-earnings ratio for developed equity markets it is hard to say that stocks are especially overvalued. In contrast to stocks, it seems that government bond markets have been relatively expensive over the past few years given that excess liquidity has subdued bond market interest rates. Furthermore, “excess” liquidity has likely contributed to overheated real estate markets in the US and the UK (Sebastian Becker, 2007). Hence the excess liquidity has been diverted to a series of asset markets rather than just one or a few markets consequently easing the price inflation of stocks in developed markets.

Hamburger and Kochin (1972) argued that the main channel for the influence of the money supply on cash flows operates through the firm's current and expected earnings. Given the demand for money, a decrease in the supply of money will raise interest rates and reduce interest sensitive expenditures such as capital investment. Homa and Jaffee (1971) also find a significant and systematic relationship existing between the money supply and the stock

market having found a significant correlation between the money supply variables, the level of the money supply and its growth rate, and the index of common stocks.

On the other hand, the influence of growth in money supply does not always have a direct impact on stock prices. In fact for the most part, the influence of money supply is indirect i.e. money supply impacts stock prices through its influences on other economic variables such as inflation and interest rates. An increase in the interest rate would in turn raise the discount rate, which would decrease the value of the stock as argued by the real activity theorists (Bernanke and Kuttner, 2005). With regard to GDP, higher economic growth is thought to lead to higher earnings and by extension bring about a rise in stock prices and vice versa. As a result, if GDP is high, the stock prices generally tend to be high, as companies are doing better than otherwise (Biniv Maskey, 2006).

1.2 Statement of the problem

It is apparent that global trends in money supply do to some extent influence the more developed markets and going by recent events in the Kenyan Stock Market there is reason to suspect that the influence of money supply on stock prices is strong. It is generally agreed that an unexpected increase or decrease in the growth rate of money results in a change in the equilibrium position of money with respect to other assets in the portfolio of investors. Studies by Reilly and Lewis (1971) and by Hamburg and Kochin (1972) confirm this trend. The competing theories on the impact of money supply on stock prices, and by extension stock returns, are those between real activity theorists and efficient market theorists. Real activity theorists such as Homa and Jaffee [1971], and Hamburger and Kochin [1972] support the view that past increases in money lead to increases in equity prices. The implication of the work of real activity theorists is that investors could earn above normal profits by using a trading strategy based on the observed behavior of the money stock. Chordia and Sarkar (2001) identified a clear link between money flows (in the form of bank reserves and mutual fund investments) and liquidity in stock and bond markets.

However, Pearce and Roley (1983) find that stock prices respond only to the unanticipated change in the money supply as predicted by the efficient markets

hypothesis. Sellin (2001) also argues that the money supply will affect stock prices only if the change in money supply alters expectations about future monetary policy. Second, an unanticipated increase in the announced money supply depresses stock prices while an unanticipated decrease elevates stock prices. These findings are consistent with Sorensen (1982) conclusion that the stock market does not over react to a large percentage of monetary activity which can be anticipated.

Sellin (2001) argues that the money supply will affect stock prices only if the change in money supply alters expectations about future monetary policy through indirect channels. He argues that a positive money supply shock will lead people to anticipate tightening monetary policy in the future. The subsequent increase in bidding for bonds will drive up the current rate of interest. As the interest rate goes up, the discount rates go up as well, and the present value of future earnings decline. As a result, stock prices decline. In addition, the economic output (GDP) declines as a result of increases in interest rates, which further depress stock prices.

The conclusion which must follow from such findings is that if one can forecast changes in monetary activity as indicated by money supply, interest rates and GDP, one can determine at least in part future prices and returns of stocks. Such a conclusion contradicts a body of knowledge recently developed which demonstrates that the stock market is efficient with regard to information. That is, all available information is "fully reflected" in current stock price (Rogalski and Vinso, 1977). The findings of real activity theorists contradict the efficient markets hypothesis which asserts that current asset prices reflect all available information so that no such trading strategy can exist. Fama (1991) was of the view that prices adjust efficiently to firm specific information but his findings were not conclusive about the impact of macroeconomic variables such as money supply, interest rates and GDP, on stock price volatility.

Indeed, the acknowledgement of the existence of speculative bubbles in the developed stock markets may be a pointer to the influence of monetary activity on stock prices as the prices rise beyond what may be regarded to as fair value prices and

the thrust of this rise is attributed to the fact that there is an over abundance in money flows towards the stock market that causes the prices to “bubble” beyond their fair values; thus in such a case stock prices cease, as it were, to be driven by information but are rather driven by the money flows to the market. Such phenomenon, between money flows and stock prices, is also intimated at the Nairobi Stock Exchange, especially in the recent past during the post IPO refund period. There are competing theories on how monetary activity affects stock market prices.

This study examines the impact of money supply and other selected macroeconomic variables on stock returns at the Nairobi Stock Exchange.

1.3 Objective of the study

To determine whether money supply directly, and indirectly through interest rates and GDP, impacts stock market returns at the Nairobi Stock Exchange (NSE).

1.4 Importance of the study

Investors, both foreign and institutional: the study will enable them to gauge whether they can be able to make above market returns by tracking and correctly anticipating changes in money supply levels, interest rates and GDP in the stock market.

Monetary authorities: will to some extent be able to assess the extended impact of monetary activity on asset prices such as stocks. Consequently, this will help them to gauge the impact monetary policy might have on asset prices such as stocks.

Academicians: the study will help to ascertain the significance and magnitude to which market bubbles weaken market efficiency at the NSE. Market efficiency has largely dwelled on information as the key determinant of market efficiency (Fama, 1990), but has not to a large extent considered the impact of monetary activity on the stock market over and above publicly and privately available information.

CHAPTER 2

2.0 Literature Review

2.1 Introduction

This chapter undertakes to give a historical account of the relationship between monetary activity and stock prices as enumerated by various studies. Trends at the NSE over the last several years are also indicated in tracking the evidence of market responsiveness to money supply and other attendant economic factors namely interest rates and the GDP. Both the direct and indirect channels of money supply are looked into in great detail subsequently supplemented by empirical studies stating the findings of other studies which tested the relationship between market volatility and the three variables – money supply, interest rates and GDP.

2.2 Money flows and stock prices

A relationship between monetary activity and stock prices is fairly well recognized in the literature. Studies of Hamburger and Kochin (1972), and Gupta (1974) have attempted to specify the short- and long-run nature and the direct and indirect nature of these relationships. It appears to be widely assumed that the influence of money on aggregate stock market values is largely indirect, working primarily through its effects on interest rates and expected corporate earnings. However, there is ample support for the hypothesis that changes in the money supply have an important short-run impact on the stock market which is independent of the influence money has on interest rates and expected corporate earnings, as these variables are normally measured.

Money supply growth is meant to support economic growth so the growth of money is in tandem with GDP growth trends; as the increase in money is used for the purpose of funding increase in output. In the event that money supply growth far surpasses the rise in GDP, it will translate to the fact that there is excess money which cannot be immediately put to proper economic use and as a result this money will end up creating artificial demand of existing output subsequently pushing up asset/ production factor prices and product prices.

Ultimately, in the aftermath of an excessive growth in money supply, over and above GDP growth, demand pull inflation ensues in both capital markets and the real markets (markets for goods and services). As can be expected asset prices and output prices do not rise at the same time. Asset prices will tend to rise with the investor expectation of their returns while output prices will depend on, among other things, the demand supply imbalance of money. As a result, asset prices, whose value is determined in the capital markets, are to a large extent determined by the expectation of asset returns; the higher the expected returns, the more the investors are willing to pay to acquire them. The motive for security speculation by the public lies in the expectation of further increases in security prices (Machlup, 1940). Shiller (2001) describes this phenomenon as follows:

The essence of a speculative bubble is a sort of feedback, from price increases, to increased investor enthusiasm, to increased demand, and hence further price increases. The high demand for the asset is generated by the public memory of high past returns, and the optimism those high returns generate for the future. The feedback can amplify positive forces affecting the market, making the market reach higher levels than it would if it were responding only directly to these positive forces.

If the public is convinced that greater returns can be achieved by investing in the capital markets as opposed to other asset markets it will do so. In other words, the various asset markets are in direct competition with each other for excess funds/media in circulation and the flow of this excess media will be determined by the rate of return proposition anticipated from the various asset classes. This flow of funds is also referred to as macro liquidity (based on money supply levels in the economy and its subsequent flow between various economic sectors), to distinguish it from liquidity pertaining to transaction activity, which is determined by stock market activity (Chordia, Sarkar, Subrahmanyam, 2001). For instance, if the investing public expect a 20% return on stocks and a 12% return on housing, it is most probable that more funds will flow towards the stock market as opposed to the housing markets. But as the funds pile up in stocks their price rises and

their yield declines to levels that are no longer attractive when compared to other asset classes and as a result the public begins to offload stocks in exchange for assets with higher return prospects.

2.3 The Nairobi Stock Exchange

At the end of 2006, there were 47 actively traded companies listed at the NSE out of which 39 were in the main investment market segment (MIMS). Just prior to the KenGen IPO, the public had witnessed a meteoric rise in Kenya Airways' share price driven by improved profitability. Kenya Airways' share price tripled over a period over one year to May 2006. This trend gave added impetus to the investing public's decision to seek high returns from the stock market via the KenGen IPO hence the market became awash with cash (Nairobi Stock Exchange, 2006).

The direct relationship between monetary activity and stock prices in the Nairobi Stock Exchange has only just begun to become evident in the months preceding the KenGen IPO. In this regard, a considerable increase in money supply was witnessed just prior to the IPO. Perhaps this growth in money supply was largely attributable to the inflow of funds from abroad by would be investors, including those of Kenyans in the Diaspora and foreign investment firms, interested in the KenGen offering. In June 2006, the month of the KenGen IPO issue, broad money expanded by 18% compared to an expansion of 8.6% in June of 2005. Before the KenGen's listing in the June/July 2006 period, the NSE 20 share Index hovered in the 4100 – 4400 range and there after continued to maintain these range, up until the point when cash refunds for oversubscribed amounts were paid back to the applicants; these were mostly ploughed back into the market and subsequently towards the end of August and the beginning of September, the index started gaining steadily to hover around the 4500 – 4800 range. At the same time year-on-year growth in liquidity as measured by broad money, M2, remained high at 19.6% in the same period (Central Bank of Kenya, 2007).

The subsequent IPOs, Scangroup, Eveready, Equity Bank, Access Kenya and Kenya Re exhibited similar trends with the liquidity impact of the IPOs on the bullishness of the market depending on the magnitude of the refunds. The larger the amount the

oversubscription the larger the refunds and the more the amount of money to be ploughed back into the market and the more the market rose. Consequently, the IPO issues acted as a series of sparks that buoyed liquidity and kept up the upward momentum of the stock market. Indeed, by the end of October the NSE index had hit the 5000 mark and by December it was approaching the 5500 mark with overall liquidity still robust at 17.7%. Midway through January 2007, the index surpassed the 6000 mark and it was also in this period that money supply had expanded drastically with a year-on-year M2 growth of 23% Central Bank of Kenya, 2007). This pattern is indicative of a strong co-movement between money flows and stock returns in the 2006 – 2007 period(s). In their study of the Istanbul Stock Exchange (ISE), Balkan and Yeldan (2000), the evolution of the bubble is clearly visible starting from 1993, where the ISE Index accelerates along with the intensification of hot money flows. Such bubble-burst-bubble performance of the stock market was clearly disassociated from the real production capacity of the economy.

Towards the end of the first quarter of 2007, with no IPOs forthcoming, the market went on a downward spiral and by March the NSE index was back in the 4500 range, although it recovered slightly immediately thereafter. Broad Money expansion also slowdown to 21% compared to its previous high of 23% in the month of January (Central Bank of Kenya, 2007). It is perhaps vital to point out that the turning point from high growth to a slowdown in growth was achieved in the same month for both the stock market and money supply.

2.4 Theoretical Literature

2.4.1 Direct Channels of Money Supply Influence on Stock Price

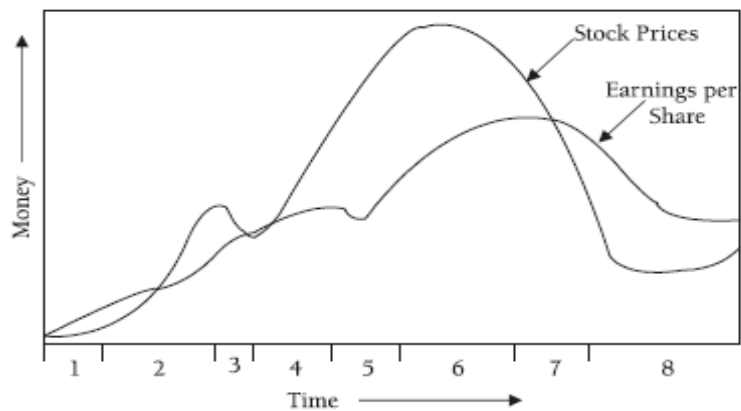
The valuation of stocks is normally a variant of the universal model (Wiggins, 1996):

$$\text{Business Value} = \frac{\text{Expected Cash Flows}}{\text{Required return}}$$

The cash flows used depend on the financial position of the firm and the nature of business operations. For instance dividends can be used as a cash flow basis only for those firms that issue dividends. Subsequently, the business value of the firm becomes an

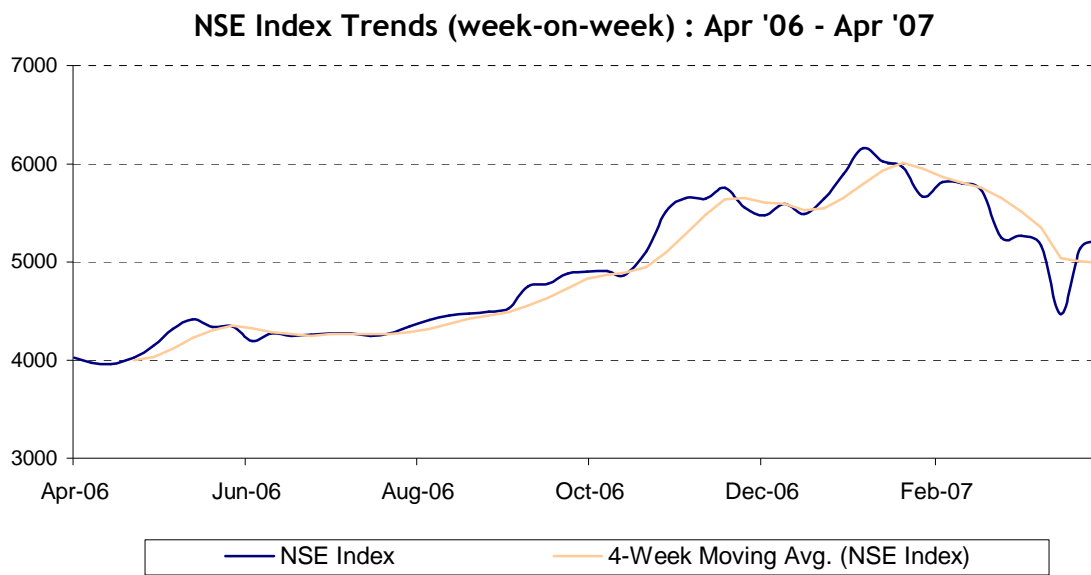
indicator of operating fundamentals and is then compared with the prevailing stock price and in the event that it is higher than the stock price the stock is said to be undervalued and vice versa. Consequently, the rising of the stock price way above the fundamental value of the business is a reflection that the rise in price is not driven by business fundamentals and will increasingly lead to a price correction (Colandro, 2004). The Soros's Boom Bust model depicts this relationship below, with earnings serving as a fundamentals indicator.

Soros's Boom-Bust Model



Source: Soros (1998), p. 52.

At the NSE the boom-burst cycle is quite evident in the more vibrant IPO period (between May 2006 – April 2007) in which stock prices posted significant gains in the post IPO period subsequently followed by a market correction all of which can be attributed to the economic undercurrents of expanding money supply.



Indeed, Hamburger and Kochin (1972), did find evidence that equities are closer short-run substitutes for money than bonds, i.e., those changes in monetary growth have more of a short-run impact on the stock market (and the Treasury bill market) than they do on the longterm bond market. Such a finding conflicts sharply with the conventional view on how money influences the stock market and suggests that changes in money have a direct impact on the market. Homa and Jaffee (1971) also find a significant and systematic relationship exists between the money supply and the stock market. This relationship was substantiated in several ways. First, they found a significant correlation between the money supply variables, the level of the money supply and its growth rate, and the index of common stocks. Secondly, the forecasts generated by this relationship, when the actual value of the money supply was assumed known, correlated almost as well with the actual stock market series as did the fitted equation.

On the other hand, the Rogalski and Vinso (1977) study results were consistent with the proposition that information concerning the actual rate of growth of the money supply is incorporated into stock returns as purported by various monetary portfolio theorists. These results also supported the notion that the stock market is efficient with respect to monetary information as the efficient market theory would suggest. Specifically, causality does not appear to go from money supply to stock prices but rather from stock

prices to money supply and possibly back again. What we therefore propose based on our results is a bi-directional theory of causality between money supply and stock returns.

2.4.2. Indirect Channels of Money Supply Influence on Stock Price

However, the influence of growth in money supply does not always have a direct impact on stock prices. In fact for the most part, the influence of money supply is indirect i.e. money supply impacts stock prices through its influences on other economic variables such as inflation, interest rates and GDP. Thus, evidence that positive monetary shocks increase stock returns indicates that expansionary monetary policy exerts real effects by increasing future cash flows or by decreasing the discount factors at which those cash flows are capitalized (Thorbecke, 1997). By itself, growth in money supply will not necessarily lead to an increase in inflation and interest rates, but the impact of money supply on these variables hinges on its growth vis-à-vis economic growth. Where money supply is growing more rapidly than economic output, the excess money supply is likely to result in the bidding up of prices in both the real market for goods and services and the capital market, which in turn occasions a rise in inflation and a subsequent upward revision in interest rates.

There are competing theories on the indirect channels through which money supply affects stock prices. Sellin (2001) argues that the money supply will affect stock prices only if the change in money supply alters expectations about future monetary policy. He argues that a positive money supply shock will lead people to anticipate tightening monetary policy in the future. The subsequent increase in bidding for bonds will drive up the current rate of interest. As the interest rate goes up, the discount rates go up as well, and the present value of future earnings decline. As a result, stock prices decline. Furthermore, Sellin (2001) argues economic activities decline as a result of increases in interest rates, which further depresses stock prices.

The real activity economists, on the other hand, argue that a positive money supply shock will lead to an increase in stock prices. They argue that a change in the money supply provides information on money demand, which is caused by future output expectations. If the money supply increases, it means that money demand is increasing, which, in effect,

signals an increase in economic activity. Higher economic activity implies higher cash flows, which causes stock prices to rise (Sellin, 2001). Ben Bernanke and Kenneth Kuttner (2005) argue that the price of a stock is a function of its monetary value and the perceived risk in holding the stock. A stock is attractive if the monetary value it bears is high. On the other hand, a stock is unattractive if the perceived risk is high. The authors argue that the money supply affects the stock market through its effect on both the monetary value and the perceived risk. Money supply affects the monetary value of a stock through its effect on the interest rate. The authors believe that tightening the money supply raises the real interest rate. An increase in the interest rate would in turn raise the discount rate, which would decrease the value of the stock as argued by the real activity theorists (Bernanke and Kuttner, 2005). The authors argue that tightening of the money supply would increase the risk premium that would be needed to compensate the investor for holding the risky assets. They believe that tightening the money supply symbolizes a slowing down of economic activity, which reduces the potential of firms to make a profit. Investors would be bearing more risk in such a situation and, hence, demand more risk premium. The risk premium makes the stock unattractive, which would lower the price of the stock (Bernanke and Kuttner, 2005).

Basically, most theories advocating an indirect relationship between money supply and stock prices do so with the assumption that stock prices are impacted by money supply through interest rate channels as follows:

$$\begin{aligned}
 \text{Stock Value} &= \frac{\text{Expected Cash Flows}}{\text{Required return}} \\
 &= \frac{CF_1}{(1 + R_f + R_p)} \\
 &= \frac{CF_1}{(1 + R + I_p + R_p)}
 \end{aligned}$$

Where, R_f = risk free rate

$$R_f = (R + I_p)$$

R_p = risk premium

R = real interest rate

I_p = inflation premium (purchasing power stabilizer)

Consequently, the impact of money supply on stock prices is indirect and occurs through the influence of money supply on the risk premium, real interest rate and the inflation premium.

Hamburger and Kochin (1972) argued that the main channel for the influence of the money supply on cash flows operates through the firm's current and expected earnings. Given the demand for money, a decrease in the supply of money will raise interest rates and reduce interest sensitive expenditures such as capital investment. The decrease in expenditures, together with the standard multiplier, will then cause a reduction in the firm's sales and thus a decrease in its earnings. The influence of the money supply on the riskless interest rate component of the investor's discount rate is a direct function of the effect of the money supply on market interest rates.

2.5 Empirical Literature

The explicit increase in market interest rates caused by increased monetary tightness may, moreover, be reinforced by credit rationing in the loan markets. In this connection, earnings will be to some extent dictated by the pace of economic growth (as reflected by GDP growth) hence a higher economic growth is thought to lead to higher earnings and by extension bring about a rise in stock prices and vice versa. As a result, if GDP is high, the stock prices generally tend to be high as companies are doing better than otherwise. A positive relationship is expected between stock prices and GDP (Biniv Maskey, 2006). On the other hand, they were of the opinion that the influence of the money supply on the risk premium component of the investor's discount rate is more difficult to quantify.

With regard to investors, the channels of money supply influence can be traced through their profit maximization motive. In instances of increased money supply, either by way of credit expansion or through increased government expenditure, consumers will have more money to spend on fewer goods thus they will bid up the price of those goods up until a level where demand and supply near equilibrium at the prevailing level of money in circulation. Also because producers cannot raise output instantaneously to cope with rising demand, their first impetus is to raise the price(s). But if the consumers expect the new demand levels to hold they will take measures to increase their production capacity by making long-term investments in capital assets such as land, machinery and buildings (Yesin, 2008).

The real return of a bank is directly proportional to the demand for investment funds and inversely proportional to the prevailing inflation as a consequence of which banks will lend out more long-term funds in instances whereby inflation is stable or declining. Inflation, on the other hand, is to some extent determined by whether the money supply patterns of the day lead to increased demand subsequently sparking a demand-pull inflation. In the event that inflation rates remain high, bank lending is likely to remain averse to long-term lending and as a result the thrust of bank lending will be short-to-medium term in nature. This in itself will serve to raise the levels of currency in circulation, which in turn can be expected to lead to bullish market activity as more circulating media finds its way to the stock market; giving rise to a *liquidity effect* of money supply on stock prices (Hamburger and Kochin, 1972). This in turn may strangle economic growth as funds are directed away from non-economic uses and into speculation and as such the GDP growth may be negatively impacted.

In instances where the commodity price inflation rises, the marginal profit also rises and vice versa. The real interest rate, R , is the real cost of making additional long-term investment, which may be incurred as a finance cost of investment funds if they are borrowed alternatively it may simply represent the opportunity cost of holding money. Hence the investor will realize additional profit in periods where money supply growth occasions a demand-pull inflation that eventually leads to rising commodity prices and subsequently earnings would also rise with the stock price also adjusting upwards in

response to the growth in earnings; giving rise to the *earnings effect* of money supply on stock prices (Hamburger and Kochin, 1972). In such a context the earnings rise is in accordance with the rise in general output level and as such the GDP growth as reflected by rising earnings triggers a rise in stock market prices.

2.6 Conclusion

Most studies, such as those of Sellin and Bernanke on one hand and the real activity economists on the other, focused on the indirect relationship between money supply and the asset (stock) value in which money flows indirectly impact on asset prices either by way of signaling the direction of future economic trends or by stifling business activity by way of rising interest rates. Further, studies for both direct and indirect money supply influences have been conducted in the more developed markets (Sellin 2001, Thorbecke 1997). Anokye and Tweneboah (2008) did undertake to study the role of macroeconomic variables in determining stock market movement at the Ghana Stock Market. They concluded that the Ghana Stock Exchange did form significant relationships with macroeconomic variables namely inflation, interest rates, exchange rates, oil prices and foreign direct investment. However, this study did not take into account broad money supply aggregates.

Nyamute M.N. (1998) found that macroeconomic variables namely inflation, money supply, treasury bills and the exchange rate (US\$/Kshs) have an impact on the performance of the Nairobi Stock Exchange (as measured by the NSE-20 stock index). Further, this study found that the impact of T-bills rates and exchange rates on the stock exchange was generally more significant than that of money supply and inflation. Even though Nyamute's study takes into account interest rates as having a bearing on stock returns it does not co-opt the indirect impact of economic output, as measured by GDP, on stock returns. Hence this study is more focused on capturing both the direct impact, if any, of money supply on stock returns and the indirect impact of interest rates and GDP growth trends on stock returns at the Nairobi Stock Exchange; the study seeks to ascertain whether any meaningful relationship, both direct and indirect, exists between monetary activity (as embodied by money supply, interest rates and GDP) and stock market activity.

CHAPTER 3

3.0 Research Methodology

3.1 Introduction

This chapter highlights the research design that was used in the study, the population and study sample. It also states the data collection methods that were used in the study, the mode of analysis and the justification of the study.

3.2 Research Design

An empirical research design was applied to explore the impact of money supply, interest rates and GDP on stock returns. Stock returns were measured by the growth in stock prices as reflected by the gains and losses of a suitable stock index, which in the case of the Nairobi Stock Exchange was the AIG 27 index. Consequently, stock Market returns were monitored by annualized excess quarterly returns of a capitalization weighted index namely the AIG 27 index. These returns were then compared to money supply growth patterns, as measured by excess money supply, in similar time periods.

3.3 Population

The population of the study constituted all companies quoted at the Nairobi Stock Exchange (NSE).

3.4 Data sampling

Data comprised all the companies used in the computation of the AIG Index. This was justified on the ground that the AIG Index is able to minimize the impact of liquidity on its price levels by virtue of its taking into account the volume of shares in issue. In addition, the analysis also took into account money supply (M2), GDP and interest rates statistics between 2002 and 2006 on a *quarterly* basis as there was no monthly GDP data and current statistics only provide GDP growth data on a quarterly basis between 2002 and 2006. The period was chosen because this is the period which

has recorded considerable stock market volatility. In addition, there is sufficient data available for all the variables incorporated in the study.

3.5 Data collection

The study relied on secondary data from the AIG Company and the Central Bank. The AIG index was sourced from the AIG Company while money supply, interest rates and GDP statistics were sourced from the Leading Economic Indicators from the Central Bank's monthly review. The AIG index was used because it constitutes a larger stock portfolio of 27 stocks compared to the NSE index's 20 stocks. Further, unlike the NSE index, dividends announcements are included in the AIG index hence it assures greater accuracy in the calculation of holding period returns.

3.6 Data analysis

In assessing the direct impact of money supply on stock prices, the study applied a similar approach to Biniv Maskey (2006). In this model the AIG-27 Index was regressed against money supply on a quarter-to-quarter basis. Money supply was monitored by quarterly trends on the Year-on-Year growth in Broad Money Supply, M2. In this study excess money supply was used as the main benchmark in assessing the impact of money supply on stock market activity the reason being that any growth in money supply not exceeding the GDP was a reflection of increased money demand occasioned by rising productivity in the market for goods and services. Hence this normal growth in money supply was not expected to filter into the stock market. In view of this, the stock market would begin to experience money supply shocks only when growth in money supply exceeded growth in GDP, in which case the stock market would serve to mop up this excess supply.

Excess money supply growth was derived by deducting GDP growth from growth in M2.

$$\text{Excess Growth in M2 (Me2)} = \Delta \text{M2} - \Delta \text{GDP}$$

The excess money supply was then compared to the stock market returns by running a regression analysis model.

On the other hand, the indirect impact of money supply on stock returns was captured by interest rate trends and GDP growth trends.

Mathematically, the empirical model was a multiple regression model in the form:

$$\text{AIG Index Returns} = \alpha + \alpha_2 \text{Me2} + \alpha_3 \text{GDP} + \alpha_4 \text{YTM} + e_i$$

M2 = Broad money; comprises currency outside banking institutions, and all private and other public sector holdings of demand savings and time deposits. It excludes central and local Government deposits with bank in g institutions

Me2 = Excess Money Supply on a quarterly basis.

GDP = GDP quarterly growth.

YTM = Yield-to-Maturity of the 10-year bond is used as the benchmark interest rate.

α = constant that measures AIG returns when the value of other variables is zero.

α_2 = measures the change in AIG Index returns arising from a unit change in excess money supply.

α_3 = measures the change in AIG Index returns arising from a unit change in quarterly GDP growth.

α_4 = measures the change in AIG Index returns arising from a unit change in the Yield-to-Maturity.

GDP is generally a mirror image of market anticipation of future prospects of listed companies. Most industries are pro-cyclical in nature, meaning that the firms in the industry do well as the economy does well and vice versa. If GDP is high, the stock prices generally tend to be high as companies are doing better than otherwise. This variable also served as a proxy for economic fundamentals. In addition, the yield on a long-term government bond (the 10-yr bond will be used where applicable) was

another control variable that served as a proxy for monitoring inflation expectations. When the yield rises, inflation expectation increases, signaling weakening purchasing power for consumers of goods and services and subsequently a general decline in earnings, which eventually leads to a weaker performance of companies listed in the stock market.

On derivation of the regression equation from the respective statistics, the coefficients α , α_2 , α_3 , and α_4 were tested for significance and the appropriate conclusions deduced as to whether money supply has a meaningful on direct influence on the Nairobi Stock Exchange. The coefficient α defines the expected returns of the index when the independent variables equate to zero while coefficients α_2 , α_3 , and α_4 define the degree to which a unit change in the independent variables – excess money supply, GDP growth and yield to maturity respectively – impacts the return on the AIG index.

3.7 Diagnostic Tests

3.7.1 T-test

A T-test was undertaken on the coefficients of the above regression equation to determine whether in general, coefficients α , α_2 , α_3 , and α_4 have a direct bearing on stock market returns (as measured by the AIG Index) and more so to ascertain whether money supply in particular has a direct influence on stock returns as attested by the coefficient α_2 .

3.8 Justification

The study involved the determination as to whether money supply was a key external driver of stock market volatility, such that if stock movement cannot be explained by fundamentals such as earnings and dividends then subsequently stock market volatility is explained by trends in money supply and other attendant variables namely GDP and interest rates.

CHAPTER 4

4.0 Data Analysis

4.1 Introduction

This chapter gives an analysis of the research data, firstly by looking at the statistic of the quarterly percentage gains and losses of the four variables for the five year period, followed by correlation and regression analysis, and lastly state the findings of the study.

4.2 Financial Market Trends

The statistics below represent the quarterly percentage gains and losses for the five year period 2002 – 2006 of the four variables – AIG Returns, Excess Money Supply (Me2), GDP and interest rates (Yield-to-Maturity - YTM). The returns on the dependent variable, AIG returns, were up significantly, in 2003 perhaps as a result of a trouble free general election with a correction witnessed in the first half of 2004 and thereafter there has been a gradual rise to 2006. Excess money supply remained in the single digits from the second quarter of 2003 to the first quarter of 2006. The upward shift in excess money supply in 2006 can be attributed to increased fund inflows from abroad in anticipation of the KenGen IPO, which was undertaken in May 2006. Over the five year period GDP has been generally on an upward trend from a low of -2.5% in the third quarter of 2002 to a high of 7.5% in the third quarter of 2006. Interest rates declined significantly in 2003 and subsequently rose again in the fourth quarter of 2004 mainly as a result of inflationary pressures.

Table I: Financial Market and Economic Trends

		AIG Returns	Me2	GDP	YTM
2002	QTR 1	-0.23%	-0.90%	4.80%	15.10%
	QTR 2	4.71%	9.70%	-1.20%	12.30%
	QTR 3	4.94%	10.60%	-2.50%	13.10%
	QTR 4	26.42%	7.90%	0.90%	13.20%
2003	QTR 1	23.54%	11.30%	-1.60%	11.20%
	QTR 2	22.90%	8.50%	0.80%	8.00%
	QTR 3	32.33%	3.40%	6.90%	5.80%
	QTR 4	23.73%	7.20%	5.50%	6.50%
2004	QTR 1	-1.75%	5.40%	6.50%	6.59%
	QTR 2	-10.13%	6.30%	6%	7.01%
	QTR 3	3.96%	8.40%	3.20%	7.75%
	QTR 4	7.55%	4.80%	4.70%	13.04%

2005	QTR 1	5.70%	7.60%	2.60%	13.63%
	QTR 2	23.81%	1.60%	7%	13.50%
	QTR 3	4.84%	1.40%	7.40%	13.58%
	QTR 4	2.29%	3.90%	5.80%	13.07%
2006	QTR 1	3.31%	9.20%	4.10%	12.60%
	QTR 2	11.13%	12.20%	5.80%	11.60%
	QTR 3	11.05%	11.00%	7.50%	11.45%
	QTR 4	7.97%	9.70%	7%	10.73%

4.3 Correlation Analysis

The correlation analysis between the four variables, as shown below, reveals that there is no significantly strong correlation between any of the variables as none has a correlation above 0.5. Accordingly, there is no major instance of multicollinearity and as a result all variables can be applied in the regression equation.

Table II: Correlation

	<i>AIG Returns</i>	<i>Me2</i>	<i>GDP</i>	<i>YTM</i>
AIG Returns	1			
Me2	0.075564659	1		
GDP	-0.12119959	0.46851	1	
YTM	-0.16949862	0.14572	0.19208	1

4.4 Regression Analysis

Table III: Multiple Regression Results

Y=	α	α_2	α_3	α_4
Y=	-0.80763976	-0.63292	-0.12092	0.22688
t-statistic	-7.19598387	-17.3553	-3.79032	7.782581
Significance at 5% (*)	*	*	*	*
Significance at 10% (**)	**	**	**	**

Using the MS Excel data analysis format the following multiple regression equation below

$$\text{AIG Index Returns} = \alpha + \alpha_2\text{Me2} + \alpha_3\text{GDP} + \alpha_4\text{YTM} + e_i$$

Translates to:

$$\text{AIG Index Returns} = - 0.80763976 - 0.63292 \alpha_2 - 0.12092 \alpha_3 + 0.22688 \alpha_4$$

4.5 Findings of the Study

Significance tests, as indicated in Table III, show that all the three variables contribute significantly to stock returns as measured by the AIG Index both at the 5% level of significance and at the 10% significance level. The results, however, seem to indicate that a negative relationship exists between returns and excess money supply. The relationship between stock returns and GDP was also found to be negative.

CHAPTER 5

5.0 Conclusion and Recommendation

5.1 Introduction

This is the concluding chapter of this study. It gives a conclusion to the study and highlights recommendations for further studies. It also highlights the limitation of the study.

5.2 Conclusion

From the analysis carried out in the study a strong negative relationship between stock returns and excess money supply was observed indicating that excesses money supply ends to lead to reduced prices. Indeed this relationship maybe induced indirectly by way as excess money supply has a bearing on inflation and interest rates and as a result of diminishing purchasing power arising from rising costs, investors are likely to sell off their stocks to supplement purchasing power. The relationship between stock returns and GDP was also found to be negative but this may be due to a market response lag to changes in GDP; as the trends in stock prices tend to mirror company earnings performance, which to a large extent tracks GDP growth trends. However, GDP growth and earnings are reported two to three months after the year end and as a result stock market reaction takes place at the time of reporting and not at the year end.

On the other hand, interest rates were found to have a positive and significant relationship with stock returns. This may arise from the fact that in times of rising interest rates bond prices decline and as a result investors are more likely to sell off their bond positions and as it were cut their losses. Subsequently, the proceeds from the bonds may be directed towards stocks as investors seek to recover bonds losses through stock price gains.

All in all, the findings subvert the conclusions of real activity economists that money supply increases stock prices (Biniv Maskey, 2006) to the extent that this study finds the relationship to be negative. Further, the findings are contrary to those of Biniv Maskey (2006) which found a positive relationship between GDP and stock prices.

5.3 Recommendation

From the findings of the study, it would be wise for investors to in future look at Money Supply, GDP and Interest trends as these three variables have a significant influence on stock market returns.

5.4 Recommendations for further Research

In view of my findings, other empirical studies may be undertaken to cast more light into the relationship between inflation, GDP and stock returns. In undertaking such studies GDP and inflation statistics should be lagged as it is probable that the stock market returns take a longer period to respond to GDP growth and inflationary trends.

5.4 Limitations of the Study

The introduction of a policy rate has only taken effect in recent years and as such a longer time frame of study maybe needed to take into account major economic and business cycles.

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APPENDIX I

AIG 27 Index constituents (2002 – 2006)

	AIG 27 INDEX
1	UNILEVER
2	KAKUZI
3	SASINI
4	REA VIPINGO
5	UCHUMI
6	KENYA AIRWAYS
7	TPS SERENA
8	NATION
9	BARCLAYS
10	CFC
11	DIAMOND TRUST
12	KCB
13	NBK
14	NIC BANK
15	HOUSING FINANCE
16	ICDCI
17	STANCHART
18	ARM
19	BAMBURI
20	E.A. PORTLAND
21	BAT
22	EABL
23	BOC
24	KPLC
25	TOTAL (K)
26	CMC
27	SAMEER

APPENDIX II

QUARTELY % GDP GROWTH DATA (2002 - 2006)

	2002	2003	2004	2005	2006
	(%)	(%)	(%)	(%)	(%)
1st Qtr	4.8	-1.6	6.5	2.6	4.1
2nd Qtr	-1.2	0.8	6	7	5.8
3rd Qtr	-2.5	6.9	3.2	7.4	7.5
4th Qtr	0.9	5.5	4.7	5.8	7
Full Year	0.5	2.9	5.1	5.7	6.1

APPENDIX III

AIG QUARTERLY RETURNS DATA (2002 - 2006)

		AIG INDEX	RETURNS
2002	QTR 1	94.39	-0.23%
	QTR 2	98.84	4.71%
	QTR 3	103.72	4.94%
	QTR 4	131.12	26.42%
2003	QTR 1	161.98	23.54%
	QTR 2	199.07	22.90%
	QTR 3	263.42	32.33%
	QTR 4	325.92	23.73%
2004	QTR 1	320.21	-1.75%
	QTR 2	287.77	-10.13%
	QTR 3	299.17	3.96%
	QTR 4	321.76	7.55%
2005	QTR 1	340.11	5.70%
	QTR 2	421.09	23.81%
	QTR 3	441.45	4.84%
	QTR 4	451.57	2.29%
2006	QTR 1	466.5	3.31%
	QTR 2	518.44	11.13%
	QTR 3	575.75	11.05%
	QTR 4	621.64	7.97%

APPENDIX IV

MONEY SUPPLY & INTEREST RATE DATA (2002 - 2006)

		M2	91-day T-Bill Rate
2002	QTR 1	3.90%	10.10%
	QTR 2	8.50%	7.30%
	QTR 3	8.10%	8.10%
	QTR 4	8.80%	8.20%
2003	QTR 1	9.70%	6.20%
	QTR 2	9.30%	3.00%
	QTR 3	10.30%	0.80%
	QTR 4	12.70%	1.50%
2004	QTR 1	11.90%	1.59%
	QTR 2	12.30%	2.01%
	QTR 3	11.60%	2.75%
	QTR 4	9.50%	8.04%
2005	QTR 1	10.20%	8.63%
	QTR 2	8.60%	8.50%
	QTR 3	8.80%	8.58%
	QTR 4	9.70%	8.07%
2006	QTR 1	13.30%	7.60%
	QTR 2	18%	6.60%
	QTR 3	18.50%	6.45%
	QTR 4	16.70%	5.73%
