THE EFFECTS OF MONETARY POLICY ON STOCK MARKET PERFORMANCE IN MALAWI

MASTER OF ARTS (ECONOMICS) THESIS

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UNIVERSITY OF MALAWI
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Master of Arts (Economics) Thesis

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DECLARATION

I the undersigned hereby declare that this dissertation is my own original work, which has not been submitted to any other institution for any degree award. Where other people's work has been used acknowledgements have been made.

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Full Legal Name

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Signature

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Date:

CERTIFICATE OF APPROVAL

The undersigned certify that this thesis represents the student's own work and effort and has been submitted with our approval.

Signature:

_____Date:_____

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Second Supervisor

DEDICATION

I dedicate this work to my wife, Virginia Mtende Kumwenda and my son Shaun Chimango Kumwenda. Being a young family but very understanding during the entire period of my study, it was not easy due to the pressures of time and period of my unavailability but you stood by me. Thanks for your love and support, I love you so much.

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To all member of my family, am grateful for the support you offered in numerous ways.

ABSTRACT

This study provides empirical evidence on the existence of a long run equilibrium relationship between the effects of monetary policy on stock market performance in Malawi using the ARDL bounds testing approach to cointegration. The study uses monthly data for the period November, 1996 to April, 2012. The study reveals that in the short run it is the lagged values of money supply, exchange rate, treasury bills yields and of stock returns that play a dominant role in influencing the short-term volatility of returns on the Malawi Stock Exchange. The study also establishes that the bank rate and treasury bills yields influence stock returns in the long run. The study concludes that the conduct of monetary policy in Malawi affects the stock market. It also establishes that monetary policy reacts as ***"firefighting device"*** to the developments on the fiscal front, which reflects orientation of political regimes. Instead of supporting effective fiscal policies that enhance economic growth and stimulate investment, monetary policy in Malawi during the period of this study endeavored to correct the problems created by ineffective fiscal policy conduct.

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LIST OF ABBREVIATIONS AND ACRONYMS

AIC	-	Akaike Information Criteria
ARDL	-	Autoregressive Distributed Lag
B-G LM	-	Breusch-Godfrey Lagrange Multiplier
CUSUM	-	Cumulative Sum
CUSUMsq	-	Cumulative Sum Squares
DF-GLS	-	Dickey Fuller Generalised Least Squares
DSI	-	Domestic Share Index
FRDP	-	Fiscal Restructuring and Deregulation Programme
FSI	-	Foreign Share Index
GDP	-	Gross Domestic Product
IMF	-	International Monetary Fund
JSE	-	Johannesburg Stock Exchange
MASI	-	Malawi All Share Index
MoF	-	Ministry of Finance
MSE	-	Malawi Stock Exchange
NDA	-	Net Domestic Assets
NFA	-	Net Foreign Assets
OECD	-	Organisation for Economic Cooperation and Development
OLS	-	Ordinary Least Squares
RBM	-	Reserve Bank of Malawi
SAP	-	Structural Adjustment Programme

CHAPTER ONE

1.0 Introduction

This section discusses the background of the study and the development of monetary policy in Malawi since independence in 1964. The aim is to provide the context in which this study is carried out.

1.1 Background

The link between monetary policy and the stock market is of particular interest to both economists and policymakers. Stock prices are among the most closely watched asset prices in any market based economy and are viewed as being highly sensitive to economic conditions (Bernanke, 2003). Stocks are claims on real assets and, hence, monetary neutrality implies that monetary policy should not affect real stock prices in the long run. However, researchers have found considerable evidence that monetary policy can affect real stock prices in the short run (e.g. Bernanke and Kuttner, 2005). They have conjectured that the nature of the monetary policy regime can affect the performance of asset markets over longer horizons.

The conduct of monetary policy in Malawi since independence can be outlined in three broadly distinct monetary policy regimes *viz.*, period of financial repression (1964-86), period of financial reforms (1987-1994) and period of financial liberalization (post-1994) (Ngalawa, 2011).

The monetary policy regime has evolved from restrictive direct monetary policy administration procedures such as; foreign exchange rationing, administration of interest rates, credit ceilings and preferential credit to certain prioritised sectors by the government, in particular, agriculture. Due to macroeconomic challenges that faced the country from the late 1970s and persisted through the 1980s, coupled with the civil war in neighbouring Mozambique, poor rainfall that culminated into a drought; the country underwent several reforms starting from 1987, with support from the International Monetary Fund and World Bank, (Chawani, 2005). Malawi undertook structural adjustment programs beginning in the second half of 1988. The SAPs comprised reforms aimed at reducing direct government intervention in the economy, and necessitated the development of new mechanisms for indirect market-orientated implementation of policies. These included the development and diversification of financial institutions, such as the establishment of Malawi Stock Exchange (MSE), elimination of direct controls, replacing them with more indirect techniques for influencing monetary aggregates. Credit ceilings and rationing were abandoned by 1989, and instead the liquidity reserve ratio (LRR) was introduced as a monetary policy instrument. Interest rates, which were initially prescribed by the Reserve Bank, were completely deregulated in 1990. The liquidity reserve requirement, the discount window repos and Treasury bill auctioning were introduced in 1989 and in 1990 respectively. The exchange rate regime in Malawi was liberalised in February 1994, and exchange controls were abandoned except for the capital account, the monetary authorities also allowed the establishment of foreign exchange bureaus (Sato, 2001).

The liberalization of the financial sector, as indicated earlier on, meant that monetary policy had to shift from direct to indirect methods. This facilitated the conduct of monetary policy in line with macroeconomic objectives of maintaining sustainable growth, viable balance of payments position and stable prices. The central bank keeps a close eye on all indicators that would entail price developments including the CPI, growth in GDP, monetary growth and expansion of bank credit. In trying to attain its goal of price stability, the Reserve Bank of Malawi establishes an annual inflation rate target, announced by the Minister of Finance in his Budget Statement to Parliament, and uses control over monetary aggregates as an immediate variable, (Sato, 2001).

The monetary policy regime in Malawi according to the pronouncement of the monetary authorities is that of monetary targeting, whose operating target is the reserve money, which is defined as the sum of currency in circulation, vault cash and bank deposits with the central bank. On the sources side, reserve money is defined as net domestic assets (NDA) plus net foreign assets (NFA), (Reserve Bank of Malawi, 2010). In this framework, the foreign exchange market operates on the supply side of reserve money through the effect of foreign exchange transactions on NFA. The rationale for reserve money targeting by the central bank is to balance supply and demand conditions of the monetary aggregate in the money market so as to achieve price stability, (Reserve Bank of Malawi, 2005).

As an instrument target of monetary policy, reserve money is used to reflect open market operations (OMO) and foreign exchange transactions. In Malawi's OMO, the central bank undertakes weekly trading of RBM Bills and Malawi Government treasury bills (TBs) in a competitive bidding system. Reserve Bank bills are short-term financial instruments issued by the central bank for monetary policy

purposes while the treasury bills are short-term financial instruments issued by the Government through RBM to borrow funds from the general public for the financing of current fiscal deficits and maturing government debt.

In order to achieve the price stability objective, the Reserve Bank exerts stricter controls over reserve money, employing for this purpose quarterly growth targets (usually agreed with the IMF under the supported programmes). While more emphasis was initially put on growth in the M2 aggregate, recent developments have indicated that M2 can better be influenced by monitoring growth in reserve money aggregate because the central bank has better control of its statement of financial position through reserve money (NFA and NDA) than the M2 money stock. In order to influence growth in the money stock, the central bank increases or decreases the amount of reserve money by managing both the domestic and foreign sources of reserve money (credit from the central bank, and acquisition of foreign exchange by the Bank that has impact on local money creation). Operationally, the Reserve Bank seeks to influence the M2 money aggregate and domestic interest rates to attain its objectives. The main instruments available to the Reserve Bank include statutory liquidity reserve requirement (LRR), open market operations (OMO), and the Bank rate, (Reserve Bank of Malawi, 2005).

However despite efforts to restore macroeconomic stability as a necessary prerequisite for economic growth as evidenced by numerous economic reforms that were undertaken both on monetary policy and fiscal policy frontier, the Malawian economy during the first ten years (10 years) of the Malawi stock exchange (MSE) establishment, showed increasing signs of fragility as evidenced by high fiscal deficits as percentages of the gross domestic product, high growth rates of money supply, high bank rates, higher lending and high inflationary environment. The fiscal deficit

including grants rose to 12.8 per cent of GDP in the 2002/03 fiscal year. The fiscal deficits for the three years 2001/02 to 2003/04, which accounted for 27.3 percent of GDP, were largely financed by short-term borrowing from the domestic banking system mainly using treasury bills. The commercial lending rate went as far as 76% and this was among the highest in the world. The bank rate reached as high as 46 per cent, money supply increased by 25.2 per cent in 2002. In the external sector, while the current account deficit excluding official transfers remained stable at 10.4 per cent of GDP, gross official reserves declined to the equivalent of 3.7 months of imports of goods and nonfactor services, reflecting the impact of suspension of balance of payments support by donors. Export growth, on the other hand, has been very erratic due to over dependency on primary products and this has contributed to the scarcity of foreign exchange.

A side effect of the economic challenges alluded to above was the high inflation rate which prevailed over the same period. A second inflationary factor, linked to the first, was the growth in money supply. The Reserve Bank of Malawi is allowed to provide short-term financial support to the government of up to 20 per cent of the government's expected revenue for the fiscal year. Money supply increased by 29.3 and 29.8 per cent in 2003 and in 2004 respectively. Such high growth rates in money supply generated high inflation rates. A third contributing factor to the high inflation rate was the shortage of food on the domestic market, leading to price increases that were accommodated by monetary expansion. With these developments a large number of banks and other investors in Malawi invested in government securities, primarily treasury bills (money markets) instead of investing in the capital markets.

Monetary policy change at any point in time is crucial investment information in the information set of investors in stock markets. Changes in monetary policy can affect the stock markets either adversely or favourably, depending on the direction of the policy change. The change in policy may be contractionary, such as a reduction in the money supply and a consequent rising of interest rates, or expansionary, such as an increase in the money supply and a consequent decrease in interest rates. These changes may be unanticipated or anticipated. Theories such as the present value of future cash flows about stock price valuation suggest that contractionary monetary policy will lower stock prices and vice versa, and that unanticipated policy changes affect the stock market more than anticipated ones due to the market's "forward looking" nature. Again the efficient market hypothesis theories explain why anticipated and unanticipated monetary policy changes affect stock markets differently. These monetary policy changes have both macro and micro effects on firms and the overall economy.

The purpose of this study is to marshal evidence on the association between monetary policy conduct and its effect on stock market prices in Malawi.

1.2 Statement of Problem

It is of great interest, then, to understand more precisely how monetary policy and the stock market are related. Understanding how a particular monetary policy regime affects stock market performance is of paramount importance being it a monetary targeting regime like Malawi's, an interest targeting regime, exchange rate targeting regime or hybrid monetary policy regimes.

It should be noted that since 2004, monetary authorities have been pursuing expansionary monetary policy which led to a reduction in interest rates until recently in 2012, that they have increased interest rates from 13% to 16% after a devaluation

of the kwacha in May 2012, a move that would have naturally resulted in investors seeking alternative investment avenues, such as the stock market, as real returns on the money market were negative and thus unattractive. But did we necessarily see an increase in investment uptake on local bourse? This is what this study pursues to answer, what have been the effects of monetary policy conduct in Malawi on the stock returns? Has monetary policy been supportive of the stock market development or been counter-cyclical? Or to put it in the context of the research objectives is there a short-run or long run relationship between reserve money, money supply, interest rates, exchange rates, and inflation and stock prices/returns in Malawi?

However, not so many studies of the effects of monetary policy on stock prices have been conducted in Malawi, of the few that have been done some have only concentrated on the effects of macroeconomic variables on stock market and effect of monetary policy on prices in general and have been inconclusive such as Govati (2009), and Mangani (2011).

This study focuses on the effects of monetary policy on stock prices in Malawi. This specific focus differentiates the study from earlier ones and explores the long-run relationship between the money aggregate (reserve money and money supply), bank rates, Treasury bill rates, exchange rates and stock market in the environment of Autoregressive Distributed Lag (ARDL) modeling. This modeling framework has not been used in studying the effects of monetary policy on stock market performance in Malawi. The ARDL has the advantage of examining both the short-run and long-run effects in the same framework.

1.3 Research Objectives

The broad objective of the study is to identify and establish the relationship between monetary policy conduct and stock market performance in Malawi. This is achieved by looking at the following specific objective:

1. Determine the influence of monetary policy (reserve money, money supply, bank rate, exchange rate, and treasury bill yields) on stock prices/returns in the long run;

1.4 Hypotheses

For the purpose of this study, it is paramount that to formulate some hypotheses and postulations which would generally give direction to the study and arrive at valid, reliable and testable conclusions. The following null hypotheses are tested:

1. There is no significant long run relationship between changes in reserve money, money supply and stock returns;
2. There is no significant long run relationship between changes in bank rate and stock returns;
3. There is no significant long run relationship between changes in exchange rate and stock returns;
4. There is no significant long run relationship between changes in treasury bill rates and stock returns;

1.5 Significance of Study

This study will contribute to the literature on understanding the effects of monetary policy conduct on the broader economy in Malawi and in particular on the stock market performance. Well-functioning stock markets can be used as a channel of foreign portfolio investments which may propagate economic growth and are also

indicators of the financial health of any market-orientated economy. When an economy is hit by a shock, asset prices are the first to react and stock indices immediately reflect the status of economy, in recession they record low and in recovery and boom the indices finish high. The impact of an economic shock is immediately felt in the money markets or capital markets before later transmitted to the real sector. It is imperative that we understand the interaction of monetary policy and equity prices. Monetary policy should endeavor to maintain growth and/or stability of returns on investment in the stock market. There is a clear indication that the pain of an economic recession is deeply felt if there is a severe downturn or persistent fall in stock prices, which culminates into, lower earnings per share. A stock market crash reduces aggregate demand, putting downward pressure on output and employment. The standard response during recessions has been for the Central Banks to lower interest rates by increasing money supply. However, for monetary policy to permeate into the financial market and affect stock prices it must pass through one or more of the known channels of transmission.

1.6 Organization of Study

The rest of the study is organized as follows: chapter two looks at the evolution of monetary policy conduct in Malawi and a brief history of the Malawi stock market. Chapter three discusses the theoretical basis of the study and reviews the available empirical evidence on the subject. Chapter four describes the methodology employed in this study. Estimation results of the model are presented and discussed in the chapter five and finally chapter six provides concluding remarks.

CHAPTER TWO

Monetary policy and stock market development in Malawi

2.0 Introduction

This section discusses in brief the development of monetary policy in Malawi since independence in 1964. It also provides in a concise manner a discussion of the development of the Malawi stock market. The aim is to provide the context in which this study is carried out.

2.1 Legal framework

The Reserve Bank of Malawi (RBM) was established by an Act of Parliament passed in July 1964 and became operational in 1965. The RBM Act stipulates that monetary policy in Malawi, should aim at promoting economic growth, employment, stability in prices, and maintenance of a sustainable balance of payments position. The RBM Act was subsequently repealed in 1989 as a result of the reforms that started in the1980s. The reforms saw an extension in the mandate of RBM from only supervising commercial banks to inclusion of non-bank financial sectors, which were previously being supervised by the MoF. In strengthening the role of RBM in financial regulations, the function of bank supervision, which was in the hands of the MoF was moved to the Reserve Bank in 1989. Prior to that, the central bank was only responsible for inspection of commercial banks and emphasis was put on whether

exchange controls were being adhered to without consideration to prudential bank supervision. With the creation of bank supervision department, coverage was extended to include other non-bank financial institutions that take funds from the public and issue loans upon the same.

2.2 Stock market in Malawi

The Malawi Stock Exchange was established in 1994 but started equity trading in November 1996 when it first listed National insurance company limited (NICO). Prior to the listing of the first company, the major activities that were undertaken were the provision of a facility for secondary market trading in Government of Malawi bonds namely, treasury bills and local registered stocks. The MSE operates under the Capital market development Act 1990 and the Companies Act, 1984. The regulatory legislation of the stock exchange will be the Securities Act (2010) and the Financial services Act (2010).

Table 1, below contains the list of Companies listed on Malawi stock exchange.

Table 1: List of listed companies on Malawi stock exchange

	Name of the Listed Company	**Date of Listing**	**Industry Type**
1	Nico Holdings Limited	11th November 1996	Conglomerate
2	Blantyre Hotels Limited	25th March 1997	Hotels
3	Illovo Sugar Malawi Limited	10th November 1997	Agro -Processing
4	Standard Bank Limited	19th June 1998	Banking
5	Press Corporation Limited	9th September 1998	Conglomerate
6	Old Mutual plc	29th September 2009	Conglomerate
7	National Bank of Malawi	21st August 2000	Banking
8	Sunbird Tourism Limited	8th December 2002	Hotels
9	National Investment Trust Limited	21st March 2005	Investments
10	First Merchant Bank	19th June 2006	Banking
11	NBS Bank	27th June 2006	Banking
12	Malawi Property Investment Limited	10th November 2007	Property
13	Real Insurance Limited	29th September 2008	Insurance
14	Telekom Networks Malawi	3rd November 2008	Telecommunications

2.3 Monetary policy and stock market interrelationship

2.3.1 Money supply and stock prices

There is no clear-cut explanation of the effects of money supply on stock prices. There is a positive causal relationship between money supply and stock prices which is hypothesized in financial theory literature by (Homa and Jaffe, 1971, Hamburger and Kochin, 1972, Pearce and Roley, 1984, Husain and Mahmood, 1999). This theory emanates from the assumed inverse relationship between money supply and interest rates, and a negative causal relationship between interest rates and stock prices (Alatiqi and Fazel, 2008:p1). However, some studies dispute the positive causal relationship arguing for non-existence of a stable and structural relationship (Pesando, 1974, Kraft and Kraft, 1976, Gupta: 1974). The foundation of the inverse causal relation from money supply to interest rates is the short term liquidity effect (Alatiqi and Fazel, 2008:p1). The liquidity effect postulates that an increase in the supply of money creates an excess supply of money at existing income, interest rate, and price levels.

Money supply growth is expected to lead to a decrease in interest rates, which will lead to a decrease in the discounting factor on future cash flows. This is expected to lead to an increased demand for shares as the returns on shares become attractive. However, the increase in money supply will at the same time lead to an increase in money demand therefore the shift in the money demand function to the right would result in the simultaneous shift of the money supply function to the right as well. This may result in new equilibrium interest rate above the old equilibrium interest rate. Therefore the assumption that is made is that the effects of factors that lead to a decline in interest rates outweigh those that may result in ultimately a higher equilibrium interest rate (Alatiqi and Fazel, 2008: p1). Hashemzadeh and Taylor

(1988) have found bi-directional causality present in regression models between money supply and stock returns using stock indexes to estimate market returns. Financial theory postulates that an increase in money supply increases the demand for stocks, which rallies the price of shares.

Figure 1 below analyses the Malawi all share index performance in relation to changes in money supply over the same period.

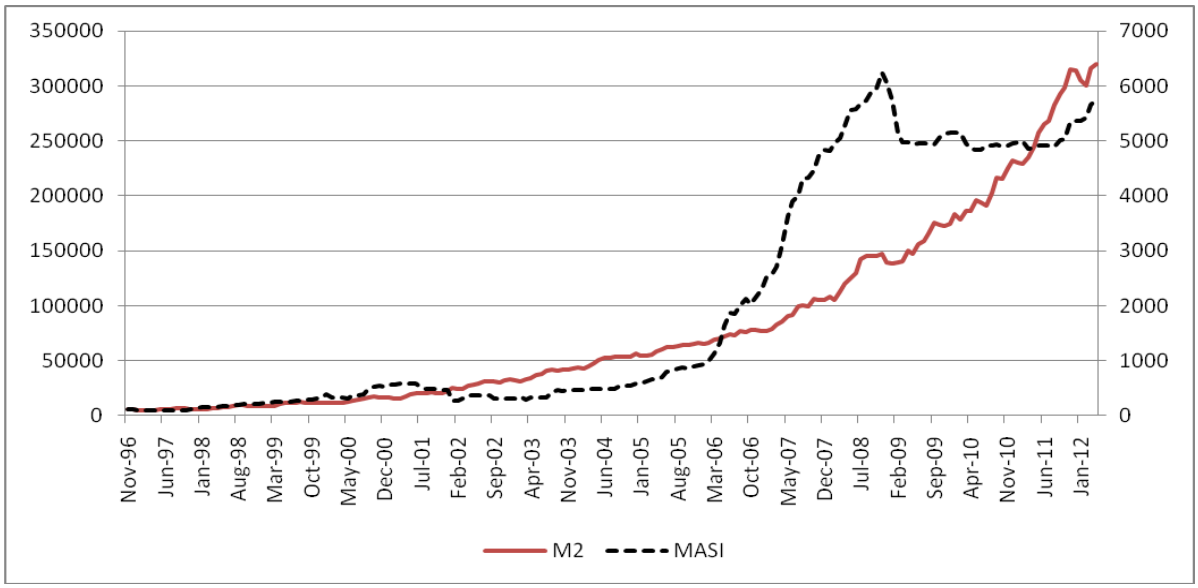


Figure 1: Malawi all share index (MASI) vs Money supply(M2)

In Figure 1, the vertical axis represents levels of money supply whilst the right hand side depicts the Malawi all stock index (MASI). The stance of monetary policy in Malawi is that of monetary targeting, which places emphasis on monitoring the growth in reserve money and having money supply (M2) as an operating target. Monetary policy in Malawi endeavours to mop up excess liquidity in the market. On the same note it can be seen from Figure 1 that money supply has successively been increasing and which has had an impact on the stock market through the interest rate channel. Expansionary monetary policy leads to decrease in interest rates, and since interest rates have an inverse relationship with prices, invoking the dynamic dividend

valuation method, the lower the interest rate the higher the share prices hence the upward surge in the MASI when read along the developments in money supply.

2.3.2 Exchange rate and stock prices

There are two main theories (approaches) that explain the relationship between share price and exchange rate. The goods market approach (also called either "flow-oriented" models or traditional approach) assumes that the exchange rate is determined largely by a country's current account or trade balance performance. This approach posits that changes in exchange rates affect international competitiveness and the trade balance, thereby influencing real economic variables such as real income and output (Dornbusch – Fisher, 1980). Stock prices, usually defined as the present value of the future cash flow of companies, should adjust to economic perspectives. Therefore this approach indicates that currency appreciation is expected to stimulate the share market of an import-dominant country and depress that of an export dominant economy and vice versa for the impact of currency depreciation (Obben et al 2007). In other words, a positive correlation between exchange rate appreciation and stock price is expected in an import-dominant economy while a negative correlation is expected for an export-dominant economy. Since the definition of an export or import-dominant country has been ambiguous for quite some time, the net effect of the aggregation (stock index) cannot be determined and therefore the sign is arbitrary. Even firms that are not internationally integrated (low ratio of exports and imports to total sales and a low proportion of foreign currency-denominated assets and liabilities) may be indirectly affected. Consequently, the empirical results based on these models are mixed and contrasting of each other over the past three decades.

Alternatively, the portfolio balance theory (also called "stock-oriented" models) argues that changes in stock prices may influence movements in exchange

rates via portfolio adjustments (inflows/outflows of foreign capital). If there were a persistent upward trend in stock prices, inflow of foreign capital would rise. However, a decrease in stock prices would induce a reduction in domestic investor wealth, leading to a fall in demand for money and lower interest rates, causing capital outflows that would result in currency depreciation. Therefore, under the portfolio balance approach, stock prices would influence exchange rates with a negative correlation. Overall, there is no theoretical consensus on either the existence of a relationship between stock price and exchange rate or its direction.

Figure 2 below analyses the Malawi all share index performance in relation to changes in exchange rate over the same period.

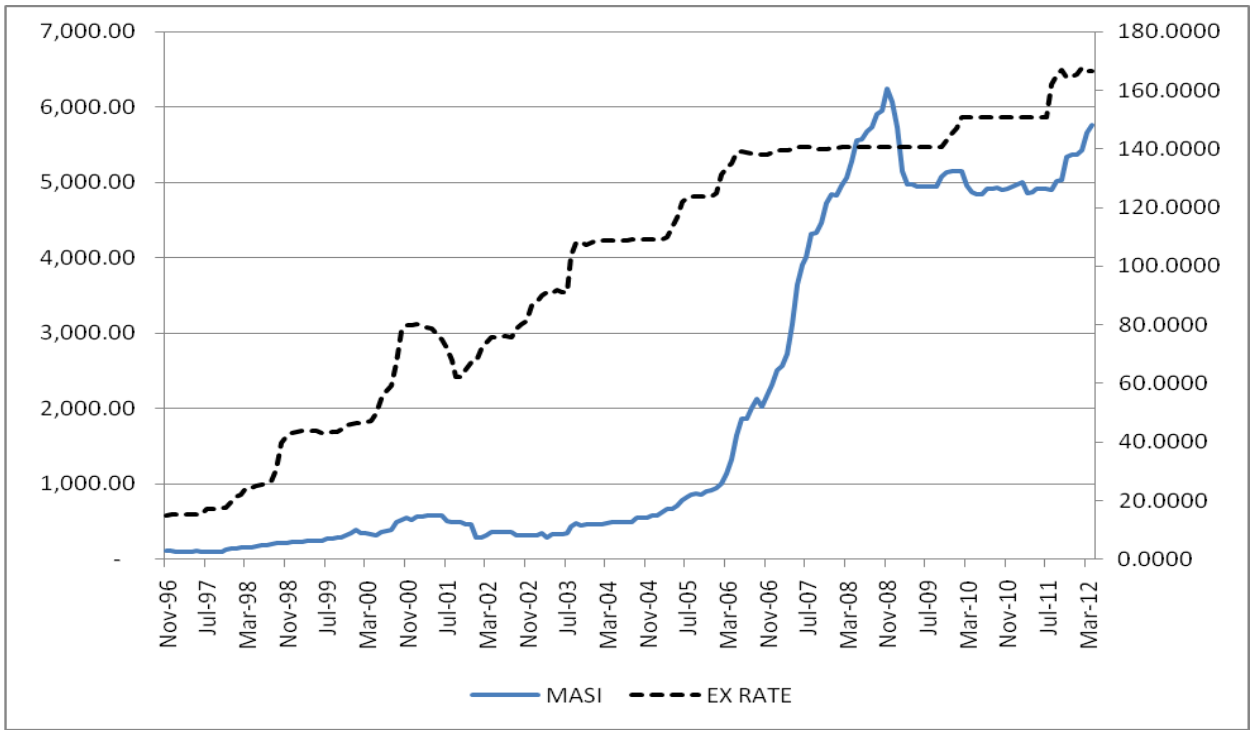


Figure 2: Malawi all share index (MASI) vs Exchange rate

Figure 2 shows the correlates of Malawi all share index and the US dollar exchange rate. The horizontal axis represents the nominal US$/MK exchange rate. In Malawi the exchange rate policy is vital, and the monetary authorities whilst

endeavoring to stabilize prices also actively monitors the exchange rate as most of the inflation in the country are imported inflation. On 7th February 1994 the monetary authorities completely liberalized the foreign exchange market and floated the Malawi kwacha, because of fundamental economic disequilibrium emanating from the 1992/93 drought, suspension of donor aid on grounds of poor governance and also by the mere fact of being a member of COMESA formerly the Preferential Trade Area which had within its membership promoted the adoption of market determined exchange rate regimes. Due to the negative developments in the external sector mainly due to the poor performance in Malawi major trading partners in the SADC, such as the nose diving of the South African Rand against the US dollar in 1996 resulted in the real exchange rate being excessively overvalued and this plummeted further due to fiscal indiscipline that resulted in the monetization of the fiscal deficits. These developments resulted in the devaluation of the kwacha in July 1997; the devaluation improved the competitiveness of the country export sector temporarily. In 1998, the Malawi Kwacha was further devalued by 28%, 23%, 21% and 24% respectively.

In 2003 due to economic disequilibrium arising from low foreign exchange reserves as a result of suspension of donor aid and other macroeconomic challenges inherent in the structure of the Malawian economy, the monetary authorities reverted to a managed exchange rate policy until May 2012, when the authorities devaluated the kwacha by about 49.9% due to acute foreign exchange shortages that almost grounded the entire economy and floated the kwacha again.

Musila and Newark (2003) find that devaluation helps to improve export performance and curtails the growth of imports in the long run, which leads to improvement in the trade balance position and further conclude that nominal

devaluation can indeed be a quite powerful tool in minimizing the imbalances in Malawi's international trade.

Export orientated companies listed on the Malawi stock exchange such as Illovo and Press Corporation are hugely affected by the monetary authority exchange rate policies. For instance in January 2002 as seen from Figure 2 on the left hand axis the MASI dropped by 82% a historical record low due to a sharp decline in the share price of Old mutual a company that is in the foreign share index, this was due to acute foreign exchange shortages and other macroeconomic challenges that the country was facing. The investors were playing a wait and see strategy. Due to acute foreign exchange shortages export oriented companies cut production as most of their critical raw materials are imported. This in turn affects their profitability and earnings hence their share prices. Currency devaluation improves operating margins of export-orientated firms hence their share prices. Successive currency devaluations in Malawi have seen the MASI concurrently increasing. There is a positive causality between the currency devaluations and MASI movement.

The Malawi stock exchange has three indices, the composite Malawi all share index (MASI), the domestic share index (DSI) and the foreign share index (FSI). The MASI is a composite index that includes both the DSA and the FSI, whilst the DSI includes all companies listed on the bourse except Old Mutual. FSI is made of only Old Mutual which is also listed on JSE.

2.3.3 Interest rates and stock prices

A portion of data, which arrives frequently to the equity markets, are interest rates and stock price fluctuations. Theoretically the interest rates and the stock prices have an inverse relationship. This is because a rise in the interest rate reduces the

present value of future dividends income which should depress stock prices (Hamrita et al., 2009).Conversely, low interest rates result in a lower opportunity cost of borrowing. Lower interest rates stimulate investments and economic activities, which would cause prices to rise. The direction of causality seems to be mostly running from interest rates to stock price but not the other way. Apergis and Eleftheriou (2001) argue that the link between stock prices and nominal interest rates mirrors ability of an investor to adjust the structure of her portfolio between stocks and bonds. The implication is therefore that an interest rate increase (decrease) prompts our representative investor to change the composition of her portfolio in favour of (against) bonds. Consequently, stock prices are expected to decrease (increase), since a decline in interest rates leads to an increase in the present value of future dividends (Hashemzabdeh and Taylor, 1988). Malkiel (1982) and Modigliani and Cohn (1979) argue that the interest rates seem to the most important determinants of stock prices. There is no consensus in literature over the actual relationship that exists between stock prices and interest rates. Certain empirical attempts provide evidence in favour of a positive, rather than a negative relationship in other empirical studies (see Asprem, 1989, Shiller and Beltratti, 1992 and Barsky, 1989). This study therefore endeavours to link up and explain the nature that exists between stock prices and interest rates in Malawi.

Figure 3 below analyses the Malawi All Share Index performance in relation to changes in bank rate over the same period.

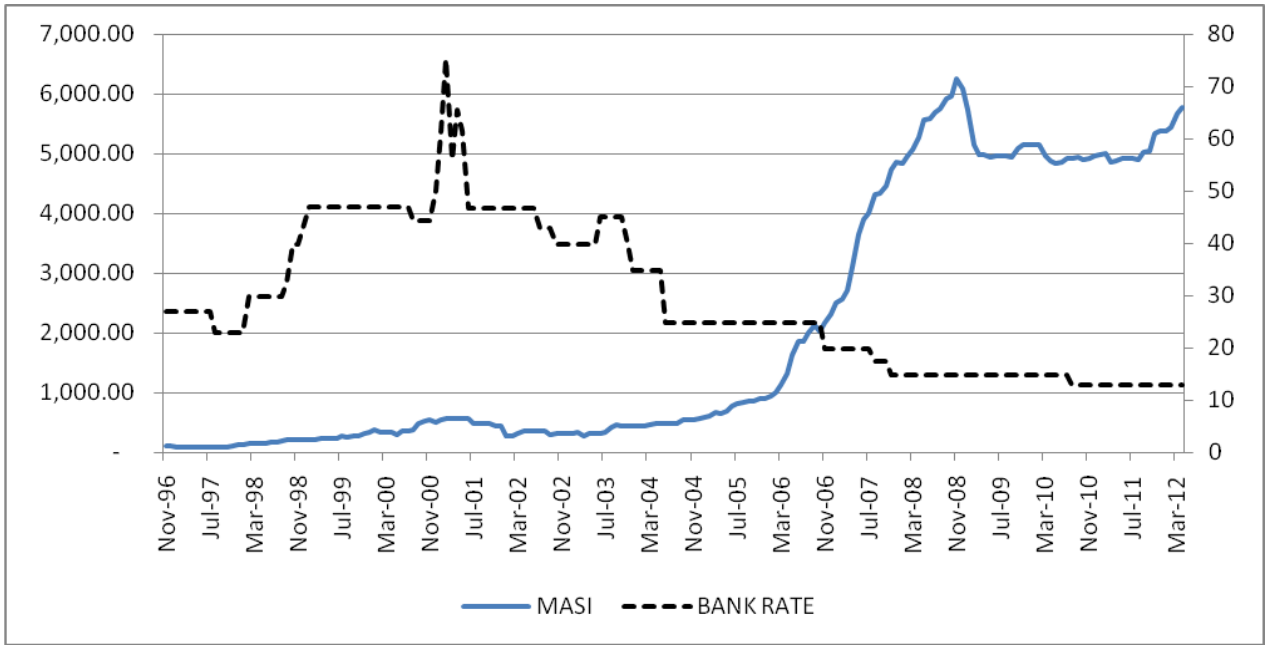


Figure 3: Malawi all share index (MASI) vs Bank rate

Figure 4 below analyses the Malawi all share index performance in relation to changes in Treasury bill yields over the same period.

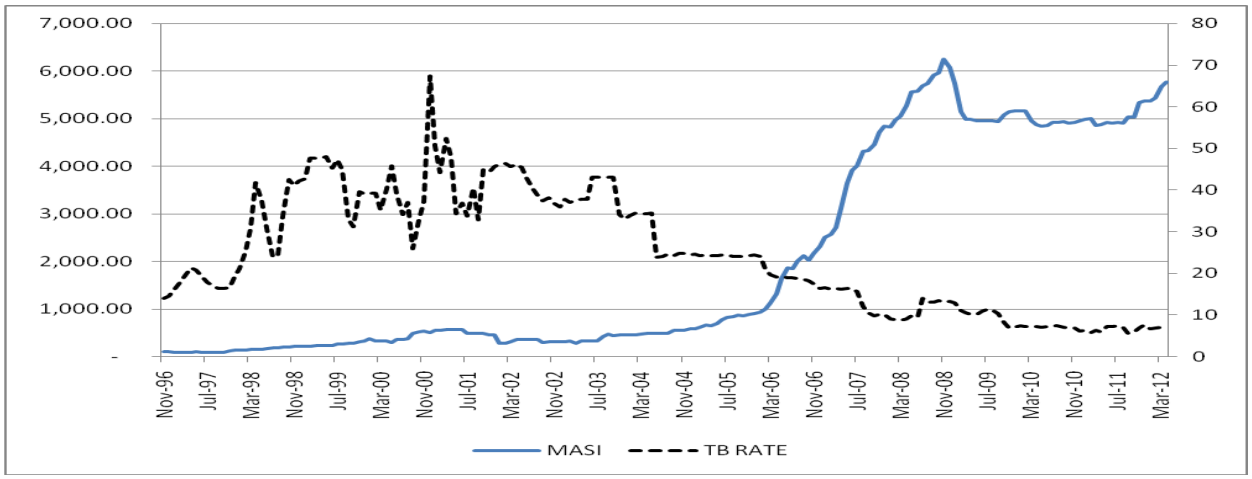


Figure 4: Malawi all share index (MASI) vs Treasury bills yields

Figure 3 plots the bank rate on the right hand axis and the MASI on the left hand axis. From the graphs it can be clearly seen that there seems to be an inverse relationship between the bank rate and stock prices. This is supported by theory. For example contractionary monetary policies will decrease money supply and increase interest rates, hence the discounting factor in the present value formula will be large,

and this will result in depressing stock prices or returns. From the Figure 3 it can be seen that bank rate reached as high as 75% and the stock index was correspondingly on the lower side, however it can be noted that after political regime changed in 2004, the monetary authorities changed the monetary policy stance, it was expansionary monetary policy and started to reduce interest rates, which reached lower levels of 16%. From Figure 3 it can be seen that during the periods of lower interest rates the MASI had an upsurge growth pattern. Again this is well explained in economic theory; lower interest rates increases the present value of stock prices or returns.

This same explanations above also applies to Figure 4 that plots treasury bill yields and Malawi all share index, the yields are on the right hand side and the MASI on the left hand side, it can be seen from the graphs that the treasury bill yields reached as high as 67% in December 2000, this had a negative impact on the stock market. Treasury bills are seen as alternative investment avenue (money market) from the stock market (capital markets). The higher the yields the more attractive the money market is from the capital market as it offers high short term returns.

Figure 5 below analyses changes in bank rate in relation to changes in Treasury bill rates over the same period.

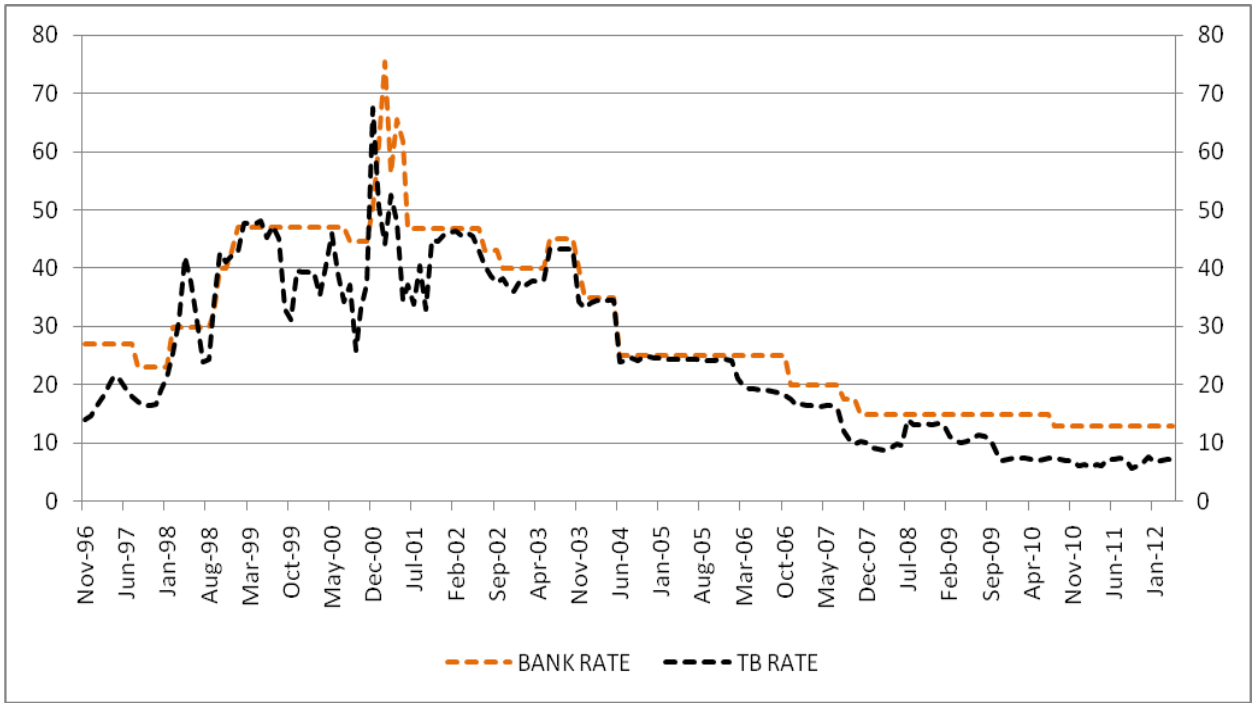


Figure 5: Bank rate vs Treasury bills yields

Figure 5 plots the bank rate movement and Treasury bill yield movements. The bank rate is set administratively but for a short period the bank rate was set at a markup over the average 273-day Treasury bill rate of the previous month. As a result changes in Treasury bill rates immediately reflected on the bank rate, there was a pass though effect. For example as said earlier in February 2001 the bank rate rose up to 75%, this was a result of an upward movement in Treasury bill rates in previous months. In June 2001, the bank rate was delinked from the Treasury bill rate and was being set administratively by the monetary policy committee. The effects of this policy was that the treasury bill rates declined from their skyrocketing levels of 67% to as low as an average of 7%, this development has had a positive development on the capital markets. When the rate of return on money markets is lower investors alternatively seek to invest in long term capital markets.

CHAPTER THREE

Literature review

3.0 Introduction

There are many theories that provide a link between monetary policy and stock market. The most compelling one and that has been widely used is the present value formula. This model provides a non-linear relationship between share prices, dividends, rate of return and dividend growth rates. When this relationship is log-linearized and again on the assumption that discounts rates and rate of returns is time varying, it becomes what is popularly known as the dynamic dividend growth model (DDM). This is the main framework that is used to establish the effects of monetary policy on stock market prices in Malawi.

3.1 Theoretical framework

3.1.1 Dynamic dividend model

The model that is used in this study in Chapter 4 is based on the fundamental theorem of share prices or the present value formula for share prices valuation. Its derivation follows from equation (1). It is based on the theoretical framework described in Kansa (2005) and Campbell et al. (1997) (CLM). The exposition begins by linking share prices and returns. Stock return, R_{t+1}, is the sum of capital gain and

dividend, that is; $R_{t+1} = \frac{(P_{t+1} - P_t + D_{t+1})}{P_t}$, where P_t is stock price measured at the end of period *t* and D_{t+1} is dividend payment at time *t* +1.

Under the assumption that expected stock return is constant, current stock price is related to the stock price and dividend of the next period, as shown in equation (1):

$$P_t = E_t\left[\frac{(P_{t+1} + D_{t+1})}{(1+R)}\right] \tag{1}$$

When an efficient market is assumed and there is no arbitrage opportunity, then the constant expected stock return is $E_t(R_{t+1}) = R_t$. Taking the expectation of equation (1) and solving it forward by repeatedly substituting out future stock prices yields:

$$P_t = E_t\left[\sum_{i=0}^{\infty}\left(\frac{1}{(1+R)}\right)^i D_{t+i}\right] \tag{2}$$

Equation (2) can when presented in a standard framework for analysing the valuation of capital stock yield the *present-value model* which is expressed in equation (3). In its basic form, a stock price, P_t, is determined by the present value of its expected future dividends, D_{t+i}, and of the expected terminal price for the holding period *K*, P_{t+k}:

$$P_t = E_t\left[\sum_{i=1}^{k}\left(\frac{1}{(1+R)}\right)^i D_{t+i}\right] + E_t\left[\left(\frac{1}{(1+R)}\right)^k P_{t+k}\right] \tag{3}$$

Equation (3) is the fundamental theorem of share prices, where R is the expected return (or discount rate), assumed to be constant. It is assumed that K gets large imposing the standard transversality condition that as *K* gets large the last term

on the right hand side vanishes, so that the present value of the terminal price shrinks to zero, shown as follows:

$$\lim_{k\to\infty} E_t\left[\left(\frac{1}{(1+R)}\right)^k P_{t+k}\right] = 0 \tag{4}$$

And equation (3) simplifies to

$$P_t = E_t\left[\sum_{i=1}^{k}\left(\frac{1}{(1+R)}\right)^i D_{t+i}\right] \tag{5}$$

Under conditions that dividends grow at constant rate and the discount rate is time invariant, equation (3) simplifies to

$$P_t = \frac{(1+g)D_t}{(R-g)} \tag{6}$$

Taking log transformation of equation (6) gives

$$\ln P_t = \ln(1+g) + \ln D_t + \ln(R-g) \tag{7}$$

Equation (6) can be expressed in smaller letters denoting natural logarithm for prices and dividends:

$$p_t = \log(1+g) + d_t + \log(R-g) \tag{8}$$

The relationship in equation (8) is traditionally called the Gordon Growth Model, very compactly illustrates the relationship between stock prices, current level of dividends, expected growth of dividends and the discount rate. However because of the assumption of a constant R and g, the Gordon Growth Model does not render itself to dynamic analyses that allows for time-varying discount rates and dividend growth rates.

The dynamic log linear equation of equation (3) is expressed as

$$r_{t+1} \equiv \log(P_{t+1} + D_{t+1}) - \log(P_t) = p_{t+1} - p_t + \log(1+\exp(d_{t+1} - p_{t+1})) \tag{9}$$

where the small letters denote logs of the variables i.e. $r_{t+1} = \log(R_{t+1})$. Using the first order Taylor expansion around the mean equation (9) becomes

$$r_{t+1} \approx k + \rho(p_{t+1}) + (1+\rho)d_{t+1} - p_t \tag{10}$$

Where, ρ and k are parameters of linearization. Equation (10) for log stock prices becomes analogous to equation (1) for the level of stock price under the assumption there are constant expected returns. Solving forward and imposing the terminal condition that $\lim_{j\to\infty} \rho^j p_{t+j} = 0$, in order to rule out rational bubbles, and then taking expectations into consideration, we have:

$$d_t - p_t = -\frac{k}{1-\rho} + E\left[\sum_{j=0}^{\infty} \rho^j \left[r_{t+1+j} - \Delta d_{t+1+j}\right]\right] \tag{11}$$

Expressed in terms of prices the equation (11) becomes:

$$p_t = \frac{k}{1-\rho} + E_t\left[\sum_{j=0}^{\infty} \rho^j \left[(1-\rho)\Delta d_{t+1+j} - r_{t+1+j}\right]\right]$$

This is the dynamic Gordon growth model, suggested by Campbell and Shiller (1988a, 1988b). It implies that high stock prices must be associated with higher expected future dividends, lower expected future returns, or some combination of the two.

Where E_t denotes investors' expectations taken at time *t*, Δd_{t+j} denotes dividend growth in *t* + *j*, calculated as the change in the log of real dividends per share, and r_{t+j} denotes log stock return during period *t* + *j*. The expected return equals the real risk-free interest rate plus a risk premium. ρ and k are parameters of linearization defined by $\rho = 1/(1 + \exp(d - p)$ and $k = -\log(\rho) - (1 - \rho)\log(1/\rho - 1)$. Equation (11) states that expected stock returns and dividend growth can be predicted by the log dividend-price ratio. Following Nelson (1999) and Sharpe

(2002), we decompose the log dividends per share into the sum of the log earnings per share and the pay-out ratio. Then, the Campbell-Shiller formula can be rewritten as:

$$e_t - p_t = -\frac{k}{1-\rho} + E_t\left[\sum_{j=0}^{\infty}\rho^j r_{t+j} - \sum_{j=0}^{\infty}\rho^j \Delta e_{t+j} - (1-\rho)\sum_{j=0}^{\infty}\rho^j\left(d_{t+j} - e_{t+j}\right)\right] \qquad (12)$$

Or

$$p_t = \frac{k}{1-\rho} - E_t\left[\sum_{j=0}^{\infty}\rho^j r_{t+j} - \sum_{j=0}^{\infty}\rho^j \Delta e_{t+j} - (1-\rho)\sum_{j=0}^{\infty}\rho^j\left(d_{t+j} - e_{t+j}\right)\right] + e_t$$

Where $e_t - p_t$ denotes the log earning-price ratio, Δe_{t+j} denotes real earnings growth in $t + j$, calculated as the change in the log of real earnings per share, and $d_{t+j} - e_{t+j}$ denotes the log of the pay-out ratio (dividends/earnings) in $t + j$. This reformulation enables us to focus on earnings/prices as in equation (12), which is more closely related to economic fundamentals than dividends since they can be affected by shifts in corporate financial policy. Campbell (1988b) argues that dividends create several difficulties for empirical work. And this forms the basis of the linear relationship that we will explore in equation (13) onwards.

From equation (12) it can be seen that monetary policy can affect stock returns in two distinct ways. First, policy can alter expected future cash flows or earnings of the firm and thereby alter the return on the firm's stock. This channel generally relies on the effects of monetary policy on the aggregate economy. A monetary easing, a decrease in the RBM bank rate, will increase the overall level of economic activity. This will in turn raise the earnings of firms in the economy and cause stock prices to rise. The effects of a monetary tightening will reduce overall expected firm profitability and stock returns.

The second, and probably more direct, way that policy affects stock returns is by altering the discount rate used by market participants. It is believed that discount factors used by equity market participants are tied in a general way to market rates of interest. Therefore, RBM's ability to alter discount rates is linked to its ability to alter other market rates of interest, like Treasury bill rates. A tighter monetary policy raises the bank rate, which increases the discount rate, in turn causing stock prices to decline. Both of these channels are generally reinforcing since a tighter monetary policy usually implies both higher discount rates and lower future cash flows.

3.2 Empirical literature review

The available empirical work on the effects of monetary policy on stock market performance is numerous but those that have focused more on the sub-Saharan Africa are a few. On this basis, this study only review empirical studies that benefit it through their emphasis on the effects of monetary policy on stock prices, even much of the literature that has been reviewed most of it used the Vector Autoregressions (VARs) as econometric methodology, however this study will use ARDL methodology. However, no study on this subject in Malawi has ever used the bounds testing approach.

3.2.1 Review of empirical studies for developed economies.

There is an extensive body of literature on stock market and monetary policy as a result of extensive research in the decades. Contributions include Brunner (1961), and Friedman and Schwartz (1963), they viewed money as an asset among other assets in an investor’s portfolio. Investors will substitute between money and other assets in an effort to re-establish their desired money holdings if there are money supply shocks. The response of investors may not be immediate, it may take a while

which makes it possible for money to predict stock returns. The hypotheses that past money supply data can be used to predict future stock returns was supported by empirical studies (Keran 1971 and Hamburger and Kochin, 1972). These findings were disputed by (Cooper, 1974; Rozeff, 1974) which showed that there is no predictive content in past money supply changes but stock returns may actually cause money supply changes.

The expectation is that changes in interest rates will influence or at best cause changes in money supply in the economy. Rogalski and Vinso (1977) set out to find out the relationship between money supply and stock returns as well as establish the direction of causality in a study to consolidate the work of Rozeff (1974). At the time literature was diluted as far as the relationship between stock returns and monetary policy, some researchers had found a strong linkage as noted above whilst Cooper (1974) and Rozeff (1974) had queried these findings.

Rogalski and Vinso (1977:p1018) assert that the later statement contradicts with the efficient market hypotheses (EMH). The results of the study by (Rogalski and Vinso,1977:p1027) are consistent with the proposition that information concerning the actual growth of the money supply is incorporated into stock returns as purported by various monetary portfolio theorists. It also supports the notion that the stock market is efficient with respect to monetary information as the efficient market theory would suggest. Based on their results therefore they propose a bi-directional theory of causality between money supply and stock returns with causality mainly appearing to run from stock prices to money supply and back again. The implication of their findings is that money supply changes will directly influence returns on shares. Rogalski and Vinso (1977) further assert that although monetary policy should

not be guided by stock markets, authorities should observe carefully developments in this market as it influences economic activity.

Studies of 1980's feature contributions from Pearce and Roley (1983), Pearce and Roley (1984) among others. Pearce and Roley (1983) investigate the short run reaction of stock prices to weekly money announcements. They concluded that stock prices respond only to the unexpected change in the money stock as predicted by the efficient markets hypotheses. They also find that an unexpected change in money depresses stock prices. Their findings supported the view that stock market participants take into account the revisions in the money stock as well as unexpected changes. Pearce and Roley (1984) examined the daily response of stock prices to announcements of the narrowly defined money stock, the CPI, the PPI, the unemployment rate, industrial production, and the Federal Reserve's discount rate. They concluded that new information related to monetary policy affected stock prices. These findings clearly point to an interdependence of stock market to monetary policy.

Fama and French (1989) study is modelled on business conditions. They state that the default spread is a business conditions variable, high when business is persistently poor and low in periods during which the economy is persistently strong. They further state that the dividend yield is correlated with the default spread and moves in a similar way with long-term business conditions. They also reported on the term spread of which for most of 1927-1987 the term spread is related to short term measured business cycles. The study concluded that these three variables affected stock and bond returns however they did not articulate what causes changes in business conditions. Monetary policy induces business conditions; expansionary monetary policy will proxy good business conditions whilst contractionary monetary

policy proxies poor business conditions. It is concluded that expected stock returns vary with business conditions the reason might be when business conditions are poor, income is low and expected returns on bonds and stocks must be high to induce substitution from consumption to investment (Fama and French, 1989:p26). They further assert that in good time's income is high and the market clears at lower levels of expected returns.

Interesting contributions to this body of knowledge in the 1990's, are by Jensen and Johnson (1995); (Conover et al 1999a, 1999b) and Thorbecke (1997). Jensen and Johnson use data for the US covering the period between 1962 and 1991 focusing on long-run monthly as well as quarterly performance and find that expected stock returns are significantly greater during expansive monetary periods than in restrictive periods.

Thorbecke (1997) utilizes innovations in the monthly federal funds rate and non-borrowed reserves to capture the effects of monetary shocks on industry level returns over the period 1967 to 1990. He utilises a VAR that includes industrial production, inflation, stock returns, log of commodity price, the log of non-borrowed reserves and the log of total reserves. It is concluded that monetary policy exerts large effects on ex-ant and ex-post stock returns. This finding is consistent with the theoretical framework of this current study. Monetary policy indeed at least in the short run has real and quantitatively important effects on real variables. Small firms are affected more than large firms by monetary shocks that affect the firm's access to credit (Thorbecke, 1997).

Rigobon and Sack (2003) estimate a VAR model using daily and weekly data on stock returns and federal funds interest rates relying on heteroskedasticity to identify the equations to measure the effect of monetary policy shocks on equity

returns, manipulating the conditional volatility in asset returns to identify the policy shocks. The authors use data in the period 1985M3-1999M12 which consists of federal funds rate, treasury bill rate, S§P 500 as well as macroeconomic shocks which include (core consumer price index, the National Association Of Purchasing power (NAPM), non-farm payrolls (NFPAY), the core producer price index (PPI) and retail sales (RETL). They find that the stock markets movements have a significant impact on short term interest rates. Short term interest rates move in the same direction as the variation in stock prices. According to their findings the estimations show that 5% increase in stock prices over a day causes the probability of a 25 basis point interest hike to increase by half. Anticipated policy actions are influenced more by a comparable sized movement that occurs over a week (Rigobon and Sack, 2004).

A similar study was conducted by Bernanke and Kuttner (2005) who seek to measure in some detail the stock market response to monetary policy actions. Bernanke and Kuttner (2005) state that market is unlikely to respond to anticipated policy action. This complicates the process of estimating the response of equity prices to monetary policy actions. It is essential to distinguish between expected and unexpected changes. They use two methods the event study approach to measure the level of surprise in the market and follow a method developed by Campbell (1991) and Campbell and Ammer (1993) which assesses how policy surprises affect expectations of future interest rates, dividends, and excess returns. The later method uses VAR to calculate revisions in expectations of these key variables (Bernanke and Kuttner, 2005). The study concluded that there is a strong and persistent response of the equity market to monetary policy actions. In their study they use federal funds futures data to measure policy expectations. They also found that the market response tend to be larger for policy changes regarded to be more permanent. The comparisons

that were done across industries revealed that reactions to monetary policy surprises tend to differ across industry portfolios.

Neri (2004) analysed relationship between monetary policy and stock market indices in the G-7 countries and Spain using Structural VAR. He concluded that contractionary monetary policy shocks, measured by exogenous increases in the short term interest rate have on average small, negative and transitory effects on stock market indices. The findings by (Neri, 2004) are contrary to the findings by (Bernanke and Kuttner, 2005) who found significant relationship.

3.2.2 Selected studies emerging markets and developing economies

There are limited published studies on this topic for emerging and developing countries. The ones selected and reviewed will be discussed below.

Mangani (2011) investigates the effects of monetary policy on JSE portfolios using a GARCH (1,1) framework. The study compares the results for the period 1990 - 2009 with those based on four sub-periods. The analysis showed that discount rate changes were important in describing mean returns and return volatilities. The significance of these effects varied during different states of the economy; according to the definition of the market portfolio; and depending on whether or not the asymmetric effects of monetary policy changes were modelled. The study concludes that the effects of positive and negative monetary policy changes were somewhat asymmetric on the JSE.

Hewson and Bonga- Bonga (2005); in South Africa they were looked at effects of monetary policy on stock returns. They sought to find out whether monetary policy indeed influences stock market as well as establish the extent to which monetary policy influences stock market changes over time. It was also of interest for them to find out if the ability of monetary policy to influence asset prices changes

across sectors. The study assesses the following sectors Financials, Industrials, and Resources and the findings were consistent with those from some developed countries, monetary policy clearly affects different sectors by varying degrees as well as over different time periods. They also find that there was an apparent change in the effects that monetary policy has on the stock market within their sample period. They attribute this to the use of the repo rate as policy instrument in the inflation targeting era that began on 23 February 2000 as well as the volatility in the exchange rate.

Okpara (2010) analysed the effects of monetary policy variables on stock market returns in Nigeria. The major finding of this study was that monetary policy was a significant determinant of long run stock market returns in Nigeria. Specifically the high treasury bills rate reduced stock market returns and thus showed evidence of monetary policy effort to slow down the economy. The study also finds that current and one period lag interest rates exerts a positive and significant influence on stock market returns.

Kuwornu (2011), analyses the effects of inflation, exchange rate, treasury bills rate and crude oil on stock market returns. He founds that treasury bills rate and exchange rate had both a negative significant influence on stock market returns in Ghana.

Tsuyoshi Oyama (1997) examines the general relationship between macroeconomic variables and stock prices using the revised dividend discount model, error correction model and multi factor returns generating model. The study finds that the sharp increase in stock prices during 1993-94 was due to capital account liberalisation and the later increase in stock prices was due to movements in monetary aggregates (M2) and market interest rates.

Far and wide on the African continent Naceur, Boughrara and Ghazouani (2009) did a study for seven Mena countries. The countries considered in this study are Jordan, Morocco, Oman, Saudi Arabia, Tunisia and Turkey. They acknowledge the fact that there is limited literature for developing and emerging market economies. They found that restrictive monetary policy tends to reduce stock prices. Stock prices shocks in Egypt and Jordan do not result in significant adjustment of inflation but Jordan monetary policy is effective in impacting stock prices. It was also found that for Egypt and Jordan real shocks have no significant impact on stock prices. The empirical analysis also shows that the monetary policy for Morocco and Tunisia could be effective in impacting stock prices but monetary authorities do not care about stock market dynamics. A tight monetary policy reduces stock prices so monetary policy is effective in influencing stock prices. The Turkish central bank considers the stock market prices as a leading indicator for inflation, the empirical investigation shows that subsequent to any hike in stock prices the Turkish central bank does not delay its reaction. Therefore Turkish authorities monitor closely stock market activity.

Related but not so similar studies for developing and emerging market economies where done in India and Malaysia, Thaker et al (2009) examine the short run and long run causal relationship between Kuala Lumpur Composite Index(KLCI) and selected macroeconomic variables. It is interesting to know the findings of this study especially the impact of money supply and inflation on the KLCI. The econometric techniques used in this study include unit root test, cointegration test, error correction model (ECM), variance decomposition and impulse response function. The empirical analysis in this paper covers an 8 year period for the pre-crisis (January 1987-January 1995) as well as for the post crisis (January 1999- January 2007) using monthly time series data. The results indicate that the variables in the

model share a long run relationship in both periods, indicating that deviations in the short run stock prices will be adjusted towards the long run value. They conclude that there is a positive relationship between stock prices and inflation which is not consistent with theory and empirical evidence elsewhere. This result however is consistent with previous studies in Malaysia (Ibraham and Yusoff, 2001; Ibrahim and Aziz, 2003 and Islam, 2003). They also report an inverse relationship between money supply (M3) and stock market which is in line with previous findings by (Ibrahim and Yusoff, 2001; Ibrahim and Aziz, 2003). The explanation for the relation between money supply and stock market is increase in inflation may lead to uncertainty that may lead to decrease in stock prices.

3.2.3 Studies in Malawi

There have been very few studies done in Malawi; the closest literature in Malawi was done by Mangani (2011). The study examines the effects of monetary policy on prices in Malawi by tracing channels of its transmission mechanism within the environment of VAR modeling. The study found out that the exchange rate was the most important variable in predicting prices and recommended that authorities should be more concerned with imported cost-push inflation rather than demand pull-inflation. Ngalawa and Viegi (2011) conduct a similar study on the dynamic effects of monetary policy shocks in Malawi using innovation accounting in a structural VAR model. The study revealed that the bank rate is a more effective measure of monetary policy than reserve money. The study only uses the exchange rate to account for movements in the external sector.

CHAPTER FOUR

Research Methodology

4.0 Introduction

Since the study is designed to analyse the effects (long run) of monetary policy on stock market performance in Malawi and adopts the dynamic dividend growth model. Its primary objective is to correctly establish the way in which monetary policy affects the stock market returns. It further seeks to determine the extent to which changes in money supply, interest rates, exchange rates, treasury bill rates affects stock prices/returns over the short and long-run.

4.1 The Model

Since we seek to assess the effects of monetary policy on stock market returns, the monetary policy variables will be considered exogenous or independent variable and the variable representing stock returns/prices will be endogenous or dependent variable. In this model, we express changes in stock price/return as a function of monetary policy variables: bank rate (I), money supply (MS), reserve money, exchange rate (EX), and Treasury bill rate (TB).

The selected literature that was reviewed also used these variables, Ngalawa (2011), used bank rate, reserve money, exchange rate in assessing the dynamic effects of monetary policy in Malawi. Mangani (2011) also uses the exchange rate, bank rate, reserve money, money supply in assessing the effects of monetary policy on prices in

Malawi. The study done by Thaker et al. (2009) on examining the short run and long run causal relationship between Kuala Lumpur Composite Index and selected macroeconomic variables also used money supply, treasury bills rate as monetary variables. The hypotheses that past money supply data can be used to predict future stock returns was also supported by empirical studies (Keran 1971 and Hamburger and Kochin, 1972). Thorbecke (1997) used non-borrowed reserves to estimate the effects of monetary policy on stock returns.

The model is specified as

$$P_t = F(MS_t, I_t, EX_t, TB_t, RM_t) \tag{13}$$

In order to test for the existence of the long run linear relationship stated in equation (14). The study applies the bounds testing approach within the ARDL environment as proposed by Pesaran et al. (2001). There are several methods available to test for the existence of long-run equilibrium relationship among time-series variables. The most widely used methods include Engle and Granger (1987) test, and Johansen-Juselius (1990) tests. These methods require that the variables in the system are integrated of order one i.e. I(1). In addition, these methods suffer from low power and do not have good small sample properties. Due to these problems, a newly developed autoregressive distributed lag (ARDL) approach to cointegration has become popular in recent years.

This study employs ARDL approach to co-integration following the methodology proposed by Pesaran and Shin (2001). This methodology is chosen as it has certain advantages on other co-integration procedures mentioned above. For example, it can be applied even when there is a mixture of I (0) and I (1) variables. It also allows for inferences on long-run estimates which are not possible under alternative co-integration procedures. The ARDL model can accommodate greater

number of variables in comparison to other Vector Autoregressive (VAR) models that have been widely used in studies of similar type. The data was tested for unit root. This testing is necessary to avoid the possibility of spurious regression, the bounds test is based on the assumption that the variables are I(0) or I(1) so in the presence of I(2) variables the computed F-statistics provided by Pesaran, *et al.* (2001) becomes invalid.

The ARDL framework for the model based on Pesaran et al. (2001) is specified as

$$\Delta p_t = \varphi_0 + \sum_{i=1}^{k} \beta_i \Delta rm_{t-i} \sum_{i=1}^{k} \psi_i \Delta ms_{t-i} + \sum_{i=1}^{k} \phi_i \Delta i_{t-i} + \sum_{i=1}^{k} \alpha_i \Delta ex_{t-i} + \sum_{i=1}^{k} \xi_i \Delta tb_{t-i} + \sum_{i=1}^{k} \vartheta_i \Delta p_{t-i} + \Omega_1 p_{t-i} + \Omega_2 rm_{t-i} + \Omega_3 ms_{t-i} + \Omega_4 br_{t-i} + \Omega_5 er_{t-i} + \Omega_6 tb_{t-i} + \Omega_7 dummy1_t + \Omega_8 dummy2_t + \Omega_9 dummy3_t + \varepsilon_t \quad (14)$$

where ε_t is a white noise error term, Δ is the first difference operator, k is the optimal lag length, φ_0 is the intercept and the rest of the variables are as defined above .By incorporating the short run dynamics, the above procedure accounts for the adjustment path towards the long run. In fact, this approach provides joint estimates of the short-run and long-run effects of the regressors. For example, the short run effect of treasury bill yields on stock market returns is measured by ξ_i coefficients while its long run effect is measured by Ω_6 normalized by Ω_1 (hence by $-\Omega_6 / \Omega_1$).

This approach to cointegration is capable of testing for the existence of a relationship between variables irrespective of whether the underlying regressors are purely I(0), purely I(1) or mutually cointegrated. Furthermore, the procedure is more appropriate for estimation in small sample studies whereas the Engle–Granger and

Johansen's cointegration procedures are not reliable for relatively small samples (Pesaran and Shin, 2001). Moreover, the results of these other cointegration tests largely depend on the choice of optimal lag length, which cannot be conclusively determined. Following Pesaran et al (2001), two separate statistics are employed to 'bound test' for the existence of a long-run relationship: an F-test for the joint significant of the coefficients of the lagged levels in Equation (14), so the null hypothesis $H_0 : \Omega_1 = \Omega_2 = \Omega_3 = \Omega_4 = \Omega_5 = \Omega_6 = 0$, means no evidence exists of long-run relationship while the alternative hypothesis is $H_1 : \Omega_1 \neq \Omega_2 \neq \Omega_3 \neq \Omega_4 \neq \Omega_5 \neq \Omega_6 \neq 0$ indicates existence of long-run relationship among the variables in the model. Two asymptotic critical value bounds provide a test for co-integration when the independent variables are *I(d)* (where $0 \leq d \geq 1$): a lower assuming the regressors are *I(0),* and an upper value assuming purely *I(1)* regressors. If the F-statistic exceeds the upper critical value, we can conclude that a long-run relationship exist regardless of whether the underlying order of integration of the variables is *I(0)* or *I(1).* If the F-statistic falls below the lower critical values we cannot reject the null hypothesis of no co-integration. If the F-statistic exceeds the upper bound, one may rejects the hypotheses of no-long-run relationship. However, if the F-statistics falls between these two bounds, inference would be inconclusive. Moreover, when the order of integration of the variable is known and if all the variables are *I(1),* the decision is made based on the upper bound. Similarly, if all the variables are *I(0),* then the decision is made based on the lower bound.

However to correctly capture the political orientation of monetary policy in Malawi, I included three dummy variables taking the value of 1 and 0 in each period of distinct political regime, the three periods are 1996m11 to 2004m5, 2004m6 to

2009m5 and 2009m6 to 2012m4. Even though the regime in the period 2009m6 to 2012m4 was the same as the one in period 2004m6 to 2009m4, the major difference was that in 2009m6 to 2012m4, the economic fundamentals had greatly changed; there was acute foreign exchange shortages, acute shortages of fuel, freezing of donor aid, suspension of IMF Program, bad governance. monetary policy become difficult to implement as well, the monetary authorities went back to introduce exchange control that were abandoned previously, the country was operating on less than a month import cover of foreign exchange reserves.

In each distinct period each political regime pursues its own policies and also appoints central bankers of their choice who in turn also pursues a monetary policy stance that favours the regime in that period. So it is evident that political developments in Malawi greatly influence the conduct of monetary policy as the issue of central bank independence is of considerable debate. For instance, the determination of which exchange rate regime to pursue is an important political importance in Malawi, as noted in Sato (2001) that the exchange rate is highly politicized with, each devaluation becoming a subject of intensive speculation. Furthermore, the appointment of the central banker is at the discretion of the state president, which is not vetted by Parliament.

Diagnostic test and stability test are conducted to ascertain the goodness of fit of the model. The diagnostic test examines the serial correlation, functional form, and heteroscedasticity associated with the model. The stability test is conducted by employing the cumulative sum of recursive residuals (CUSUM) and the cumulative sum of squares of recursive residuals (CUSUMsq). If the plots of CUSUM and CUSUMSQ statistics stay within the critical bonds of 5 percent level of significance, the null hypothesis of all coefficients in the given regression are stable and cannot be

rejected. Examining the prediction error of the model is another way of ascertaining the reliability of the ARDL. If the error or difference between the real observation and the forecast turn out to be infinitesimal, then the model will be regarded as best fitting.

4.2 Description of the variables in the models and expected signs

4.2.1 Stock returns (RT)

The proxy of equity market used is the Malawi all share index (MASI). The continuously compounding rate of returns is calculated by using the formula:

Stock return is measured as:

$$R_t = \ln(P_t / P_{t-1})$$

R_t = Return on month t; P_t = Index closing value on month t; P_{t-1} = Index closing value on month‘t-1’; ln= Natural Logarithm.

4.2.2 Money supply (MS) growth

Money circulating in an economy or total amount of money available in a given economy is called money supply. The proxy of money supply is used for broad money (M2). Increase in money supply has a direct impact on corporate earnings; resultantly increase in future expected cash flows. The increase in money supply is an optimistic sign for the investors regarding to earn higher dividends, which cause ultimately increase in demand of firm’s stock. Growth in money supply would show excess in liquidity higher stock prices returns:

The change in money supply is measured as:

$$MS_t = \ln(M_t / M_{t-1})$$

Money supply has positive/negative impact on equity market.

4.2.3 Reserve money (RM) growth

Money policy efforts are tailored to bring inflation to the level that does not distort savings and investments decisions. Thus the main objective of monetary policy is price stability. In Malawi the intermediate variable is M2 whereas the operating target is reserve money (M0). This assumes that there is a stable relationship between reserve money, M2 and inflation at least in the long run. In practice the central bank aims at controlling the quantity of reserve money while also taking a passive approach on the associated levels of interest rates. The growth rate target of reserve money are set in agreement with IMF programs and also with the forecasted growth of nominal GDP that the Minister of Finance delivers in the budget statement for that particular fiscal year in Parliament. Similarly to M2 the growth of reserve money has direct impact on earnings and cash flows of firms.

A change in reserve money is measured as:

$$RM_t = \ln(RM_t / RM_{t-1})$$

Reserve money has positive impact on equity market.

4.2.4 Bank rates (BR)

This is the direct tool that monetary policy affects stock prices. Changes in bank rates or discount rates will affect the rate of return on a share, which is a discounting factor in the present value formula for share price valuation. If there is a tightening of monetary policy (M↓), in most cases this results in the decline of money supply, this policy move is associated with higher interest rates (i ↑) and when the interest rates move up, investors will liquidate their portfolios on the stock exchange and invest in alternative assets such as treasury bills. If there is an expansionary monetary policy then money supply is expected to increase, this policy move favours

lower interest rates. This results in investors investing in shares unlike unattractive interest bearing assets such as treasury bills.

Another way changes in bank rate affect shares is through affecting general economic activity either by making credit available at a lower cost in the economy or at a higher cost. The higher cost of borrowing means that interest expense eats into the firm's profitability, hence affecting their earning, which is directly linked to share price valuation. Higher interest rates are an indication of a contractionary monetary policy stance and lower interest rates indicate an expansionary monetary policy stance.

A change in bank rate is measured as:

$BR_t = \ln(BR_t / BR_{t-1})$ Interest rate has a negative relationship with equity market returns.

4.2.5 Exchange rate (ER)

The rate at which a unit of the currency can be exchanged for a unit of another currency is called exchange rate. A fall or devaluation of a home currency will lead to a rise in the demand for home exports and a resultantly increase capital inflows and dividends payoffs for firms. At the same time depreciation would result in costly imported goods leading to capital flight from the country, and finally reduction in dividends pay-outs. Malawi being an import dominant country so a depreciation or devaluation of the local currency will have mixed results on the stock market (the MASI), it will depress the domestic stock index (DSI) and at the same time make the foreign stock index (FSI) attractive on account that investors in foreign currency terms will perceive the local equity market as an attractive investment platform due to the devaluation of the local currency. Since the MASI is an all-share index, then the

gains on the FSI and the losses on the DSI will net-off when we are looking at the MASI.

Changes in exchange rate is measured as:

$$ER_t = \ln(ER_t / ER_{t-1})$$

Exchange rate has a negative/positive relationship with equity market returns.

4.2.6 Treasury bill rate (TB)

Treasury bill rates are chosen as an indicator of the opportunity cost of investing either in interest bearing assets or dividend earning assets. Changes in bank rates affect general asset interest rates in an economy. The Central Bank uses open market operations in its conduct of monetary policy and treasury bills is one of the instruments that it uses to mop up excess liquidity in the market. If there is a tightening of monetary policy (M↓), in most cases this results in the decline of money supply, this policy move is associated with higher interest rates (i ↑) and when the treasury bill rates move up, investors will liquidate their portfolios on the stock exchange and invest in alternative assets such as treasury bills. If there is an expansionary monetary policy then money supply is expected to increase, this policy move favours lower interest rates. This results in investors investing in shares unlike unattractive interest bearing assets such as treasury bills. This also serves

A change in Treasury bill rates is measured as:

$$TB_t = \ln(TB_t / TB_{t-1})$$

4.3 Sources of data

Masi, Money supply, Reserve Money, Bank rates, Treasury bill rates, and Exchange rates data were collected from the Reserve Bank of Malawi, Research Department. The study uses Eviews 6.0 to do econometric estimations.

4.4 Cointegration test

Cointegration is confirmed in the above model if the Ω_i coefficients are jointly significant. The cointegration tests are conducted in the environment of standard Wald F-tests for linear restrictions. Pesaran et al. (2001) provides the upper and lower bound critical values for resolving this hypothesis, based on the standard *F*-statistics. If the *F*-statistic is greater than the upper bound critical value, cointegration is rejected but it is rejected if the statistic is smaller than the lower bound critical value. However, the test becomes inconclusive if the statistic falls in between the critical values.

4.5 Time series properties of the data

4.5.1 Unit root tests

While acknowledging the fact the ARDL-bounds testing approach does not require pre-testing of the variables for the order of integration, it is also imperative to ensure that none of the variables are integrated of order 2 or higher. This is because the critical values for evaluating the test are computed on the assumption that the variables are integrated of either order 1 or 0 and the cointegration test collapses if this does not hold. The study applied the DF-GLS tests. Dickey Fuller Generalized Least Squares (DF-GLS) method proposed by Elliot, Rothenberg and Stock (1996) to test for unit root. The test is a modification of the conventional Augmented Dickey-Fuller (ADF) *t*-test as it applies generalized least squares (GLS) de-trending prior to running the ADF test regression. Compared with the ADF tests, the DF-GLS test has the best overall performance in terms of sample size and power especially when an unknown mean or trend is present.

4.5.2 Diagnostic tests

These tests are conducted to avoid running spurious regressions and to make sure that the model is correctly specified. First and foremost, it is highly reasonable to suspect that some of the variables, which are used in the study, may exhibit seasonal trends, such as exchange rates. Since the study uses monthly data, each of the explanatory variables are regressed against 11 dummies which assumes a value of 1 in the i^{th} month and zero otherwise. Hence, seasonality tests are conducted on each of the variables in the model by running the following regression;

$$X_t = \psi_1 + \sum_{i=2}^{12} \psi_i d_{it} \qquad (16)$$

Where X_t is the series being tested for seasonality, d_{it} assumes the value 1 in the i^{th} month of the year and zero otherwise, and ψ_j are parameters to be estimated. Seasonal effects are said to be prevalent if at least one of the coefficients for the dummies is significant at 5 percent level.

The study makes use of the Akaike Information Criterion (AIC) and Schwarz Information Criterion (SIC) in order to establish the appropriate order of the differenced lag terms in the cointegrating equation. This helps to address the issues of over-parameterization and to save the degree of freedom. If the information criterion is smaller, the better will be the model.

The Breusch-Godfrey Lagrange multiplier (B-G LM) test is conducted to test for serial correlation of orders 1 through 5. This general test of serial correlation is more efficient than other tests in that it allows for non-stochastic regressors (such as the lagged values of the dependent variable), higher order autoregressive schemes and

simple or higher order moving averages of white noise error terms (Gujarati, 2003). Ramsey's RESET test (regression specification error test) will also be applied to test for specification error and establish model adequacy. This is a general test of specification error and the study will test for the appropriateness of including a quadratic term. The autoregressive conditional Heteroscedasticity Lagrange Multiplier (ARCH LM) tests of orders 1 through 5 will be conducted to check if the residuals are conditionally heteroskedastic. Even though ARCH in itself does not invalidate the standard OLS inference, ignoring ARCH effects may result in loss of efficiency. To test for the null hypothesis that there is no ARCH up to order *q* in the residuals we run the following regression.

$$e_t^2 = \beta_0 + \beta_1 e^2_{t-1} + \beta_2 e^2_{t-2} + ... + \beta_q e^2_{t-q} + \mu_t \quad (17)$$

CHAPTER FIVE

Results and discussions

5.0 Introduction

This chapter presents and interprets the results of the present study. The descriptive statistics are presented in Appendix 1 but all the results of the diagnostic tests and estimations are presented in this chapter.

5.1 Seasonality Tests

Seasonality tests on each of the variables are the first to be conducted and the results are presented in Table 2.

Table 2: Seasonality Test Results

SERIES	ψ_2	ψ_3	ψ_4	ψ_5	ψ_6	ψ_7	ψ_8	ψ_9	ψ_{10}	ψ_{11}	ψ_{12}
lnmasi	0.99	0.96	0.89	0.97	0.98	0.97	0.91	0.86	0.85	0.99	0.97
lnmney	0.97	0.97	0.88	0.99	0.92	0.87	0.80	0.79	0.79	0.99	0.99
lnbrate	0.87	0.95	0.91	0.72	0.86	0.89	0.97	0.99	0.97	0.90	0.92
lnexrat	0.96	0.92	0.91	0.98	0.99	0.97	0.93	0.87	0.77	0.91	0.97
lntbrat	0.96	0.97	0.90	0.70	0.83	0.85	0.92	0.84	0.95	0.88	0.97
lnreser	0.96	0.93	0.84	0.84	0.85	0.63	0.59	0.65	0.59	0.84	0.97

Note: The figures represent probability values for the coefficients of the seasonal dummies. ψ_i represents seasonal dummy coefficients where i = 2, 3, 4… 12. 2 represents February, 3 is March, 4 stands for April.

As it can be seen in Table 3, all the probabilities indicate that at 5 percent significance level, all the dummy coefficients are statistically insignificant. This implies that none of the variables in the study exhibits seasonality.

5.2 Unit root tests

As indicated in the previous chapter, the study applied the Elliot, Rothenberg and Stock (ERS) DF-GLS unit root test. The results of the unit root tests conducted on each of the variables are presented in Table 3 below.

Table 3: DF-GLS Unit root test on the variables

Variable in Levels	ERS Statistic(CV)	First Difference	ERS Statistic(CV)
lnmasi	-1.335(-2.946)	d(lnmasi)	-11.074(-2.946)**
lnmoneysupply	-3.523(-2.946)*		
lnbankrate	-1.060(-2.945)	d(lnbankrate)	-13.577(-2.946)**
lnexrate	-0.688(-2.946)	d(lnexrate)	-7.834(-2.946)**
lntbrate	-1.155(-2.945)	d(lntbrate)	-13.220(-2.946)**
lnreserve	-5.904(-2.948)*		

*represents indicates that a variable is I(0) while ** represents an I(1) variable. The figures in parenthesis represent the 5% critical values of the DF-GLS test.

As it can be seen in Table 3, all the variables are integrated of order 1 except for the log of money supply and reserve money. These results reveal that there is no variable that is integrated of order 2 or beyond and hence permit the application of the bounds testing approach.

5.3 The ARDL model specification – Selection criteria statistics and diagnostic tests.

In order to specify a good model the study, with the guidance of standard information criteria, first sought to come up with the appropriate lag order of both the

differenced terms short run and long run terms that would result in a more parsimonious model.

Table 4: ARDL model selection statistics

Lag	Information criteria		Breusch-Godfrey serial correlation LM Test	
	AIC	SIC	$\chi_1^2(p)$	$\chi_5^2(p)$
1	-2.392235	-2.111625*	0.208138(0.6482)	2.551894(0.7687)
2	-2.462939*	-2.075641	0.089446(0.7649)	1.573729(0.9044)
3	-2.448098	-1.953303	0.293506(0.5880)	2.477085(0.7799)
4	-2.392235	-1.792626	0.034793(0.8520)	2.806919(0.7297)

*represents the lag chosen by the information criterion; χ_1^2 and χ_5^2 are the BG LM test statistics for the null hypothesis of no 1st order and no 5th order serial correlation respectively and the p in parenthesis represents the corresponding probability of accepting the null hypothesis of no serial correlation.

The Akaike criterion suggested a model with lag order of 2 whilst Schwartz criterion suggested a model with lag order of 1. The model with a lag order of 2 that was suggested as being the most parsimonious after also considering other factors such as the R-squared; the model suggested by AIC had an R-squared of 52% whilst that of SBC had an R-squared of 46%, the model of order 1 to 4 also accounted for no serial autocorrelation problems. However, the results for serial correlation tests of order 2, 3, and 4 are not presented in the table for space purposes. Adding a third and fourth lag proved futile as such models could not account for higher order serial correlation. As such, the model with differenced terms of lag order of 2 was the most appropriate.

Table 5: Ramsey reset and Engel arch tests for the selected stock returns model

Ramsey's RESET Test		**Engel's ARCH Test**
$F_2(p)$	$\chi_1^2(p)$	$\chi_5^2(p)$
1.551972(0.2147)	0.014448(0.9043)	0.200580(0.9991)

Notes: F_2 is the test statistic for investigating the appropriateness of a quadratic model while χ_1^2 and χ_5^2 are the test statistics for ARCH (1) and ARCH (5) effects, respectively, *p* denotes the corresponding probability of accepting the respective null hypotheses of correct specification or no ARCH effects.

The statistically insignificant F_2 statistic from the Ramsey RESET test indicates that the inclusion of a quadratic term is inappropriate and would not improve the specification of the model. Thus, the model was correctly specified. The results from the ARCH LM test indicate that there was absence of conditional Heteroscedasticity in the selected model. This is reflected by the statistically insignificant ARCH LM test statistics. Table 5 presents only the results of test regressions with squared residuals of orders 1 and 5 but the results of the orders in between also revealed no signs of ARCH effects.

5.4 Stability test

5.4.1 CUSUM and CUSUMQ Plots

Finally, the study examined the stability of the long run parameters by invoking the cumulative sum (CUSUM) and cumulative sum squares (CUSUMsq) tests. This procedure has also been utilized by Pesaran (1997) to test the stability of the long run coefficients**.** As it can be seen in Figures 6, the plots of CUSUM and CUSUMsq statistics stay within the critical 5 percent bounds for all equations. Thus,

the stability test using the CUSUM and CUSUMsq suggest an absence of structural breaks.

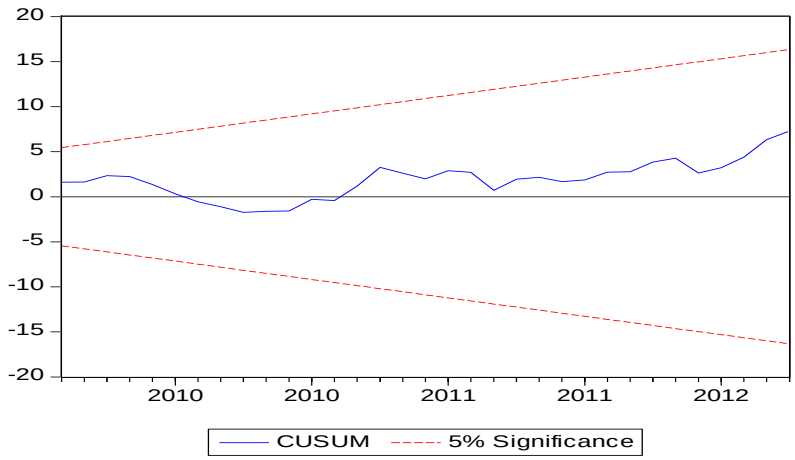
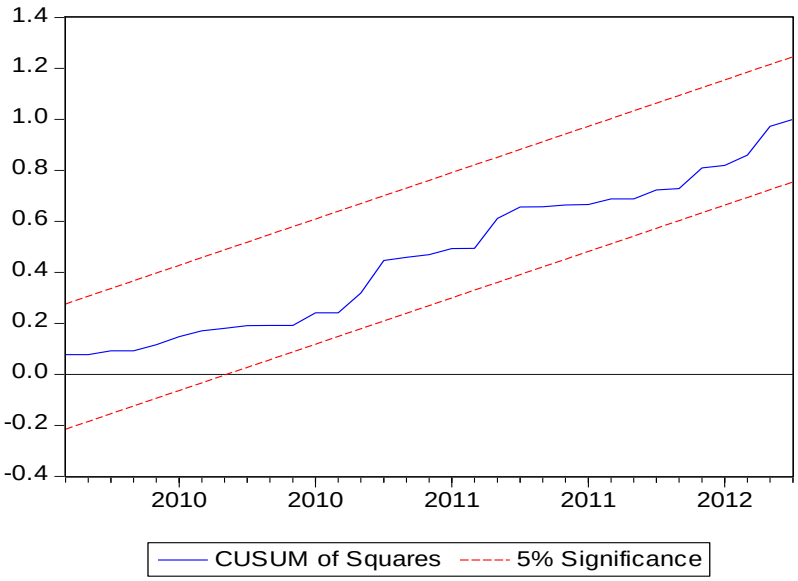


Figure 6: CUSUM and CUSUMsq plots



5.5 The Specified ARDL model

Therefore, the study adopted an ARDL model with differenced terms of lag order 2. The estimation results are presented in Table 6. As it can be seen in Table 6, the explanatory variables explained over 52 percent of the variability in the stock

market returns. This is also supported by the highly statistically significant F-statistic, which shows overall significance. In the short run, stock market returns is only affected by shocks emanating from lagged values of bank rate, exchange rate and treasury bills rate. The statistical significance of the exchange rate, support the findings by Mangani (2011). The statistical significance of the bank rate is also supported by Ngalawa (2011), the study concluded that the bank rate was an effective measure of monetary policy in Malawi than the reserve money.

Hewson and Bonga-Bonga (2005) found that monetary policy indeed affects stock market returns and in particular the repo rate as well as volatility in exchange rate. The Hewson (2005) study also reaffirms the results found by this research that the bank rate, Treasury bills rate and the exchange rate are all found to be statistically significant in both the short run and long.

Thaker et al. (2009) found that money supply is inversely related to stock returns on the Kuala Lumpur Composite Index, this result also reaffirms the results found by this study that Money supply is negatively related to stock returns in the short run and also statistically significant. An increase in money supply creates inflationary pressures, when the rate of growth of money is not aligned with the growth in nominal GDP. Hence the effect of high inflation is to erode the real returns of investors on the stock market thus money supply having a negative significant influence on stock returns as found by this study.

Okpara (2010) also found that current and one period lag interest rates had a significant and positive impact on stock returns in Nigeria, thus also reaffirming the results of this study that found that there is a significant and also a positive relationship between the bank rate and stock market returns in Malawi. Okpara (2010) study also found that Treasury bill had a significant and negative relationship with

stock market returns; this result also reaffirms the findings of this study that there is a both significant and negative relationship between Treasury bills and stock market returns in Malawi.

Kuwornu (2011) in his study: Macroeconomic variables and stock market returns in Ghana also found that treasury bills rate and exchange rate has a negative significant influence on stock market returns in Ghana thus reaffirming the findings of this study.

The model that was tested is

$$\Delta p_t = \varphi_0 + \sum_{i=1}^{2} \psi_i \Delta ms_{t-2} + \sum_{i=1}^{2} \beta_i \Delta rm_{t-2} + \sum_{i=1}^{2} \phi_i \Delta i_{i-2} + \sum_{i=1}^{2} \alpha_i \Delta ex_{t-2} + \sum_{i=1}^{2} \xi_i \Delta tb_{t-2} + \sum_{i=1}^{2} \vartheta_i \Delta p_{t-2}$$
$$+ \Omega_1 p_{t-1} + \Omega_2 ms_{t-1} + \Omega_3 rm_{t-1} + \Omega_4 i_{t-i} + \Omega_5 ex_{t-1} + \Omega_6 tb_{t-1} + \Omega_7 dummy_1 + \Omega_8 dummy_2 + \Omega_9 dummy_3 + \varepsilon_t$$

Table 6: Estimation results for the selected ARDL model

	Coefficient	Std. Error	t-Statistic	Prob.
C	-0.018917	0.031512	-0.600324	0.5491
DRT(-1)	0.027555	0.104477	0.263744	0.7923
DRT(-2)	0.063498	0.078769	0.806125	0.4214
DRM(-1)	0.020241	0.112678	0.179639	0.8577
DRM(-2)	0.052713	0.064881	0.812465	0.4177
DMS(-1)	-0.304804	0.208841	-1.459500	0.1464
DMS(-2)	-0.334527*	0.148745	-2.248991	0.0259
DBR(-1)	-0.176503	0.133203	-1.325063	0.1870
DBR(-2)	0.040876	0.085371	0.478803	0.6327
DTB(-1)	0.184617*	0.072253	2.555168	0.0115
DTB(-2)	0.166817*	0.048572	3.434451	0.0008
DER(-1)	-0.199558	0.205036	-0.973282	0.3319
DER(-2)	-0.418952*	0.181692	-2.305832	0.0224
RT(-1)	-0.908402*	0.125572	-7.234103	0.0000
RM(-1)	0.072083	0.155209	0.464427	0.6430
MS(-1)	0.315059	0.265643	1.186025	0.2374
BR(-1)	0.360318*	0.183091	1.967968	0.0508
TB(-1)	-0.193417*	0.089647	-2.157532	0.0325
ER(-1)	0.283419	0.230106	1.231691	0.2199
DUMMY1	0.021248	0.032902	0.645779	0.5193
DUMMY2	0.048866	0.033606	1.454076	0.1479
DUMMY3	0.011808	0.033613	0.351284	0.7258
R-squared	0.524120	F-statistic		8.391388
Adjusted R-squared	0.461661	Prob (F-statistic)		0.000000
Durbin-Watson stat	2.014581			

*represents statistical significance at 5 percent; RT stands for Stock Returns, RM stands for Reserve Money, MS stands for Money Supply, BR stands for Bank Rate, TB stands for Treasury Bills Rate, and ER stands for Exchange Rate

5.6 Cointegration test

After running the ARDL model, an F-test was conducted in the environment of Wald Test for linear restrictions. The F-statistic was compared with the upper and lower bound critical values provided by Pesaran et al. (2001), as presented in their Table C1.iii. The results are summarized in Table 7.

Table 7: Results for ARDL bound test for cointegration

Model	Null Hypothesis	*F*-Statistic	5% Critical Values		10% Critical Values	
			CV_L	CV_U	CV_L	CV_U
DRT	$H_0 : \Omega_1 = \Omega_2 = \Omega_3 = \Omega_4 = \Omega_5 = \Omega_6 = 0$	10.546	3.79	4.85	3.17	4.79

Note: CV_L and CV_U are the lower bound and upper bound critical values provided by Pesaran et al. (2001).

Since the calculated F-statistic is greater than the upper bound critical values, both at 5 and 10 percent significance levels, then the null hypothesis of no cointegration is rejected. The presence of a co-integrating relationship indicates the presence of a long run relationship between the variable over the sample period.

5.6.1 The Long run effects

As stated in the previous chapter, the ARDL model has the ability of capturing the long run effects through the process of normalization. The long run elasticities of stock returns to its covariates established through normalization are presented in Table 8.

Table 8: Normalized long run effects

Variable	**LR Effect**	**Null Hypothesis**	$\chi_1^2(p)$
Reserve Money	0.0793	$-\Omega_3/\Omega_1=0$	0.22 (0.6365)
Money supply	0.347	$-\Omega_2/\Omega_1=0$	1.29 (0.2561)
Bank rate	0.397*	$-\Omega_4/\Omega_1=0$	3.93 (0.0475)
Treasury Bills	-0.213*	$-\Omega_6/\Omega_1=0$	4.57 (0.0325)
Exchange Rate	0.312	$-\Omega_5/\Omega_1=0$	1.65 (0.1996)
Dummy1	0.023	$-\Omega_7/\Omega_1=0$	0.42 (0.5158)
Dummy 2	0.054	$-\Omega_8/\Omega_1=0$	2.24 (0.1346)
Dummy 3	0.013	$-\Omega_9/\Omega_1=0$	0.12 (0.7245)

*indicates statistical significance, χ_1^2 is the Wald test statistic while the p in parenthesis represents the probability of accepting the null hypothesis of no long run effect.

The normalized effects should only be interpreted within the context of statistical significance. Table above indicates that bank rate, and treasury bills rate had significant long run effects on the stock market returns during the sampled period. It was only the reserve money, money supply and the three dummy coefficients that had no statistically significant long run effects, also confirming the theoretical underpinning of the neutrality of money in the long run. The presence of long run statistical significance is supportive of the finding that there is cointegration among the variables. The statistical significance of the bank rate also re-affirms the results found by Ngalawa (2011) that in Malawi the Bank rate is an effective measure of monetary policy than reserve money targeting.

5.7 Joint short-run effects

Since there were only three variables that were individually significant in the short run, in the spirit of Granger-causality testing, the study evaluated the joint significance of each explanatory variable's lagged difference terms. The results are in Table 9.

Table 9: Joint short run test results

Variable	**F-statistic** (p)
Return (RT)	0.3922(0.6762)
Reserve Money (RM)	0.8134(0.4452)
Money Supply (MS)	2.550(0.0813)**
Bank Rate (BR)	3.243(0.0416)*
Treasury Bills (TB)	5.913(0.0033)*
Exchange Rate	2.665(0.0727)**

Note: * denotes statistical significance at 5 percent, while ** denotes statistical significance at 10% and (p) is the probability of accepting the null hypothesis of joint insignificance.

Table 9 above indicates that the coefficients of the lagged values of the bank rate, treasury bill rate, were jointly significant at 5%, and Money Supply, and Exchange Rate are significant at 10%. It must be noted that out of these variables it was Masi (Return) and Reserve Money were statistically insignificant at both 5% and 10%.

CHAPTER SIX

Conclusion

6.0 Summary

With particular emphasis on the effects of monetary policy variables on stock returns, the overarching objective of the study was to empirically test whether there exist a stable long run relationship between stock returns and its covariates of monetary policy in nature. In order to achieve this, the study applied the recently developed ARDL-bound testing approach to cointegration proposed by Pesaran et al. (2001). Cognizance of the fact that monetary policy stance in Malawi is that of monetary targeting with the main anchor being reserve money (M0) and special attention drawn to the growth in money supply (M2), the study included these variables. The exchange rate was also included because of the significant role that it plays as the authorities also endeavor to stabilize the exchange rate to avoid the inflationary pressures that exchange rate pass-through brings to the domestic economy. The other variables such as bank rate, treasury bills rate were also included as monetary authorities use these instruments to influence monetary developments in the economy and also bearing in mind that the market closely monitors these rates and make adjustments.

The ARDL stock returns model revealed that in the short run it is the lagged values of money supply, treasury bills, exchange rates and stock returns that were statistically significant. The cointegration test established the existence of a long run

equilibrium relationship. The bank rate and exchange rate were found to be jointly significant at 5% whilst money supply and exchange rate were jointly significant at 10% in the short run respectively. In the long run it was the bank rate and treasury bills yields that were statistically significant and through the process of normalization, treasury bills yields and bank rate were found to have a long run effects on the stock market returns in Malawi.

6.1 Policy recommendations

The study found that there is indeed a long run cointegrating relationship between monetary policy variables and stock returns. Just to reinforce at the opening of 2002, there was about 82% downward fall in the Malawi all share index (MASI), due to the fall of the foreign domestic index, because the country was experiencing foreign exchange problems hence investors potentially saw the market as illiquid making it potential difficult to realize their return on investments. And also the study found that exchange rate negatively affects the stock returns in the short run. Hence indeed policy makers should endeavor to achieve stability of the exchange regime in the country.

The study also found that money supply only negatively affected stock returns or prices in the short-run, through inflation expectations. According to the theory of the “neutrality of money in the long-run”, that changes in the nominal money stock lead to changes in nominal income due only to changes in the price level. However the study also found that both reserve money and money supply do not significantly affect stock market returns in Malawi in the long run. This implies that it is imperative for policy makers to achieve price stability and fight core inflation. In Malawi inflation does not emanate from volatility in asset prices but from food, especially maize prices.

Policy makers should ensure adherence to the IMF program, ensuring that the growth in Money Supply does not outpace the program targets and nominal GDP growth targets. As uncontrolled growth in money supply negatively affects stock returns through inflation expectations as found out by this study. Much of this growth in money supply is due to excessive government borrowing.

Policy makers should also endeavor to stabilize the exchange rate regime and create a more competitive exchange rate regime, the study found out that exchange rate negatively affects stock returns. The stock market is viewed as illiquid by investors also because of the low foreign exchange reserves that the country continues to experience.

Policy makers should again ensure that they endeavor to pursue expansionary monetary policies with the aim to lower interest rates hence giving investors a prime choice between short term investment in the money markets or long term investments in the capital markets. The study also found that there is a negative long run relationship between Treasury bill yields and stock returns. This has direct implication on the concentration of portfolio holding by investors. The study also found that there is a positive relationship between treasury bill yields and stock returns in the short run, this just confirms the problems of information asymmetry that has been there as policy makers have for some time been sending conflicting signals to the market, hence putting investors in the dilemma on optimal choices of investment as the risk premium trade-off could not be determined easily.

6.2 Limitations and areas for further study

A major limitation of the study was the use of the variable, the relative nascence of our stock market and the way in which monetary policy is conducted in Malawi. Despite the fact that it is well known that the monetary policy stance in

Malawi is monetary targeting, over the years what has grown to be so influential has been exchange rate and it plays an important role to such an extent that each speculative devaluation of the local currency results in immediate price changes and the degree of pass-through of the exchange rate to asset prices is not well researched, it is not well known whether each exchange rate regime switch has been benefiting the stock market or not, this is an area of further research.

Again the other challenge was to exactly find the recent monetary policy committee pronouncements, as this is crucial information for the market. The problem of information asymmetry makes prices including asset prices artificial in Malawi as relevant information that the market needs to know from the policy makers is not released to the markets as the developments take place.

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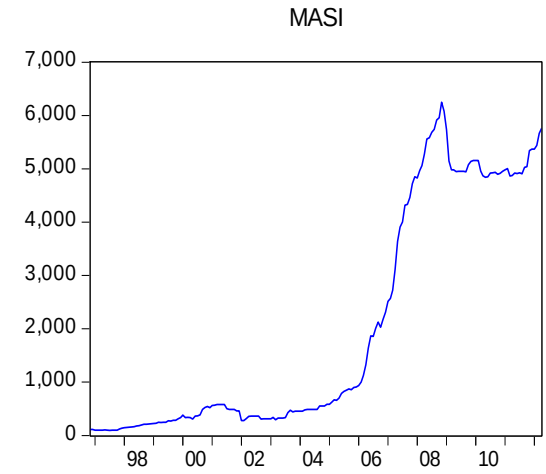
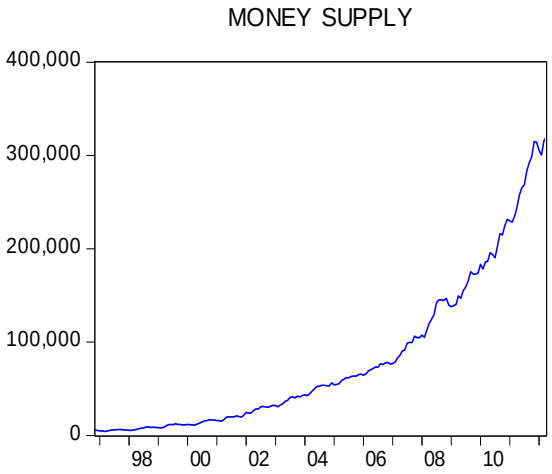
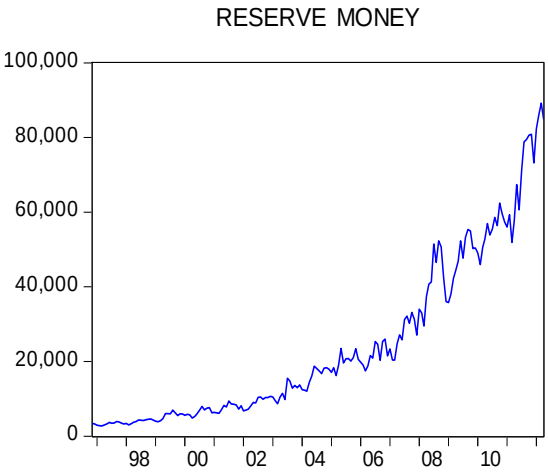
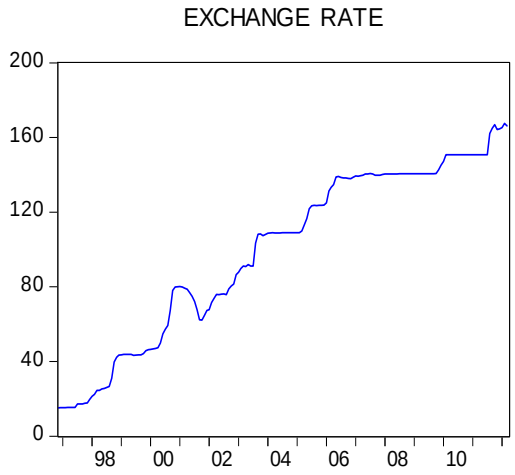
APPENDICES

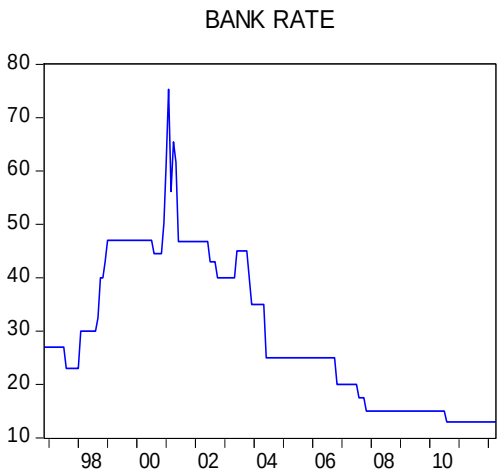
APPENDIX 1: GRAPHS OF VARIABLES USED IN THE STUDY

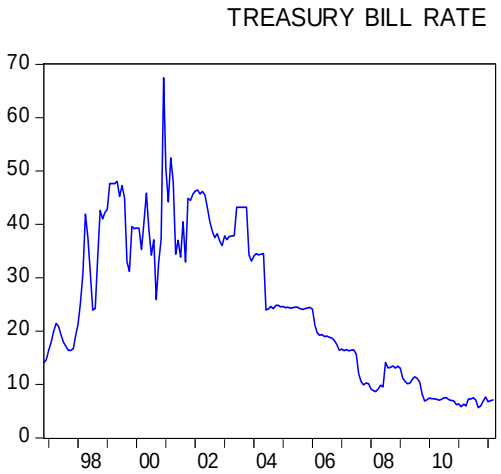












APPENDIX 2: DESCRIPTIVE STATISTIC

	MASI	RESERVE	MONEYSUPPLY	BANKRATE	TBRATE	EXRATE
Mean	2027.389	24132.04	81437.97	29.27699	24.72726	99.73984
Median	571.7700	16891.28	52784.44	25.00000	24.09000	108.9400
Maximum	6249.300	89167.86	319839.9	75.33000	67.46000	167.5516
Minimum	95.01000	2718.600	4486.600	13.00000	5.660000	15.12390
Std. Dev.	2176.066	22148.29	84058.61	13.81548	14.14034	46.65622
Skewness	0.679756	1.131653	1.259119	0.559468	0.333548	-0.414204
Kurtosis	1.636853	3.285254	3.637395	2.383727	1.971871	1.820766

APPENDIX 3: DATA USED IN THE STUDY

obs	MASI	MONEYSUPPLY	RESERVE	EXRATE	BANKRATE	TBRATE
1996M11	112.5000	5604.100	3423.100	15.12390	27.00000	14.06000
1996M12	112.5000	5434.500	3268.900	15.32240	27.00000	14.69000
1997M01	100.0000	4952.400	2932.800	15.32370	27.00000	16.46000
1997M02	100.0000	4812.700	2830.300	15.33210	27.00000	17.96000
1997M03	100.0000	4486.600	2718.600	15.36270	27.00000	19.99000
1997M04	100.6800	4752.100	3024.800	15.36810	27.00000	21.45000
1997M05	103.4600	5300.400	3293.900	15.35770	27.00000	20.86000
1997M06	100.3500	5835.300	3657.200	15.35460	27.00000	19.25000
1997M07	95.01000	5852.100	3439.600	17.20000	27.00000	17.92000
1997M08	98.60000	6121.600	3565.000	17.22450	23.00000	17.11000
1997M09	98.60000	6457.700	3938.600	17.25800	23.00000	16.40000
1997M10	98.60000	6122.300	3783.000	17.63560	23.00000	16.39000
1997M11	122.2300	5843.600	3453.900	17.78650	23.00000	16.71000
1997M12	137.5700	5555.400	3276.200	19.61510	23.00000	19.17000
1998M01	145.2600	5669.900	3389.500	21.32190	23.00000	21.27000
1998M02	150.0900	5430.100	2994.300	22.34990	30.00000	25.35000
1998M03	154.3900	5983.900	3364.700	24.58330	30.00000	30.92000
1998M04	158.4600	6568.000	3753.800	24.58330	30.00000	41.89000
1998M05	166.2600	7280.200	3904.600	25.35330	30.00000	37.53000
1998M06	176.4800	7884.000	4317.300	25.62310	30.00000	30.93000
1998M07	184.9500	8125.300	4280.500	26.12600	30.00000	23.92000
1998M08	197.0000	9110.300	4229.000	26.65120	30.00000	24.26000
1998M09	210.9500	9020.800	4418.800	31.00290	32.50000	33.85000
1998M10	211.4100	8513.200	4498.600	39.73380	40.00000	42.59000
1998M11	215.4500	8857.800	4616.200	42.17570	40.00000	41.05000
1998M12	220.6800	8641.200	4308.000	43.37090	43.00000	42.20000
1999M01	225.1200	8370.500	3969.300	43.54230	47.00000	42.83000
1999M02	230.0000	8039.300	3848.900	43.77700	47.00000	47.63000
1999M03	246.4900	8669.000	4102.500	43.88310	47.00000	47.63000
1999M04	244.8500	10043.90	4748.900	43.81200	47.00000	47.63000
1999M05	245.9300	11476.50	6042.700	43.80170	47.00000	48.04000
1999M06	246.0800	11786.70	6052.800	43.28140	47.00000	45.26000
1999M07	277.3200	11588.70	6006.500	43.39560	47.00000	47.29000
1999M08	269.6900	12629.90	6991.200	43.56140	47.00000	44.92000
1999M09	283.3100	11696.60	6252.900	43.57180	47.00000	33.01000
1999M10	283.2500	11653.70	5512.300	44.28270	47.00000	31.19000
1999M11	313.5300	11253.10	5997.900	45.79760	47.00000	39.62000
1999M12	337.5800	11545.60	5929.600	46.34930	47.00000	39.20000
2000M01	382.8100	11706.20	5612.900	46.50560	47.00000	39.32000
2000M02	337.7100	11579.70	5870.700	46.73030	47.00000	39.27000
2000M03	337.8200	11314.20	5712.100	47.04020	47.00000	35.31000
2000M04	334.9900	11227.90	4835.000	47.42190	47.00000	40.43000
2000M05	307.7400	12388.60	5282.300	49.93300	47.00000	45.85000
2000M06	364.9300	13479.30	6058.500	54.80880	47.00000	39.10000
2000M07	367.8400	14682.40	6984.100	57.35800	47.00000	34.26000
2000M08	386.3900	15687.80	7959.400	59.31920	44.50000	37.10000
2000M09	488.5400	16084.90	7047.400	67.32910	44.50000	25.93000
2000M10	524.4300	17160.40	7512.000	78.02850	44.50000	32.91000
2000M11	543.8900	16653.00	7615.000	79.94710	44.50000	37.25000
2000M12	518.4000	16444.20	6230.500	80.09460	50.23000	67.46000

2001M01	562.6700	15931.10	6396.600	80.10670	61.29000	50.55000
2001M02	565.1900	15645.10	6271.400	79.90970	75.33000	44.23000
2001M03	578.3800	15398.40	6089.400	79.28790	56.16000	52.44000
2001M04	578.4600	17213.20	7102.200	78.74310	65.46000	47.95000
2001M05	578.3500	19617.90	8239.800	76.80700	61.65000	34.40000
2001M06	578.3800	20058.80	7853.800	74.90070	46.80000	37.00000
2001M07	499.9300	20031.70	9434.600	72.15100	46.80000	33.89000
2001M08	488.8400	19964.80	8603.700	67.78150	46.80000	40.50000
2001M09	488.7700	20974.10	8537.200	62.37290	46.80000	32.95000
2001M10	488.7700	20234.40	8349.600	62.22830	46.80000	44.89000
2001M11	458.7800	19802.10	7236.300	64.76830	46.80000	44.50000
2001M12	458.7400	21725.50	8164.800	67.31110	46.80000	45.67000
2002M01	279.4300	24736.94	6754.040	67.68920	46.80000	46.22000
2002M02	279.4300	23958.82	6975.730	71.52710	46.80000	46.43000
2002M03	315.8700	24062.42	7245.360	73.78130	46.80000	45.70000
2002M04	360.5400	26598.82	8081.480	75.95000	46.80000	46.18000
2002M05	364.9900	28300.38	9051.240	75.85000	46.80000	45.50000
2002M06	363.0400	28523.18	8878.430	76.05000	46.80000	43.05000
2002M07	363.0600	30736.18	10407.20	76.15000	43.00000	40.48000
2002M08	362.8400	31146.67	10461.57	75.85000	43.00000	38.71000
2002M09	307.9800	30608.57	9879.050	78.90000	43.00000	37.52000
2002M10	313.8100	30290.29	10340.01	80.40000	40.00000	38.27000
2002M11	313.3300	31335.79	10345.90	81.55000	40.00000	36.88000
2002M12	313.4000	32422.66	10681.46	86.50000	40.00000	36.05000
2003M01	313.3400	31851.25	10463.23	87.86000	40.00000	37.83000
2003M02	340.3200	30855.74	9517.140	89.85000	40.00000	37.14000
2003M03	292.0800	32618.54	8716.620	91.08000	40.00000	37.73000
2003M04	327.8300	34092.14	10447.53	90.84500	40.00000	37.79000
2003M05	327.5800	36530.48	11446.41	91.97000	40.00000	37.88000
2003M06	327.5800	37778.81	9835.600	91.17500	45.00000	43.22000
2003M07	336.5800	40815.30	15478.60	91.09500	45.00000	43.22000
2003M08	427.3700	41401.45	14795.13	103.4200	45.00000	43.22000
2003M09	472.4700	40399.35	12845.52	108.1900	45.00000	43.22000
2003M10	442.0200	42072.68	13614.77	108.3000	45.00000	43.22000
2003M11	457.3100	41443.02	12968.53	107.4200	40.00000	34.24000
2003M12	457.2700	42870.95	13742.85	108.0900	35.00000	33.12000
2004M01	457.3500	43543.08	12439.12	108.6900	35.00000	34.03000
2004M02	457.7200	42738.26	12310.51	108.8650	35.00000	34.52000
2004M03	478.6400	44429.00	12058.11	108.9250	35.00000	34.30000
2004M04	488.3900	47366.81	14429.84	108.9000	35.00000	34.44000
2004M05	488.8800	50147.95	16108.46	108.8750	35.00000	34.52000
2004M06	489.4700	52494.96	18722.95	108.9050	25.00000	23.95000
2004M07	490.0500	52609.74	18154.68	108.9350	25.00000	24.14000
2004M08	490.2500	53756.72	17503.72	108.9750	25.00000	24.64000
2004M09	552.5700	53776.07	16727.56	108.9450	25.00000	24.22000
2004M10	552.8200	53176.63	18180.09	108.9450	25.00000	24.79000
2004M11	553.1600	52959.14	18358.23	108.9450	25.00000	24.87000
2004M12	583.4800	56566.38	17967.47	108.9450	25.00000	24.51000
2005M01	583.9700	54432.26	17055.00	108.9500	25.00000	24.63000
2005M02	623.2200	54518.13	18338.75	108.9600	25.00000	24.40000
2005M03	667.8600	55299.35	16195.92	109.9700	25.00000	24.46000
2005M04	660.8900	58526.76	19062.42	113.2597	25.00000	24.31000
2005M05	703.0300	60260.79	23515.78	116.4690	25.00000	24.37000
2005M06	788.6500	61917.28	19580.47	121.8592	25.00000	24.46000

2005M07	826.1100	61706.98	20739.74	123.3389	25.00000	24.46000
2005M08	849.0800	63321.64	20804.24	123.5983	25.00000	24.20000
2005M09	872.4900	63609.20	20114.53	123.5883	25.00000	24.06000
2005M10	859.0300	63585.81	21032.52	123.6219	25.00000	24.21000
2005M11	898.1000	65262.83	23453.63	123.6274	25.00000	24.33000
2005M12	906.8500	65756.14	20610.61	123.7789	25.00000	24.44000
2006M01	937.5900	64669.30	19764.93	124.9365	25.00000	24.12000
2006M02	1002.000	66010.68	18981.26	131.3015	25.00000	21.09000
2006M03	1127.230	68753.43	17500.39	133.3364	25.00000	19.71000
2006M04	1327.100	70370.64	18774.90	134.7910	25.00000	19.20000
2006M05	1639.640	71872.00	21557.44	138.8620	25.00000	19.37000
2006M06	1865.040	73473.62	20924.33	139.1331	25.00000	18.99000
2006M07	1857.250	73082.24	25337.83	138.6508	25.00000	19.09000
2006M08	2011.540	76774.51	24622.84	138.2851	25.00000	18.82000
2006M09	2123.900	76017.21	20340.61	138.2681	25.00000	18.70000
2006M10	2027.690	77888.02	25355.01	138.0225	25.00000	18.25000
2006M11	2175.440	78008.69	25979.33	137.9738	20.00000	17.50000
2006M12	2310.000	76624.05	21522.27	138.6721	20.00000	16.44000
2007M01	2512.670	77011.01	23396.87	139.4431	20.00000	16.61000
2007M02	2571.940	78707.59	20390.58	139.3220	20.00000	16.35000
2007M03	2722.410	83008.28	20390.62	139.5345	20.00000	16.53000
2007M04	3118.020	85673.77	24774.84	139.8355	20.00000	16.29000
2007M05	3640.730	90675.17	27145.58	140.4224	20.00000	16.42000
2007M06	3908.860	91596.53	25796.85	140.4718	20.00000	16.50000
2007M07	4006.300	99011.89	31231.61	140.7172	20.00000	15.72000
2007M08	4319.990	99851.32	32176.68	140.4373	17.50000	12.02000
2007M09	4332.680	99406.57	30230.90	139.8071	17.50000	10.52000
2007M10	4464.340	106352.8	33147.76	139.7975	17.50000	9.940000
2007M11	4722.370	104876.2	31293.00	139.8061	15.00000	10.30000
2007M12	4849.790	104879.8	27057.65	140.1727	15.00000	10.16000
2008M01	4828.630	107563.9	34004.58	140.3921	15.00000	9.150000
2008M02	4964.470	105205.1	32992.27	140.4748	15.00000	8.860000
2008M03	5058.020	112592.1	29524.37	140.4798	15.00000	8.680000
2008M04	5277.410	119994.0	37389.52	140.4981	15.00000	9.150000
2008M05	5558.840	124700.0	40706.88	140.4946	15.00000	9.860000
2008M06	5582.700	129462.1	41340.35	140.5058	15.00000	9.570000
2008M07	5683.600	142438.2	51431.85	140.5183	15.00000	14.12000
2008M08	5741.200	145376.4	46543.51	140.5544	15.00000	13.09000
2008M09	5915.200	145381.6	52313.17	140.5934	15.00000	13.20000
2008M10	5958.900	144660.5	50733.69	140.5987	15.00000	13.46000
2008M11	6249.300	146983.6	42477.02	140.6011	15.00000	13.07000
2008M12	6080.400	139643.3	36047.38	140.6002	15.00000	13.42000
2009M01	5735.800	137954.1	35803.96	140.6027	15.00000	13.04000
2009M02	5147.300	139188.1	38094.92	140.6017	15.00000	11.23000
2009M03	4981.000	140553.3	42259.83	140.6057	15.00000	10.55000
2009M04	4981.000	149575.9	44304.75	140.6065	15.00000	10.14000
2009M05	4947.900	147249.8	46798.22	140.6042	15.00000	10.25000
2009M06	4952.100	155364.6	52308.77	140.6046	15.00000	11.00000
2009M07	4954.300	159209.5	47716.80	140.6036	15.00000	11.46000
2009M08	4954.300	165560.1	53284.76	140.6054	15.00000	11.12000
2009M09	4942.100	175510.0	55326.08	140.6060	15.00000	10.45000
2009M10	5078.900	172908.5	54939.75	140.6480	15.00000	8.210000
2009M11	5139.000	172823.8	50262.59	142.7295	15.00000	6.920000
2009M12	5155.000	174032.2	50393.02	145.2153	15.00000	7.140000

2010M01	5155.000	183249.2	49080.32	147.1309	15.00000	7.470000
2010M02	5155.100	178383.8	45937.45	150.7241	15.00000	7.330000
2010M03	4957.400	186094.2	50616.91	150.8006	15.00000	7.340000
2010M04	4871.700	186509.6	52825.81	150.7802	15.00000	7.250000
2010M05	4840.800	195814.4	56963.36	150.8005	15.00000	7.040000
2010M06	4851.000	193827.0	53909.80	150.8006	15.00000	7.230000
2010M07	4920.000	190485.4	55406.90	150.8005	15.00000	7.500000
2010M08	4925.600	202881.9	58564.60	150.8003	13.00000	7.510000
2010M09	4932.700	216165.9	56391.70	150.8005	13.00000	7.140000
2010M10	4898.800	214892.3	62416.80	150.8006	13.00000	7.010000
2010M11	4917.200	225188.8	59560.60	150.8005	13.00000	6.930000
2010M12	4953.100	231710.7	57417.40	150.8005	13.00000	6.200000
2011M01	4978.800	229923.8	56007.86	150.8005	13.00000	6.380000
2011M02	5002.730	228626.6	59305.10	150.8005	13.00000	5.830000
2011M03	4863.400	235163.0	51945.70	150.8005	13.00000	6.330000
2011M04	4876.280	244241.4	57614.40	150.8006	13.00000	6.010000
2011M05	4919.670	257544.5	67402.40	150.7957	13.00000	7.270000
2011M06	4912.300	265590.3	60671.21	150.7983	13.00000	7.300000
2011M07	4922.900	268406.9	70968.60	150.7995	13.00000	7.510000
2011M08	4906.000	282905.4	78825.77	162.0990	13.00000	7.100000
2011M09	5027.300	292282.1	79482.85	164.8616	13.00000	5.660000
2011M10	5039.300	298703.8	80606.56	166.8331	13.00000	6.000000
2011M11	5341.600	315039.1	80882.29	164.3051	13.00000	6.860000
2011M12	5369.420	314330.7	73219.79	164.6474	13.00000	7.670000
2012M01	5369.390	305488.6	82287.95	165.2376	13.00000	6.770000
2012M02	5437.390	300522.1	86004.27	167.5516	13.00000	6.940000
2012M03	5667.120	315937.6	89167.86	166.2590	13.00000	7.120000
2012M04	5763.620	319839.9	84809.89	166.5903	13.00000	7.120000