FISCAL AND MONETARY POLICY INTERACTIONS IN MALAWI

MASTER OF ARTS (ECONOMICS) THESIS

By

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DECLARATION

I, SALIM AHMED MAPILA, hereby declare that this thesis is my own original work which has not been submitted to any other University for any degree award. Where other people's work has been used acknowledgements have been made.

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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.

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DEDICATION

To the two that taught me how to read and write; my mother and my father's belt! Yet I hold fonder memories of the former. **RIP Miriam Mapila**

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ABSTRACT

This study analyses the nature of the interaction between fiscal and monetary policy in Malawi during the period 1980 to 2014. Accordingly, a Vector Autoregressive (VAR) analysis was employed to examine the issue of policy coordination and dominance by means of innovation accounting. The results of the study reveal that the two policies were weakly coordinated while the economy was characterized by a fiscally dominant regime during the study period. Consequently, fiscal policy must have been interfering with the monetary policy objective of price stability. As such, the study went further to explore the main channels through which fiscal policy becomes dominant and affects price levels in Malawi. Based on an examination of the causes of inflation variability, the study then concludes that fiscal policy mainly becomes dominant through its grip on money supply. Therefore, the nature of fiscal dominance in Malawi can best be explained by the Quantity Theory of Money (QTM) as opposed to the Fiscal Theory of Price Levels (FTPL).

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ABBREVIATIONS AND ACRONYMS

AIC	Akaike Information Criterion
ARCH	Autoregressive Conditional Heteroskedasticity
ADF	Augmented Dickey Fuller
FISP	Farm Input Subsidy Programme
FTPL	Fiscal Theory of Price Level
GDP	Gross Domestic Product
IMF	International Monetary Fund
LR	Likelihood Ratio
LRR	Liquidity Reserve Requirement
MGDS	Malawi Growth and Development Strategy
MOF	Ministry of Finance
OMO	Open Market Operations
QTM	Quantity Theory of Money
RBM	Reserve Bank of Malawi
SADC	Southern Africa Development Community
SBC	Schwartz Bayesian Criterion
STA	Set Theoretical Approach
VAR	Vector Autoregressive
WAMZ	Western Africa Monetary Zone
WDI	World Development Indicators

CHAPTER ONE

INTRODUCTION

1.0 Background

For an economy to achieve overall macroeconomic stability it requires a combination and harmonization of both fiscal and monetary policy. Fiscal policy deals with the taxation and spending decisions of the government, while monetary policy is concerned with decisions about the level of money supply and interest rate in an economy.

In a general sense, the main objective of fiscal policy is to ease unemployment by creating an economic environment where all available resources are efficiently used to produce more output. On the other hand, the main objective of monetary policy is usually to maintain price and exchange rate stability by ensuring that money supply growth does not go out of control vis-à-vis macroeconomic fundamentals. Ultimately, it is the objective of both policies to maximize the overall welfare of the society by keeping inflation low and employment at its potential level (Liviatan, 2003; Tarawalie et al, 2013). The traditional practice of most studies that have looked at the issue of fiscal and monetary policy has been to overly focus on one policy while slightly considering the other (Cochrane, 1998; Leeper et al., 1996; Romer & Romer, 1990). However, the conduct of one of these policies may have serious repercussions on the effectiveness of

the other since their objectives are not mutually exclusive (Javid et al, 2008). As such, many researchers and policy makers have recently undertaken the task of understanding the nature of the interaction between fiscal and monetary policy in several countries around the world.

Accordingly, Buti et al. (2001) observe that fiscal and monetary policies can be coordinated either as *strategic compliments* or as *strategic substitutes*. When the policy coordination scheme is that of strategic compliments, the two policies tend to move in the same direction. As such, a fiscal expansion is followed by a monetary expansion or vice versa. Alternatively, when the two policies are coordinated as strategic substitutes, they tend to move in opposite directions. In this case, a fiscal expansion is coupled by a monetary contraction or vice versa.

Nevertheless, in some cases, there might not be any coordination between fiscal and monetary policy at all. This absence of coordination between the two policies is considered to be a potentially dangerous situation depending on the prevailing policy regime in the economy (Javid, et al., 2008 & Tarawalie et al, 2013). Nyamongo et al (undated), noted that the lack of coordination between fiscal and monetary policy is a serious problem in an economy characterized by a *fiscally dominant regime*; as opposed to one characterized by a *monetary dominant regime*.

The concepts of fiscal and monetary dominance basically relate to how certain macroeconomic variables, such as inflation and interest rates, react to these respective

policies. Therefore, in a fiscally dominant regime, fiscal policy is stronger than monetary policy such that it has a greater influence on these macroeconomic variables. On the contrary, a monetary dominant regime is one where monetary policy has a greater influence on the macroeconomic variables as opposed to fiscal policy (Canzoneri, et al., 2001 & Javid, et al., 2008). These two policy regimes were also respectively referred to as *non-Ricardian regime* and *Ricardian regime* by Woodford (1994, 1995).

Obinyeluaku & Viegi (2009) point out that in a *fiscally dominant* or a *non-Ricardian regime*, where the fiscal authority sets the budget independently of public sector liabilities; a fiscal expansion may eventually require monetization, and hence result into higher inflation. However, money creation may not be the only channel through which fiscal policy becomes dominant. A fiscally dominant regime may also arise when fiscal policy is not sustainable and government bonds are considered net wealth.

The implication of such an outcome is that fiscal policy can be the main determinant of inflation in an economy. As such, fiscal policy can affect monetary policy either through debt monetization or through a direct effect on price dynamics. The former is the conventional classical view, based on what is referred to as the *Quantity Theory of Money* (QTM); while the latter is a more recent view, referred to as the *Fiscal Theory of Price Level* (FTPL).

Again, it is also interesting to note that there is a possibility for a country to experience periods of alternating policy regimes as time elapses. Therefore, there can be several

shifts between a fiscally dominant regime and a monetary dominant regime in an economy (Krolzig, 1997 & Okafor, 2012). In this regard, the existence of policy coordination is usually more desirable because it guarantees a better outcome regardless of the prevailing policy regime. Therefore, any economy that fails to coordinate these two policies will run the risk of slow growth and high levels of inflation, when the coordination scheme and policy regime do match. As such, it is necessary to understand the nature of the interaction between fiscal and monetary policy in every economy.

As a country, Malawi has always been heavily dependent on donor aid. As a matter of fact, a large proportion of its annual budget is usually financed by foreign grants and loans, suggesting a shortfall in the country's domestic resources vis-a-vis the government's expenditure requirements (Phiri, 2001). As a consequence of this disparity, the nation has often been plagued by huge budget deficits over the years.

Nonetheless, the central government has on several occasions called upon the Reserve Bank of Malawi (RBM) to finance persistent budget deficits in a bid to promote economic growth. However, deficit financing by the RBM has been found to be a major cause of excess liquidity injections into the economy due to fiscal indiscipline. Consequently, this outcome has also been seen to exert a considerable amount of pressure on prices and interest rates in the country (Mangani, 2012).

In this sense, it can then be implied that the central government has had some level of influence over prices and interest rates in Malawi; hence, raising suspicion about the existence of a fiscally dominant regime in the economy.

1.1 Problem Statement

Ideally, effective monetary policy should be able to make use of its instruments to achieve the objective of price stability. However, the literature on Malawi seems to suggest that monetary policy is ineffective due to several factors that characterize the economy. Mangani (2012) points out that despite the RBM's commitment to control money supply so as to affect prices; there is still a potential for this to be radically influenced by factors outside the control of the monetary authority such as market imperfections, external shocks and the influence of the executive arm of the government. Accordingly, such observations already indicate the need to explore the nature of the interaction between fiscal and monetary policy in Malawi.

Nevertheless, as it has already been suggested in the background, the existence of a fiscally dominant regime in the absence of policy coordination poses a threat to the well-functioning of any economy. This is so because such an outcome may lead to conflicts in the pursuit of various policy objectives, and therefore jeopardize the attainment of a country's macroeconomic goals. As such, it is very important to empirically ascertain the existence of either a fiscally dominant or non-Ricardian regime in the Malawian economy; and more so, to check whether or not such a policy regime is coupled by policy coordination or a lack thereof.

Furthermore, in the case that a fiscally dominant regime really does exist in the Malawian economy; it is necessary to understand the channel through which it exerts its influence on the monetary policy objective of price stability. This exercise involves assessing whether or not the variations in inflation rates are a consequence of monetary variables or fiscal variables. In other words, there would be a need to understand whether the effect of fiscal dominance on price stability in Malawi is better explained by the QTM or the FTPL. Ultimately, such an understanding would prove to be very important in coming up with measures designed to curb the negative effect fiscal dominance.

As it stands, specific empirical evidence on the nature of the interaction between fiscal and monetary policy in Malawi is still somewhat scanty. Most of the studies in Malawi have usually focused on the issue of Central Bank Independence with an emphasis on its measurement and economic consequences (Phiri, 2001 & Sinoya, 2001). Yet still, some studies have at least tried to examine how fiscal policy affects monetary policy in the Southern Africa Development Community (SADC) (Obinyeluaku & Viegi, 2009). Nevertheless, from the literature, it seems to suggest that not many studies (if any at all) have attempted to relate the concepts of policy coordination and dominance in the Malawian context.

Owing to this, there remains a need to interrogate the nature of the interaction between fiscal and monetary policy in Malawi, in greater detail. Again, this need is particularly urgent because even though similar studies have been done for other countries; there is still a huge knowledge gap on the same for Malawi.

1.2 Objectives of the Study

The main purpose of this study is to analyze the nature of the interaction between fiscal and monetary policy in Malawi. Consequently, the specific objectives are threefold:

- To examine if there is evidence of fiscal and monetary policy coordination in Malawi
- To determine whether or not there is fiscal dominance or a non-Ricardian regime in Malawi
- To examine whether inflation is more of a fiscal phenomenon than it is a monetary phenomenon in Malawi.

1.3 Study Hypotheses

The general hypothesis of the study is that the nature of the interaction between fiscal and monetary policy in Malawi is characterized by an absence of both policy coordination and an absence of fiscal dominance. Therefore, the following specific hypotheses shall be investigated in the study:

- There is no evidence of coordination between fiscal and monetary policies in Malawi
- There is no fiscal dominance or a non-Ricardian regime in Malawi
- There is no evidence that inflation is more of a fiscal phenomenon than it is a monetary phenomenon in Malawi.

1.4 Significance of Study

As stated above, monetary policy in Malawi has been under great pressure from the persistent budget deficits that have affected price levels in the economy. Nonetheless, the objective of price stability continues to be an important goal for the RBM. As such, this study will, among other things, set the pace and act as a reference point for research studies that seek to resolve this predicament.

Furthermore, this study holds particular significance to policy makers because the complementarities and conflicts of these two policies possess severe consequences for the stability and management of an economy. As such, the study will greatly inform the formulation and conduct of fiscal and monetary policy in Malawi, so as to attain macroeconomic stability.

1.5 Organization of Study

This chapter has given the background, problem statement, objectives, hypotheses and significance of the study. The next chapter will present an overview of fiscal and monetary policy in Malawi. Chapter three is a review of the literature and it is divided into two sections. Firstly there is the theoretical literature which is then followed by the empirical literature review. The fourth chapter outlines the methodology employed in the study. Consequently, this chapter contains the analytical framework, model specifications, diagnostic tests and nature of data. Chapter five will present a discussion of the empirical results and interpretations. Finally, chapter six covers the conclusions and policy recommendations.

CHAPTER TWO

FISCAL AND MONETARY POLICY IN THE MALAWIAN ECONOMY: AN OVERVIEW

2.0 Introduction

This chapter seeks to discuss the working of fiscal and monetary policies in the Malawian economy. However, we shall first consider the Malawian economy itself in order to better appreciate the context in which these two policies operate. Consequently, this chapter will set the stage for the environment in which the study is being carried out.

2.1 The Malawian Economy

2.1.1 Structure of the Economy

Malawi is a small land-locked country in Southern Africa with a population of about 17 million people and a population density of 178.5 people per square kilometer of land. In 2014, the nation's gross domestic product (GDP) was estimated to be around $4.258 billion, with a corresponding GDP per capita of $253(Government of Malawi, 2015). A larger proportion of the population in Malawi is based in the rural areas; consequently, the highest population of the poor and ultra-poor are found in the rural areas of the southern and northern regions (Delaniyangala & Kaluwa, 2011). It has also been estimated that 72.2 percent of the population live below the poverty line. This suggests that poverty is widespread in the country.

The agricultural sector (which includes forestry and fishing) is the major contributor to GDP in Malawi. This sector accounts for about 30 percent of the GDP in the economy. The agricultural sector in Malawi is divided into two sub-sectors namely; the smallholder sub-sector and the estate sub-sector. A larger proportion of the total agricultural produce in Malawi comes from the small holder sub-sector. This sub-sector is responsible for meeting the country's demand for staple food such as maize, rice, beans and ground nuts. In addition, it also produces tobacco and cotton as cash crops to be exported. The estate sub-sector, on the other hand, produces the main cash crops which are tobacco, tea and sugar. Despite the fact that the estate sub-sector accounts for a lower proportion of the total agricultural output, it contributes over two thirds of the country's foreign exchange earnings (Mangani, 2012 & Phiri, 2001).

The manufacturing sector, which is basically agro-based, accounts for about 9.5 percent of GDP. Compared to the agricultural sector, the manufacturing sector is fairly small; however, it out-performs the mining & quarrying sector and the construction sector which respectively contributes around 0.9 percent and 2.8 percent to GDP. From Table 1, the professional and support services sector can be seen to be the least contributor to GDP in the Malawian economy (Government of Malawi, 2015).

Table 1: Sectoral Contributions to GDP (%)

Sector	2012	2013	2014
Agriculture, forestry, fishing	29.9	29.9	30
Mining & quarrying	1.0	1.0	0.9
Manufacturing	9.6	9.5	9.5
Electricity, gas and water supply	1.3	1.3	1.3
Construction	3.0	2.8	2.8
Wholesale and retail trade	15.5	15.8	15.7
Transportation and storage	2.7	2.7	2.7
Accommodation and food services	1.9	1.9	1.9
Information and communication	3.9	3.9	4.1
Financial and insurance services	5.1	5.0	4.9
Real estate activities	8.3	8.0	7.7
Professional and support services	0.3	0.3	0.3
Public administration and defense	2.0	2.0	2.0
Education	2.6	2.6	2.6
Health and social work activities	2.7	2.7	2.6
Other Services	4.9	4.8	4.8

Source: Government of Malawi, Annual Economic Report, 2015

The private sector in Malawi is also relatively weak despite national macroeconomic policies that emphasis the significance of promoting its role as an engine for economic growth and wealth creation.

This outcome is believed to be a consequence of the following major constraints: (i) macroeconomic instability, (ii) poor access to and high cost of finance, (iii) unreliable electricity supply, and (iv.) a lack of skilled workers (Mangani, 2012). Nevertheless, several reforms have been registered over the years in a bid to boost the private sector. For instance, from 2014, the government has made starting a business easier by streamlining company name search and registration by eliminating the requirement for inspection of company premises before issuance of a business license. However, in spite of such developments, the private sector in Malawi remains relatively small (Government of Malawi, 2015).

2.1.2 Business Cycles

The preceding section on the structure of the economy reveals a weak resource endowment and a heavy dependence on a few agricultural exports in Malawi. Subsequently, this renders the economy susceptible to economic shocks which may cause fluctuations in GDP. Figure 1 shows the evolution of the growth rates of GDP and GDP per capita in Malawi, from independence to the year 2014.

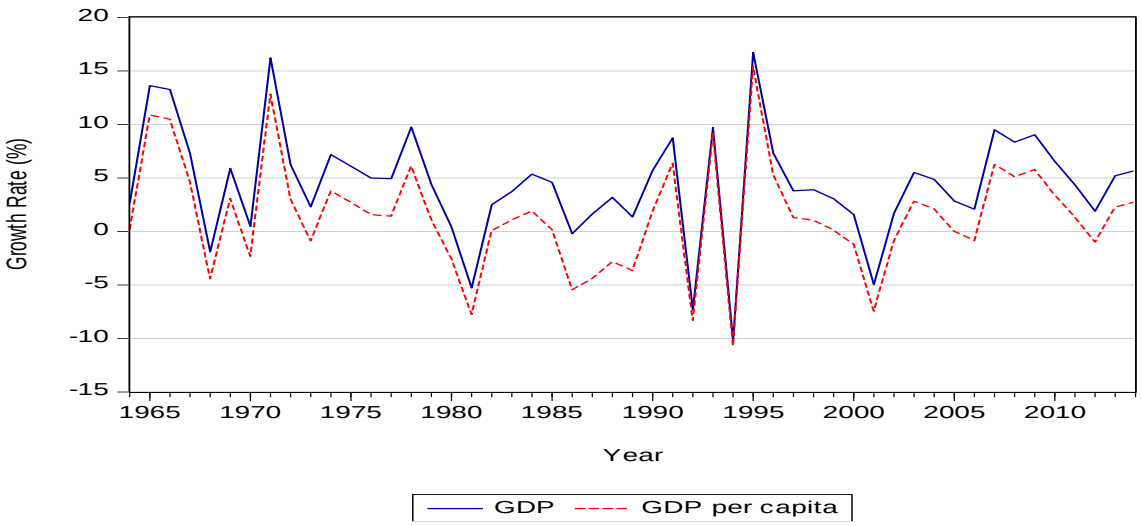

Figure 1: Economic Growth, 1964-2014

Source: Generated using data from the World Bank, World Development Indicators (WDI)

At the dawn of independence in 1964, the economy of Malawi experienced relatively high rates of growth in both GDP and GDP per capita. However, from the late 1970s, these levels of growth could not be sustained due to several factors that plagued the economy. Phiri (2001) singles out four external shocks which he considers to have been the initiating factors behind the downward trend in GDP growth rates. The factors are as follows: (i) a decline in remittance income coupled with deteriorations in terms of trade around 1977; (ii) severe droughts in the years 1980 and 1981; (iii) high importation and exportation costs due to the disruption of the country's transport route by the Mozambican war; and (iv) a sharp increment in interest rates on commercial debt that was incurred to deal with other shocks.

Around the years 1988 and 1991, the economy slightly picked up due to an increase in agricultural output. However, this level of growth was short-lived because of the withdrawal of donor aid in order to effect a change in political power. Around 1994 when Malawi adopted multiparty democracy, the economic condition was revived due to a resumption of foreign aid and a better performance of rain-fed agriculture. From Table 2, it can be seen that this resulted into an average growth rate of about 7 percent in the second half of the 1990s. Again, this trend was in spite of the fact that the country had adopted a floating exchange rate regime in 1994 that exposed the economy to more external shocks. The peak of these high levels of growth was recorded in 1995 when the growth rate reached 16.7 percent (see figure 1).

However, by the new millennium, this progress was undone due to a lack of fiscal discipline on the part of the government. Consequently, the economy experienced a period of persistent budget deficits, high domestic debts, massive excess liquidity injections, and a crowding out of private investment. Against this background, failures in agriculture due to unfavorable weather conditions sent the economy into another low growth period (Mangani, 2012). Table 2 reveals that the average growth rate between the years 2000 and 2004 was 1.7 percent.

Table 2: Average GDP growth rates for 5-year periods

Period	Average Growth Rate
1964-1969	6.8
1970-1974	6.5
1975-1979	6.0
1980-1984	1.3
1985-1989	2.1
1990-1994	1.3
1995-1999	7.0
2000-2004	1.7
2005-2009	6.4
2010-2014	4.7

Source: Generated using data from the World Bank, World Development Indicators (WDI)

In the second half of the 2000s, however, the government began to exercise some discipline in fiscal management. This fiscal discipline eventually led to improvements in the growth rate. From Table 2, we see that the average growth rate between 2005 and 2009 was 6.4 percent. Apart from fiscal discipline, this positive trend was also a result of improved donor relations and favorable conditions for rain-fed agriculture coupled with the Farm Input Subsidy Programme (FISP). Nonetheless, the trend deteriorated yet again due to another period of fractured donor relations under the Bingu WaMutharika government. This period witnessed the fuel crisis and the lack of foreign exchange in the economy. Hence, the average GDP growth rate of 4.7 percent between 2010 and 2014.

2.2 Monetary Policy in Malawi

Prior to independence in 1964, the Bank of Rhodesia and Nyasaland served as the monetary authority over what is now called Malawi. However, after the collapse of the Federation of Rhodesia and Nyasaland, the territorial branches of this bank were split into independent central banks. This eventually resulted into the establishment of the RBM in June 1965 under the Reserve Bank of Malawi 1965 Act (Sinoya, 2001).

From then onwards, the RBM has been responsible for conducting monetary policy in Malawi with the aim of achieving the set monetary policy objectives at a point in time. In this regard, we shall consider the functions of the RBM; and go on to look at the objectives and conduct of monetary policy in Malawi.

2.2.1 Functions of the RBM

After its inception in 1965, the principal functions of the RBM were limited to: (i.) the issuance of legal currency in Malawi; (ii.) safeguarding the external value of the currency by maintaining external reserves; (iii.) promoting monetary stability; and (iv.) acting as banker to the government while developing a sound financial system. However, in 1989 it was deemed necessary to revise the Act owing to the trend and extent of economic developments that the country was facing; and the complex nature of the financial system at the time (Sinoya, 2001 & Phiri, 2001).

The Reserve Bank of Malawi 1989 Act, therefore, redefined and expanded the functions of the RBM in a number of ways. For instance, the RBM was now required to perform the following main functions:

a) The formulation and implementation of sound monetary policy
b) The Issuance of legal tender currency in Malawi
c) Preserving the value of the kwacha both internally and externally
d) Banker and Advisor to Government
e) Banker to other banks in Malawi
f) Lender of last resort for financial institutions

However, apart from these main functions, the RBM also performs other delegated functions. These delegated functions are usually performed on behalf of the government and include the following:

a) Establishment of money and capital markets. This encompasses a regulation and supervision of the same.
b) Supervision of financial institutions
c) Issuing of government paper and Treasury Bills
d) Administration of exchange control

In addition to all these, the RBM is also responsible for other miscellaneous functions such as collecting and analyzing economic data from different sectors of the economy for research and policy purposes.

2.2.2 Objectives of Monetary Policy

The Reserve Bank of Malawi Act, 1989, stipulates the mandate of monetary policy in Malawi as follows:

> "…to implement measures designed to influence the money supply and the availability of credit, interest rates and exchange rates with the view of promoting economic growth, employment, stability in prices and sustainable balance of payment position."

However, the specification of this mandate by the Act is very broad. Consequently, the implementation of such a broad mandate proves problematic because some of the policy objectives included conflict with each other. For instance, the analysis presented by the Phillip's curve suggests that there is a trade-off between inflation and unemployment; such that any reduction in inflation would have to be at the expense of an increase in unemployment or vice versa (Kwalingana, 2007 & Mangani, 2012). This implies that the RBM would have to make a choice on which one of the two objectives to pursue at a point in time. Furthermore, the objectives like economic growth and employment can easily be influenced by factors other than monetary policy. In fact this holds more truth for a country like Malawi where the mainstay of the economy is rain-fed agriculture (Mangani, 2012).

It should also be noted that in a bid to operationalize the broad policy objectives of the RBM into short and medium term goals, the Malawi Growth and Development Strategies (MGDS) emphasized the pursuit of low inflation rates and low interest rates.

Accordingly, this emphasis is complemented by the RBM's prioritization of price stability as its short term measurable monetary policy objective. As such, it is quite evident that despite the broad mandate of the RBM, the main objective of monetary policy in Malawi is price stability.

2.2.3 Conduct of Monetary Policy

Having looked at the objectives of monetary policy in Malawi, it should be mentioned that the RBM uses a combination of instruments to attain such pursuits. Consequently, the instruments that have been employed over the years include: the discount rate, the lending rate, liquidity reserve requirement (LRR), open market operations (OMO), and the sales and purchases of foreign exchange. Subsequently, the operating target of monetary policy instruments in Malawi is reserve money, while the intermediate target is broad money (M2).

Since independence to around the late 1980s, the conduct of monetary policy in the Malawian economy was largely influenced by the Keynesian theories of demand management. This influence resulted into the direct control of interest rates, credit, exchange rates, and foreign exchange flows during that period. As a result, the average discount rate in the 1970s and 1980s was 6.5 percent and 10.8 percent, respectively. Alternatively, the lending rate averaged 19.1 percent between 1980 and 1989. However, during this same period, there was a mixed pattern in inflation rates. For instance, the 1970s had an average inflation rate of 8.0 percent while the 1980s registered an average of about 15.0 percent (Kwalingana, 2007 & Mangani, 2012). Figure 2 presents the

evolution of inflation in Malawi since the 1980s while Figure 3 depicts the movements in interest rates over the same years.

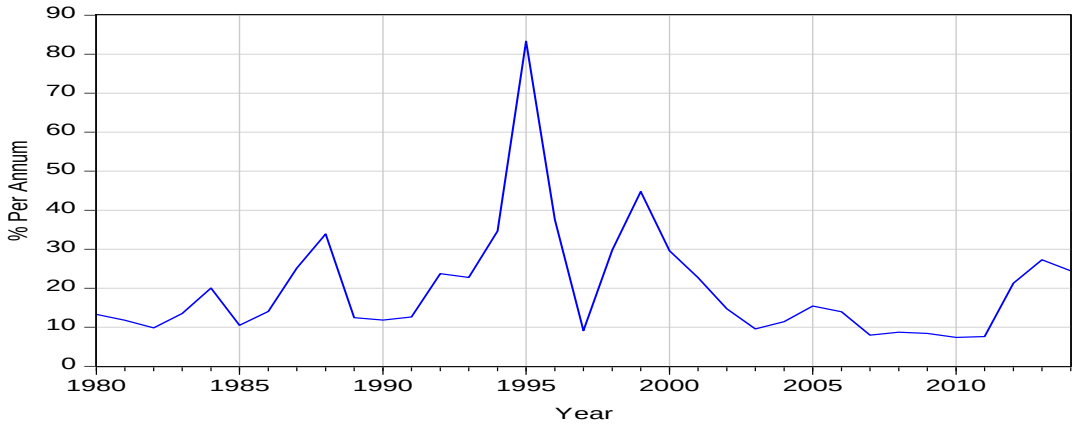

Figure 2: Inflation Rate, 1980-2014

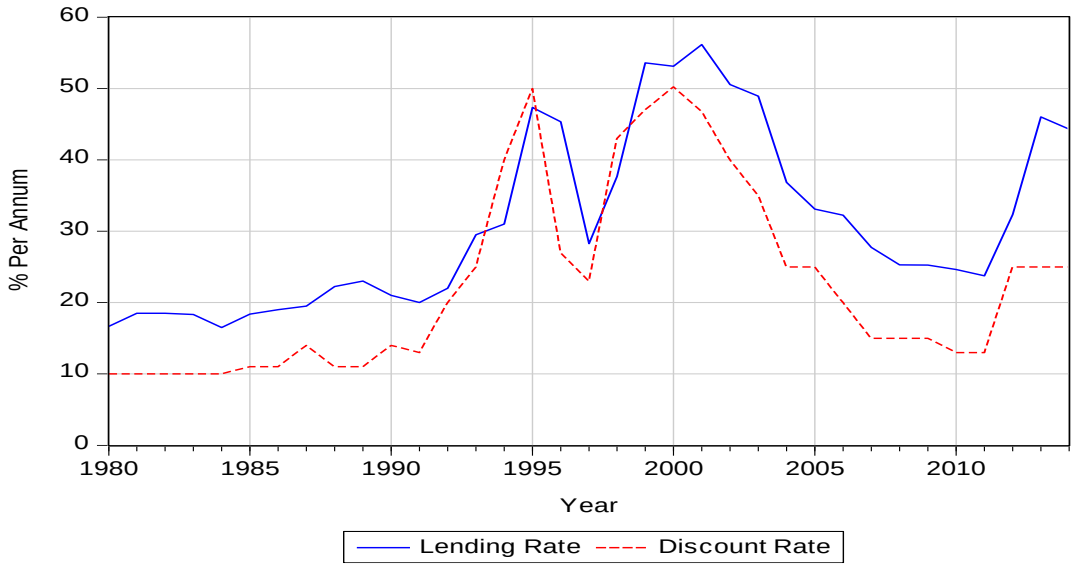

Figure 2: Interest Rates, 1980-2014

Source: Generated using data from the World Bank, World Development Indicators (WDI)

In 1971, the Bretton Wood's fixed exchange rate system broke down; and as a consequence, monetary policy in Malawi took a monetarist perspective. Eventually the Structural Adjustment Programmes were adopted in the 1980s; and around 1989, the credit ceilings were abandoned and monetary policy focused on the LRR ratio as its main instrument. However, due to the limited flexibility of the LRR ratio; OMOs and the discount rate displaced it as the main instruments of monetary policy in Malawi (Sato, 2000).

In 1990, interest rate decontrols were enforced while the exchange rate was floated in 1994. Figure2 and figure 3 depict how these developments exerted an upward pressure on prices and interest rates. As a matter of fact, in the year 1995, the discount rate went beyond 40 percent while the inflation rate exceeded 80 percent. From the late 1990s to 2005, fiscal indiscipline caused massive excess liquidity injections in the Malawian economy; this exerted more upward pressure on prices and interest rates. Eventually, the discount rate reached its all-time high of 50 percent in 2000, while lending rate went to 52 percent.

Improvements in fiscal discipline and economic growth between 2005 and 2011, led to a reduction in interest rates and inflation over that period. Nonetheless, the conduct of monetary policy in the recent years has been done by setting an annual inflation target in collaboration with the Ministry of Finance. This inflation target is usually announced during the presentation of the national budget by the Ministry of Finance (Mangani, 2012).

2.3 Fiscal Policy in Malawi

The conduct of fiscal policy in Malawi is carried out by the Ministry of Finance (MOF) through a series of budgetary measures that affect real activity in the economy. Consequently, by adjusting its revenues and expenditures, the government strives to create an economic environment that is conducive for macroeconomic stability and sustainable macroeconomic development.

Phiri (2001) points out that the MOF raises government revenue through various tools at its disposal such as: (i.) taxes; (ii.) the printing of money; (iii.) domestic and foreign borrowing; (iv.) and mandatory payments like user charges. However, even though the government can borrow or print money in an effort to raise revenues in the short-run, there is still a need for an effective tax system that is able to raise sufficient revenues so as to meet the expenditure requirements of the government in the long-run.

In this sense, an effective tax system is one that is able to meet the government's increasing financial commitments as GDP grows. Accordingly, such a system guarantees stable and buoyant tax revenues; which in turn, ensures that the expenditure requirements of the government are adequately met. In recognition of this, the Malawi government initiated a comprehensive tax reform program in 1987 with the major objectives of broadening the tax base and enhancing administrative efficiency of the tax system (OPC, 1999 & Phiri, 2001).

However, prior to this tax reform, the focus of the government in the years after independence was on promoting social and economic development in the economy (Kwengere, 1994). As it has already been shown in figure 1, the Malawian economy experienced some relatively high levels of growth from independence to the early 1970s. These high levels of growth allowed the government to collect enough revenue for development purposes seeming it was a priority at the time. Nevertheless, prioritizing development eventually called for higher expenditures and the need for more revenue (Phiri, 2001). This need, ultimately, become a cause of high budget deficits in the economy because the revenue collected domestically failed to keep pace with the expenditure increments of the government.

In a bid to improve this predicament, the Malawi government introduced a three-year rolling program in 1971with the intent of reducing the disparity between revenues and expenditures. As a matter of fact, the program did achieve a certain degree of progress in closing the revenue-expenditure gap; however, the success of the program was short-lived due to the oil crisis that affected the whole world in 1973-74.

An increase in the importation costs of petroleum products in the aftermath of the oil crisis hiked government expenditures in Malawi even more, while the sources of government revenue remained unchanged. So, in another desperate attempt to close this gap, the government introduced some changes in the fiscal measures around 1977. For instance, the import duty payable on alcoholic drinks and tobacco by-products was increased so as to generate more revenue (Phiri, 2001).

However, in 1978-79 the government's efforts were once again frustrated by yet another oil crisis. To make things even worse, this oil crisis was coupled by a severe famine which led the economy into a depression in 1980. On top of that, this was also the period that Malawi was experiencing a series of balance of payment problems due to external shocks, such as a recession in industrial countries; deteriorating terms of trade; and transport bottlenecks as a result of civil war in Mozambique. Eventually, the Malawi government was forced into adopting the Structural Adjustment Programmes in the late 1980s, in order, to deal with the difficult times. The nature of the conduct of fiscal policy in the mid-1990s to 2005, led to budget deficits being financed by the RBM through the printing of money. Accordingly, this outcome has been attributed to poor fiscal management by the MOF. Figure 4 below shows the evolution of budget deficits and money supply from 1990 to 2014.

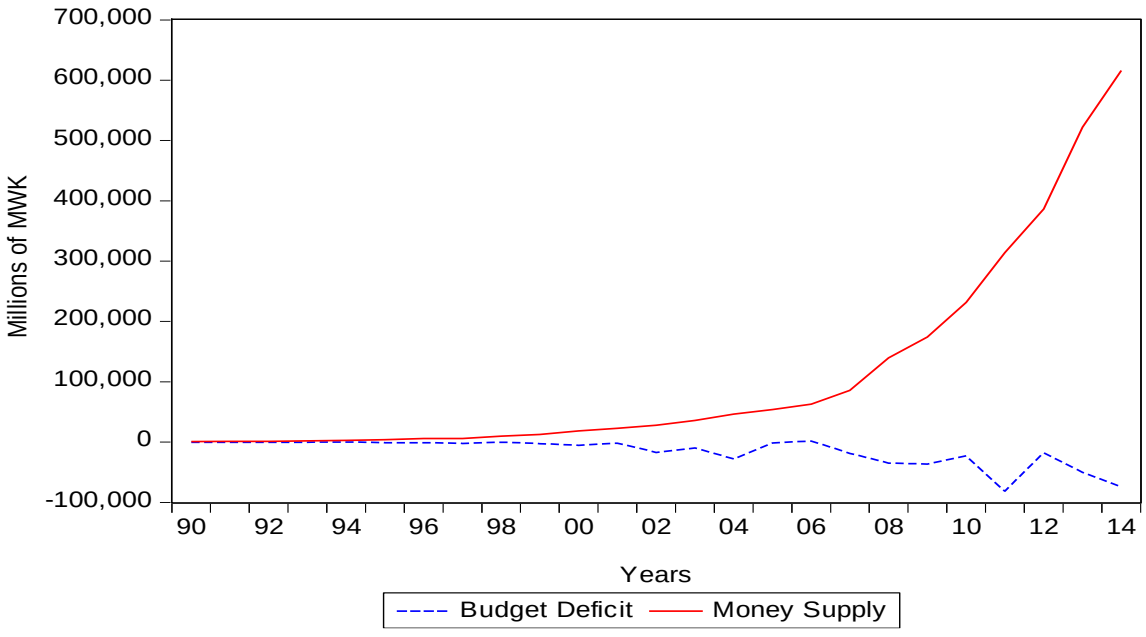

Figure 4: Budget Deficits and Money Supply, 1990-2014

Source: Generated using data from the World Bank, World Development Indicators (WDI)

The trend exhibited by budget deficits and money supply in figure 4 reveals a serious element of fiscal indiscipline on the part of the government during this period. The sharp increments in money supply from 1995 onwards, are a consequence of the government asking the RBM to print money in order to meet its expenditure requirements. However, such actions have a bearing on the effectiveness of monetary policy in achieving its objective of price stability; since its intermediate target is also money supply (M2).

Furthermore, the link between fiscal policy and the monetization of deficits by the RBM has always been heightened by the absence of effective independence of the central bank. As a matter of fact, the relationship between the government and the RBM, as stipulated in the RBM Act of 1989, is so vague that the allocation of power is largely determined by the interplay of personalities involved. Therefore, even though the Act in a way gives the RBM operational independence in terms of the pursuit of price stabilization; it still puts pressure on the RBM to make sure that monetary policy does not contradict the actions of the government (Mangani, 2013 & Phiri, 2001). In a way, the above exposition suggests that the conduct of fiscal policy in Malawi mainly affects inflation through its influence on money supply. Accordingly, this pattern fits in very well with the basic tenets of the QTM. However, recent revelations have shown that the Malawian economy has also gone through periods of declining trends in price levels coupled with growth in money supply (Mangani, 2012). In this case, the FTPL would present a better explanation of the movements in money supply and inflation. As such, we are left with the unanswered question of what theory best explains the interaction between fiscal and monetary policy in Malawi?

CHAPTER THREE

LITERATURE REVIEW

3.0 Introduction

This chapter seeks to review the literature on the interaction between fiscal and monetary policy. Consequently, it is divided into two sub-sections namely theoretical literature and empirical literature. The theoretical review focuses on the theoretical underpinnings behind the discussion of fiscal and monetary policy interdependence. The empirical review, on the other hand, focuses on how several studies have empirically analyzed the interaction between fiscal and monetary policy.

3.1 Theoretical Literature

Over the years, there have been several theorists that have tried to explain the nature of the interaction between fiscal and monetary policy. In this section, we shall consider two major viewpoints that have dominated the literature on fiscal-monetary policy mix. The first one is a monetarist view, and more specifically what is referred to as "*Some Unpleasant Monetarist Arithmetic"*. Secondly, we shall look at what is called the *fiscal theory of price level (FTPL).*

3.1.1 Monetarist View: Some Unpleasant Monetarist Arithmetic

The control of inflation is traditionally considered to be the responsibility of a monetary authority and the QTM has always been the basis of all economic studies that have tackled the issue of price determination from a monetarist perspective. The QTM as originally proposed by Irvin Fischer (1911) is expressed as:

$$MV = PT \tag{3.1}$$

Where M, V, P and T represents quantity of money supply, velocity of money in circulation, price level and volume of transactions; respectively. The change in V and T are assumed constant such that any increase in price level is solely due to an increase in money supply. Alternatively, the QTM can be expressed as:

$$MV = PY \tag{3.2}$$

Where Y represents output and is a measure of income or wealth. The basic idea suggested by the QTM is that by controlling money supply, a monetary authority can determine the price level since inflation is essentially a monetary phenomenon.

Nonetheless, the modern analysis of the interaction between fiscal and monetary policy has its central point of reference in the seminal works of Sargent and Wallace (1981) entitled ***"Some Unpleasant Monetarist Arithmetic"***. According to Javid et al (2008) this influential study was the first attempt to show how the government's intertemporal budget constraint can affect monetary policy conditions and, in particular, price dynamics. The intertemporal government budget constraint is given as follows:

$$B_t = (1 + i_{t-1})B_{t-1} + GE_t - T_t - TR_t \tag{3.3}$$

Where B represents interest-bearing government securities, GE represents total government expenditures (excluding interest payments), T represents total tax revenues, and TR is the transfer to government by the central bank which in this case could also be referred to as seignorage revenue (Fratianni and Spinelli, 2001).

The renowned monetarist, Milton Friedman, warned that we should not expect a lot from monetary policy as it can only exert substantial control over inflation and not on real output, unemployment and real rates of return on securities. However, Sargent and Wallace argued that even in an economy that satisfies monetarist assumptions, if monetary policy is interpreted as open market operations, then Friedman's list of the things that monetary policy cannot permanently control may have to be expanded to include inflation. Consequently, the two set out to demonstrate that, even in a pure monetarist framework, unbounded fiscal policy could have negative spillover effects on monetary policy, and hence undermining the ability of monetary policy to control inflation (Sargent and Wallace, 1981; Obinyeluaku & Viegi, 2009).

In the writings of Sargent and Wallace (1981), an economy that satisfied the monetarist assumptions (or, a *monetarist economy*) had to have two characteristics. Firstly, the monetary base had to be closely connected to the price level. Secondly, the monetary authority had to be able to raise *seignorage*, which refers to revenue from money creation. Ultimately, they wanted to illustrate that under certain situations, the monetary authority's grip over the price level in a monetarist economy is limited even when the monetary base and the price level remain closely related. More specifically, they wanted

to show that this held true when fiscal and monetary policies interacted in a certain way and when the public's demand for government bonds took on a particular form.

In this sense, the demand for government bonds by the public was thought to constrain the government of a monetarist economy in two ways. The first way was by setting an upper limit on the real stock of government bonds relative to the size of the economy. The other was by affecting the interest rate the government must pay on bonds. Subsequently, the extent to which the two constraints retard a monetary authority and its ability to stabilize inflation permanently in an economy partly depends on the interaction style of fiscal and monetary policies. Therefore, they considered two different forms of interaction where one was characterized by a monetary dominant regime and the other by a fiscal dominant regime (Sargent and Wallace, 1981).

When the interaction style is characterized by a monetary dominant regime, the monetary authority is able to independently set monetary policy by, say, announcing the growth rates of base money for the current period and all future periods. In so doing, the monetary authority can determine the amount of seignorage that goes to the fiscal authority. Consequently, the fiscal authority faces the constraints imposed by the demand for bonds since it must set its budgets so that any deficits can be financed by a combination of the seignorage determined by the monetary authority and the sale of bonds to the public (Sargent and Wallace, 1981). Given this form of interaction, the monetary authority can control inflation permanently because it has the complete freedom to choose a path that base money is to take.

Alternatively under an interaction style characterized by a fiscally dominant regime, the fiscal authority independently sets its budgets. As such, it announces all current and future deficits and surpluses and thus determining the amount of revenue that must be raised through seignorage and the sale of bonds. So the monetary authority ends up being required to finance with seignorage any differences between the revenue demanded and the amount of bonds sold to the public. This erodes the potency of the monetary authority to control inflation permanently (Sargent and Wallace, 1981).

Perhaps one of the most notable contributions of the work by Sargent and Wallace is that the policy conflict that exists between fiscal and monetary policy can be reconciled by assigning policy leadership to the monetary authority (or Central Bank). The implication of this with regards to the policy game is that the monetary authority would then become the *first mover*. As such, the fiscal authority would be constrained in its actions by the amount of revenue from seignorage available at its disposal. As a matter of fact, in the analysis by Sargent and Wallace, the monetary authority was usually considered to be the loser of the policy game because it could not exert sufficient pressure on the spending decision of the fiscal authority. Hence, an establishment of appropriate institutional arrangements was considered paramount in resolving the policy conflict between fiscal and monetary policy in the economy. This makes a case for the independence of the Central Bank (Obinyeluaku & Viegi, 2009).

3.1.2 Fiscal Theory of Price Level (FTPL)

Recently, a new wave of research has modified the theoretical underpinnings behind the analysis of the interaction between fiscal and monetary policy. Modern theories like the ***"Fiscal Theory of Price Level (FTPL)"*** have questioned the conclusions derived by Sargent and Wallace in the Unpleasant Monetary Arithmetic. The FTPL offers a rather controversial and strongly unorthodox body of analysis developed primarily by Leeper (1991), Sims (1994), and Woodford (1994, 1995, 2001).

The FTPL basically states that a government can exogenously set its real expenditure and revenue strategies, and that inflation accordingly takes on the required value so as to adjust the real value of the contractual nominal debt obligations to ensure the solvency of the government. This suggests that for some combinations of fiscal and monetary policy, the price level is determined by the ratio between government nominal liabilities and the real present value of future budget surpluses. The FTPL puts emphasis on how the price level is able to "jump" with respect to the government present value budget constraint. Consequently, under the FTPL, governments can be labeled as being fiscally dominant or non-Ricardian (Afonso, 2002; Bihan and Creel, 2006).

According to Bihan and Creel (2006), contrary to the process formulated by Sargent and Wallace, the mechanism underlying the FTPL does not depend on the variation of the monetary aggregates or on the monetization of public debt but rather is directly linked to the present value budget constraint. In this case, we can re-express the budget constraint in equation (3.3) as:

$$B_{t+1} = (1 + i_t)B_t - S_{t+1}, \tag{3.4}$$

Where B_t represents the public debt at the end of period t, i_t is the return on public debt, S_t is the net (primary) surplus and is equal to $(T_t + TR_t - GE_t)$ in equation (3.3). Consequently, we can also express this constraint in terms of GDP shares as follows:

$$b_{t+1} = r_t b_t - s_{t+1} \tag{3.5}$$

Where, $b_t = \frac{B_t}{p_t y_t}$, $s_t = \frac{S_t}{p_t y_t}$ and $r_t = (1 + i_t)\frac{p_t y_t}{p_{t+1} y_{t+1}}$, with p_t as the price level and y_t as real GDP. As such, $(r_t - 1)$ approximately equates the real interest rate less the economic growth rate. For convenience, it is assumed that the expected real rate is constant and equal to r such that $E_t r_{t+j} = r$ for all $j > 0$.

We can solve forward the flow condition to come up with the present value budget constraint as follows:

$$b_t = \sum_{j=1}^{k} \frac{1}{r^j} E_t s_{t+j} + \frac{1}{r^k} E_t(b_{t+k}). \tag{3.6}$$

Equation (3.6) is an accounting identity that should hold for whatever value of the interest rate, the primary surplus or nominal income. The solvency of the government is guaranteed if $\frac{1}{r^k} E_t(b_{t+k})$, tends to zero when k tends to the infinity. It is this condition of transversality that ensures that the public debt to GDP ratio does not increase by more than the gap between the interest rate and the growth rate of GDP. The public finance sustainability condition is given as:

$$b_t = \sum_{j=1}^{\infty} \frac{1}{r^k} E_t(b_{t+k}). \tag{3.7}$$

Bihan and Creel (2006) point out that the main outcome of the FTPL is in stating that there are two ex-ante scenarios under which the equality in Eq. (3.7) holds. Firstly, you have the fiscal authority adjusting its future expenditure and revenue with respect to the constraint for whatever value of interest rate and nominal income. Such a fiscal authority is referred to as "Ricardian". On the other hand, you have a fiscal authority that does not act in accordance with its fulfillment of the budget constraint such that p_t must adjust to ensure equilibrium. This type of a fiscal authority is referred to as "non-Ricardian". For example, if at time period 0, the future primary surpluses are set exogenously while both the initial nominal debt and real GDP are pre-determined; inflation is set so as to satisfy the present value budget constraint dictated by:

$$p_0 = \frac{B_0}{y_0}\left[\sum_{j=1}^{\infty} \frac{1}{r^j} E_0 s_j\right]^{-1} \tag{3.8}$$

Therefore, under a ceteris paribus assumption, higher future primary deficits entail higher initial price levels. Owing to this, the FTPL is also referred to as a theory of the *jumping general price level* since substitutes the quantity theory of money under the monetarist view with a quantity theory of the Public Debt (Bihan and Creel, 2006; Woodford 1995).

3.2 Empirical Literature

Various attempts have been made to examine the nature of the interaction between fiscal and monetary policy in different countries. A good number of such studies have mostly focused on countries in the developed world. However, recent empirical works have also tried to replicate the same in third world countries. Consequently, we shall review studies done both in developed and developing countries.

Bohn (1998) and Canzoneri et al. (2001) are the pioneers of the two main approaches used to distinguish between a fiscally dominant or monetary dominant regime; namely, the *backward-looking* and *forward-looking* approaches, respectively. The two studies are based on the US economy and focus on the dynamic interrelation between primary surpluses and public liabilities. Bohn (1998) making use of co-integration analysis showed that lagged public liabilities elicited a positive response in primary surpluses. Canzoneri et al. (2001), on the other hand, obtained by means of vector auto-regressive (VAR) analysis that a positive innovation in the primary surplus causes a fall in public liabilities. Accordingly, the results of both studies support the existence of a monetary dominant regime in the US economy.

Bajo-Rubio et al., (2014) investigated the sustainability of the Spanish government deficit over the period 1850-2000. The study emphasized the role played by a monetary dominant or a fiscally dominant regime in the attainment of fiscal solvency. Consequently, the distinction between the two alternative regimes was established by the methodology proposed by Bohn (1998). The results revealed that the conditions for fiscal

solvency were satisfied; as such, government deficits were sustainable along the sample period. More importantly, the study showed that the whole study period was characterized by a fiscally dominant regime.

Muscatelli et al., (2002) examined the response of monetary and fiscal policy to macroeconomic targets, and the interdependence between the two policy instruments. Consequently, they estimated VAR models with constant and time variant parameters for G7 countries. The findings showed that monetary and fiscal policies were increasingly used as strategic complements, implying a presence of coordination. However, even though monetary policy was found to act in response to fiscal expansion in the US and the UK, there was no evidence of the same for France, Italy, and Germany. Subsequently, they also managed to demonstrate that it is possible to capture the shifts in the strategic interdependence between fiscal and monetary policy using Bayesian VAR models.

Fialho and Portugal (2005) conducted a study to verify the predominance of a monetary or fiscally dominant regime in Brazil in the post-Real period. The analysis was based on the model by Canzoneri et al. (2001), which proposes that there is a relationship between public liabilities and primary surpluses; by using the VAR framework and analyzing the impulse response functions. Another aim of the study was to extend the article written by Muscatelli et al., (2002) on the interactions between monetary and fiscal policies using the Markov-switching vector autoregressive model (MS-VAR) introduced by Krolzig (1997), since the relationship between these policies may not be constant over time. The study concluded that, the macroeconomic coordination between monetary and fiscal

policies in Brazil was virtually a substitute policy throughout the study period, with a predominantly monetary regime, in opposition to the fiscally dominant or non-Ricardian policies of the FTPL.

Andlib et al (2012) undertook a study to analyze the coordination of fiscal and monetary policy in Pakistan using an unrestricted VAR model. The VAR model consisted of four variables, two of which were macroeconomic variables (output/unemployment and inflation) and the other two were policy variables representing the fiscal and monetary policy stance. The study made use of annual time series data for the period 1975-2011. The results of the study revealed that there was a weak coordination between fiscal and monetary policy in Pakistan over the study period. From the results they were also able to infer that fiscal policy continued to substantially influence the monetary policy even when the Central Bank was enjoying sufficient amount of independence.

Tarawalie et al (2013) investigated the level of coordination between the fiscal and monetary authorities in the WAMZ countries and its implications for the attainment of the inflation and fiscal deficit criteria. The study utilized a Set Theoretic Approach (STA) and VAR modeling to estimate the degree of policy coordination in the Zone. Annual data for the period 1980 – 2011 was used. The results revealed weak policy coordination in all the WAMZ countries during the period, contributing to the non-compliance with respect to inflation and fiscal deficit criteria. The results of the set theoretic models showed that explicit policy coordination scores in the WAMZ countries was less than 50.0 percent. Additionally, the monetary authorities in the WAMZ countries were seen to

implement relatively more prudent policies than the fiscal authorities, except in the case of Guinea, where the two policies were at par in terms of prudence.

Obinyeluaku & Viegi (2009) set out to investigate how fiscal policy affected monetary policy in the SADC region over the period 1980-2006. Consequently, the study employed VAR modeling to test the FTPL and to distinguish between policy regimes. However, only 10 SADC countries were considered due to an unavailability of data. Nevertheless, the results of the study suggested that 5 (Malawi inclusive) out of the 10 countries exhibited somewhat of a fiscally dominant regime, while the remaining five countries were monetary dominant. It should be mentioned, however, that some of the variables employed in the VAR models where slight departures from the usual variables used in other studies when testing the FTPL. This again was a consequence of the data unavailability in some countries.

Nyamongo et al. (undated) undertook a study to explore the nature of the interaction between fiscal and monetary policy in Kenya for the period 1979-2007. An examination of the interaction between the two policies revealed that the two policies were coordinated on several years. However, there was also evidence of a lack of coordination in some years during the study period. Consequently, the study employed a forward-looking approach to identify the presence of either a fiscally dominant or a monetary dominant regime as proposed by Canzoneri et al. (2001). The results showed that Kenya was characterized by a monetary dominant regime during the study period. Therefore,

even though there were a number of years when the two policies were not coordinated, the situation was not potentially dangerous due to the existence of monetary dominance.

From the empirical literature, it is evident that most of the studies have usually employed the forward-looking approach proposed by Canzoneri et al (2001) to distinguish between a fiscally dominant regime and monetary dominant regime. Furthermore, it is interesting to note that, only a few of the studies have jointly addressed the issue of policy coordination and policy dominance. A majority of the empirical work only focuses on either fiscal and monetary coordination; or the verification of the predominant policy regime.

However, as observed by Nyamongo (undated), the effects of the lack of coordination between fiscal and monetary policies are more severe under a fiscally dominant regime as opposed to a monetary dominant fiscal dominant regime. Therefore, this study shall attempt to jointly consider these two issues in the context of the Malawian economy.

CHAPTER FOUR

METHODOLOGY

4.0 Introduction

This chapter present the methodology employed to test the hypotheses stated in the introduction. It thus discusses the analytical framework, the model specifications, variable definitions and estimation techniques. The chapter also describes the data that has been employed in the study and its sources. The time series properties of the variables and the diagnostic tests that are carried out in the study are also explained.

4.1 Objective One: Policy Coordination

Following Andlib et al (2012), this study shall make use of the approach developed by Nordhaus (1994) to examine whether or not there is evidence of coordination between fiscal and monetary policy in Malawi. The approach uses an unrestricted VAR model which consists of four variables. The first two are the macroeconomic variables namely unemployment (or output) and inflation, while the other two are the policy variables describing the stance of fiscal and monetary policy. We shall, however, first consider the analytical framework behind this approach since it is directly linked to the model to be estimated.

4.1.1 Analytical Framework

The analytical framework of the VAR model used to examine whether or not there is evidence of policy coordination is based on the objectives of the fiscal and monetary authorities. Consequently, the utility function of the fiscal and monetary authorities is presented as a function of unemployment rate, inflation rate and potential output. However, the weight assigned to each of these variables by the two authorities differs because they also have different preferences. The fiscal authority assigns more weight to unemployment than inflation while the monetary authority assigns more weight to inflation as opposed to unemployment (Andlib et al, 2012; Tarawalie et al, 2013). Based on the above information, the utility functions of the two authorities can be given as follows:

$$U^F = G(\hat{\mu}, \pi, \theta) \tag{4.1}$$

$$U^M = G(\mu, \hat{\pi}, \theta) \tag{4.2}$$

Where U^F = utility function of fiscal authority, U^M = utility function of the monetary authority, μ = unemployment rate, π = inflation rate, and θ = potential output. The hat on top of a variable implies that more weight is assigned to that variable by the authority as compared to other variables. Furthermore, the unemployment rate can be modeled as a function of the interest rate(r) and fiscal balance ratio (*f*) as follows:

$$\mu = G(r, f) \tag{4.3}$$

Inflation rate, on the other hand, is given as a function of unemployment rate and expected inflation as follows:

$$\pi = g(\mu) + \pi^E \tag{4.4}$$

Here, π^E = expected inflation; and is considered to be a function of a backward looking component and the actual inflation rate in the economy. Hence, expected inflation is given as:

$$\pi^E = \omega\pi + (1-\omega)\pi^B \tag{4.5}$$

In equation 4.5, π^B represents the backward looking component while ω is the weight of expected inflation with regards to its two arguments. Expanding equation 4.4 using equation 4.5, we obtain:

$$\pi = \frac{g(\mu)}{(1-\omega)} + \pi^B, \qquad 0 \le \omega < 1 \tag{4.6}$$

When ω =1, the inflation rate does not depend on the backward looking behavior of prices and the unemployment rate is at its natural rate i.e. $\pi = \pi(\mu^N)$.

Lastly, potential output (θ), which is considered to be dependent on the investment ratio, is a sum of private and government savings ratio. Now, under the simplifying assumption that fiscal and monetary policies do not affect private investment, potential output (θ) can be expressed as:

$$\theta = \theta(f) \tag{4.7}$$

If we combine equations 4.1 to 4.5 and perform some mathematical manipulations, the utility functions of the fiscal and monetary authorities can be re-expressed as a function of unemployment rate, inflation rate and fiscal balance ratio as follows:

$$U^F = U^F\left[\mu = \mu(r,\ f...), \frac{\pi(\mu)}{(1-\omega)} + \pi^B, \widehat{\theta}(f),\ f\right] \tag{4.8}$$

$$U^M = U^M\left[\widehat{\mu} = \mu(r,\ f...), \frac{\pi(\mu)}{(1-\omega)} + \pi^B, \theta(f)\right] \tag{4.9}$$

This formulation of the utility functions provides a basis for the VAR model we shall empirically estimate.

4.1.2 Estimation Technique, Model Specification and Variable Definition

Tarawalie, et al. (2013) observes that the strength of fiscal and monetary policy coordination can be ascertained using a VAR approach. VAR models are considered to be a powerful statistical tool for forecasting historical data since they provide a simple way of explaining and/or predicting the values of a set of economic time series at a particular point in time. VAR models are also preferred over the structural models because they avoid the structurally-induced restrictions that are required for structural models to be exactly or over-identified so as to obtain a solution. Hence, the VAR framework offers a more convenient and fairly comprehensive means of analyzing the effects of unanticipated shocks in macroeconomic variables (Hasan and Isgut, 2009).

The empirical VAR model to be estimated is based on the variables identified in the analytical framework above. As such, the unrestricted four variable VAR model is specified as follows:

$$OUT_t = c_1 + \sum_{d=1}^{\eta} \psi_{1d} OUT_{t-d} + \sum_{d=1}^{\eta} \psi_{1d} INF_{t-d} + \sum_{d=1}^{\eta} \psi_{1d} FS_{t-d} + \sum_{d=1}^{\eta} \psi_{1d} IR_{t-d} + \varepsilon_{1t} \tag{4.10}$$

$$INF_t = c_2 + \sum_{d=1}^{\eta} \psi_{2d} OUT_{t-d} + \sum_{d=1}^{\eta} \psi_{2d} INF_{t-d} + \sum_{d=1}^{\eta} \psi_{2d} FS_{t-d} + \sum_{d=1}^{\eta} \psi_{2d} IR_{t-d} + \varepsilon_{2t} \qquad (4.11)$$

$$FS_t = c_3 + \sum_{d=1}^{\eta} \psi_{3d} OUT_{t-d} + \sum_{d=1}^{\eta} \psi_{3d} INF_{t-d} + \sum_{d=1}^{\eta} \psi_{3d} FS_{t-d} + \sum_{d=1}^{\eta} \psi_{3d} IR_{t-d} + \varepsilon_{3t} \qquad (4.12)$$

$$IR_t = c_4 + \sum_{d=1}^{\eta} \psi_{4d} OUT_{t-d} + \sum_{d=1}^{\eta} \psi_{4d} INF_{t-d} + \sum_{d=1}^{\eta} \psi_{4d} FS_{t-d} + \sum_{d=1}^{\eta} \psi_{4d} IR_{t-d} + \varepsilon_{4t} \qquad (4.13)$$

Where *OUT* represents output, *INF* represents inflation rate, *FS* is fiscal surplus, and *IR* is the interest rate. The empirical estimation has made use of output instead of unemployment rate because the unemployment data for Malawi is unreliable. The constant, coefficient, optimal lag length and error term are represented by c, Ψ, η and ε; respectively. Output and inflation are the two macroeconomic variables which are of primary interest to the fiscal and monetary authority respectively. Fiscal surplus is the variable indicating the stance of fiscal policy while interest rate is used as the stance indicator variable for monetary policy. The order of the variables in the VAR model is based on the study by Hasan and Isgut (2009).

Consequently, the variables in the above VAR model are defined as follows:

(i) Output (*OUT*): This is measured using the real gross domestic product in a particular year. As such, it gives the monetary value of all finished goods and services produced within the borders of the country.

(ii) Inflation Rate (INF): This is measured using the Consumer Price Index (CPI) as a percentage change where the previous year is the corresponding period.

(iii) Fiscal Surplus (FS): This is defined as overall public revenues minus public expenditures, divided by nominal GDP in particular fiscal year.

(iv) Interest Rate (IR): This is measured using the discount rate (or bank rate) that is set by the RBM in a particular year. The discount rate is employed as an instrument for monetary policy by the central bank

Nevertheless, it should be noted that the unrestricted VAR model usually suffers from the problem of over parameterization. Hence, the individual coefficients do not give meaningful economic interpretations. As such, the study shall employ innovation accounting to ascertain the existence of coordination between the two policies. More specifically, we shall make use of impulse response functions to examine the response of one policy variable to a shock in the other.

4.2 Objective Two: Policy Dominance

As shown in the empirical review, the literature has usually made use of two main approaches to test for the prevalence of either a fiscally dominant or a monetary dominant regime:

(i) The *backward-looking* approach proposed by Bohn (1998), which makes use of co-integration analysis.

(ii) The *forward-looking* approach developed by Canzoneri, et al. (2001) which makes use of VAR analysis.

However, Ramos and Tanner (2002) point out that there are drawbacks to using the one-equation framework proposed by Bohn because it cannot distinguish between ex-post adjustments of primary balances to public liabilities (consistent with a monetary

dominant regime) and ex-ante adjustments of public liabilities to primary balances (consistent with a fiscally dominant regime and FTPL). As such, they suggest that it may be more fruitful to analyze fiscal adjustment in a forward looking manner.

4.2.1 Estimation Technique, Model Specification and Variable Definition

In this study, we shall therefore follow the methodology proposed by Canzoneri, et al. (2001) which makes use of an unrestricted bivariate VAR model to assess whether primary surpluses are set exogenously or dependent on public liabilities. This approach is considered to be more convenient because it does not impose any restrictions on the economy and requires the estimation of only a small number of parameters (Zoli, 2005).

For empirical analysis, primary surpluses are thought of as being affected by past and current values of public liabilities; likewise public liabilities are affected by current and past values of primary surpluses. Therefore the VAR model to be estimated is specified as follows:

$$PL_t = a_1 + \sum_{k=0}^{\alpha} \Phi_{1h} PL_{t-k} + \sum_{k=0}^{\alpha} \Phi_{1k} PS_{t-k} + \tau_{1t} \quad (4.14)$$

$$PS_t = a_2 + \sum_{k=0}^{\alpha} \Phi_{2h} PL_{t-k} + \sum_{k=0}^{\alpha} \Phi_{2k} PS_{t-k} + \tau_{2t} \quad (4.15)$$

Where *PS* is primary surplus and *PL* is public liabilities. As in equation 3.5, the two variables are expressed as a share of GDP. The entries a, Φ, α, τ respectively represent the constant, coefficient, optimal lag length, and error term. Consequently, the joint dynamics of primary surpluses and public liabilities shall be examined using Impulse Response Functions to determine whether we have a fiscally dominant or a monetary dominant regime. Again, the study has adopted the above VAR order which is consistent

with a monetary dominant regime. However, regardless of the order in the VAR model the results are the same (see appendix 5).

Nevertheless, the definition of the variables in the bivariate VAR model is given as follows:

(i) Primary Surplus (PS): This is defined as overall public revenues minus public expenditures (including the net interest payments) all divided by nominal GDP in a particular fiscal year.

(ii) Public Liabilities (PL): This is defined as net public debt plus the monetary base divided by nominal GDP in a particular fiscal year.

Looking at how liabilities respond to shocks in primary balances it is expected that under a fiscally dominant regime, a positive shock to current primary surplus should raise the future public liabilities. The assumption is that under a fiscally dominant regime, the primary surpluses are exogenous and therefore future liabilities should be either unresponsive or respond positively to a current increase in surpluses. Hence, when the positive shocks to current primary surplus provoke a fall in the future public liabilities so as to guarantee government solvency, this can be interpreted as a rejection of the fiscal dominance hypothesis or the prevalence of a monetary dominant regime (Bihan & Creel, 2006). It should also be noted that the forward-looking approach is conditional on the persistency of primary surpluses. In this sense, persistence is measured by analyzing the autocorrelation of primary surpluses. If the primary surplus has a positive autocorrelation

of at least 5 lags, it is considered to be persistent. Otherwise the primary surplus is regarded as negatively autocorrelated with low persistence (Baldini & Ribeiro, 2008).

4.3 Objective Three: Inflation Variability

The FTPL suggests that in the presence of fiscal dominance, the variations in inflation are better explained by the associated wealth effect of private consumption than by the growth of monetary aggregates. The rationale behind this reasoning is that, under a fiscally dominant regime, if the fiscal authority is unable to adjust primary surpluses so as to guarantee the solvency of the government; the increments in nominal public debt are perceived by the private agent as an increase in nominal wealth. Consequently, there would be an increase in the demand for goods, leading to a corresponding increase in domestic prices in the economy (Javid et al., 2008).

However, under the monetarist perspective, the variations in price levels are thought of as being always and everywhere a monetary phenomenon. As such, the QTM holds on to the view that the variations in inflation can better be explained by the growth of monetary aggregates than by a fiscal variable such as primary surplus.

4.3.1 Estimation Technique, Model Specification and Variable Definition

We can identify which of the two viewpoints best explains inflation variability in Malawi by employing a four variable VAR model that is used to test the FTPL. The order of the VAR model is given as follows:

Primary Surplus➔ Nominal Money Growth➔ Real Output Gap➔Inflation rate

This ordering guarantees that the inflation rate will be the only variable in the system that responds contemporaneously to shocks in both fiscal and monetary policy. Furthermore, the inclusion of the real output gap in the model is to control for the effects of aggregate demand on inflation. Subsequently, the empirical VAR model to be estimated is specified as follows:

$$PS_t = \partial_1 + \sum_{i=1}^{\lambda} \beta_{1i} PS_{t-i} + \sum_{i=1}^{\lambda} \beta_{1i} NMG_{t-i} + \sum_{i=1}^{\lambda} \beta_{1i} ROG_{t-i} + \sum_{i=1}^{\lambda} \beta_{1i} INF_{t-i} + \upsilon_{1t} \quad (4.16)$$

$$NMG_t = \partial_2 + \sum_{i=1}^{\lambda} \beta_{2i} PS_{t-i} + \sum_{i=1}^{\lambda} \beta_{2i} NMG_{t-i} + \sum_{i=1}^{\lambda} \beta_{2i} ROG_{t-i} + \sum_{i=1}^{\lambda} \beta_{2i} INF_{t-i} + \upsilon_{2t} \quad (4.17)$$

$$ROG_t = \partial_3 + \sum_{i=1}^{\lambda} \beta_{3i} PS_{t-i} + \sum_{i=1}^{\lambda} \beta_{3i} NMG_{t-i} + \sum_{i=1}^{\lambda} \beta_{3i} ROG_{t-i} + \sum_{i=1}^{\lambda} \beta_{3i} INF_{t-i} + \upsilon_{3t} \quad (4.18)$$

$$INF_t = \partial_4 + \sum_{i=1}^{\lambda} \beta_{4i} PS_{t-i} + \sum_{i=1}^{\lambda} \beta_{4i} NMG_{t-i} + \sum_{i=1}^{\lambda} \beta_{4i} ROG_{t-i} + \sum_{i=1}^{\lambda} \beta_{4i} INF_{t-i} + \upsilon_{4t} \quad (4.19)$$

Where *PS* represents primary surplus, *NMG* stands for nominal money growth, *ROG* is real output gap, and INF is inflation rate. The constant, coefficient, optimal lag length, and error term are represented by α, Φ, λ, and μ; respectively. Consequently, the variables are defined as follows:

i. Primary Surplus (PS): As already defined in the previous model, this is the overall public revenues minus public expenditures (including the net interest payments) all divided by nominal GDP in a particular fiscal year. In this case, it is representing the fiscal variable that best explains the variations in inflation, under the FTPL.

ii. Nominal Money Growth (NMG): This is defined as the average annual growth rate in money and quasi money (M2). It is measured as the difference in end-of-year totals relative to the level of M2 in the preceding year.

iii. Real Output Gap (ROG): This is defined as the difference between real GDP and potential GDP in an economy. Consequently, the study shall make use of the Hodrick-Prescott (H-P) procedure in E-views to come up with this variable.

iv. Inflation Rate (INF): This is measured using the Consumer Price Index (CPI) as a percentage change where the previous year is the corresponding period.

Accordingly, innovation accounting shall also be employed on this VAR model and variance error decompositions for inflation shall be computed to identify the relative importance of each variable in explaining the variations.

4.4 Data Sources

The study will use data obtained from the following sources: the International Financial Statistics (IFS) compiled by the International Monetary Fund (IMF); the World Development Indicators (WDI) issued by the World Bank; and the Financial and Economic Review (various editions) by the Reserve Bank of Malawi (RBM). The study employs annual time series data for the period 1984-2014 and uses E-views 9.0 for the actual analysis.

4.5 Unit-Root Test

The unit root test is conducted to verify the stationarity of a time series variable. A series is considered stationary when its mean and variance are constant over time and the value of the covariance between the two time periods depends only on the gap between the two time periods and not the actual time at which the covariance is computed. If a non-stationary series becomes stationary after being differenced once, we say that the series is integrated of order one. By implication, if a time series has to be differenced d times to become stationary, then it is integrated of order d (Gujarati, 2005). Consequently, we shall investigate the integrating properties of the variables in the VAR models by conducting unit-root tests using the augmented Dickey-Fuller (ADF) tests.

Dickey and Fuller (1979) suggested that the test for stationarity is the same as the test for the presence of a unit root. Consider the following test equation:

$$\Delta y_t = \sigma_0 + \gamma y_{t-1} + \sum_{i=2}^{p} \beta_i \Delta y_{t-i+1} + \partial_t \qquad (3.20)$$

The coefficient of interest in Equation 3.20 is γ hence the null hypothesis is that $\gamma = 0$ and the alternative is $\gamma < 0$. If the null hypothesis is not rejected then it follows that there is a unit root or the series is non-stationary. However, in the VAR model, the rejection of non-stationarity for some variables will mean that a shock to these variables will be temporary and the effects of the shock will dissipate over time. Consequently, long-term forecasting of such variables will entail convergence to the unconditional mean of the series. In contrast, non-stationary variables will have permanent components with means

and/or variances that are time variant. Since ADF considers the possibility of more than one lag, the lag length can be determined by either AIC or SBC (Enders, 1995).

4.6 Lag Length Determination

The lag length is very crucial in VAR modeling because long lags can eat away degrees of freedom while short lags can lead to model misspecification. Consequently, the Akaike Information criterion (AIC), the Schwartz Bayesian Criterion (SBC) and the Likelihood Ratio (LR) test shall be employed to determine the appropriate lag length for the two VAR models above. AIC and SBC are the most popularly used methods to determine the optimal number of lags. In their original formulation, they are given as:

$$AIC = -2 \log L + 2s \tag{3.21}$$

$$SBC = -2 \log L + s \log T \tag{3.22}$$

Where L stands for the Likelihood function and s denotes the number of estimated parameters. The determination of the optimal lag length is based on the size of the AIC and SBC statistic. The model which gives the smallest AIC and SBC statistic is the one with the ideal number of lags.

We also make use of the LR test to determine the order of the VAR models. The test is expressed in the forms:

$$LR = T(\log|\textstyle\sum_{RR}| - \log|\sum_{UR}|) \tag{3.23}$$

$$LR_s = T - c(\log|\textstyle\sum_{RR}| - \log|\sum_{UR}|) \tag{3.24}$$

Where T stands for the number of observations, c is the number of estimated coefficients including the constant in the unrestricted VAR, $\sum_{RR}$ denotes the maximum likelihood

estimate of the residual covariance matrix of the restricted VAR and $\sum_{UR}$ is the estimate of the unrestricted VAR residual covariance matrix. Equation 3.18 is the generally used form that gives the standard LR statistic while equation 3.19 gives the augmented LR statistic developed by Sims (1980). The LM statistics follow a Chi-square distribution with the degrees of freedom equating the number of restrictions.

The null hypothesis is that the restriction does not hold. Hence if the value of the calculated statistic is less than the value of the critical statistic at a particular level of significance, then we fail to reject the null hypothesis. In this case, the restricted equation turns into the unrestricted equation and the test proceeds until the optimal lag length is determined (Enders, 2004)

4.7 Innovation Accounting

As mentioned above, the simple VAR model usually suffers from the problem of over parameterization. As such, the interpretation of individual coefficients in such a model does not make much economic sense. In view of this, the study shall make use of innovation accounting in its interpretations. Forecasting in VAR models using innovation accounting is done by employing impulse response functions and variance error decompositions. The impulse response functions are used to trace the effects of a shock in each variable on the rest of the system. Alternatively, the variance error decompositions give the relative importance of each variable in the system, to the variation in the others.

4.8 Diagnostic Tests

The estimation process based on VAR modeling essentially uses the Ordinary Least Squares (OLS) technique in the individual equations that comprise the system. As such, it is important that we carry out the usual time series diagnostics to check if the OLS assumptions have been satisfied and whether the estimates are unbiased, efficient and consistent.

4.8.1 Autoregression (AR) or Serial Correlation (LM) Test

In the context of time series regression, the term serial correlation refers to a problem where the disturbance terms are correlated over time. The presence of serial correlation results in inefficiency of OLS estimators especially when the lagged dependent variables are included as regressors in the equation. Consequently, the Breusch-Godfrey serial correlation Lagrange Multiplier (LM) test is used to test for higher order serial correlation among the disturbance terms. This test is applicable regardless of the inclusion or exclusion of lagged dependent variables. The null hypothesis is that there is no serial correlation up to a pre-specified lag order while the alternative hypothesis is that there is serial correlation.

4.8.2 Autoregressive Conditional Heteroskedasticity (ARCH) Test

According to Enders (2015), the variance of the disturbance term in a conventional econometric model is assumed to be constant or *homoscedastic*. However, in other cases, the assumption of homoscedasticity may be inappropriate. As such, the ARCH test is used to test for conditional Heteroskedasticity in the residuals. Basically, the ARCH test seeks to examine whether the magnitude of the past residuals is related to that of recent residuals. It should be said that the ARCH in itself does not validate or invalidate the inference based on standard OLS but ignoring it may result into inefficiency. In terms of the null hypothesis, the assumption is that there are no ARCH effects up to some order q.

CHAPTER FIVE

EMPIRICAL RESULTS AND INTERPRETATION

5.0 Introduction

This chapter presents the empirical results and economic interpretation of the findings in the study. However, before we present and interpret these results, we shall first consider the outcomes of the unit root test, lag length determination criteria, and the diagnostic tests.

5.1 Unit Root Test Results

Before estimating the VAR models, the ADF test was employed to test whether or not the variables are stationary. Accordingly, the SC was used to determine the optimal lag length in the ADF test since the number of lags has a bearing on the outcome of the test. The results of the unit root test and the corresponding orders of integration for all of the variables are presented in Table 3.

Table 3: Results of Unit Root Tests on the Variables

Variable	P-Value in Levels	P-Value at 1st Diff	Significance Level	Order of Integration
OUT	**1.0000**	**0.0003**	**1%**	**I (1)**
INF	**0.0183**	**0.0000**	**1%**	**I (1)**
IR	**0.0183**	**0.0000**	**1%**	**I (1)**
PS	**0.1063**	**0.0000**	**1%**	**I (1)**
NMG	**0.8391**	**0.0000**	**1%**	**I (1)**
PL	**0.0042**	**---**	**1%**	**I (0)**
FS	**0.0001**	**---**	**1%**	**I (0)**
ROG	**0.0011**	**---**	**1%**	**I (0)**

NB: The Decision Rule was made at 1% level of significance

As it can be seen from the above table, only public liabilities, fiscal surplus, and real output gap are stationary in levels; at 1% level of significance. The remaining variables became stationary after transforming the data by taking the first differences. However, at 5% level of significance, inflation rate and interest rate can also be grouped among the variables stationary in levels.

In econometrics, the standard practice is to avoid estimating models using non-stationary variables because they usually lead to spurious regressions. However, it is argued that with VAR analysis, it does not matter whether or not a variable is stationary. The idea behind this argument is that with VAR models, we are just concerned with the interrelations among the variables and not the parameter estimates. As such, the presence

of non-stationary variables in the model does not introduce any bias in the analysis (Enders, 2009). In view of this, the estimation of the VAR models in this study shall be carried out without transforming the data in any way.

5.2 Lag Length Determination

To establish the optimal lag length for each of the VAR models discussed in the methodology, the study made use of the AIC, SC and LR test. Consequently, the findings are presented in the tables below.

Table 4: Policy Coordination VAR model, Lag Length Determination

Number of Lags	LR	AIC	SC
1	**172.5655**	**60.58507**	**61.50116***
2	**30.12422***	**60.27532**	**61.92428**
3	**21.04391**	**60.16775***	**62.54957**

NB: The * denotes the choice lag length based on a respective criteria

In Table 4, the AIC selects a lag length of order 3 for the VAR model employed to ascertain the existence of policy coordination. Alternatively, the SC selects a lag length of 1 while the LR test recommends an optimal lag length of order 2. Based on the principal of parsimony, the ideal and simplest way to estimate this model was to use 1 lag as suggested by the SC. However, this introduces serial correlation in the model. Alternatively, we could adopt a lag length of order 2, but this also is associated with heteroskedasticity (see appendix 1). Therefore, we shall estimate the model will a lag length of order 3.

Table 5: Policy Dominance VAR model, Lag Length Determination

Number of Lags	LR	AIC	SC
1	**39.81174***	**-7.258782***	**-6.983957***
2	**1.939902**	**-7.080631**	**-6.622588**
3	**1.683494**	**-6.897970**	**-6.256711**

NB: The * denotes the choice lag length based on a respective criteria

Table 5 presents the recommended lag lengths for the VAR model used to identify the predominant policy regime in Malawi. However, it is interesting to note that all the three criteria suggest that the bivariate VAR should be of order 1. Accordingly, the study shall estimate the VAR model with a lag length of 1.

Table 6: Inflation Variability VAR model, Lag Length Determination

Number of Lags	LR	AIC	SC
1	**56.29953***	**62.60970***	**63.52578***
2	**19.04208**	**62.78178**	**64.43073**
3	**18.64625**	**62.80040**	**65.18222**

NB: The * denotes the choice lag length based on a respective criteria

Finally, Table 6 gives the lag length recommendations for the Inflation variability VAR model. Again, as it was in the previous case, all the 3 criteria unanimously select a lag length of order 1. Therefore, the VAR model shall be estimated accordingly.

5.3 Diagnostic Test Results

The study conducted a Breusch-Godfrey serial correlation LM test to test for the presence of higher order serial correlation in each of the 3 VAR models. The LM test statistics in appendix 1 indicates that at 1% level of significance, there is neither first order nor second order serial correlation in all of the VAR models. Furthermore, the results suggest a rejection of the presence of third order serial correlation in the policy coordination VAR model.

The study also conducted the ARCH test to check for the existence of autoregressive conditional heteroskedasticity in each of the VAR models. From the results presented in appendix 2, we fail to reject the null hypothesis of no ARCH effects up to order 1 in the policy dominance and inflation variability VAR models, at 10 % level of significance. Furthermore, at 10% level of significance, the null hypothesis of no ARCH effects up to order 3 in the policy coordination VAR model was also not rejected.

5.5 Innovation Accounting

5.5.1 Impulse Response Functions

5.5.1.1 Policy Coordination

In order to assess whether or not there is evidence of policy coordination in Malawi, the study computed the impulse response functions of the policy variables describing the stance of fiscal and monetary policy. Figure 5 gives the responses of fiscal surplus to a shock in each of the variables in the system.

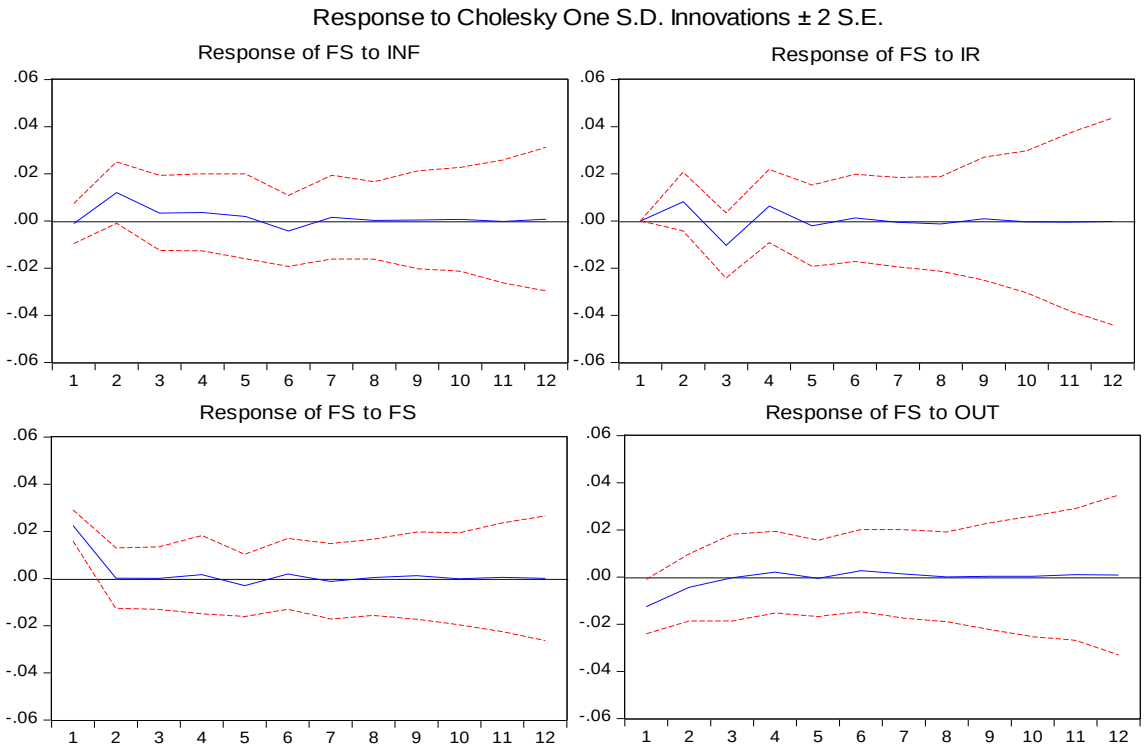

Figure 3: Response of Fiscal Surplus

From figure 5 above, it can be seen that a positive shock in interest rate which is suggestive of a monetary policy contraction is followed by an increase in fiscal surplus which is also suggestive of a fiscal policy contraction. Nonetheless, the response declines to the negative ranges around the second forecast period before improving again as it fades off to zero. At face value we could say there is an element of coordination between the two policies but the results are statistically insignificant.

Furthermore, a positive shock in the inflation rate elicits a positive response in fiscal surpluses. However, the response deteriorates to a negative range in the fifth year of the forecast period before eventually waning during the seventh year. A shock in current fiscal surplus (such as a contractionally fiscal policy) produces a positive response in future fiscal surplus, but eventually tapers off gradually to zero after the second year.

Fiscal surplus responds negatively to a shock in output in the first three years. However, after the fourth forecast year it temporarily improves before fading off to zero.

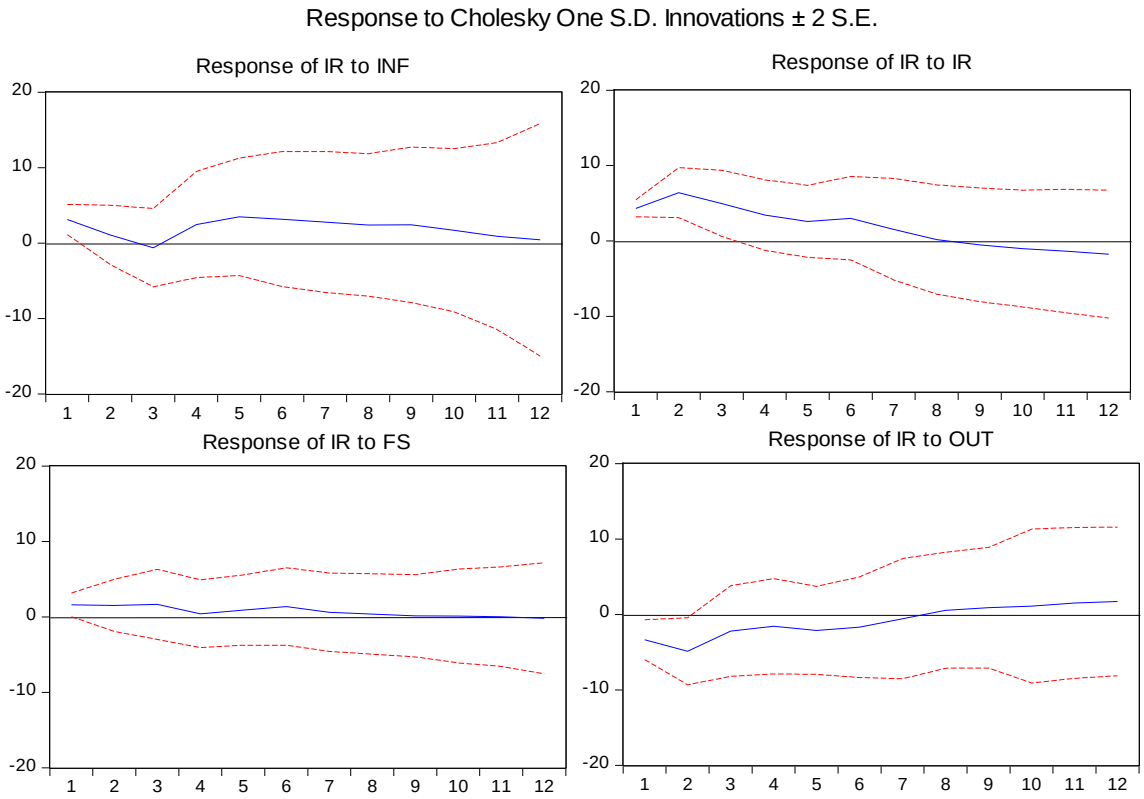

Figure 4: Response of Interest Rates

The time path of the response of interest rates to a shock in each of the variables in the system is presented in figure 6 above. Consequently, it can be seen that when contractionally fiscal policy induces a positive shock in fiscal surplus, the interest rate elicits a corresponding positive response which speaks of contractionally monetary policy. Therefore, we see that there is also a suggestion of coordination between the two policies. However, like in the previous case, the results are statistically insignificant.

Nonetheless, the response of interest rate to an own shock is seen to be positive in the first eight years but eventually declines at the turn of the ninth year. Furthermore, a positive shock in inflation also produces an increase in the interest rates as the monetary authority takes up contractionally monetary policy to reduce the price levels. Output elicits a negative response in interest rates over the first eight years but eventually there is an improvement from the ninth forecast year.

Overall, both the response of fiscal surpluses and interest rates suggest that there is weak coordination between the two policies in Malawi. However, it can be argued that since Malawi's financial system is not fully developed, a more appropriate measure of monetary policy stance should have been the intermediate target of money supply. As such, for a robust check of policy coordination, the study estimated another VAR model but this time interest rate was replaced by money supply. Figure 7 gives the impulse responses between fiscal surplus and interest rate.

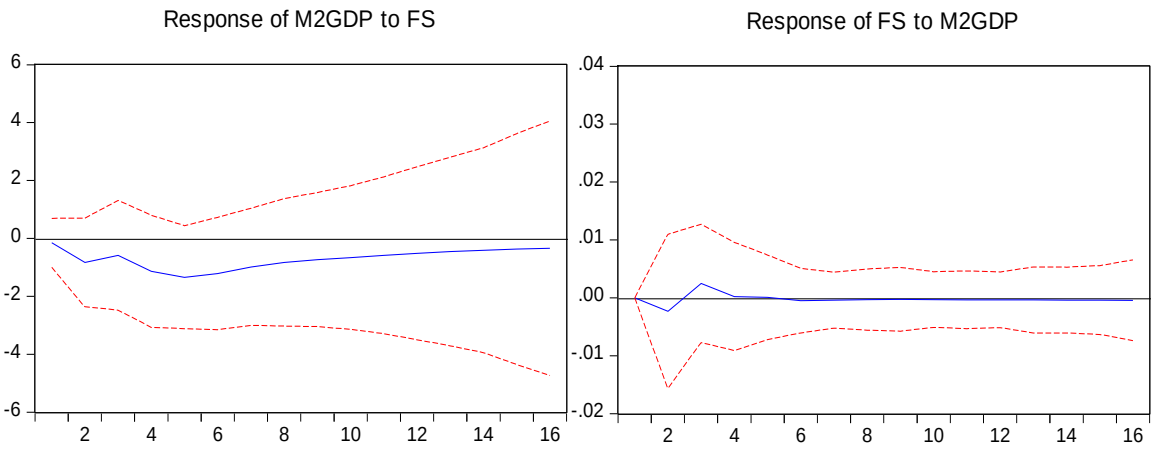

Figure 5: Impulse Response Functions, Money Supply and Fiscal Surplus

From figure 7, we see that a positive shock to fiscal surplus (contractionally fiscal policy) elicits a negative response in money supply (contractionally monetary policy) until it goes back to its long run equilibrium after sixteen years. On the other hand, a positive shock in money supply (expansionally monetary policy) produces a decline in fiscal surplus (expansionally fiscal policy) in the first two years before going back to its long run equilibrium. Again, this is suggestive of fiscal and monetary policy coordination. However, like in the first instances where interest rate was used as the indicator variable for monetary policy stance; the results are still insignificant in both cases implying the existence of weak coordination between the two policies.

5.5.1.2 Policy Dominance

As a precondition to the methodology employed to identify the predominant policy regime in Malawi; the autocorrelation of primary surplus was examined to establish consistency. Consequently, a correlogram of the primary surpluses was computed and the findings are presented in table7.

Table 7: Autocorrelation of Primary Surplus

Lag	Autocorrelation	Q-stat	P-value
1	0.770	22.577	0.000
2	0.689	41.229	0.000
3	0.646	58.131	0.000
4	0.492	68.230	0.000
5	0.437	76.456	0.000
6	**0.324**	**81.133**	**0.000**
7	0.144	82.088	0.000
8	0.066	82.294	0.000
9	0.041	82.376	0.000
10	0.006	82.378	0.000

From Table 7 it appears that primary surpluses register significant positive autocorrelations for a period of over 5 years. As such, we can conclude that the primary surpluses are positive and persistent. Therefore, the study went on to compute the impulse response functions of the bivariate VAR model as presented in Figure 8. The criteria on which the identification of a predominant policy regime is determined can be seen in Appendix 5.

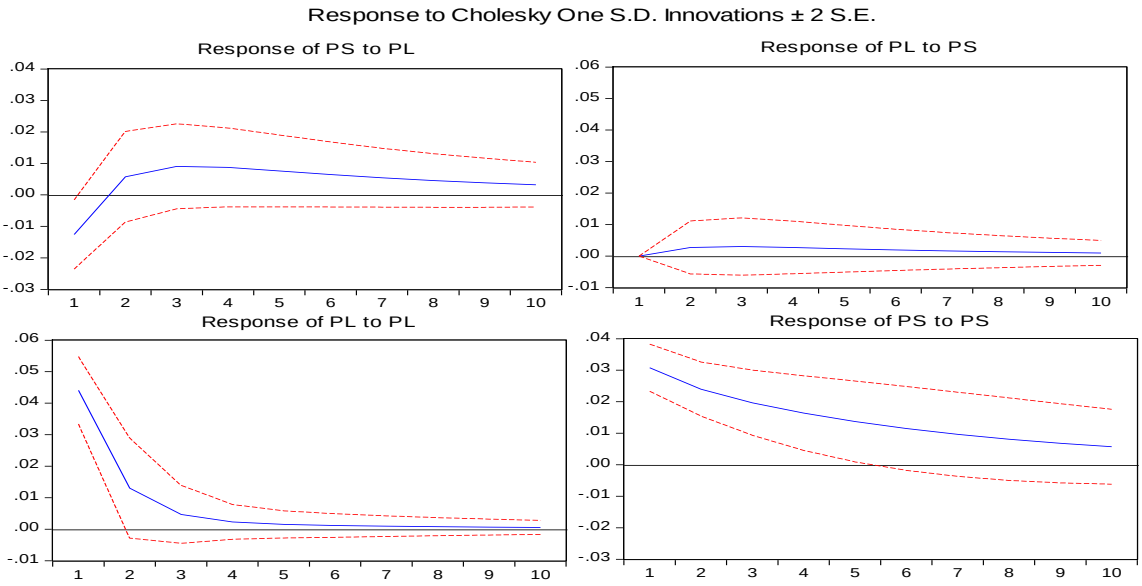

Figure 6: Impulse Response Functions, Primary Surplus and Public Liabilities

An innovation in primary surpluses in period 0 elicits a positive response in public liabilities in period 1. This suggests that future liabilities respond positively to current primary surpluses. This trend is consistent with the predominance of a fiscally dominant regime in the economy. However, the responses of public liabilities are statistically insignificant.

Nevertheless, the response of primary surpluses in period 1 due to an innovation in primary surpluses in period 0 is positive and significant. Therefore, based on the criteria outlined in appendix 5, we can conclusively say that there is a fiscally dominant regime, as opposed to a monetary dominant regime. The above analysis was based on the VAR ordering that is consistent with a monetary dominant regime; however, the same results are obtained under the alternative order (see appendix 6).

5.5.2 Variance Error Decompositions

5.5.2.1 Inflation Variability

The relative importance of the fiscal and monetary variables in explaining the variations in inflation rates are recorded in Table 8, over a period of 12 years. Consequently, the average percentages of inflation variability explained by these two variables are also computed in the same table.

Table 8: Variance Error Decomposition of Inflation

Period	S.E.	PS	NMG	ROG	INF
1	0.035915	11.06620	34.84039	0.860395	53.23302
2	0.046169	9.839855	39.54012	2.879922	47.74011
3	0.051610	9.653535	38.93555	4.343975	47.06694
4	0.055001	9.612331	38.73189	4.862248	46.79353
5	0.057074	9.607165	38.67356	5.003204	46.71607
6	0.058355	9.610391	38.66616	5.028855	46.69459
7	0.059144	9.615434	38.66806	5.030874	46.68563
8	0.059630	9.620417	38.66901	5.030085	46.68048
9	0.059929	9.624446	38.66895	5.029600	46.67700
10	0.060113	9.627366	38.66851	5.029421	46.67470
11	0.060227	9.629340	38.66808	5.029356	46.67323
12	0.060298	9.630621	38.66775	5.029325	46.67230
Average Percent		9.511425	38.44986	4.42977	47.35897

NB: VAR ordering is PS➔NMG➔ROG➔INF

Having included the real output gap to control for the effects of the aggregate demand channel, we see that about 38.45% of the variations in inflation are explained by nominal money growth while primary surplus accounts for only 9.51% of the variations. This suggests that inflation variability in Malawi is better explained by the monetary aggregates as opposed to the fiscal variables. A graphical representation of these findings is presented in Appendix 6.

Nevertheless, the study also estimated an alternative VAR model to confirm the above results. This alternative VAR model substituted primary surpluses with another fiscal variable namely; nominal debt growth (Javid et al, 2001). The basic purpose for doing this was to provide a robust check for the FTPL in Malawi; so as to better appreciate the significance of wealth effect pass-through. Table 9, presents the variance error decomposition of inflation under the alternative VAR model.

Table 9: Variance Error Decomposition of Inflation, Alternative VAR model

Period	S.E.	NDG	NMG	ROG	INF
1	338.9223	0.105297	26.80129	0.399651	72.69376
2	358.6126	0.307928	28.24160	10.84080	60.60968
3	367.9996	0.359835	28.33661	11.18193	60.12162
4	372.9885	0.351638	26.70622	16.28145	56.66069
5	374.0699	0.348152	26.22619	18.54043	54.88524
6	374.4632	0.351604	26.46236	18.81611	54.36992
7	374.6815	0.352874	26.57517	18.82230	54.24966
8	374.8174	0.356897	26.58523	18.83148	54.22639
9	374.8305	0.357120	26.58203	18.83798	54.22288
10	374.8363	0.357107	26.58091	18.83827	54.22371
11	374.8383	0.357211	26.58051	18.83820	54.22407
12	374.8386	0.357277	26.58017	18.83889	54.22366
Average Values		0.330245	26.85486	15.75563	

NB: VAR ordering NDG➔NMG➔ROG➔INF

The results of this alternative VAR model in Table 9 reveal that inflation variability is still better explained by nominal money growth (26.86%) than by the growth in nominal debt (0.33%). Therefore, inflation is seen to be more of a monetary phenomenon than it is a fiscal phenomenon in the Malawian economy.

CHAPTER SIX

CONCLUSION

This chapter presents a summary of the study and gives several policy recommendations from the findings. It further goes on to discuss the limitations of the study and highlights the areas for future research.

6.1 Summary

The study sets out to understand the nature of the interaction between fiscal and monetary policy in Malawi. Consequently, it explores the issue of policy coordination and dominance with regard to the consequences of a mismatch between the two. In addition, the study also seeks to establish the relative importance of fiscal and monetary variables in explaining the variations in inflation.

Using annual time series data from 1980 to 2014, a VAR analysis is carried out on each of the three objectives in the study. However, prior to the actual estimation process, several tests are conducted to ensure the appropriateness of the estimation procedure. Accordingly, the time series properties of the variables are considered and the optimal lag length for each VAR model is established.

The findings of the study reveal that fiscal and monetary policies in Malawi are coordinated as strategic compliments over the sample period. However, the strength of

policy coordination is found to be relatively weak since the results of the impulse response functions are statistically insignificant. As such, an investigation of the predominant policy regime is undertaken to check whether or not the situation is potentially harmful for the economy. Looking at the dynamic interactions between public liabilities and primary surpluses in Malawi, it is established that the economy is characterized by a fiscally dominant regime during the study period. In fact, this is proved to be so because future public liabilities exhibited a positive response to shocks in current primary surpluses; hence, meeting the criteria for fiscal dominance (see Appendix 4)

Against this background of weak policy coordination and fiscal dominance, the study further establishes that inflation variability in Malawi can better be explained by the changes in monetary aggregates as opposed to fiscal variables. Hence, suggesting that the nature of fiscal dominance in Malawi is more consistent with the QTM as opposed to the FTPL. In retrospect, the findings of the study reveal a difference between the macroeconomic environment in Malawi and that of the US, where Canzoneri *et al.*, (2001) initially employed the approach used to identify the predominant policy regime. Nevertheless, the study agrees with the observation by Obinyeluaku and Viegi (2009) that fiscal policy matters in achieving the monetary policy objective of price stability.

6.2 Policy Recommendations

Three major policy recommendations can be deduced from the findings in the study:

i) Firstly, owing to the fact that the Malawian economy is characterized by a fiscally dominant regime, there is a great need to improve the strength of coordination between fiscal and monetary policy so as to overcome the negative effects of fiscal dominance. Therefore, open exchanges of ideas between the RBM and MOF are greatly encouraged.

ii) Secondly, having established that the type of fiscal dominance in Malawi is that explained by the QTM, the economy can benefit from adopting appropriate policies designed to suppress this channel through which fiscal policy mainly becomes dominant. For example, pushing for a more effectively independent RBM would slow down the money creation process that compromises the stability of price levels.

iii) Lastly, even though fiscal policy mostly becomes dominant through the money creation channel in Malawi, there remains a need to make sure that the wealth effect pass-through does not become significant with the passage of time. In essence, this speaks of dealing with the root cause of fiscal dominance as opposed to the channels through which it seeks manifestation. Therefore, fiscal discipline must be upheld in the economy at all times.

6.3 Study Limitations and Direction for Further Research

The major limitation of the study can be seen in the approach employed to identify the predominant policy regime in the economy at a point in time. For instance, sometimes an economy can alternate between a fiscally dominant regime and monetary dominant regime during the study period. However, the approach proposed by Canzoneri et al., (2001) does not allow for an identification of the policy regime shifts during the study period. Therefore, the identification of a policy regime based on this approach may at times be incorrect.

As such, further research on the interaction between fiscal and monetary policy should consider adopting more appropriate VAR techniques that allow for an identification of a regime switch within the study period. An example of such a technique would be the Markov-switching Vector autoregressive (MS-VAR) model introduced by Krolzig (1997).

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APPENDICES

Appendix 1: Serial Correlation Test Results

Policy Coordination VAR Model, with lag order 1

LAG	LM-Statistic (16 df)	P-Value
1	26.37161	0.0490
2	25.67076	0.0588

Policy Coordination VAR Model, with lag order 3

LAG	LM-Statistic (16 df)	P-Value
1	21.53623	0.1588
2	16.35082	0.4288
3	22.13519	0.1389

Policy Dominance VAR Model, with lag order 1

LAG	LM-Statistic (4 df)	P-Value
1	2.075197	0.7219
2	0.460201	0.9773
3	1.315772	0.8587

Inflation Variability VAR Model, with lag order 1

LAG	LM-Statistic (16 df)	P-Value
1	16.16616	0.4414
2	19.26555	0.2551
3	10.40088	0.8449

Appendix 2: White's Heteroskedasticity Test Results (no cross terms)

Policy Coordination VAR, with 2 lags

Chi-Stat	Df	P-Value
184.2899	160	0.0915

Policy Coordination VAR, with 3 lags

Chi-Stat	Df	P-Value
89.59351	80	0.2170

Policy Dominance VAR, with 1 lag

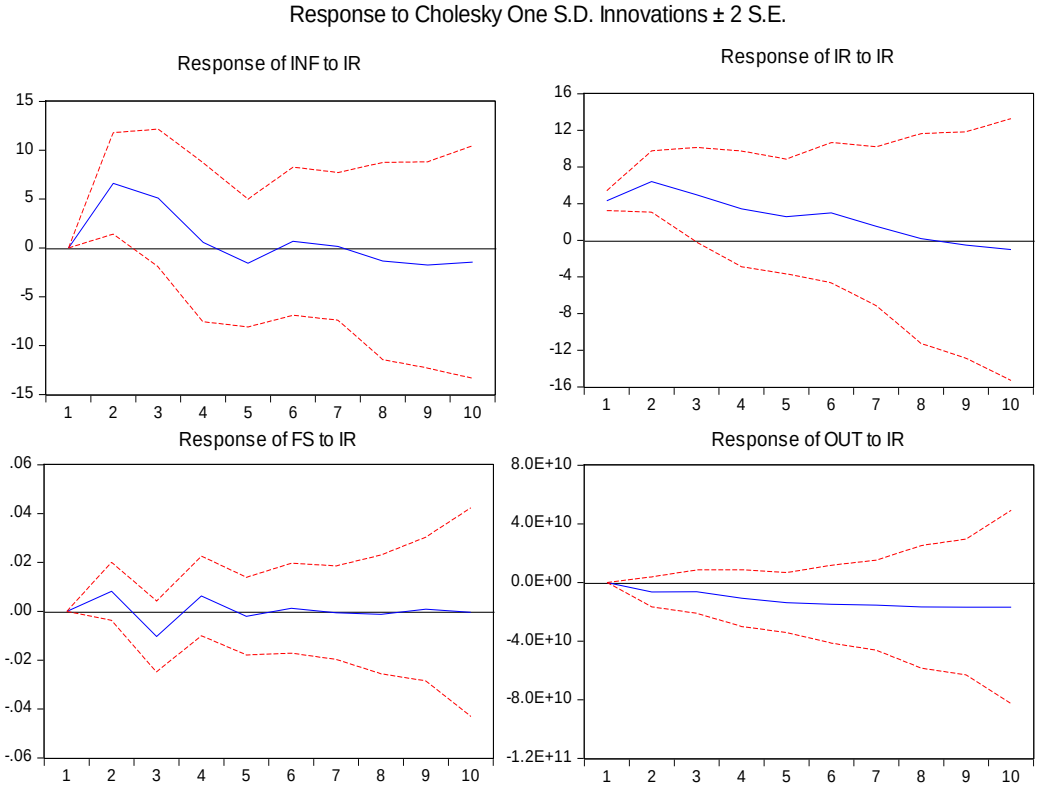
Chi-Stat	Df	P-Value
9.683363	12	0.6437

Inflation Variability VAR, with 1 lag

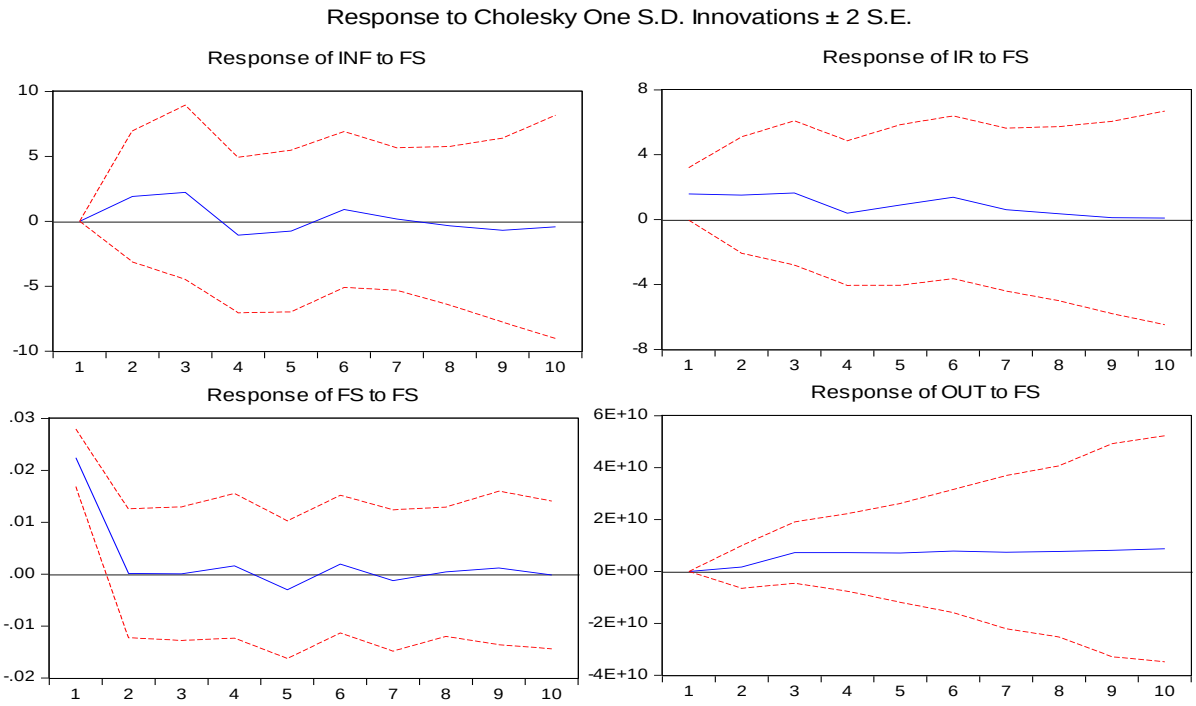
Chi-Stat	Df	P-Value
86.69135	80	0.2853

Appendix 3: Policy Coordination VAR model, Impulse Response Functions

Shock in Interest Rate



Shock in Fiscal Surplus



Appendix 4: Identification Criteria for Fiscal Dominance & Monetary Dominance

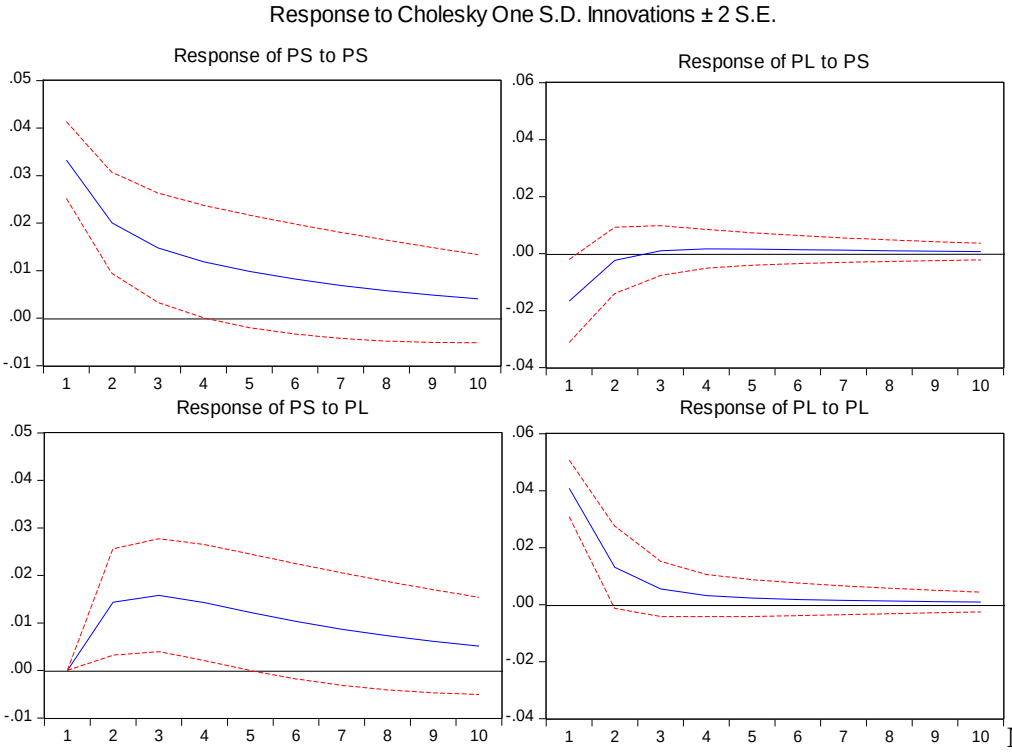
	Response of Future PL to Current PS		Response of Future PS	
Criteria	**1st Order**	**2nd order**	**to Current PS**	**Regime**
C1	Negative (-)	Negative (-)	Positive (+)	MD
C2	Non negative (0,+)	Non negative(0,+)	Non negative (0)	FD
C3	Negative (-)	Negative (-)	Negative (-)	Unidentified

Note

1st VAR ordering is PL➔PS, which is consistent with a monetary dominant regime

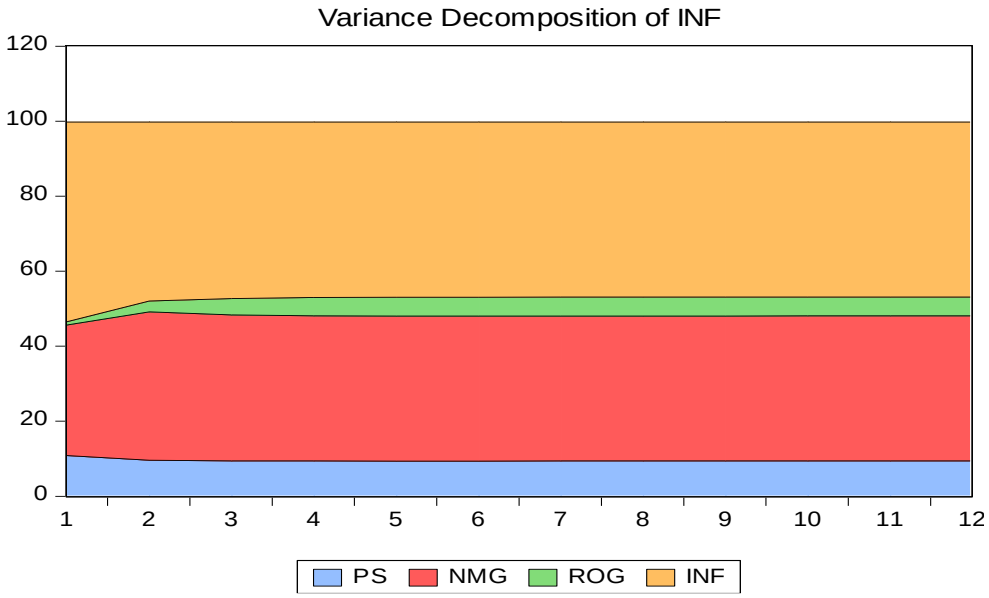
2nd VAR ordering is PS➔PL, which is consistent with a fiscally dominant regime

Appendix 5: Policy Dominance VAR model, Impulse Response Functions



NB: VAR Ordering PS➔PL, consistent with a fiscally dominant regime

Appendix 6: Variance Error Decomposition of Inflation



Appendix 7: Data Used in the Study

Year	OUT	INF	IR	FS	PS	PL	NDG	NMG	ROG
1980	2.80601E+11	13.30	10.00	-0.08	0.07	0.15	37.79	12.60	15208795780
1981	2.65757E+11	11.81	10.00	-0.10	0.06	0.18	141.64	26.05	-6677119665
1982	2.7241E+11	9.82	10.00	-0.05	0.09	0.15	-26.94	14.48	-7217859368
1983	2.82541E+11	13.50	10.00	-0.09	0.09	0.12	-4.58	5.94	-4518964190
1984	2.97686E+11	20.03	10.00	-0.08	0.09	0.16	-16.19	32.62	2944271002
1985	3.11293E+11	10.52	11.00	-0.06	0.11	0.11	36.77	-0.99	8651137282
1986	3.10624E+11	14.05	11.00	-0.04	0.13	0.21	151.74	27.15	-133700386
1987	3.15672E+11	25.16	14.00	-0.08	0.11	0.22	-74.71	36.75	-3501273910
1988	3.25702E+11	33.91	11.00	-0.03	0.15	0.08	-412.82	21.55	-2269748594
1989	3.30082E+11	12.45	11.00	-0.03	0.13	0.09	-115.21	6.06	-7118275805
1990	3.48871E+11	11.82	14.00	-0.03	0.15	0.04	-786.14	11.07	1987992280
1991	3.79329E+11	12.62	13.00	-0.05	0.12	0.09	-158.38	25.44	22353857337
1992	3.51512E+11	23.75	20.00	-0.05	0.12	0.17	587.40	15.79	-1.5936E+10
1993	3.8558E+11	22.77	25.00	-0.02	0.10	0.12	-40.51	39.86	7079953120
1994	3.46096E+11	34.65	40.00	-0.01	0.06	0.15	56.73	36.54	-4.4073E+10
1995	4.03994E+11	83.33	50.00	-0.05	0.10	0.12	204.53	56.23	1429743057
1996	4.33553E+11	37.60	27.00	-0.03	0.03	0.11	-66.82	39.96	18200944363
1997	4.49995E+11	9.14	23.00	-0.06	-0.02	0.14	160.11	2.07	21780089313
1998	4.67524E+11	29.75	43.00	-0.01	0.03	0.04	-304.46	67.76	26506190870
1999	4.81747E+11	44.80	47.00	-0.03	0.01	0.12	-153.98	27.99	27905950403
2000	4.8934E+11	29.58	50.23	-0.05	-0.01	0.14	102.08	45.53	22306820773
2001	4.64995E+11	22.70	46.80	-0.02	0.04	0.10	-3.62	23.73	-1.6224E+10
2002	4.729E+11	14.74	40.00	-0.08	-0.05	0.14	478.21	22.63	-2.4348E+10
2003	4.9891E+11	9.58	35.00	-0.04	0.03	0.10	-32.92	27.48	-1.6898E+10
2004	5.23115E+11	11.43	25.00	-0.10	0.04	0.09	-26.09	29.70	-1.4226E+10
2005	5.3797E+11	15.41	25.00	0.00	0.06	0.09	-16.24	16.25	-2.4152E+10
2006	5.49063E+11	13.97	20.00	0.00	0.05	0.04	-112.60	16.42	-4.1221E+10
2007	6.01177E+11	7.95	15.00	-0.04	0.02	0.07	-323.55	36.59	-2.0539E+10
2008	6.51309E+11	8.71	15.00	-0.06	-0.04	0.11	1108.82	62.64	-4588382473
2009	7.1016E+11	8.42	15.00	-0.05	-0.02	0.12	34.36	24.63	18059507574
2010	7.56557E+11	7.41	13.00	-0.03	0.04	0.05	-194.72	33.14	27004277854
2011	7.89449E+11	7.62	13.00	-0.09	-0.01	0.14	-231.41	35.66	21786037413
2012	8.04336E+11	21.27	25.00	-0.02	-0.03	0.14	-64.01	22.94	-1770820787
2013	8.46162E+11	27.28	25.00	-0.04	0.02	0.19	495.37	35.07	1380013047
2014	8.94393E+11	24.43	25.00	-0.04	0.02	0.18	-35.10	18.05	10828296813