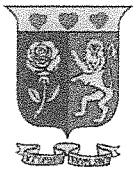

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Monetary Policy Effectiveness
The Role of Financial Frictions on the Effectiveness of the Kenyan Monetary Policy

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DECLARATION

I declare that this work has not been previously submitted and approved for the award of a degree by this or any other University. To the best of my knowledge and belief, the Research Project contains no material previously published or written by another person except where due reference is made in the Research Project itself.

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This Research Project has been submitted for examination with my approval as the Supervisor.

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29/11/2015 ..... [Date]

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List of abbreviations

CBK-Central Bank of Kenya

MPC-Monetary Policy Committee

CRB-Credit Reference Bureau

MONETARY POLICY EFFECTIVENESS : THE ROLE OF FINANCIAL FRICTIONS ON THE EFFECTIVENESS OF THE KENYAN MONETARY POLICY

Abstract

This paper examines the role of credit market frictions on the effectiveness of the Kenyan monitory policy .Following from the credit channel theory, of particular interest is the credit channel of the Kenyan monitory policy and its interaction with financial frictions. I test the theoretical prediction of the theory that monetary policy transmission mechanism through the credit channel is more effective and stronger in countries and periods of high levels of financial frictions, hence with low levels of financial frictions, the monetary policy transmission mechanism is less effective. SVAR impulse responses of output and prices are analyzed with respect to monetary policy shock, where both the credit and exchange rate channels of monetary policy are found to be present. A regression analysis between proxy of financial friction (interest rate spread) and the maximum amplitude of output and price responses depicts a positive and statistically significant relation between financial frictions and monetary policy effectiveness after controlling for factors such as financial development and firm size. Results from this research will help inform policy decisions of the CBK through the MPC and CRB.

Key words; financial frictions; monetary policy effectiveness; credit channel

CHAPTER 1

INTRODUCTION

1.1 Background of the study

Financial markets according to Mishkin (2010) aid in channeling of funds from surplus units to deficit units within the financial system to support productive investment opportunities which lead to economic growth. Where the role of the financial system is hampered, financial markets cannot operate effectively since they cannot identify a more credit worthy investment to finance, bringing forth problems associated with information asymmetry where the cost of acquiring information and controlling borrowers' behavior drives the wedge between the cost of internal and external finance, Adrian (2010) and Aysun *et al* (2013).

Information asymmetry has over the years been a major cause of frictions on the financial markets as sited by Bernanke *et al* (1995). Adverse selection and moral hazard are effects of information asymmetry which lead to market inefficiency, (Akerlof, 1970). With adverse selection lies the probability that more risky individuals or entities are likely to seek out loans even at higher interest rates while moral hazard presents the possibilities that the borrower may engage in rather risky investment ventures which will undermine his ability to repay the loan advanced. Moral hazard as cited by Mishkin (2010), creates a situation of conflict of interest between the lender and the borrower. The lender in the effort to mitigate moral hazard, places restrictive covenants on loan contracts. However the cost of monitoring the behavior of the borrower are generally high, the lender will therefore resort to lending less than otherwise he would have. The results of both adverse selection and moral hazard are lending and investments at suboptimal levels, (Monacelli, 2007).

Major global crisis such as the Great Depression in 1930's, the recession in 1990-1991 and the global financial crisis in 2007-09 have been attributed to a large extend to frictions emerging from financial markets .According to Mishkin (1995, 2010) , the sound operation of the financial markets in the crises were restored upon the monetary policy intervention of Central Banks. The aftermath effects of the global financial crisis spark up various debates on the effectiveness of the monetary policy. Some researchers such as Mishkin (2010) and Bernanke (2010) argue for the case of effectiveness monetary policy intervention while others such as Woodford (2010) conclude that monetary policy is ineffective and other interventions by the central bank such as direct liquidity provisions may work better than standard open market operations. Curdia and

Woodford (2008), further state that assuming a situation of complete breakdown of intermediation, the central banks should focus more on the rate which the ultimate borrower can borrow rather than the rate it directly controls.

Literature surrounding the effectiveness of the monetary policy has over the years grown to account for factors such as financial frictions and financial developments which have been considered to alter the structure of financial markets consequently impacting on the effectiveness of the monetary policy. Kim (1990) argues that financial market deregulations and innovations observed at the end of the 20th century have weakened the traditional monetary policy channels by significantly altering the link between monetary policy and bank lending channel. Credit market frictions, as held by Salmon (1997) and Ibrahim (2005) , play an important role in the transmission mechanism, following the accelerator theory by Bernanke *et al* (1996) which asserts that there exists a positive relationship between levels of financial frictions of information asymmetry and effectiveness of the monetary transmission mechanism. In periods of financial distress such as during crisis periods, the credit view of monetary policy holds that the credit channel is more effective.

Most research on financial market frictions and the effectiveness of the monetary policy have been centered on the developed economies such as the US, Japan and UK. However, developing economies such as those in Sub Saharan Africa have been known to be characterized by high levels of financial frictions attributed to the factors such as political instability and structural features of the financial markets, (Frankel, 2011).

Financial markets of emerging economies such as that of Kenya have been dominated by the banking sector which play a crucial role in the monetary transmission mechanism in Kenya, (Makambi, 2014). The effectiveness of the monetary policy is based on the ability of the Central Banks to affect the operations of the banking sector through manipulation of the central bank rate (CBR).A weak monetary transmission system may be attributed to disconnect between monitory policy actions and behavior of commercial banks. Documented research on the effectiveness of the Kenyan monetary policy has been carried out by various researchers such as Elias (2014), Kaaman (2014) and Cheng (2006).Applying a Vector Autoregressive model, similar results and conclusion are made where the three studies find a positive but insignificant impact of monetary policy on output and price levels in Kenya. This research was done between 1983 and 2012, a

period which was characterized by various reforms, developments and innovations on the Kenyan financial market.

Financial reforms in the Kenyan financial market in 1990 gave independence to both the CBK and the commercial banks, Ngugi (2001). CBK pursued a tight monetary policy through indirect monetary tools by increased reserve and cash ratios, Ngugi (2001).

According to Jagongo (2013) and Ngugi (2001), financial liberalization in 1990 gave commercial banks the independence to formulate credit policies and therefore make decisions on credit allocations. However this independence brought forth issues with credit risk that gave rise to issues such as high levels of non-performing loans and thereby credit rationing. Credit risk arose from the problem of information asymmetry that consequently gave rise to a banking crisis that led to bank failure where period between 1993 and 1997, cases of insolvency and statutory management of both non-bank institutions and commercial banks occurred. This financial distress period as sited by Ngugi (2001) was characterized by dominance of commercial banks, constraint borrowing and tight monetary policy.

Kenya has generally pursued an expansionary/ accommodative monitory target from 2002 to date aimed at stimulating economic growth (CBK, 2014) .The banking sector has also experienced growth in performance which has boosted economic growth by contributing to 71.2 % to Gross Domestic product as at 2013, (CBK, Kenya Financial Sector Stability Report, 2013) . Instances of contractionary monetary policy have been in place in periods of currency crisis such as 2011 and 2015, aimed at stabilizing the Kenyan currency against the dollar and high inflation due to increased prices in oil.

Various developments and innovations have occurred during periods between 2002 and 2010.Major development include mobile banking in 2007 and the establishment of the Credit Reference Bureau in 2008 to enhance information sharing. The government introduced financial reforms to improve credit accessibility such as licensing of more commercial banks and other financial institutions such as Micro finance institutions. The Kenyan banking sector remains segmented into formal banking institution dominated by commercial bank which provide credit for households and private investments. Due to information asymmetry, majority of the Kenyan population have failed to acquire credit from the formal institutions and have resorted to the informal lending institutions that are characterized by flexibility and easier access to credit.

1.2 Problem statement

The Kenyan monetary policy plays a crucial role in maintaining economic stability which provides a conducive environment for economic growth through aspects such as investments. Such investments are facilitated through credit offered by financial institutions such as commercial banks that have remained the dominant source of credit to households and private sectors, Makambi (2014).Hence commercial banks play an important role in the monetary policy transmission mechanism which has been considered weak by various researchers such as Kaaman (2014), Elias (2014) and Cheng (2006).

The Kenyan banking sector in the 1990's after liberalization of interest rates, was faced with the severe problems of non-performing loans which were as a result of information asymmetry in the credit market (Wanjau, 2011) . This period was characterized by high interest rates and tight monetary policy that led to the collapse of financial institutions within the banking sector, Ngugi (2001).In 2008, the CBK formed the Credit Reference Bureau (CRB), to facilitate information sharing among credit lending institutions which according to Wanjau (2011) and Gaitho (2013), has led to a reduction in borrowing cost and loan delinquencies to moderate extent.

The link between the effectiveness of monetary transmission mechanism and frictions in the credit market particularly frictions resulting from information asymmetry such as adverse selection and moral hazard, has been provided by the credit channel of monetary policy and the accelerator theorem, where the two are positively correlated such that in the presence of financial frictions, a credit channel of monetary policy is created through which a tight monetary policy is propagated to the economy.

Research on the effectiveness of the Kenyan monetary policy sited above has focused on the determining the effectiveness of the transmission mechanism considering its impact on the output and price levels in the Kenyan economy using Vector autoregressive model (VAR). However, factors such as financial frictions arising from information asymmetry may have an impact on the effectiveness of the transmission mechanism. Therefore this study, based on macroeconomic data between period of 1993 and 2013, seeks to analyze the relationship between the financial frictions captured by interest rate spread and the effectiveness of the Kenyan monetary policy using the structured Vector Autoregressive model (SVAR).

1.3 Research Objectives

1.3.1General objective

The objective of the study is to determine the effectiveness of the Kenyan monetary policy with reference to the credit channel theory and the accelerator theory.

1.3.2 Specific objective

In particular, the study seeks to determine the role of credit market frictions on the effectiveness of the Kenyan monetary policy.

1.4 Significance of the study

Given the relationship between monitory policy and financial market frictions, the findings of this study will help influence policy decisions when it comes to tackling financial market frictions using the monetary policy. This will help the central bank through the monitory policy committee, formulate an appropriate monitory stance expected to signal and alter other market rates in the economy to achieve economic stability.

Whether financial frictions play a significant role in effectiveness of the monetary policy transmission mechanism will help inform the CBR on strategies to put in place when dealing with effects of information asymmetry. The CBK will also be informed on whether to pursue monitory policy through the bank credit channel especially in times of financial frictions or concentrate on other channels of the transmission mechanism.

Other researchers may incorporate other variables in a similar model or alternatively use a different model to try and draw inferences from the data analysis and compare results obtained to the results from this research.

CHAPTER 2

LITERATURE REVIEW

Introduction

This section explores both the theoretical and empirical literature on financial frictions, credit channel of monetary policy and further the interaction of the credit market frictions and monetary policy. With particular interest is information asymmetry as the major source of financial frictions and the credit channel of monetary policy, drawing inferences from the "credit view" of monetary policy by Gertler *et al* (1998) and the financial accelerator theorem by Bernanke *et al (*1996).

2.1 Theoretical Literature Review

2.1.1 The credit view of monetary policy

The credit channel is not thought as an alternative to the traditional monetary transmission mechanism but as asset of factors through which conventional interest rates are amplified and propagated within the economy as held by (Gertler B. a., 1998). The credit view of monetary policy gives an overview of how credit market imperfections create a credit channel for monetary policy. Additionally, such imperfections make disruptions in the credit availability hence a source of fluctuations in economic activities.

Endogenous changes in the external finance premium are thought to amplify the direct effects of monetary policy on interest rates. Therefore, the size of external premium reflects the imperfections of credit markets hence, the central role given to credit channel with respect to financial frictions.

The credit view or the lending view is drawn from the financial accelerator theorem put forth by Bernanke and Gertler (1995), from which they argue that financial accelerator results from changes in the credit market conditions associated with information asymmetry, which consequently affect the intrinsic cost of borrowing and lending. The financial accelerator theorem if discussed further in the section below.

2.1.2 Summary of the financial accelerator theorem

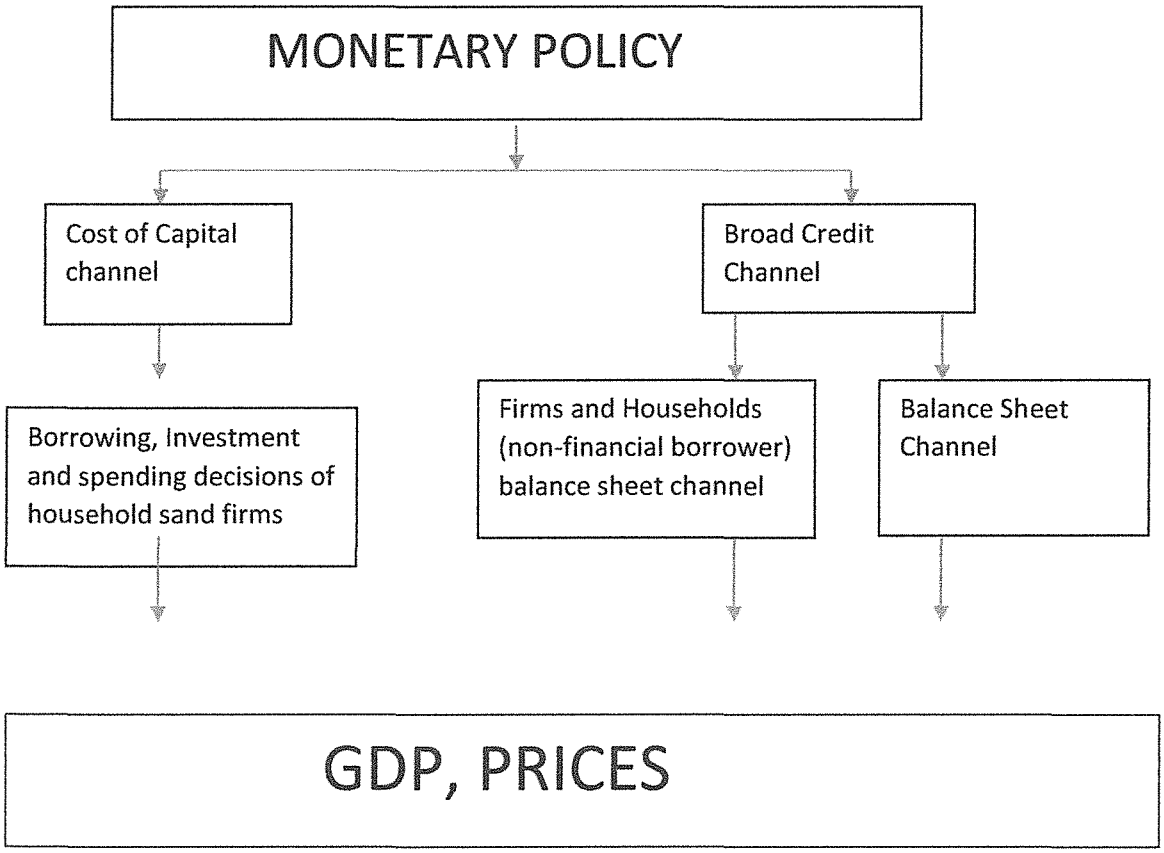
The financial accelerator theory, can loosely be considered as a mechanism that has been used to characterize how financial factors amplify and propagate business cycles. Models based on the financial accelerator theorem, though they may differ in some ways, the general assumption underpinning their development is that financial market frictions which are generally associated with information asymmetry, generate a wedge between external and internal financing. Following

the financial accelerator theorem, (Bernanke & Gertler, 1995), examine the linkages between the credit channel and external finance premium through the bank lending channel and the balance sheet channel.

Aysun et al (2013) and Ciccarellia (2014), following the credit view of monetary policy, assert that monetary policy has real effects through credit supply and demand through its effects on balance sheet of lenders and borrowers. The effects of monetary policy on both the demand and supply of credit are carried out through two distinct channels, as depicted in figure 1, the cost of capital channel or the balance sheet channel and the broad credit channel or bank lending channel. The bank lending channel focuses on the possible effect of monetary policy actions on loan supply by depository institution. However this channel has been controversial with the developments that have occurred in financial sector that have rendered it rather less plausible and on the other hand, other developments are thought to increase the importance of the same channel. The balance sheet channel is centered on the potential impact of monetary policy on borrowers' net worth and cash flow.

Advocates of the credit channel, hold that monetary policy not only affects the general levels of interest rates in the economy but also affect the size of external finance premium whose movements aid in explaining the strength, timing and monitory policy composition. The link between the two aspects, the external finance premium and the monetary policy is best explained through the bank lending channel and the balance sheet channel.

Figure 1: *The balance sheet and bank lending channels*



2.1.3. a. The Balance sheet channel

The channel is based on the prediction that the external finance premium depends on the borrower's net worth, such that the greater the borrowers net worth (sum of total liquid assets and collateral), the lower the external financial premium. Basically, a stronger financial position of the borrower, the lesser the possibility of occurrence of the problem of moral hazard. Therefore fluctuations in the quality of borrowers' balance sheet similarly affects their investment and spending decisions. Based on the financial accelerator theorem that is rooted in the imperfection

of financial systems, a decline in the net worth of a borrower reduces aggregate demand and output consequently reduces the borrowers' net worth.

A tight monetary policy directly affects the borrower's balance sheet such that, with rising of interest rates, the net cash flows are reduced hence weakening the financial position of the borrower. The rising interest rates also lead to the declining of asset prices which further shrink the borrower's collateral. A tight monetary stance has different reactions faced from large and small firms. The small firms respond to the cash flow squeeze by cutting work hours and production unlike the large firms which are considered to have access to other sources of short term financing, react by increasing their short term borrowing.

Models based on the broad credit channel rely on the presence of the moral hazard problem in the debt market so as to generate the role of credit in economic fluctuations according to Bean, Larsen and Nikolov (2002). Moral hazard makes it cheaper for firms to invest using their retained earnings other than external financing implying that with stronger cash flows, firms investment will be higher.

2.1.3. b. The Bank lending Channel

Monetary policy not only affects the external finance premium but also the supply side of credit where it shifts the supply of loans by commercial banks which remain as dominant financial intermediaries in overcoming informational problems and other credit market frictions. The disruption of bank loans may force the bank dependent borrowers to incur costs associated with finding new sources of credit. Such costs as a result of reduction in the supply of bank credit, holding other factors constant, will likely result to an increase in the external premium. The conduct of central banks through open market sales affects the supply of credit through limiting the banks; access to loanable funds. Bernanke and Blinder (1998).

The bank lending channel existance and if it's active within a given economy, is determined by the extend of response of lending supply to monetary shocks, (Ramos - Tallada, 2015).Such that higher sensitivity of credit supply imply more effectiveness of the monetary policy.However,if the lending supply is too sensitive, the balance sheet chanel may give rise to a sudden stop of economic activity increasing volatility levels in output.

2.2 Empirical Literature Review

2.2.1 Financial developments, innovations and intermediation

Financial development, innovation and regular changes of financial market has left the bank lending channel less dispensable. According to (Woodford M. , 2010) the three basic assumptions underlying the bank lending channel models have been overridden by the presence of non-bank intermediation. These assumptions are, deposits are considered as the main sources of funding in the financial sector, reserve requirements are considered typically a binding contract and banks lack other substitutes to lending to bank dependent borrowers.

Adrian and Shin (2008) explore the role of financial intermediation in financial stability and the conduct of monetary policy. According to Adrian and Shin, financial intermediation has evolved from the traditional banking system that involved the commercial banks to a market based banking system which brings forth the broker dealer intermediations which has increasingly become influential in charting the course of economic events. The broker dealer balance sheets as compared to the commercial banks' balance sheet, provide more information on the funding conditions in the economy hence a better signal of the marginal availability of credit. However the Central bank via the monetary policy has failed to keep pace with such financial innovation which according to Simkovic (2009), intermediaries such as investment banks though subject to central bank monitoring, often conduct transactions in a way that do not show up in the conventional balance sheets, hence not visible to regulators and unsophisticated investors . Such developments have seen the changing structure of financial systems towards one based on capital markets.

The developments in the credit markets have been strongly blamed for the origin of the recent financial crisis that saw the banking systems of developed economies such as the US, become effectively insolvent for the first time since the Great Depression, as sited by Metrick (2012). Taylor (2010), drawing lessons from the past financial crisis, attributes the occurrence of the financial crisis on the moral hazard problem that developed due to financial institutions considered too big to and important to fail which were also under inadequate supervision. Information deficiency problem, adverse selection also arose as a result of highly complex financial products and the interconnectedness of financial institutions.

Kiyotaki & Gertler (2010), financial frictions such as agency cost have disrupted financial intermediation which has seen the development of the recent financial crisis, whereby intermediaries with deficit funds offered higher loan rates than intermediaries with surplus funds. With the widening gap, intervention of monetary and fiscal authorities in various countries were used to combat the crisis. Such interventions in countries such as US have employed unconventional policy measures such as quantitative easing as a form of direct lending in credit markets, Gertler and Kiyotaki (2010).

2.2.2 Financial frictions and monetary Policy

The Tylor rule model which is an interest forecasting model by John Taylor (1992), has traditionally been used as a monetary tool for various central banks to foster price stability and full employment through reducing uncertainty and increasing credibility of future central bank actions. However, the reliability on models based on Tylor rule has over time become questionable with the growing concerns on the role of financial frictions within an economy.

Traditionally, Tylor rule according to Yagihashi (2011), has been viewed as a tool that tries to describe or predict the monetary policy behavior and in essence acts as a channel of communication of policy intentions to the public. However, over the years, models incorporating the tailor rule as a measure of monetary policy, have failed to incorporate credit market friction. According to Blas (2009), the traditional Tailor rule assumes perfect credit markets which in reality the existence of uncertainty, induced by information asymmetry, in the maturity of contracts in financial markets, invalidates the frictionless assumption .The incorporation of credit market imperfection, interest rates not only have a much more amplified stabilizing or destabilizing effect, but also a more persistent effect on economic output upon comparison of this results with those attained from assuming a frictionless market.

Credit market imperfection, using a stabilizing interest rate rule can bring the economy closer to its frictionless optimum. Similar arguments by Yagihashi (2011) upon extending variables in the Tylor rule, by adding credit channel variables which include proxies for net worth of capital ratio, bankruptcy cost and default rate, results depicted an significant role played by credit channel variables on policy making which upon implementation by policy makers would improve communication to the general public on policy matters.

Monetary policy is conducted through either expansionary monitory policy or contractionary monetary policy depending on the optimal target levels of inflation. Through the conducting of such stances, there has been observed relationships between the monitory stance and financial frictions within an economy. Generally, loose monetary policy gives rise to financial vulnerability which in turn necessitates implementation of tighter monetary policy stances to combat effects of frictions within an economy. Therefore, loose or accommodative monetary policy propels economic growth but at the expense of buildup of financial frictions in the economy as discussed below by Adrian & Liang, (2014).

According to Adrian and Liang (2014), accommodative monetary policy eases financial conditions but with it comes the consequence of contribution to build up of financial vulnerabilities and frictions hence increased risk to financial stability. Such vulnerabilities include compressed risk premiums, excessive leverages or maturity and liquidity transformation which increase probability of a financial crisis and severe economic depression and recessions. With looser monetary policy, risk return tradeoff increases risk taking which consequently give rise to financial frictions. Similar conclusion on the relationship between the monitory policy and financial frictions on credit markets are drawn from the model developed by Woodford (2010), where the model implies increased leverage in the financial sector owing to the consequence of looser monetary policy.

Studies on the effectiveness of the monetary policy in the face of financial frictions has been carried out by researchers such as Aysun & Hong (2013), who carried out a cross-country relationship trying to capture the effects of financial frictions on the monetary transmission mechanism, using bankruptcy recovery rates and leverage sensitivities as proxy measure of financial frictions in the US economy during the global financial crisis. Results support the evidence of a positive relationship between level of financial frictions and the effectiveness of the monetary policy which further suggests the strength of monetary policy during episodes of financial distress. Mishkin (2009), concludes that monetary policy is more potent during financial crisis than it is during the normal times. Through the unconventional monetary policy intervention, downside risks of the crisis were reduced. Similar conclusions on the credit channel were drawn by Kempa *et al* (2009), where the credit channel appears to be more active during periods of financial distress such as the Great depression and the 1980's Savings and Loan Debacle in the US.

Mody (2007), carried out an investigation on cross country and country specific cycles ability to explain output fluctuations. Results from the investigation indicate that the impact of a bank credit shock is significant in all countries under investigation but more persistent in the European region than the North American region. Such variations, were reasonable on the fact that financial frictions are perhaps more substantial in the Europe than Northern America.

The financial accelerator effects, as sited by Mody (2007), could be termed more relevant and stronger in downturns than upturns since credit crunch are mostly associated with periods of economic downturn. The effects could also be stronger for smaller firms than large firms as small firms are more prone to credit constraints than larger firms. With such characteristics, investigations on developing economies could reveal more significant role of the financial accelerator since such countries experiences frequent scenarios of credit rationing.

2.2.2. a Financial frictions and monetary policy in developing economies

Developing economies such as those in East Asian such as Korea, in Sub-Saharan Africa, in Southern America such as Jamaica, Mexico and Brazil, have common financial market characterized by unstable economic fluctuations, uncompetitive financial banking systems, weak enforcement of economic contracts and high volatility in exogenous shocks due to terms of trade and country risk premium. Such factors according to Frankel (2011) and Yang (2013) have made developing economies highly prone to problems such as information asymmetry, imperfect institutions, illiquidity and default risk. Compared to developed economies, developing economies are thought to experience higher levels of financial frictions which may be domestically generated due to factors such as political instability and fluctuations in domestic food prices. With high levels of financial frictions, developing economies provide a promising ground for the financial accelerator to be more significant and relevant.

To my knowledge Literature on the linkage between financial friction and the monetary policy in Sub Saharan Africa, has received little documentation. However much of the literature has focused on the effectiveness of the transmission mechanism within various countries in Sub Saharan Africa as summarized below. Results from majority of the literature reveal a weak monitory transmission mechanism which contrasts with results from developed economies where the strength and effectiveness of the transmission mechanism is observed during times of financial distress and high levels of financial frictions. However such contradictory results may be attributed to lack of

incorporation of variables of credit channel in models to capture the effects of financial frictions on monetary policy.

Gertler *et al* (2007) , developed a small open economy macroeconomic model which captured well the behavior of the Korean economy during its financial crisis period of 1997- 1998, where they observed a drop in economic output, employment and investment with particular results of credit market frictions magnifying the drop in investment during the crisis period. The financial accelerator mechanism turned out to be quantitatively significant by accounting for approximately 50 % of the total economic activity reduction. However, a similar research carried out by Yang (2013), reveal that financial frictions played a limited role in economic fluctuations in Korea basing their study on the 1997 East Asian financial crisis. Hwang, (2012) considering the same crisis of 1997, with a time period between 1998-2006, investigates the role of domestic credit market frictions using an open economy DSGE model incorporating the banking system and results predicted that due to financial openness influence, the effects of the domestic financial frictions do not give rise to significant differences brought about by domestic productivity, export demand shocks and foreign interest rates.

Ramos - Tallada, (2015), carried out an investigation on determinants of the bank lending channel of monetary policy in the Brazil economy between time period of 1995 to 2012.From the results some factors such as bank characteristics as used in empirical literature, showed no relationship with the sensitivity of credit supply to monetary policy. Such a response was attributed to the changing patterns of the balance sheet channel observed during the post crisis period, where the money market rate no longer affected the lending supply of average banks. However other factors such as size of banks, higher market risks in relation to bank securities and uncertainty of money markets were consistent with empirical literature where they appeared to enhance efficiency of monetary policy through the Bank lending channel.

Excess liquidity is a factor that affects the effectiveness and strength of monetary policy within an economy. Saxegaard (2006), from his research on the transmission mechanism in two sub Saharan countries, Nigeria and Uganda, results depicted high levels of excess liquidity, the monetary policy transmission mechanism was weakened as commercial banks were unresponsive to signals from the central bank as they held involuntary excess reserves. However the weakness of the

transmission mechanism may not only be attributed to the excess liquidity but may also be as a result of developments in the economies such as financial deepening.

Few strands of research such as Davoodi *et al* (2013) on the transmission mechanism in the East African community, results reveal presence of both the exchange rate and credit channel in Kenya, the credit channel being more important in Rwanda and the interest rate channel for Burundi. Countries such as Kenya and Uganda, with deeper financial markets and more competitive banking system, policy rate seemed to matter more to evolution of prices in Kenya and Uganda

Research with particular focus on Kenya has been carried out by various authors documenting on the effectiveness of the monetary policy channels in propagating monitory policy in an economy. Results such as those by Elias *et al* (2014), Kamaan (2014) and Cheng (2006) who carried out an auto regressive analysis on the Kenyan monitory policy effectiveness, indicate the positive but insignificant impact of monitory policy on output and prices in Kenya. Other factors other than monitory policy as sited by Kamaan (2014) may be indicators for Kenyan Economic growth. In comparison to the Kenyan fiscal policy using the recursive VAR, Elias (2014) concludes that the monitory policy is less effective in Kenya in affecting output though he does not rule out the reliability of the monetary policy.

Were and Tiringo (2012) using a VAR analysis to assess the effectiveness of monetary policy in Kenya from 2004-2010 , results show that there is a weak transmission mechanism which as other sub Saharan countries, arise from shallow and less developed financial markets and limited competition in the banking systems. Sub Saharan economies are characterized with structural weaknesses which according to Were and Tiringo, affect the conduct and effectiveness of the monetary policy. The Kenyan economy due to its agri-based nature and large informal sectors, fluctuations in real output and inflation are likely to be caused by the supply side shocks rather than aggregate demand shocks.

Generally, the monetary transmission mechanism in developing economies has been considered weak based on quantitative factors. However various qualitative factors affecting the effectiveness of the monetary policy have been identified. According to Mishra (2012), the bank lending channel, though likely to be the dominant channel in developing economies, may be weaker and in effective due to factors such as the degree of independence of the central banks, the nature and

characteristics of financial institutions which are thought to affect the nature of central banks reaction function. Such factors have contributed to the weaker link between the monetary policy instruments and aggregate demand, hence weakening the effectiveness of monetary policy.

2.3 Summary of Literature review

In developed countries such those in Northern America and Europe, the credit channel of monetary policy is more effective during times of financial distress which are characterized by high levels of financial frictions. Therefore with high frictions in the economy, the monetary policy transmission mechanism through the credit channel is considered more active and effective.

Developing countries, generally thought to have higher levels of financial friction, following various results from research, the monetary transmission mechanism seems to be weak which contradicts the underlying empirical literature of the financial accelerator and the credit view of monetary policy. The two theories assert that with high levels of financial frictions such as those arising from information asymmetry, should lead to the strengthening and efficiency of the monetary policy transmission mechanism. The contradictory results may be attributed to the structural inefficiencies of the financial sectors and also considering an open economy the effects of domestic financial frictions may be eroded away. Other factors such as the degree of independence of the central banks have been identifies as potential factors that affect the effectiveness of the monetary transmission mechanism.

The inclusion of financial frictions in various models determining the effectiveness of the monetary transmission mechanism, should help in determining the relationship between financial frictions and effectiveness of monetary policy which has been observed to be positive. In developing economies such as Kenya, incorporating financial frictions and controlling for recent developments and innovations in the financial sector while coming up with models depicting the effectiveness of the transmission mechanism, results from this research may help explain the positive and insignificant effectiveness of the Kenyan monetary policy.

CHAPTER 3

METHODOLOGY

3.1 Introduction

This chapter covers the procedure that is used to conduct the study, including data and model specification. The section is divided into various sections namely the research design, data specification and model specification.

3.2 Research Design

With reference to the objective of the study which is to assess the effectiveness of the Kenyan monetary policy, monthly macroeconomic data from 1993 to 2013, is used to quantify the effectiveness of the monetary policy using the structural autoregressive model (SVAR), from which impulse responses are generated. Thereafter, the relationship between financial frictions and the monetary policy is determined through involve a regression analysis between the financial friction proxy measure, control variables and the impact of monetary transmission mechanism. Results from the regression will form the basis of analysis and interpretation in the consequent chapter.

3.2.1 Justification of research design

The study period from 1993 to 2013 encompasses crisis periods in Kenya such as the banking crisis in the 1990's, periods of financial distress and recessions owing to political instability and domestic food prices.

The SVAR model is preferred over the normal VAR model since VAR it does not solve the fundamental economic problem of identification. In addition, the SVAR model enables the identification of exogenous monetary shocks

3.3 Data collection and specification

Monetary policy actions as reviewed in section 2 is aimed at affecting output and prices in the economy. Through the variables of output and prices, we are therefore able to determine the effectiveness of the monetary policy propagated through the monetary transmission mechanism by measuring the impact of monetary stances on the variables.

The identification of the macroeconomic variables is based on the availability of macroeconomic data in the study from 1993 to 2013. Monthly secondary data will be collected from various sources such as the World Bank Database, IMF Database, the International Country Risk Guide (ICRG) and the Kenya National Bureau of Statistics.

Variables identified include those directly affected by monetary policy such as short term interest rates and the government securities and aggregate macroeconomic variables such as output and prices. A brief description of the variables chosen are put forth below.

Variables

3.3.1 *Output*

Various measures have been used as a measure of output such as GDP and the GDP deflator. These factors according to (Gertler & Bernanke (1995), respond to an unanticipated tightening of the monetary policy by declining approximately four months after the shock. Other measure of output such as industrial Production Index (IPI) and Gross National Product (GNP) can be used. However due to the availability of data, GDP will be used in this study instead.

3.3.2 *Price levels* (*CPI*)

The consumer price index will be used to represent the price levels. According to Bernanke and Gertler (1995), CPI inclusion in the VAR model serves the purposes of controlling oil price shocks and other factors influencing output and inflation.

3.3.3 *Short term interest rates* (r_t)

A tight monetary shock in the economy is often associated with the increase in short term interest rates. Therefore, to represent the policy instrument, the Treasury bill short term in interest rates are used in the model.

3.3.4 *The real effective exchange rate* (*REER*)

The real exchange rate is used as a measure of the response of the exchange rate to a monetary policy shock in the Kenyan economy.

3.3.5 *The monetary aggregate* (*M*3).

The monetary aggregate is used to separate money demand and money supply shocks. According to (Aysun, Honig, & Brandy, Financial frictions and the strength of monetary transmission, 2013), the monetary aggregate accounts for the liquidity puzzle as well as minimizing the risk of dependency of monetary policy shocks on money demand shocks.

3.3.6 *World Commodity Price Index* ($WCpi$)

Aysun et al (2013), in trying to identify monetary policy shocks, their results reveal the 'price puzzle' and liquidity puzzle problems which have a wide documentation as frequent shortcomings in identification strategies. To solve the problem such as the price puzzle, (Christiano, 1994) advocates for addition of the commodity price index. In this study we use the world fuel commodity price index.

3.3.7 *The federal fund rate*(FFR).

Following the assertion put forth by Kaaman (2014), the inclusion of (FFR) and $WCpi$, serves the purpose of controlling for changes in the overall global economic stances.

3.4. Preliminary diagnostics (Stationarity tests, cointegration tests and lag length selection)

The study employs time series data which is prone to various issues such as non stationarity leading to spurious results. Therefore to obtain consistent results, unit root tests such as augmented Dickey Fuller (ADF) and Philip- Peron (PP) tests are carried out. Consequent tests such granger erogeneity (cointegration tests) to ensure stability of the model and information criterion tests to determination of the optimal lag length of the variables.

3.5 Model identification and specification

The vector Autoregressive model (VAR), has been identified in various literature to study the macroeconomic effects of an unexpected change in monetary policy. Christopher Sims (1980) provided a new macroeconomic framework known as VAR , which as described by Bernanke et.al (1999), is a system of ordinary least square regressions involving the regression of the variables on the lagged values of themselves and other variables hence, each variable is treated as an endogenous variable.

The basic VAR model can be modified into the structural Vector Autoregressive model (SVAR) or the reduced form VAR. This study will employ the SVAR, to analyze the impact response of monetary transmission mechanism.

3.5.1 SVAR model

Structural Vector Autoregressive models have in the recent past gained popularity with the earlier documentations by Christiano et al (1999) and Kim (1999).Recent use of the model has also been seen in the work by Aysun et al (2013).

The SVAR model is an extension of the VAR model which involves adding constraints on the matrix. Generally, it's a VAR with restrictions. However, too many constraints can lead to failure of convergence process but also enough constraints are needed to allow identification.SVAR model are well suited for the analysis of the monetary transmission mechanism with focus on the role of shocks for the variables in the model.

3.5.1.a Model specification

The SVAR unlike VAR, involves the specification of both the exogenous and endogenous variables which in the study will involve the macroeconomic variables identified earlier. The general form of the model is therefore;

$$Y_t = (GDP, Cpi, REER, r_t, M1, WCpi, FFR)$$

The reduced form estimation of structural parameters requires some restrictions on the matrix elements. These restriction are made based on existing theories. However for the study we follow the same non recursive approach strategy by Aysun (2013) borrowed from (Kim, 1999). Hence restrictions on the contemporaneous structural parameters are summarized in an equation matrix

$$\begin{bmatrix} e_{GDP} \\ e_{Cpi} \\ e_{M3} \\ e_{T-bl} \\ e_{crdt} \\ e_{NEER} \\ e_{Wcpi} \\ e_{FFR} \end{bmatrix} = \begin{bmatrix} 1 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ a_{21} & 1 & 0 & 0 & 0 & 0 & a_{27} & 0 \\ a_{31} & a_{32} & 1 & 0 & 0 & 0 & a_{37} & 0 \\ a_{41} & a_{42} & a_{43} & 1 & 0 & 0 & a_{47} & a_{48} \\ a_{51} & a_{52} & a_{53} & a_{54} & 1 & 0 & a_{46} & 0 \\ a_{61} & a_{61} & a_{62} & a_{63} & a_{64} & 1 & a_{67} & a_{68} \\ 0 & 0 & 0 & 0 & 0 & 0 & 1 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & a_{77} & 1 \end{bmatrix} \begin{bmatrix} u_{GDP} \\ u_{Cpi} \\ u_{M3} \\ u_{T-bl} \\ u_{crdt} \\ u_{NEER} \\ u_{WCpi} \\ u_{FFR} \end{bmatrix}$$

Where e_{ij} , u_{ij} and a_{ij} represent the structural disturbances, reduced form residuals and contemporaneous structural parameters respectively.

Estimation equation

The respective reduced form estimation equation of the model is given as;

$$Y_t = B(L)Y_t + C(L)X_t + e_t$$

Where Y_t is the endogenous variable vector denoted by:

$$Y_t = (GDP, Cpi, REER, r_t, M3).$$

X_t , is the vector of exogenous variables given by; $X_t = (WCpi, FFR)$

$B(L)$, $C(L)$ represent the matrix polynomials of the lag operators, e_t is the disturbance term or the innovation term that is assumed to be serially uncorrelated.

In the model the forecast error variance decomposition (FEVD) of variables will be computed to measure the impact of monetary policy shocks on variables.

3.6 Financial frictions and monetary transmission mechanism

3.6.1 Proxy measures of financial frictions

Bernanke, Gilchrist and Gertler (1999) framework is an example of a cost state verification model which identify the bankruptcy recovery rate as the key parameter to capture financial frictions on the credit market. Aysun (2013), defines the recovery rate as a measure of the percentage of value of a loan that banks recover in case of default. Higher recovery rates indicate lower levels of financial frictions on the credit market.

Rayner & Jacobs (2012), identifies two possible proxies of credit frictions which are the interest rate spreads on corporate bonds and the interest rate spreads on bank lending where the bank lending is identified as the predominant source of business debt. Ngugi (2001), analyzing the Kenyan interest spreads from 1991 to 1999, results from her research indicate that there was an increase in the interest rate spread in the post liberalization period. The high levels of non-performing loans during this period is a clear indication of high levels of financial frictions.

Therefore financial frictions of information asymmetry and interest rate spreads are positively correlated. In the study, interest rate spread is used as a proxy measure of financial frictions.

Given interest rate spread (IRS) as a measure of financial friction, an estimation of the following equation will be carried out.

$$MTS = \alpha_0 + \alpha_1 IRS + \beta X + \varepsilon_t$$

X , denotes vector of control variables such as stock capitalization to capture the presence of small firms that are considered to be bank dependent. Other control variables used are such as turnover rate of CBK governors Mishra and Montiel (2012), and institutional quality variables such as corruption and bureaucratic rights which are obtained from ICRG.

The control variables above, according to Aysun (2013), affect the monetary transmission mechanism. Therefore a regression on the control variables and the MTS is carried out to determine whether the relationship between credit market frictions and MTS still holds.

3.7 Summary of methodology

Step1: Generating proxy measures of monetary policy effectiveness. This is achieved through determining of impulse responses of macroeconomic variables to monetary shocks using SVAR model and computing forecast error through forecast error variance decomposition (FEVD)

Step 2: determining the relationship between credit market frictions and monetary transmission mechanism. This is done through an OLS regression of the measures of effectiveness of monetary transmission system on the measure of financial frictions.

Step 3: Regression analysis between control variables and the measure of monetary transmission. The aim is to determine whether the relationship obtained in step 2 holds after introducing control variables in the regression.

CHAPTER 4

DATA ANALYSIS AND INTERPRETATION

Preliminary diagnostic tests of stationarity, cointegration and lag selection are carried out on data where variables are first transformed into natural logs for statistical reasons such as avoiding problems such as heteroscedasticity.

4.1.1 Unit root tests of stationarity

The Augmented Dickey Fuller (ADF) test and Philip Perron (PP) tests of stationarity are carried out where all variables are found to be non-stationary at level , but stationary at first difference except federal fund rate which was stationary at second difference as shown below;

VARIABLES	**C.V**	**1%**	**5%**	**10%**	**CONCLUSION**
		-3.461	**-2.880**	**-2.57**	
	ADF t-statistic		**PP t-statistic**		
Log T-bill	-9.591		-23.831		stationary
Log Private credit	-8.439		-16.325		stationary
dlog Cpi	-8.439		-18.217		stationary
dlog Gdp	-8.108		-16.479		stationary
dlog M3	-8.582		-18.240		stationary
dlog NEER	-10.636		-23.338		stationary
Dlog int rate spread	-9.399		-23.049		stationary
dlog stock cap	-6.919		-21.330		stationary
dlog Wcpi	-5.718		-17.170		Stationary
Log federal Fund Rate	-10.422		-32.88		Stationary (at second difference)

4.1.2 Cointegration tests

The johansen cointegration test results depict the presence cointegration at 5% confidence intervals as shown below;

Rank	Eigen value	Trace -stat	5% CV	conclusion
0		603.17	82.49	Reject null
1	0.5938	379.16	59.96	Reject null
2	0.5069	204.390	39.89	Reject null
3	0.4188	69.825	24.31	Reject null
4	0.2334	3.939*	12.53	Fail to reject null

Results from the cointegration analysis with no restrictions, indicates the existence of a long run relationship among the variables hence the need for an error correction model to determine both the long run and short run effects.

4.2 The Vector Error Correction Model

The long run effects interpretation is based on the analysis of the significance of the error correction term (speed of adjustment towards long run equilibrium).The short run causality effects are analyzed using the granger causality technique so as to determine the joint causality effect of the lags of independent variables on the dependent variable.

Results from the VECM model indicate that all variables have a significant error correction term depicting a long run causality from in depended variables, as summarized in the table below. The analysis of the short run dynamics revealed the presence of bidirectional causality between both GDP, CPI and M3.There is no short run causality between GDP and short term T-bill rate. Unidirectional causality is observed from NEER to all other variables.

The VECM results are summarized in the table below.

Endogenous Variable	**Error Correction term (L1)** Speed of adjustment to long run equilibrium	**Conclusion**
Log GDP	-2.41 (p = 0.0000)	Long run causality
Log CPI	-5.42 (p = 0.0000)	Long run causality
Log M3	-7.57 (p = 0.0000)	Long run causality
Log T-bill	-11.022 (p = 0.0000)	Long run causality
Log credit	-2.41 (p = 0.0000)	Long run causality
Log NEER	-1.21 (p = 0.0000)	Long run causality

The LM test for serial correlation was carried where the null hypothesis of no autocorrelation was rejected, indicating existence of autocorrelation among the endogenous variables. Treatment of autocorrelation required differencing and use of lagged variables. Test on normality of the error terms indicated that most of the variables except for CPI and NEER were not normally distributed.

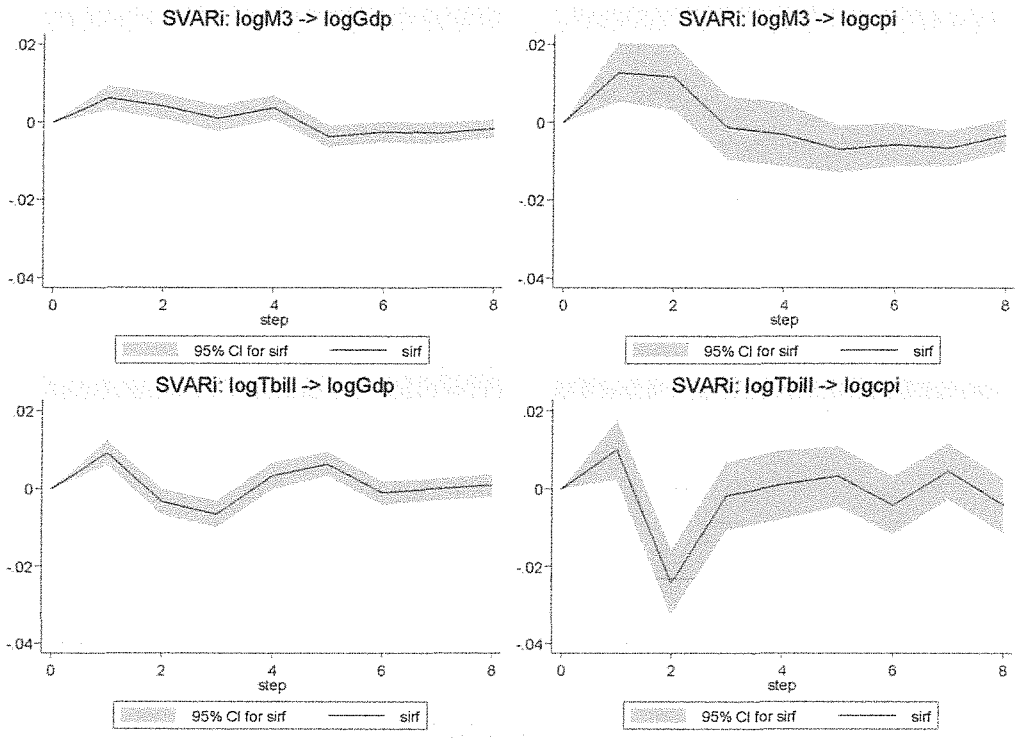
4.3 SVAR Impulse responses

The analysis of monetary policy effectiveness in the East African Community (EAC) has been carried out on a short term basis, since the effects of monetary policy in the region has been found to be short lived relative to those in advanced economies.

To measure the effectiveness of the Kenyan monetary policy, an analysis of the impulse response of output and prices to one standard deviation shock to money reserve and short term interest rates is carried out. In line with theory, Cheng (2006) and Davoodi (2013) impulse response functions results depict a significant and permanent effects on CPI following a positive shock on both the money reserve and short term interest rates. However, similar monetary reserve and interest rate innovation on GDP, are statistically insignificant.

Conclusions on the effectiveness of the monetary policy is based upon the statistical and economic significance of the impulse responses of output and prices, Davoodi (2013).Monetary policy is considered weak if the confidence interval of the impulse response includes zero.

4.3.1 Impulse responses of output and prices to shocks in monetary policy



CPI response to a one standard deviation shock on both monetary reserve and short term interest rates is significant. However, the effect of interest rate peaks earlier than the effect in monetary

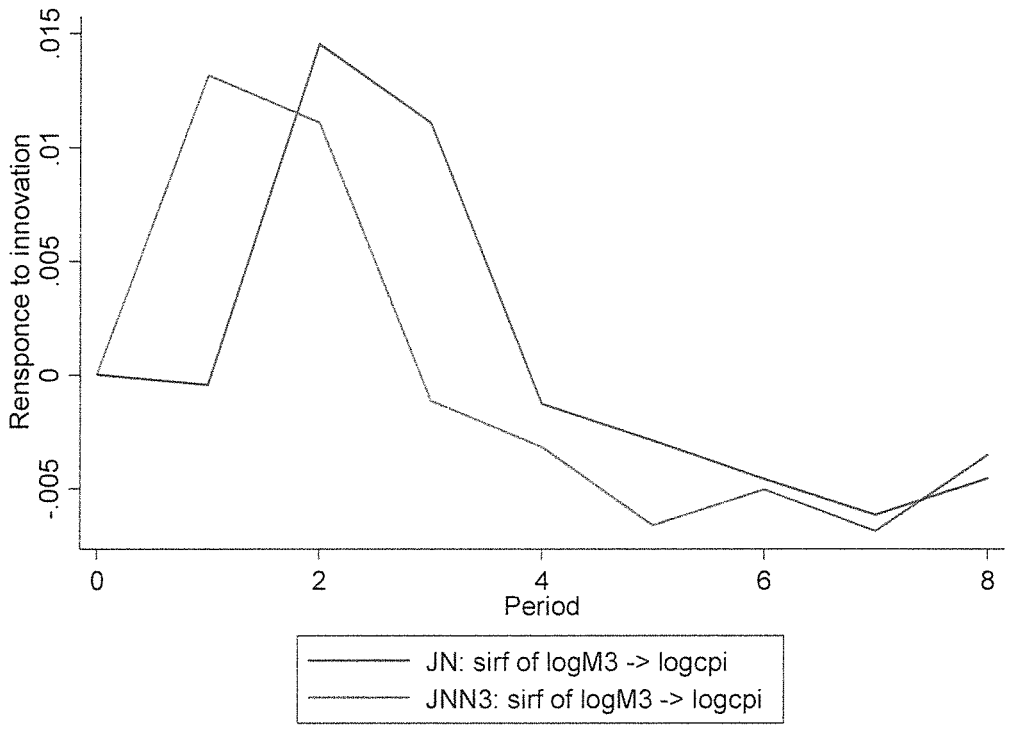
CPI response to a one standard deviation shock on both monetary reserve and short term interest rates is significant. However, the effect of interest rate peaks earlier than the effect in monetary policy. The effect of both monetary policy innovations on GDP is rather transitory and insignificant as the effect of both shocks tends to die out over time.

4.3.2 Testing the existence of credit channel of monetary policy

Appendix 1 gives the remaining SVAR impulse responses where impulse response of CPI to credit and NEER innovation is statistically significant which gives a partial indication of the existence of the credit and exchange rate channels of monetary policy.

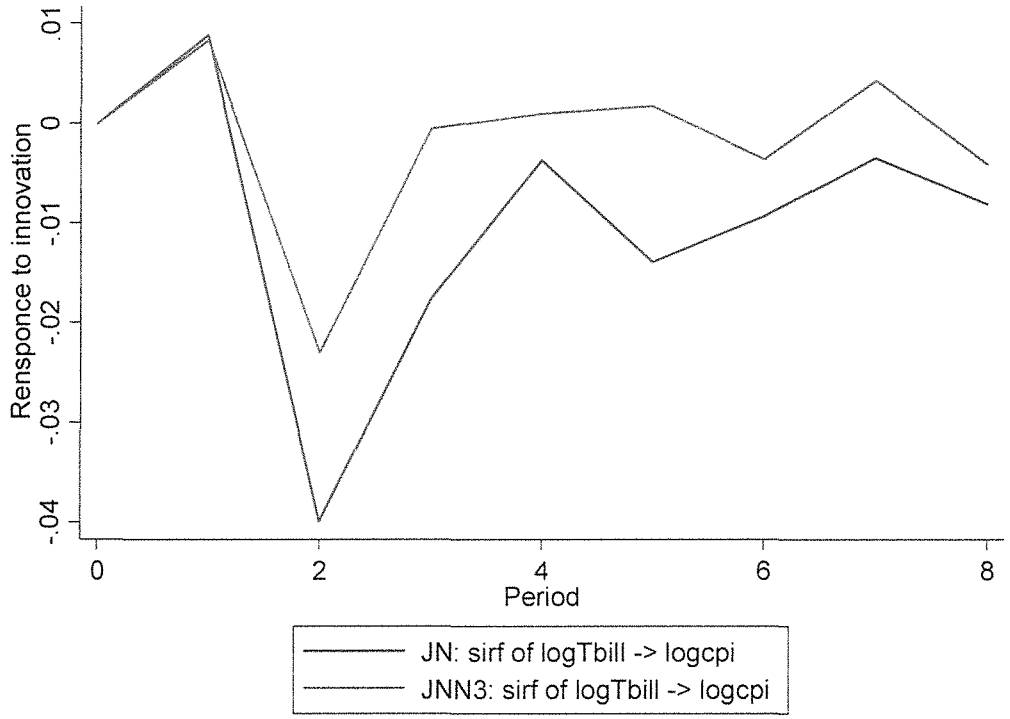
Following the steps by Davoodi (2013), we estimate SVAR model with the six exogenous variables and SVAR model with five endogenous variables where credit is an exogenous variable. Impulse response functions from the models are analyzed below.

Impulse response of CPI to shock of M3



JNN3 represents SVAR impulse response function with credit as an exogenous variable while JN represents SVAR impulse response when credit is endogenous.

Impulse response of CPI to T-bill rate

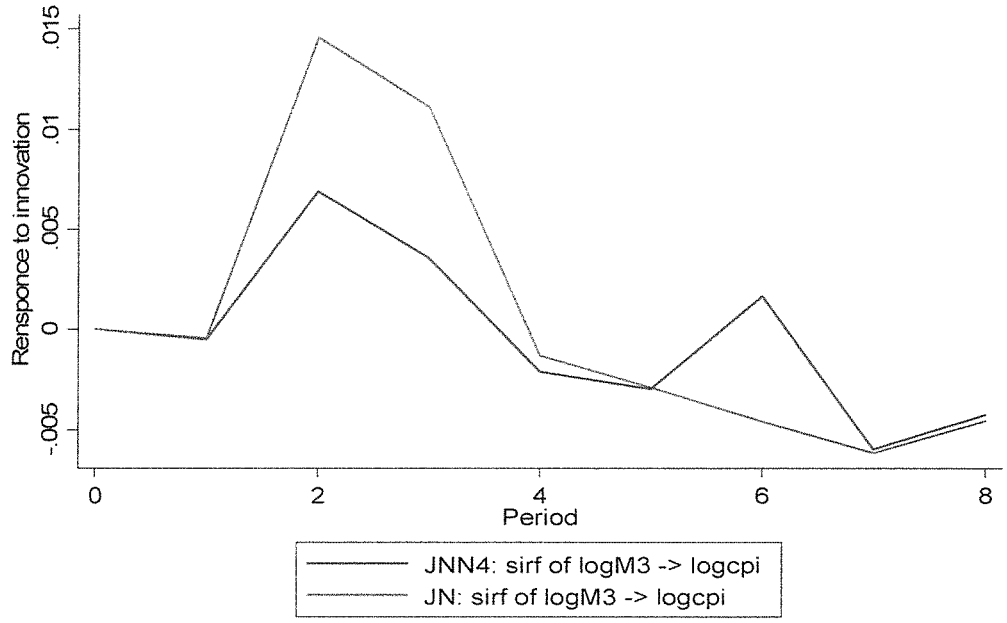


Given that CPI responds more to innovations in interest rates than in monetary aggregate M3, results from the second graph indicate that allowing for endogeneity of credit increases the impact of monetary policy shocks on CPI hence this can be seen as a direct evidence of existence of the credit channel of monetary policy. This results are consistent with (Davoodi S. D., 2013).

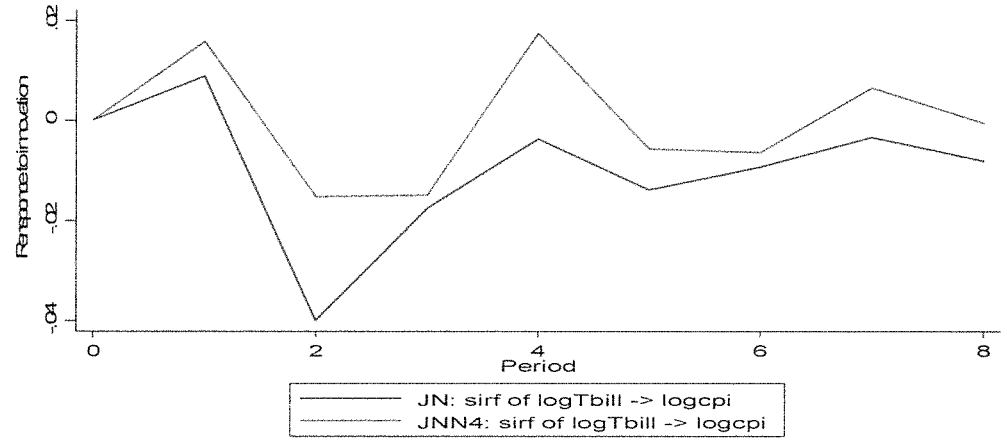
4.3.3 Testing for Exchange rate channel

We carry out a SVAR with nominal exchange rate as an endogenous variable (JN) and a SVAR with nominal exchange rate as an exogenous variable (JNN4). The impulse response functions are as shown below;

Response of NEER to M3



Response of NEER to T-bill



Results from the impulse response depict that the endogeneity of the NEER variable also increases the impact of monetary shocks on CPI hence a direct evidence of existence of an exchange rate channel of monetary policy. From the two graphs, NEER response is more pronounced in shocks to short term interest rates than monetary aggregate. This is in line with findings of Cheng (2006), the short term interest rates in Kenya affects the levels of prices through prices of imports.

Results from the forecast error variance decomposition in Appendix II are consistent with the impulse response function results. Inflation responds more to shocks in short term interest rates than shocks to the monetary aggregate.

4.4 Monetary policy effectiveness and financial friction

In evaluating the relationship between financial frictions and monetary policy effectiveness we carry out a regression analysis between the proxy of monetary transmission mechanism and the proxy of financial frictions (interest rate spread), as shown below.

$$MTS = \alpha_0 + \alpha_1 IRS + \beta X + \varepsilon_t$$

The MTS proxy is taken from the SVAR maximum output impulse response.

The analysis of results from the simple correlation aims to assess the effect of monetary policy on prices in the economy amidst financial frictions. A positive and significant correlation coefficient of 0.88 is obtained from the regression. However, controlling for factors such as financial development and firm size using the proxy of stock capitalization, the coefficient is reduced to 0.203 though it still remains positive and significant. To indicate the presence of effect of financial frictions on MTS through response modelling, we introduce a dummy variable into the regression. The interaction dummy is formed between interest rate spread and the short term interest rates. A positive and significant coefficient of 0.3958 is obtained from the regression. The three models are summarized in Appendix 2.

The positive Results from the simple correlation between financial frictions and effectiveness of the monetary policy depict that in times of financial distress, the monetary policy is quite effective. Though the models vary in strength of financial frictions effects on MTS, the results are statistically significant.

CHAPTER 5

CONCLUSION

5.1 Summary and conclusion

The analysis of the effectiveness of the Kenyan monetary policy is carried out through examining the impulse response of variables to shocks on monetary policy variables in a SVAR model. The macroeconomic variables of interest are output and price levels within the economy. Results from the impulse response depict that prices are more sensitive to short term interest rates than to shocks in monetary aggregate. These results are supported by results from Variance decomposition. Output on the other hand is not sensitive to shocks in the monetary variables.

Tests on endogeneity- exogeneity of credit and NEER variables are carried out. Results from impulse responses give a direct evidence of existence of both the credit and exchange rate channel in Kenya.

To test the predictions of the credit theory of monetary policy, a simple correlation analysis between financial friction proxy and MTS is carried out. Results are in line with the predictions of the theory that in the presence of frictions, the credit channel of monetary policy is amplified.
One reason that may be attributed to this result is that in the presence of high information asymmetry in credit markets, there is constraints in contract enforcement as there is loss in value of assets to be used as collateral to access credit from the credit markets.

5.2 Policy recommendation

The Kenyan monetary policy is more effective through the use of the short term interest rate when it comes to affecting the level of prices within the economy. Output is more responsive to monetary aggregate instrument though this response is insignificant. Therefore other instruments of the monetary policy other than interest rates and monetary aggregates are to be used when it comes affecting output levels.

The effectiveness of the Kenyan monetary policy upon assessment of its impact on output and inflation levels, results from this study reveal that there is need for complementation of monetary policy by other policies such as fiscal policies to achieve optimal or near optimal inflation and output levels following research by (Mutuku & Koech, 2014) whose empirical results depicted that Fiscal policy rather than monetary policy affects output in the Kenyan economy.

The positive relationship between financial frictions and the effectiveness of the monetary policy is crucial in times of financial distress. In accordance to the credit theory, the presence of such frictions amplifies the credit channel of monetary policy hence, monetary policy is able to alter inflation and output levels in the economy.

None the less, the effect of financial frictions on monetary policy in Kenya is reduced upon controlling for other variables such as financial development which tends to have a significant impact on the monetary policy of Kenya. This opens up room for more research on the relationship between financial development, firm sizes and effectiveness of the Kenyan monetary policy. This will shed more light on the role of financial liberalization and institutions such as credit reference bureaus in economic growth.

5.3 Limitation of the study

The study employs monthly data which is obtained from both local and international databases. However, some variables such as GDP, credit to private sector were available on an annual basis therefore necessitating interpolation into monthly frequencies. Such interpolation brings forth some econometric issues such as lack of precision and loss of statistical significance of data.

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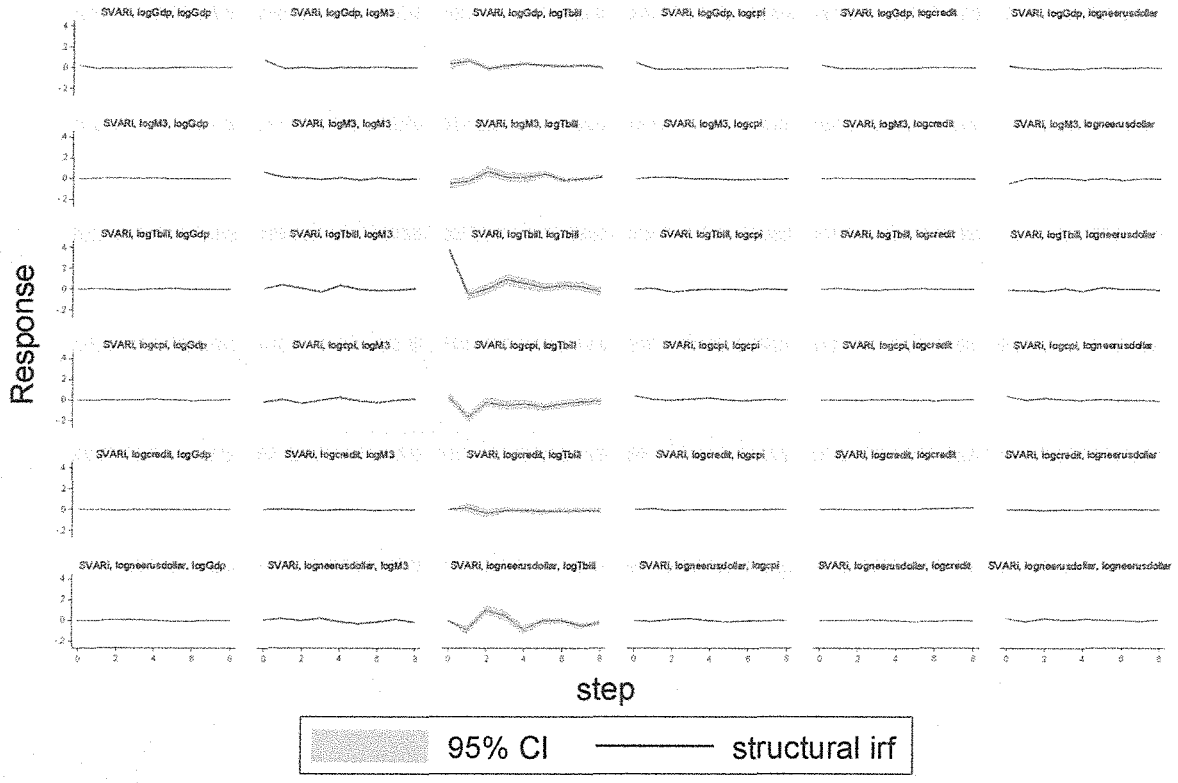
APPENDIX I:

SVAR impulse response graphs



Graphs by irfname, impulse variable, and response variable

APPENDIX 2:

Financial friction and monetary policy effectiveness

	Model 1	Model 2	Model 3
	$MTS = \alpha_0 + \alpha_1 IRS + \varepsilon_t$	$MTS = \alpha_0 + \alpha_1 IRS + \beta X + \varepsilon_t$	$MTS = \alpha_0 + \alpha_1 IRS + \beta X + \beta_2 D_{intbil} + \varepsilon_t$
coefficient	$\alpha_1 = 0.88$	$\alpha_1 = 0.203$	$\beta_2 = 0.3958$
SD error	0.0807	0.060	0.038
P value	0.000	0.001	0.000