MONETARY POLICY AND ASSET PRICES IN KENYA: DOES THE CENTRAL BANK RESPOND TO ASSET PRICES?

PAULINE NASAMBU WAFULA

X50/73245/2014

A RESEARCH PAPER SUBMITTED IN PARTIAL FULFILLMENT OF THE REQUIREMENTS FOR THE AWARD OF MASTER OF ARTS DEGREE IN ECONOMICS, UNIVERSITY OF NAIROBI

NOVEMBER, 2019

DECLARATION

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

…… ……..

Pauline Nasambu Wafula Date

This research paper has been submitted with my approval as the University Supervisor

Signature…… Date……

Dr. Owen Nyang'oro

DEDICATION

I dedicate this research project to my mother Priscah Shiundu Wafula who has taught me everything I need to know about life by teaching me about the Almighty God, without whom nothing exists.

ACKNOWLEDGEMENT

I thank the Almighty God who gave me the strength to keep pushing on with this research even during the most difficult moments.

I sincerely thank my supervisor Dr. Owen Nyang'oro for his guidance throughout the project and for continually encouraging me to complete the research project.

Additionally, my appreciation to my husband Victor and my daughter Sakhile for always being there for me. To my father Peter and my mother Priscah, I will forever be indebted for your investment in my life.

TABLE OF CONTENTS

LIST OF FIGURES

LIST OF TABLES

ABSTRACT

The intricacy that defines how monetary policy relates with asset prices has garnered interest in many studies due to the importance of the position held by asset prices in influencing the financial stability of economies across the world. This research studies how asset prices (variation in stock prices) shape the central bank's monetary decisions in Kenya. Drastic shifts in the prices of assets have impacted different sectors of economies across the globe. As a result, policy makers in monetary authorities across the world have debated on how to treat asset prices as they implement monetary policy for their economies. A change in stock prices variable is added to a Taylor rule that is forward looking to study how asset prices have affected monetary policy decisions in Kenya (Clarida *et al*., 1998). The study employs quarterly data ranging from initial quarter 2000 to initial quarter 2019 and uses the Generalized Method of Moments (GMM) as a method of estimation. The results show that the parameter estimate of the change in stocks price variable is positive and statistically significant. This means that the monetary authority tightens monetary policy in response to an ascent in the change in stock prices. Additionally, we find significant positive parameter estimates for output gap and interbank rate while the coefficient of inflation gap lacks statistical significance. The study also finds that the adjustment of the central bank to target interest rates is approximately 0.37 basis points.

CHAPTER ONE
INTRODUCTION

1.1 Background

Central banks globally have three fundamental tasks which include; pursuing macroeconomic stability by making inflation stable, low and predictable; maintaining financial stability, and lastly, ensuring a proper functioning economy which ensures high and sustainable economic growth rates aimed at improving citizenry living standards (Gertler & Karadi, 2015; Komlan, 2012). In the recent past, policy makers have increasingly faced the dilemma of deciding on the target interest rates (Smaghi, 2009; Yi, 2013). The 2007-2009 global financial crisis (GFC) led policymakers to question what central banks can do to dampen large changes in asset prices (Airaudo, Cardani & Lansing, 2013).

Asset prices have been found to be important in driving fluctuations seen in economies and financial markets around the world (Hordahl & Packer, 2006). Asset prices are also sources of information regarding risk attitudes, indicators of inflation, expectations of the market and as indicators of economic shocks (Savioz & Bengui, 2006). Fluctuations in asset prices which have resulted in asset price booms and busts have brought doubts to policymakers on how to handle such situations (Selody & Wilkins, 2006). These uncertainties are mainly because of the risk posed to the economy when policy makers embark on drastic corrections to prices (Hunter et al., 2003; Ahearne et al., 2005).

The asset market in Kenya has experienced accelerated growth over the past couple of years. Among the indices used for measuring the asset market include: the property index such as housing and land prices; tradable instruments such as bonds and shares; and capital goods. Housing and land prices have soared as has been recorded by various property indexes. Hass Consult property index reported housing prices in Nairobi suburbs having increased by 12.6 percent from 2017 to 2018. There has been a rapid advancement of the stock market in Kenya. This can partly be attributed to the fact that Kenya has faced steady economic growth. The Nairobi Securities Exchange (NSE) share Index increased by 17 percent from 2016 to 2017 (Nairobi Securities Exchange Annual Report, 2017). Kenya is one among many countries around the world where the

growth of mortgage markets has increased the interest in movements of asset prices. According to literature, stock and property prices may have an impact on economic activity through Tobin's q effect on investment and wealth repercussions on consumption (Gilchrist & Leahy, 2002). Given one of central bank's objectives is to manage inflation, it is therefore critical to study to what degree monetary policy reciprocates to shifts in asset prices.

Different studies have analyzed the responses of monetary authorities towards asset prices and have arrived at different views. There is a lack of agreement as of what monetary authorities need to do with regard to asset prices. Wadhwani (2008) and Chadha, et al. (2004) found monetary authorities to react to asset prices while Singh & Pattanaik (2012) and Vickers (2000) have found that monetary authorities fail to react to asset prices. Singh and Pattanaik (2012) contend that findings on this topic can largely be summarized into the pre-crisis view held antecedent to the global financial meltdown of 2007, and the post crisis perspective. Antecedent to the financial crisis, most scholars agreed that monetary authorities ought not interfere with over-inflated asset prices. One of the arguments for this view is that bubbles are difficult to detect and that the central bank was in no better position to detect an asset bubble than any other financial institution (Kohn, 2008). Monetary policy instruments would be ineffective with dealing with speculative bubbles since interest rates would need to be heightened by a very huge amount in order to mitigate bubbles in asset prices (Gruen, Plumb, & Stone, 2005). The problem with such high interest rates is that they lead to a recession by causing a contraction in aggregate demand (Trichet, 2009). Lastly, is that central banks are not mandated to keep a watch on asset prices (Himanshu, 2006; Singh & Pattanaik, 2012). Nevertheless, after the financial crisis, there has been a gradual shift of views concerning asset prices and the role they play in the macroeconomic environment.

Prior to the financial crisis asset prices lacked much attention from monetary authorities. However, with the devastation that was observed in the economies when asset prices were left ungoverned, questions arose regarding the degree to which monetary authorities ought to be involved with asset prices. Perhaps there was a way that central banks could detect an asset bubble early and prevent its build up. This type of view was popularly known as "lean against the wind" (Singh & Pattanaik, 2012). There have been several propositions as to ways in which central banks

can control asset price bubbles. One is to avoid excess liquidity and excess credit and another is to adopt prudential regulation (Singh & Pattanaik, 2012; Mishkin, 2008). With prudential policy central banks can control the actions of financial institutions by regulating the sectors to which these financial institutions lend (Mishkin, 2008). Prudential policy aims at ensuring that financial institutions act according to the stipulated codes of conduct and that they manage risk appropriately. Hence financial institutions have to abide by the policies that have been put in place by the central bank.

1.1.1 Monetary Policy in Kenya

Monetary policy is defined as the process through which a governing authority regulates the supply of money to keep inflation low and to keep the economy growing at a desired rate. (Dwivedi, 2005). From 1966 to 1970, Central Bank of Kenya (CBK) pursued passive monetary action mostly because inflation was low and stable; the economy grew at rates of approximately 6.7 percent annually (Killick & Mwega, 1990). From 1966 to 1972, inflation was between 0 percent and 3 percent. This was followed by a steep increase between 1973 and 1983 with inflation averaging at 12 percent. This period was followed by a fall to about 9 percent from 1984 to 1988 (Killick & Mwega, 1990). The inflation rate has since declined with the current inflation rate averaging at 5 percent (Central Bank of Kenya, 2019). The pace of price build up in Kenya has remained relatively stable for a significant period of time.

The CBK's main goal is to regulate the growth of money in line with the government's policy objectives (CBK, 2019). The monetary policy mediums include the Central Bank Rate (CBR), open market operations (OMO), required reserves and discount window (Ndung'u, 2008). Monetary policy instruments are the mechanisms adopted by the governing authority to undertake monetary policy. The CBR rate is set such that the governing authority attains the desired money stock along with ensuring a stable financial market; the Treasury bill rate plus 3 percent was used before the CBR (Nyang'oro et al., 2015). In summary we have seen that monetary policy decisions in Kenya have been gradually changing since independence as the economy has been growing steadily. The trend of pursuing monetary stability is observed across many African countries, however, a few African countries have moved towards inflation targeting e.g. Ghana and South

Africa (Heintz & Ndikumana 2010). Most developed countries have taken up inflation targeting as a monetary action objective.

1.1.2 Asset Price Dynamics in Kenya's Macroeconomic Environment

The asset market in Kenya has been changing rapidly in the previous fifteen years. This period has been marked with growth in housing, land and stock markets. According to Hass Consult (2017), the average cost of a residential house rose from Ksh. 7.1 million in December 2000 to Ksh. 29.8 million in September 2017. As the middle class grows, more people are looking for ways of investing their disposable income after consumption. According to Hass Consult Property index of 2016, housing prices in Nairobi suburbs increased by 0.1 percent in the fourth quarter and had an annual return of 7.6 percent. Also for 2016 satellite towns recorded an 8.6 percent rise in prices and a 4 percent rise in rental prices (Hass Consult Property Index, 2016).

As for land prices, Hass Consult Property Index (2016) reported a 0.8 percent increase in the fourth quarter of 2016 and a 5.1 percent increase for the year. Land in satellite towns performed better with prices rising at an average of 2.3 percent in the fourth quarter and an annual rise of 21.8 percent (Hass Consult Property Index, 2016). For the stock market, a report by the Nairobi Securities Exchange showed growth in shareholders' equity from 2014 to 2015 and a growth in dividend per share for the same period. Nevertheless, real estate companies such as Hass Consult have reported a slight slowdown in the rate of growth of housing prices in 2017.

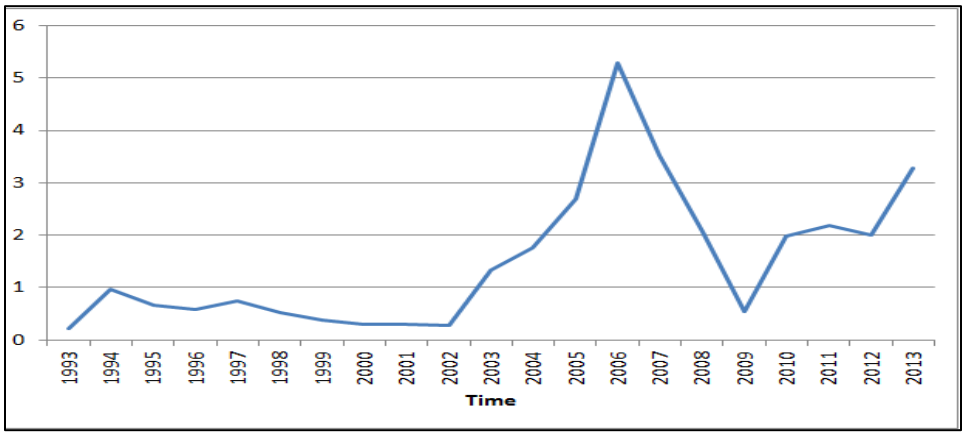
Other factors that have affected the asset market in Kenya include the capping of lending rates by the central bank in 2016. Lending rates that were previously as high as 24 percent were capped to a low of 14 percent. This has sent shock waves across the banking sector in the country. Interest charged on loans is a major revenue earner for banks; therefore, capping of the lending rates has resulted in a decline in bank revenues (Monetary Policy Committee Report, 2017). According to an analysis done by the monetary policy committee to determine how interest rate capping has affected the economy, banks' profitability had declined with the downward trend starting from September 2016 onwards (Monetary Policy Committee Report, 2017). They also found that lending to the small, micro and medium enterprises slowed down in 2017 due to

perceived risks with respect to lending to the sector (Monetary Policy Committee Report, 2017). This has led banks to attempt to reduce operating costs by downsizing (as has been observed in several banks eg. Sidian Bank, Bank of Africa).

Banks have also tightened their lending policies due to the fear of riskier borrowers who have now entered the loan bracket. This has made it quite taxing for individuals to borrow loans or mortgages. Instead of lending to individuals who are considered as risky borrowers, banks are choosing to lend money to the government and to institutions since these are perceived to be less risky. Due to the resulting challenges, the interest rate cap has been repealed in the fourth quarter of 2019. Thus with the glut of housing developments and the shortage of credit available to individuals, the rate of increase in the prices of housing is slowly declining. Below are graphs that show the trends of several variables in the Kenyan economy. We show trends in the stocks sector, housing index, the central bank rate and Gross Domestic Product (GDP) growth rate. Figure 1 shows the stocks traded in proportion to GDP from 1993 to 2013 in Kenya.

Figure 1, shows that stocks transacted as a ratio of GDP underwent a sharp increase starting the year 2002 to 2005. The beginning of this rise in the stocks traded in 2002 can be partly due to the incoming of the NARC government. The new government built investor confidence thus investors were bullish about economic prospects. According to the Kenya Gazette of 2005, this rise in stocks traded was also propelled by the easy accessibility of funds to the non-state-controlled and improved economic standards. The growth in the stock market was also an outcome of Initial Public Offerings (IPOs). From the figure above, we see the total value of stocks traded declining between 2007 and 2009. The sharp decline observed between 2007 and 2009 could be partly attributed to the post-election violence that gripped the country at the beginning of the year 2008. The violence eroded investor confidence. During this period of time, we also had the global financial crisis which could have contributed to the decline in the stocks traded. After 2009, the stock traded increased: a sign of restored investor confidence.

Figure 1: Stocks exchanged, overall amount (% of GDP)

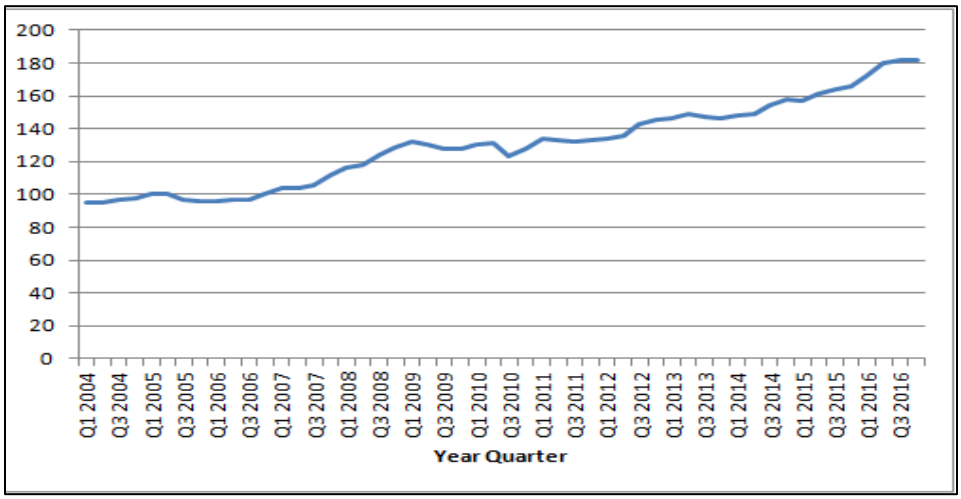


Origin: World Development Indicators|World DataBank

The housing market has undergone periods of price increase and some periods of price decline. Figure 2 shows the housing prices trend in Kenya based on data collected by Hass Consult group. The index was measured for housing in Kileleshwa, Kilimani, Lavington, Nyari, Riverside and Westlands. The index uses housing prices for 2005 first quarter as the base. Nevertheless we note that this index is not representative of the housing situation in the whole of Kenya. Most of the data available for housing prices is for units in Nairobi and its environs. Very little data is available for the housing situation in other counties across the country. Due to this sample bias, we will avoid using housing data in our empirical analysis. Figure 2 shows the Hass Consult Property index from the earliest quarter of 2004 to the second last quarter of 2016 in Kenya.

Figure 2 depicts an increasing trend in housing prices from the earliest quarter of 2004 to the last quarter of 2016. The reasons for the increase of cost of housing have not been established. However, Vuluku & Gachanja (2014) attribute it to a rise in the middle income population in Kenya. As the middle income population grows, it is expected that disposable income available to households also grows therefore more resources can be channeled to investments such as housing. Also there has been an increase in the number of speculators who have entered the housing markets hence driving the increase in prices.

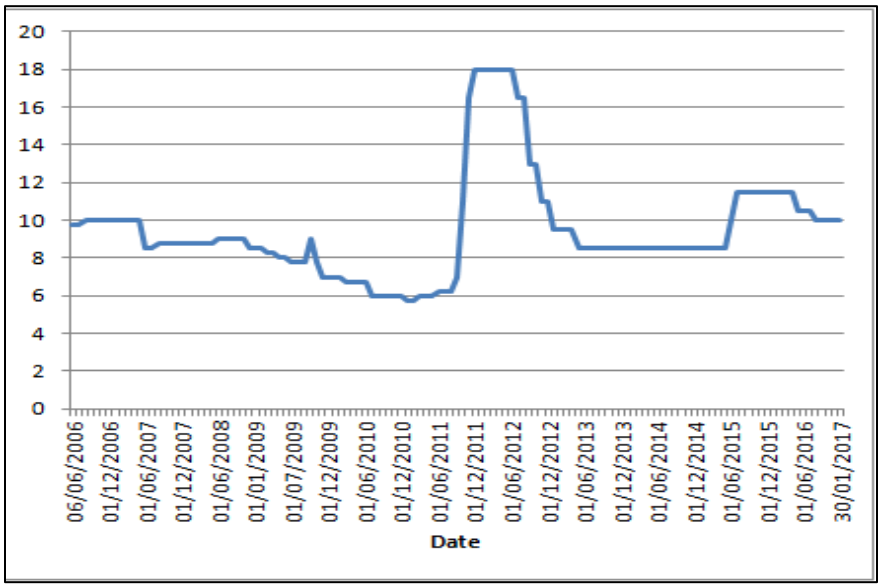
Figure 2: Housing Index (Base Index 2005=100)



Source: The Hass Consult Property Index. Base index: 100=Ksh. 15,682,819

Figure 3 shows Kenya's central bank rate from 2006 to 2017. In 2012, decrease in cost of borrowing and the drop in Central Bank Rate (CBR) starting 18 percent in June 2012 to 9.5 percent in January 2013 affected credit demand (CBK, 2012). In 2011, the Central bank tightened monetary policy and this led to a credit crunch (Financial Sector Stability Report, 2011). In reference to the Central Bank's financial sector stability report (2011), securities that were already held by individuals incurred losses during this period. Other than 2011- 2012 period, Figure 3 shows that the Central bank has set rates of between 6 percent and 12 percent. Below is figure 4 which displays the annual GDP growth rate from 1990 to 2015 in Kenya.

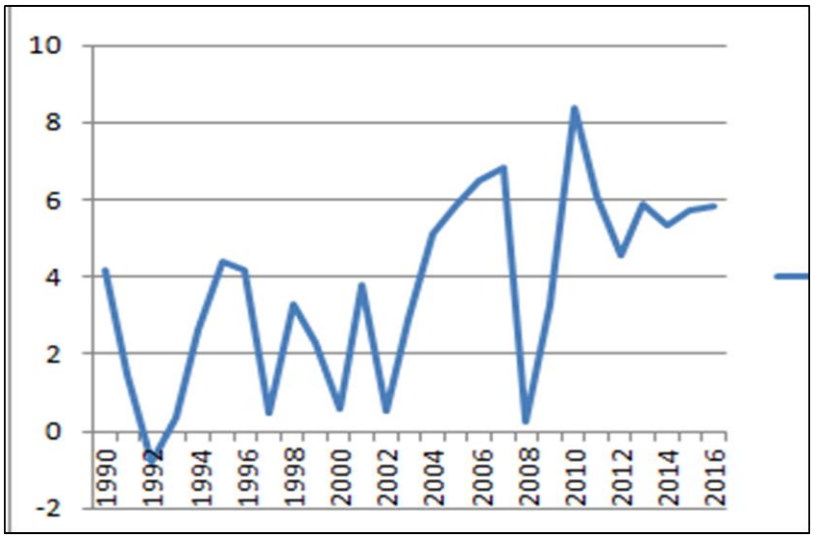
Figure 3: Central Bank Rate



Source: Central Bank of Kenya website

Figure 4 shows GDP growth rate for the period 1990 to 2015. The GDP growth rate has shown periods of increase and decrease. The highest GDP growth rate in figure 4 is recorded in the year 2010. Low GDP growth rates recorded in 1992, 2002 and 2008 coincide with general election periods in the country. Such periods of political uncertainty are marked with low levels of investments.

Figure 4. Annual GDP Growth Rate%



Source: World Bank, and OECD data files.

1.2 Problem Statement

Monetary authorities are mandated with ensuring macroeconomic and financial stability in the economy and with this mandate comes issues to tackle such as shocks to the economy. The questions as to how asset prices relate to monetary policy has been an area of interest in many studies (Misati & Nyamongo, 2012; Inheancho, 2018; Bernanke & Gertler, 1999). Fluctuations in asset prices have greatly impacted economies and caused disruptions in the financial landscape around the world (Borio, Kennedy & Prowse, 1994). These disruptions caused to the economies have led to major financial disasters such as the 2007 - 2009 global financial crisis (Borio, Kennedy and Prowse, 1994). As a result, questions have arisen as to what manner to contend with changes in asset prices and if monetary authorities need to be involved. In Kenya, asset rates have advanced briskly over the elapsed fifteen years as is evident from statistics from the Nairobi securities exchange and from different housing consulting firms such as Hass Consult. Hence to avert any possible asset bubbles or overheating of the asset market, it is necessary to establish whether monetary action in Kenya responds to asset prices. This is what our research seeks to establish.

1.3 Research Question

The research queries that this study seeks to answer include:

- What is the relationship between asset prices and monetary policy in Kenya?
- How do asset prices impact monetary action in Kenya?
- What is the central bank's adjustment mechanism on interest rates?

1.4 Objectives of the Study

The general intention of this research is to establish the linkage between monetary policy and asset prices in Kenya. The study specifically seeks to:

i. Establish how changes in asset prices impact monetary policy in Kenya.
ii. Establish the central bank's adjustment mechanism on target interest rates.
iii. Provide policy implications to the relevant authorities.

1.5 Relevance of the Study

This study is helpful in establishing whether the Central bank factors movements in asset prices when determining monetary policy in Kenya or if asset prices are only useful in providing information regarding the other monetary policy variables as has been suggested in other studies. This is useful in determining whether the Central bank regulates the asset market in order to avoid any overheating of asset prices that would be detrimental to the economy. The study also establishes how the central bank adjusts to target interest rates. This adjustment mechanism is adopted so as to avoid disruptions in the economy caused by drastic shifts in interest rates. This study fills the gap of establishing how monetary policy and asset prices relate in Kenya.

CHAPTER TWO
LITERATURE REVIEW

2.1 Introduction

Below is a probe of existing literature applicable to the research. This comprises the theoretical analysis, empirical review and the summary of the literature. The theoretical breakdown lays out several theories that try to explain the connection that exists between prices of assets and monetary action. The empirical review gives a summary of what other studies have found regarding this theme in Kenya and other countries.

2.2 Theoretical Review

2.2.1 Efficient market hypothesis

The efficient market hypothesis infers that information regarding the price of a given asset is contained in the asset itself therefore, one cannot gain a competitive edge above other players in terms of information since all information is equally available to everyone (Bell & Quiggin, 2006). If the efficient market theorem is followed then the existence of asset bubbles is a contradiction in that it would be expected that asset prices would not be overvalued (Bell & Quiggin, 2006). Hence following the efficient market hypothesis monetary authorities need not worry about asset prices because asset price would always be at the efficient market level hence cannot cause any detrimental effects to the economy.

2.2.2 New Classical view

The new classical view assumes that markets independently attain equilibrium thus in the context of asset prices, if minor shocks would occur on the prices of assets, the markets will adjust to the optimal levels without external influence (Bell & Quiggin, 2006). The new classical view assumes rationality of actions in the economy. In this case central banks would be considered as external influence and thus they would not possess any part to play in the asset market.

2.2.3 New Keynesian model

The new Keynesian model builds on the new classical model in that it assumes that information is imperfect and it allows for other conditions such as asset bubbles (Bell & Quiggin, 2006). This imperfect information makes the economy to take a long time to move to its long run equilibrium value. Hence monetary policy gains significance from these slow movements of prices and wages (Thoma, 2012). Thus with the new Keynesian model, monetary policy is a useful tool in affecting prices.

2.2.3. Other theories and monetary policy strategies

The "lean against the wind" strategy is a strategy where monetary authorities react to adjustments in asset prices. With this strategy, central banks are geared towards pricking asset bubbles and mitigating any adverse effects on the macroeconomic environment caused by these bubbles. Some of the reasons put forward as to why central banks may undertake this strategy include that asset price shocks may adversely affect aggregate demand thus being largely detrimental to the macro economy (Smets, 1997). Second is that asset prices are information sources that can be helpful in determining future inflation (Smets, 1997). The "benign neglect" strategy is a strategy whereby central banks fail to act on shifts in asset prices. Hence monetary authorities are passive towards asset prices. In this strategy, asset prices are only considered in cases where they affect inflation (Erler et al., 2011).

Inflation targeting is a strategy whereby the central bank determines a desirable level of inflation to achieve (Bernanke & Gertler, 1999). The benefit of aiming inflation is that it enables central banks to implicitly correct misalignments in asset prices while focusing on their mission of attaining the inflation target (Bernanke & Gertler, 1999). Asset prices are not considered as target variables by the central bank but these prices will eventually be catered for as the central bank adjusts interest rates to correct aggregate demand (Bernanke & Gertler, 1999).

How asset prices and economic activity relate can be further explained by the financial accelerator's effect on investment in an economy (Gilchrist and Leahy, 2002). According to this theory, small movements in the credit sector can lead to large shifts in the economy thus a shock that results in a rocketing of asset prices would lead to an amplified effect in the larger financial market (Bernanke & Gertler, 1999). Hence this theory explains how asset price shocks are transmitted to not only the financial sector but also the greater macro economy. The theoretical expectations on the association of asset costs and monetary action is that asset premiums are a transmission mechanism of monetary policy and also noteworthy is that the extent that prices of assets alter monetary action decisions is predominantly determined by the kind of strategy employed by the authorities in regulating these prices.

2.3 Empirical Review

This segment discusses research based on the monetary policy strategies discussed above as follows: "lean against the wind", "benign neglect", asset channel and the association between financial steadiness and monetary policy. Kontonikas and Montagnoli (2006) use an expanded Taylor rule to study asset prices and monetary policy. They uphold "lean against the wind" action in that presiding authorities are obliged to counter shifts in asset prices (Kontonikas and Montagnoli, 2006). Wadhwani (2008) argues for the "lean against the wind" principle by presenting a review of studies that support central banks paying attention to stock prices when setting monetary policy decisions. Wadhwani (2008) also tackles several objections towards the "lean against the wind" principle. One of the objections is that asset price bubbles are troublesome to single out in that it is impossible to tell when in fact the economy is experiencing an asset bubble (Wadhwani, 2008). Most of the time this is only realized when it is too late. Another objection is that asset bubbles are difficult to prick without causing other catastrophic events to the economy (Wadhwani, 2008).

Chadha et al. (2004) incorporate asset prices along with exchange rates to a forward-looking Taylor rule. They discover that the US Federal Reserve as well as the Bank of England

target not only asset rates but also exchange rates while the bank of Japan targets exchange rates. This further demonstrates the lack of consensus on what monetary authorities should pay attention to. These responses of monetary policy to asset prices are observed only when misalignments were very large (Chadha et al., 2004). Another inquest that uses Taylor rule to investigate asset prices and monetary policy is by Erler et al. (2011). Using a procedure of dating asset cycles, Erler et al. (2011) find that the Federal Reserve appears to answer to increases in the prices of assets in the US. This is evidence of the "lean against the wind" principle. This also further supports the post-global financial crisis era where monetary authorities began to give consideration to asset prices while establishing monetary policy.

Using the Taylor rule as a theoretical basis, Vickers (2000) supports the benign neglect strategy by finding that prices of assets should not be considered when designing strategies for monetary action. He explains that prices of assets provide information regarding escalation of prices thus should only be used for information purposes (Vickers, 2000). Posen (2006) further supports the benign neglect strategy by concluding that central banks should neither interfere with asset bubbles nor regard asset prices when establishing monetary policy. Wamalwa (2018) carried out a study to establish to what extent monetary policy counters output and asset prices. The results revealed that monetary policy should target interest rates and not asset prices (Wamalwa, 2018). The conclusion depicted that the output price goals can be best accomplished with a dependable and plausible monetary policy action (Wamalwa, 2018). In the above studies it is evident that monetary authorities need not consider asset prices as a primary focus. Nevertheless, by monetary authorities focusing on stabilizing interest rates, inflation and aggregate demand in the economy, they will indirectly stabilize the asset market.

Monetary policy transmission channels include balance sheet, exchange rates, asset prices and interest rate (Kabiro & Nyamongo, 2014). The asset channel of monetary policy requires rationality of investors; if investors are irrational, the asset channel becomes ineffective (Yao et al., 2013). The fact that investors in China are irrational make it burdensome for the monetary authority to realize the desired direction of shift in asset premiums. Additionally, the speculative nature of investors brings delays in the asset channel achieving the desired action (Yao et al.,

2013). Whenever the central bank tightens monetary policy actions investors are bullish; they rush to buy houses and shares instead of moving away from the market (Yao et al., 2013). With this we see that investor behaviour affects how effective monetary policy will impact the economy and eventually achieve the intended goal.

Tuuli (2012) conducted a study on the wealth channel in China using a structural vector autoregression (VAR) model. Their study contradicts Yao et al., (2013) with regard to findings on the asset channel. While Yao et al., (2013) found that rationality of investors greatly impacts the asset channel, Tuuli (2012) find that the asset channel in China works and that monetary authorities can obtain the desired results in asset prices (Tuuli, 2012). They find a weak wealth effect channel concerning the effect that asset prices (transmitting monetary policy) have on household consumption (Tuuli, 2012). Singh & Pattanaik (2012) delved further into this subject matter to establish if monetary policy should address instability in the financial market caused by asset prices in India. Applying a structural VAR model, they find that adjustments in prices of assets do not upset inflation (Singh & Pattanaik, 2012). Additionally, they find that interest rates influence stock prices. This is an evidence of asset channel of monetary policy (Singh & Pattanaik, 2012). We have seen evidence of the asset channel in several countries including China and India. In China an aspect of rationality of investors has resulted in an inconclusive discussion pertaining to the efficiency of the asset medium in the relaying of monetary policy.

Brett (2014) studied monetary action and asset prices in the U.S. mergers and acquisitions (M&A) activity. The study was grounded in the theory which suggests that asset prices rise as a result of an adverse disturbance to monetary policy, which curtails interest rates (Brett, 2014). With low interest rates, cost of borrowing decreases, investment levels increase and as a result asset price rises (Brett, 2014). The study used VAR methodology and found that mergers and acquisitions (M&A) activity does not influence shocks in monetary policy (Brett, 2014).

Delving further into this thematic area when considering the African nation of Nigeria, Igbinosa and Obayagbona (2012) used vector autoregression (VAR) to unearth that shocks emanating from the asset market result to unsteady responses from monetary policy and these

reactions also take a lengthy period to be effective (Igbinosa & Obayagbona, 2012). Iheanacho (2018) uses an Autoregressive Distributed Lag model (ARDL) to find that asset prices reciprocate weakly to monetary policy (Iheanacho, 2018). With these two studies, we discover that the bi-directional responses of monetary actions and asset premiums in Nigeria are weak. Therefore, careful consideration should be put in place in deciding the best way to deal with asset price in Nigeria. Misati and Nyamongo (2010) study the asset channel in Kenya and also how shocks in the stock market alter monetary policy. Misati and Nyamongo (2010) find that stock prices can be used to provide information regarding future market cycles (Misati & Nyamongo, 2010). In the African context, we find that the asset market is still growing and that there is a challenge in accessing reliable data especially with regard to the housing market. A greater number of the studies have focused on stock prices since these are more readily available. Additionally, we see that there is evidence of the asset channel.

The association between a stable financial market and monetary policy has been widely covered in literature. Three views have been presented in contributing to this topic. First is that once stability in monetary policy is achieved we expect financial stability to prevail, hence, central banks should only intervene in cases of financial crises (Claudio & Lowe, 2002). Second is that maintaining a stable financial environment should be the central bank's primary focus; other problems affecting the economy should be managed by other establishments (Tymoigne, 2006). Third is that the governing monetary body needs to watch the greater economy to ensure stable prices since stable prices lead to a stable economy (Claudio & Lowe, 2002). Filardo (2000) described how asset prices are linked to monetary policy by their effect on inflation. Filardo (2000) redefines the measure of inflation from the conventional measures such as consumer price index to one which comprises housing and stock prices. His argument is that the non-conventional measures of inflation such as stock prices would rise in the current period if households presume that inflation would rise in the future (Filardo, 2000).

2.4 Overview of Literature

The empirical review has revealed inconclusive results as to how asset prices should be handled by monetary authorities. The main findings are that asset prices influence monetary policy decisions in some countries such as the US, and fail to affect monetary policy decisions in others such as Japan (Chadha et al., 2004). Additionally, there is proof of asset channel of monetary policy (Kabiro & Nyamongo, 2014). Also that how monetary action is relayed by the asset market is affected by the rationality of the population in question (Yao et al., 2013). Also noted is that there is a lack of breadth of studies from the African context that deal with how asset prices influence money supply decisions and if actions from governing monetary bodies have implicitly countered asset prices. This research will bridge the gap in knowledge that exists.

CHAPTER THREE
RESEARCH METHODOLOGY

3.1 Introduction

This section cites the theoretical and the empirical frameworks of this paper.

3.2 Theoretical Framework

The structure begins with the quantity theory of money (Were et al., 2013; Nyang'oro, Mwega and Gor, 2015)

$$MV = PY \qquad (1)$$

where M = broad money, V= velocity of money, P = price and Y = output. Let $k = \frac{1}{V}$; replacing in equation (1) (Were et al.,2013)

$$M = kPY \qquad (2)$$

Equation (2) assumes that interest rates fail to affect the demand for money. There have been arguments against this so we modify equation (2) to show that interest rates affect the demand for money as shown below (Were et al., 2013).

$$\frac{M}{P} = f(Y, i) \qquad (3)$$

whereby *Y* is real income and *i* is the nominal interest rate.

The model suggests that money demand is affected by the real GDP, nominal interest rates and price level (Were et al., 2013). Taking logs on equation (3):

$$M = \alpha Y + \beta P - \gamma i \qquad (4)$$

where M = nominal money demand, Y = real GDP and i = nominal interest rate.

Rearranging equation (4):

$$i = \frac{1}{\gamma}(\alpha Y + \beta P - M) \qquad (5)$$

Equation 5 demonstrates that interest rate is formed by output, price and money demand. The most appropriate model to use as the basis of the empirical specification is the Taylor rule.

3.3 Empirical Model

A forward looking Taylor rule assumes that for a given period of operation, the governing monetary body establishes a mark for the interim interest rates which is determined by the variation of inflation and output from their corresponding target values (Clarida *et al*., 1998, Chadha *et al*., 2004)

$$i_t^* = \bar{\imath} + \beta(E[\pi_{t+n}|\Omega_t] - \pi^*) + \gamma(E[y_t|\Omega_t] - y_t^*) \qquad (6)$$

where i_t^* = nominal short term target interest rate, $\bar{\imath}$ = long run equilibrium nominal rate, Ω_t= information set accessible to the monetary authority, $E[\pi_{t+n}]$ = expected inflation at time *t+n*, π^*= target inflation, $E[y_t]$= expected output, y_t^* = potential output at time *t*.

To avoid disruptions to the macro economy, monetary bodies smooth changes in interest rates. Below is an equation that assumes that the present short-term rate of interest r_t adapts to the set target r_t^* conforming to a partial alteration mechanism (Clarida et al., 1998, Chadha *et al*., 2004):

$$r_t = (1-\rho)r_t^* + \rho r_{t-1} + v_t \qquad (7)$$

ρ- captures the extent of smoothing of interest rate and $v_t$is a random external disturbance to the interest rate.

Combining equations (6) & (7) and using actual values instead of expectations:

$$i_t = (1-\rho)r_t + \gamma_1(\pi_t - \pi_t^*) + \gamma_2(y_t - y_t^*) + \rho r_{t-1} + \varepsilon_t \qquad (8)$$

whereby $r_t = r_t^* + \pi_t^*$, $(\pi_t - \pi_t^*)$ is deviation of inflation from target, $(y_t - y_t^*)$ is disparity between output and potential and ε_t is an error term which is a linear consolidation of the exogenous disturbance v_t and the other projection errors.

The study extends equation (8) to include a variable that captures change in stock prices. This is following Clarida et al. (1998) who extended their model to include an extra variable and Chadha et al. (2004) who included exchange rate and stock prices.

$$i_t = (1-\rho)r_t + \gamma_1(\pi_t - \pi_t^*) + \gamma_2(y_t - y_t^*) + \rho r_{t-1} + \kappa \Delta s_t + \varepsilon_t \quad (9)$$

where Δs_t is change in stock prices.

To meet the first objective equation (9) is estimated using the variables described below in order to get the direction and validity of the coefficient of the change in stocks prices variable (κ). Equation 8 is estimated as a baseline model. The coefficient of the interbank rate (ρ) will enables us to determine the central bank's adjustment mechanism as (1-ρ) hence meeting the second objective.

Dependent Variable

Bank Rate

The regressand in our model (i_t) is the central bank rate. For data before 2006, the rate used is the Treasury bill rate + 3 percent.

Independent Variables

Interest rate

This is the nominal interbank rate (r_{t-1}) which is guided by trends in the market (Nyang'oro, Mwega & Gor, 2015).

Inflation Gap

This is the variation of inflation from potential inflation. The nineteenth bi-annual monetary policy committee report of 2017 reports that the Government's target medium-term target rate is 5 percent. The inflation gap is estimated by employing Hodrick-Prescott (HP) filter. The expected sign of the coefficient is positive (Clarida et al., 1999; Chadha et al., 2004, Nyangoro et al., 2015).

Output Gap

This is the variation of GDP from potential GDP. Log values of GDP are used. GDP gap is determined by employing the Hodrick-Prescott (HP) filter. The expected sign of the coefficient is positive (Bernanke & Gertler, 2001).

Stock prices

The change in log of NSE 20 share index is adopted as the variable of estimation. The anticipated sign of this coefficient is positive (Chadha et al., 2004).

GMM is used to estimate the model. Ordinary Least Squares (OLS) estimations are disregarded due to the reverse counteractions from the bank rate to the regressors and thus contravenes the condition of uncorrelated regressors and error terms (Erler et al., 2013). Due to the endogeneity of the explanatory variables, the approximated parameters would be biased using OLS (Erler et al., 2013). To deal with endogeneity, the variables are instrumentalized. The instruments are the constant, the first, second and third lags of the output gap and inflation gap; the second and third lag of the interbank rate; the first and second lags of change in stock prices. The instruments in question are highly correlated with the respective variables (Chadha et al., 2004). The instruments are chosen based on the assumption that our expectation is that monetary policy resolutions are fashioned after the observance of the variables at the end of every quarter. Also perpendicularity exists between the set of instruments and the error term and given that the moments of estimation exceed the parameters being estimated the Generalized Method of Moments is chosen as the method of estimation.

3.4 Diagnostic Tests

J statistic

This test checks if the instruments used in the model are valid. It is spread as a Chi square. The null hypothesis of the J statistic is that the moments of estimation are relevant; we will reject the null if the moments of estimation are incorrectly specified (Chadha et al., 2014; Nyang'oro et al., 2015). The degrees of freedom for the J-statistic is determined as the number of instruments minus the number of endogenous variables.

Cumby-Huizinga test for autocorrelation

This test determines if autocorrelation exists at the range of lags specified or at the specific lag. The null hypothesis being that the variables in question are serially uncorrelated. The alternate hypothesis being that serial correlation is exhibited at the stated lags or lag range.

3.5 Data and Sources

Quarterly data spanning from first quarter 2000 to first quarter 2019 is used in this research. Data is sourced from the Kenya National Bureau of Statistics (KNBS) and the Central Bank of Kenya.

CHAPTER 4
EMPIRICAL RESULTS AND DISCUSSION

4.1 Introduction

This section presents a description of the statistics and thereafter a discussion of the results on the topic under study.

4.2 Descriptive statistics

This segment gives a description of the data to be able to understand its nature and distribution. Table 1 exhibits the detailed figures of the variables.

Table 1. Descriptive statistics

Variables	Bankrate	Interbank rate	Inflation gap	lnOutput gap	lnstock prices
Mean	10.09	7.06	0.000	0.000	8.10
Median	9.83	7.0	-0.48	-0.003	8.21
Max	18.03	21.87	10.13	0.06	8.64
Min	4.17	0.47	-6.57	-0.08	6.95
Standard deviation	3.14	3.90	4.08	0.04	0.42
Skewness	0.64	1.30	0.61	-0.03	-1.06
Kurtosis	3.42	6.5	2.74	1.89	3.42
Observations	77	77	77	77	77

The measures of normality are kurtosis and skewness. The variables have positive kurtosis indicating that they are peaked-curves with more values higher than the sample mean. Inflation gap, bankrate and stock prices are tending towards normal distributions with kurtosis of approximately 3. Regarding the skewness, we find that bankrate, interbank rate and inflation gap have positive skewness. This implies that the values have a long right tail with more values higher

than the sample mean. Output gap and stock prices have negative skewness indicating that they have a long left tail with more values lower than the sample mean. On the measures of central tendency, we find that the mean and median values of bankrate, interbankrate and stocks are almost similar which indicates that they tend towards a normal distribution. Below are graphical representations of the variables which show that there is variation in the data in each of the variables estimated.

Figure 5 shows the bankrate from 2000q1 to 2019q1. For data up to 2006, the rate used is Treasury bill rate + 3% and from 2006 onwards, the central bank rate is used. There is evidence of fluctuation in the bankrate with the maximum rate recorded as 18 percent and the minimum 4 percent. The highest peak of the bankrate observed in the first quarter of 2012, a case of monetary tightening, could have occurred as a way of curbing the high inflation rate that was observed in the last quarter of 2011.

Figure 5. Bank rate

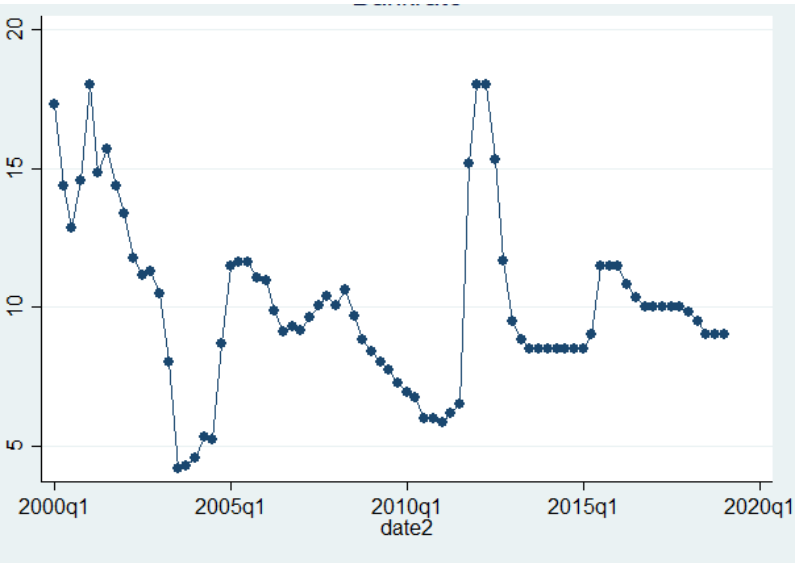


Figure 6 shows stock prices (log values) of the NSE 20 share index from 2000q1 to 2019q1. Stock prices have undergone fluctuations within this period of time. It is evident that areas of decline in stock prices coincide with the general election years (2002, 2007, 2013 and 2017). This

is because during election years, there is a loss in investor confidence due to the unpredictability of the political environment thus leading to a decline in stock prices.

Figure 6. NSE 20 share index

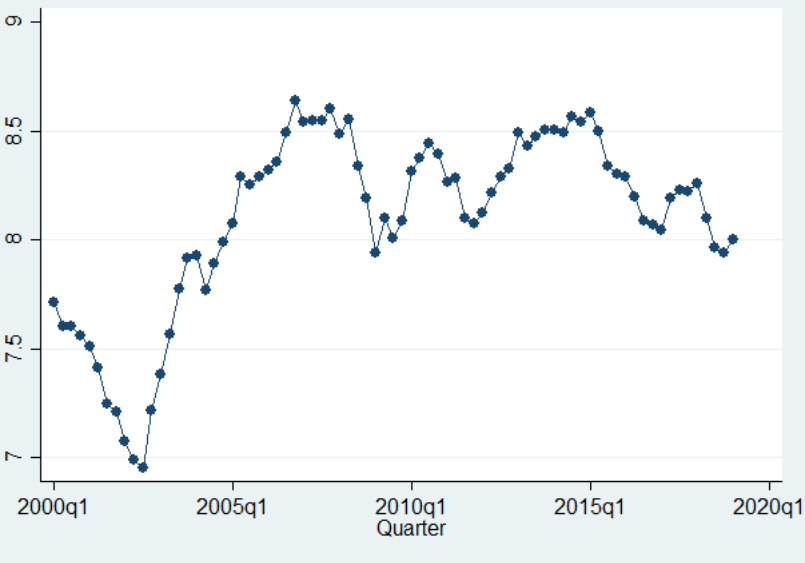


Figure 7 shows bankrate and log of stock prices (NSE 20 share index) from 2000q1 to 2019q1. There is evidence of stock prices declining during periods when the bankrate rises and stock prices falling during periods when the bankrate falls. This could be because a rise in the bankrate relates to monetary tightening and thus preceding a downturn in stock rates as demand falls. A decline in the bankrate relates to monetary loosening hence leading to a rise in stock prices as demand rises.

Figure 7. Bank rate and log of NSE share index

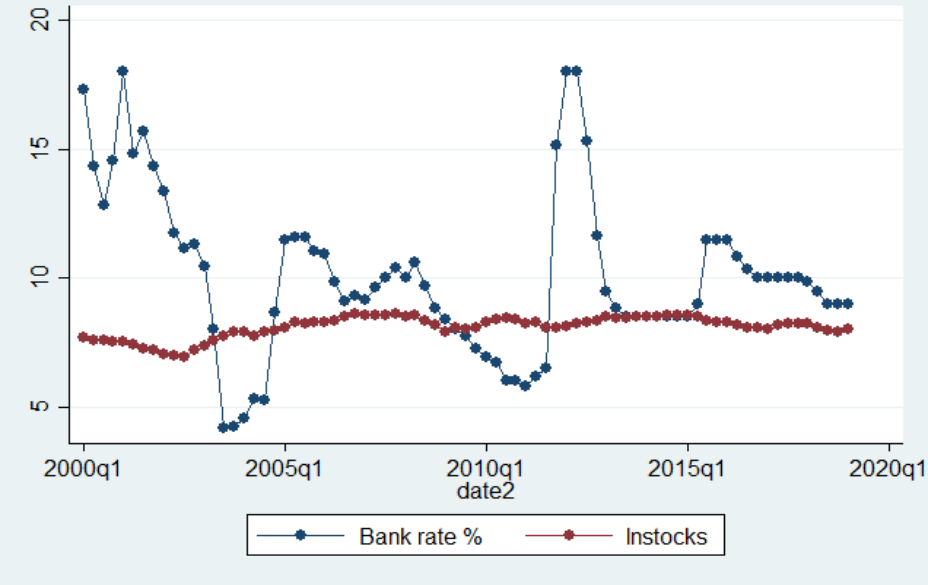


Figure 8 presents the log of GDP gap. GDP gap is obtained using HP filter, hence the cyclical component from HP filter is used as the GDP gap. The log of GDP gap fluctuates between positive and negative values. The positive values indicate the GDP is higher than potential while the negative values indicate that GDP is lower than potential.

Figure 8. Log of GDP gap

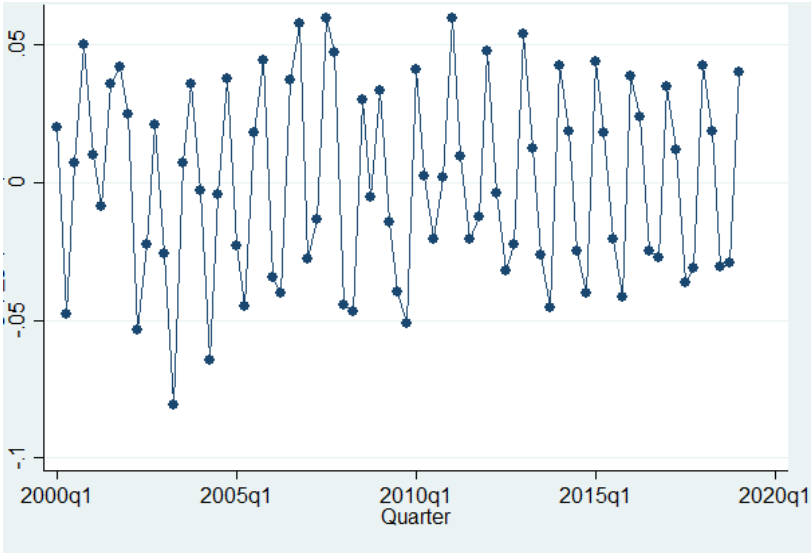


Figure 9 shows inflation gap for the period between 2000q1 and 2019q1. Inflation gap was obtained using HP filter, hence the cyclical component from HP filter is used as the inflation gap. Inflation gap has fluctuated between positive and negative values. The positive values indicate the inflation is greater than target inflation while the negative values indicate that inflation is less than the target inflation. The highest peak of inflation gap was observed around the fourth quarter of 2011. According to Were, Kaminchia and Ndirangu (2013) this rise in prices above the target was as a result of the drought that occurred early that year which led to a shortage of food and thus driving the prices upwards.

Figure 9. Inflation gap

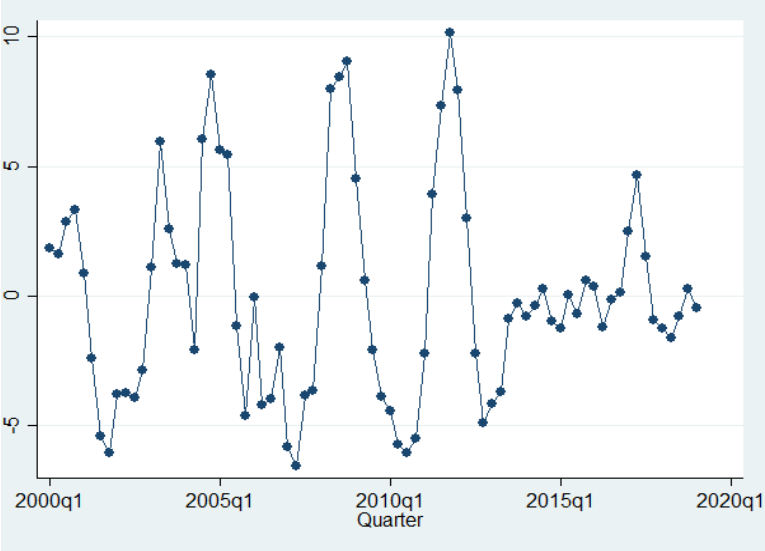
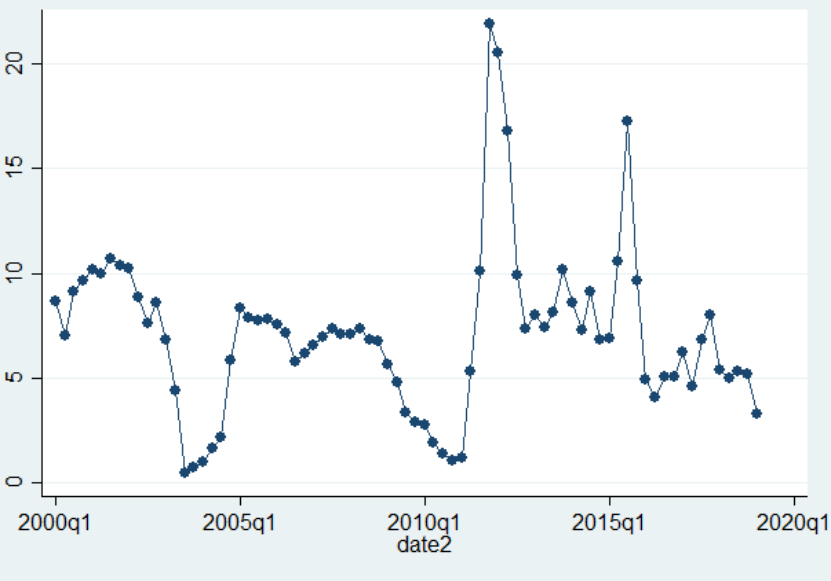


Figure 10 shows interbank rate for the period 2000q1 to 2019q1. There is evidence of fluctuation of the interbank rate during this period. The highest peak is a rate of 21 percent realized in the last quarter of 2011. This coincides with the high inflation rate observed during the fourth quarter of 2011.

Figure 10. Interbank rate



4.3 Estimation results

In this section is a presentation and analysis of the estimation outcome. Table 2 displays results for the baseline model given by equation 8 in the methodology section. The model is estimated without stock prices and only includes gaps of inflation and output and the market interest rates as the regressors. The outcome depicts statistical significance to only be present in the estimation parameter for interbank rate, therefore rejecting the inference of its comparison to zero. The other regressors lack statistical significance.

The margin of adjustment of the bank rate to interbank rate is 0.632. Inferring that a 1 percent boost in market determined rate of interest leads to an adjustment of the bank rate by approximately 0.37 basis points (bps) (this is calculated as, 1-ρ). The outcome of a 1 percent gain in output gap is a 0.32 bps expansion in bankrate. The coefficient of output gap is positive but lacks statistical significance. The positive sign is expected as is evidenced in several other studies (Bernanke & Gerler, 2001; Chadha et al. 2004). This is because as the disparity between output and potential output increases, implying expansionary pressure, the central bank responds with a

tightening of monetary policy in order to stabilize aggregate demand. A 1 percent increase in inflation gap produces a 0.038 bps increase in bank rate. The coefficient of inflation gap is positive but lacks statistical significance; the sign is expected as seen in other studies, for instance, Chadha et al. (2004) and Bernanke (2001). This suggests that the central bank stiffens monetary policy when inflation grows higher than expected inflation so as to drive it downwards towards the anticipated rate. The lack of significance in the coefficients of gaps of output and inflation is surprising. This insinuates that the central bank disregards these variables when setting monetary policy. Nevertheless, Nyang'oro, Mwega and Gor (2015) also fail to find statistical significance in the parameter estimate of inflation gap.

Table 2. GMM Estimates- Baseline model

Variables	Coefficient	z statistic	p value
Inflation gap	0.0384 *(0.060)*	0.64	0.522
Output gap	0.320 *(6.44)*	0.05	0.960
Interbank rate (-1)	0.632 *(0.041)*	15.38	0.000
Constant	5.364 *(0.278)*	19.29	0.000
R^2	0.653		
Adjusted R^2	0.638		
J statistic	8.448 (0.133)		

Dependent variable: Bankrate
Instruments: Output gap (-1,-2,-3), Inflation gap (-1,-2,-3), Interbank rate (-2,-3).
Standard errors are in parentheses and italicized
p-value for J statistic is in parenthesis
The estimates were obtained by GMM.

The J-statistic for our model is not significant at both 5 percent and 10 percent levels signifying that the instruments adopted within the model are credible. The R^2 value is 0.653 and

the adjusted R^2 value is 0.638. This means that approximately 65 percent of variation is described by the estimated model. Table 3 shows the outcome of autocorrelation check (Cumby-Huizinga). The null hypothesis states that autocorrelation is absent (in the specified range on the left-hand side of the table or at the specific lag on the right-hand side of the table) while alternative hypothesis is that there is autocorrelation (at the specified range or specific lag). There is presence of autocorrelation in all ranges (1-1 to 1-4). Regarding the specific lags, there is indication of serial correlation on the first and second lags, however, there is no serial correlation on the third and fourth lags.

Table 3. Autocorrelation results- Cumby-Huizinga for baseline model

H0: no serial correlation				H0: no serial correlation			
HA: serial correlation is present				HA: serial correlation is present			
lags	Chi-squared	df	p- value	lag	Chi-squared	df	p- value
1 to 1	23.888	1	0.0000	first	23.888	1	0.0000
1 to 2	25.489	2	0.0000	second	8.972	1	0.0027
1 to 3	25.611	3	0.0000	third	3.192	1	0.0740
1 to 4	25.879	4	0.0000	fourth	1.862	1	0.1724

Table 4 shows results for the model appended with a change in stock prices variable given by equation 9 in chapter 3. This model assumes that monetary policy is a function of gaps of inflation and output, market interest rates and change in stock prices. The outcome depicts that the estimated parameter of inflation gap is not statistically significant but the coefficients for output gap, change in stock prices and interbank rate are statistically significant. A percentage increase in change in stock prices leads to 9.66 bps growth of the bank rate. The sign of the coefficient is positive as anticipated and is significant. What can be inferred is that as the change in stock prices increases the central bank reacts with a tightening of monetary policy as an approach towards avoiding overheated prices. Chadha et al. (2004) find the estimated parameter of stock prices to be positive. Muinde (2017) found that monetary tightening leads to a reduction in stock premiums.

Rigobon and Sack (2003) find that stock prices have a positive association to monetary action in the US in that a gain in stock prices leads to a stiffening of the monetary policy. This shows that our findings are aligned to other research findings. A percentage rise in output gap results in a gain in bank rate by approximately 13.9 bps and this value is statistically significant at the ten percent level. This variable has now gained significance contrary to the findings in the baseline model. The sign of the coefficient is positive as expected. This is because as output gap increases, implying expansionary pressure, the central bank responds with a toughening of monetary policy to steer the economy back to stability. A 1 percent upsurge in inflation gap brings forth a 0.014 bps decline in bank rate. The sign of the coefficient unexpectedly reverses but lacks statistical significance. This proposes that the monetary authority loosens monetary policy when inflation grows higher than expected. This finding supports Nyang'oro, Mwega and Gor (2015) who also find an unexpected negative sign on the coefficient of inflation gap. One study that tries to explain this unexpected sign on inflation was conducted by Durevall and Ndungú (1999) who found no evidence of excess money supply having a part to play on the long run rise of prices in Kenya. Thus they found that long run inflation in Kenya is brought about by other factors. The coefficient of the interbank rate is 0.648. The parameter estimate is positive and significant. The above outcomes imply that the central bank pays attention to output gap, change in stock prices and interbank rate when setting of monetary policy. Additionally, the results imply that the monetary authority disregards inflation gap when setting monetary policy.

Table 4. GMM Estimates- Model augmented with change in stock prices

Variables	Coefficient	z statistic	p value
Inflation gap	-0.014 *(0.075)*	-0.19	0.853
Output gap	13.933 *(7.511)*	1.86	0.064
Interbank rate(-1)	0.648 *(0.043)*	15.21	0.000
Δ Stock prices	9.660 *(3.505)*	2.76	0.006
Constant	5.413 *(0.356)*	15.19	0.000
R^2	0.594		
Adjusted R^2	0.570		
J statistic	4.505 (0.609)		

Dependent variable: Bankrate
Instruments: Output gap (-1,-2,-3), Inflation gap (-1,-2,-3), Interbank rate (-2,-3), Δ stock prices (-1, -2)
Standard errors are in parentheses and italicized.
p-value for J statistic is in parenthesis
The estimates were obtained by GMM.

The J-statistic for our model is 4.5 and is not significant at both 5 percent and 10 percent levels signifying that the instruments employed in the model are correct. The R^2 value is 0.594 and the adjusted R^2 value is 0.570. This means that approximately 59 percent of the variation is described by our estimation. Table 5 shows the outcome for autocorrelation check (Cumby-Huizinga). The null hypothesis is that autocorrelation is non-existent (in the specified range on the left-hand side of the table or at the specific lag on the right-hand side of the table) while alternative hypothesis is that there is autocorrelation (at the specified range or specific lag). There is presence of autocorrelation in all ranges (1-1 to 1-4). Regarding the specific lags, there exists proof of serial correlation on the first and second lags, however, there is no serial correlation on the third and fourth lags.

Table 5. Autocorrelation results- Cumby-Huizinga for model with ∆stock prices

H0: no serial correlation				H0: no serial correlation			
HA: serial correlation is present				HA: serial correlation is present			
lags	Chi-squared	df	p- value	lag	Chi-squared	df	p- value
1 to 1	11.617	1	0.0007	first	11.617	1	0.0007
1 to 2	15.617	2	0.0004	second	7.264	1	0.0070
1 to 3	18.403	3	0.0004	third	0.095	1	0.7581
1 to 4	18.405	4	0.0010	fourth	0.157	1	0.6916

CHAPTER 5

SUMMARY, CONCLUSIONS AND RECOMMENDATIONS

5.1 Introduction

This segment provides conclusions to the findings and gives policy pointers deduced from the findings. Additionally, this section will provide suggestions on areas of additional research.

5.2 Summary

This study sought to demonstrate how asset prices influence monetary policy decisions in Kenya and also to establish the central bank's adjustment mechanism on target interest rates. The study estimated a Taylor rule that is forward-looking as a baseline model and one augmented with a change in stock prices variable as an alternative model. The results are that variations in stock prices alter monetary policy decisions in Kenya. The change in stock prices variable is found to be positive and to bear statistical significance at both five and ten percent levels. A 1 percent gain in change in stock prices results in a growth in the bank rate by approximately 9.66 basis points. This means that an upsurge in the change in stock premiums brings forth a tightening of monetary policy. This result supports other studies that have also found a similar sign on the coefficient of stock prices (Chadha et al., 2004; Rigobon & Sack 2003). Additionally, the results show that the monetary authority's adjustment mechanism on target interest rates is approximately 0.37 basis points. Also established is that the coefficient for output gap is positive and possesses statistical significance; and that the coefficient of inflation gap is negative but lacks statistical significance. This implies that when setting monetary policy, the central bank considers output gap but not inflation gap. We have also established that central bank acknowledges market interest rates (interbank rate) in pursuing monetary actions alluded by the statistical significance of the variable's coefficient in the estimation results.

5.3 Conclusion

The implication of asset prices on monetary actions has drawn a lot of enthusiasm from many researchers due to the vital position assumed by prices of assets in the overall strength of the monetary sector. This research aimed at uncovering how asset prices interact with monetary activity in Kenya. This study has found that fluctuations in prices of assets affect the direction of monetary policy that is undertaken in Kenya. The direction of the effect is positive as expected; the results show that a growth in the change in stock prices results in tightening of the bank rate. Additionally, the outcome depicts that the Central bank acknowledges output gap when establishing monetary actions in Kenya but disregards inflation gap.

5.4 Policy implications

One policy implication of this research is that stock prices need to become one of the targets of monetary policy in Kenya. This is a policy direction that has been followed by major monetary institutions across the world such as the Federal Reserve Bank of the US and the Bank of England. Another policy implication is that more attention needs to be accorded to output gap compared to inflation gap in the course of setting monetary policy decisions in Kenya. Additionally, another policy recommendation is for the central bank to ensure that the direction of monetary policy it undertakes will endeavor to promote the growth of a stable and strong asset market in the economy.

5.5 Areas of further research

More research needs to be administered on asset prices to incorporate housing and land prices so as to provide a more general deduction of asset prices in Kenya. Better data collection on national housing and land prices should be implemented so as to enable conducting of research on these markets. This is because most of the acute surges in the costs of assets have been observed in land and housing prices, and also that in Kenya house and land prices are more volatile.

Additionally, for further research it is imperative to study misalignments in asset prices for the reason of finding out how policy reacts to such in addition to changes in asset prices.

5.6 Limitations of the study

One limitation was the lack of availability of reliable national data on housing and land prices to use for the study. This limited the study to only use stock prices as the asset prices under research.

REFERENCES

Ahearne, G., Ammer, J., Doyle, B., Kole, L. and Robert, M. (2005). House prices and monetary policy: a cross-country study. *International Finance Discussion*, 841.

Airaudo, M., Cardani, R., and Lansing, K. (2013). Monetary policy and asset prices with belief-driven fluctuations, *Journal of Economic Dynamics and Control*, 37(8), 1460-1463.

Bell, S., & Quiggin, J., (2006). Asset price instability and policy responses: the legacy of liberalization. *Journal of Economic Issues, XL*, 629-649.

Bernanke, B.,& Gertler, M., (1999). Monetary policy and asset price volatility. *National Bureau of Economic Research.* http://www.nber.org/papers/w7559

Bernanke, B., & Gertler, M., (2001). Should central banks respond to movements in asset prices? *American Economic Review*, 91(2), 253-257.

Borio, C., Kennedy, N., & Prowse, S. (1994). Exploring aggregate asset price fluctuations across countries: Measurement, determinants and monetary policy implications. *BIS Economic papers*, 40.

Brett, R. (2014). The relationship between monetary policy and asset prices: a new approach to analyzing U.S. M&A activity. *The developing economist*, 1(1), 1-2.

Central Bank of Kenya (2011, December). *Kenya's Financial Sector Stability Report*, (3). Retrieved from https://www.centralbank.go.ke/images/docs/kfs/2011.pdf

Central Bank of Kenya-CBK (2012). *CBK's Credit Officer Survey, January – December 2012*, 5.

Central Bank of Kenya (2019). *Central Bank of Kenya website*. Retrieved from https://www.centralbank.go.ke/inflation-rates/

Chadha, S., J., Sarno, L., & Valente, G., (2004). Monetary policy rules, asset prices, and exchange rates. *IMF staff papers*, 51, 529-552.

Clarida, R., Gali, J., & Gertler, M., (1998). Monetary policy rules in practice: Some international evidence. *National Bureau of Economic Research*, wp 6254.

Claudio, B., Lowe., P., (2002). Asset prices, financial and monetary stability: exploring the nexus. *BIS Working Papers*, 14.

Duravell, D. and Ndung'u, N.S. (2001). A Dynamic Model of Inflation for Kenya, 1974 – 96. *Journal of African Economies*, 10(1), 92-125.

Dwivedi, N. (2005). *Managerial Economics, sixth edition,* New Delhi, India: VIKAS Publishing house PVT LTD.

Erler, A., Drescher, C., Krizanac, D., (2013). The Fed's TRAP: a taylor-type rule with asset prices. *Journal of Economics and Finance,* 37, 136-149.

Filardo, A., (2000). Monetary policy and asset prices. *Federal Reserve Bank of Kansas City. Economic Review,* 11-37.

Financial Sector Stability Report (2011, December). *Central Bank of Kenya*. Retrieved from https://www.centralbank.go.ke/images/docs/kfs/2011.pdf

Gertler, M. and Karadi, P. (2015). Monetary policy surprises, credit costs, and economic activity. *American Economic Journal: Macroeconomics,* 7(1): 44-76

Gilchrist, S., & Leahy, J., (2002). Monetary policy and asset prices. *Journal of Monetary Economics,* 49, 75-97.

Gruen, D., Plumb, M. and Stone, A. (2005). How should monetary policy respond to asset-price bubbles? *International Journal of Central Banking,* 1(3), 1-4

Hass Consult, (2012). *The Hass property index*. Retrieved from http://www.hassconsult.co.ke/index.php?

Hass Consult Property Index, (2016). *The Hass property index*. Retrieved from http://www.hassconsult.co.ke/index.php?

Heintz, J., Ndikumana, L. (2010). Is there a case for formal inflation targeting in Sub-Saharan Africa? *Political Economy Research Institute,* wp 218.

Himanshu, J. (2006). Identifying asset price bubbles in the housing market in India- preliminary evidence. *Reserve Bank of India Occasional Paper*s, 27(1), pp.2-4

Hordahl, P. and Packer, F. (2006). Understanding asset prices: an overview. *Bank for International Settlement BIS*, 34.

Hunter, C., Kaufman, G. and Pomerleano, M. (2003). *Asset price bubbles: the implications for monetary, regulatory, and international policies*, Cambridge, MA: MIT press.

Igbinosa, S. and Obayagbona, J. (2012). Monetary policy and asset prices: empirical evidence from Nigeria. *Journal of Finance and Investment Analysis*, 1(4), 74-80

Iheanacho, E. (2018). Monetary policy and asset prices: the role of inflation rate: new evidence for Nigeria. *International Journal of Emerging Research in Management & Technology*, 7(8), 20-25

Kabiro, M., G., & Nyamongo, E., (2014). The effect of bank lending channel on the monetary transmission mechanism in Kenya. *International Journal of Education and Research,* 2(5), 243-260.

Killick, T. and Mwega, F.M. (1990). Monetary policy in Kenya 1967-1988, *Overseas Development Institute*, wp 39

Kohn, L. (2008). *Monetary policy and asset prices revisited*. Speech at the Cato Institute's 26th annual monetary policy conference, Washington.

Komlan, F. (2012). *Monetary Policy, Asset Price and Economic Growth* (Doctoral dissertation). Retrieved from https://pdfs.semanticscholar.org/88a9/b055ae9ee97330e9da0e0aad4cd3a8d2f877.pdf

Kontonikas, A., & Montagnoli, A., (2006). Optimal monetary policy and asset price misalignments. *Scottish Journal of Political Economy, 53, 5,* 636-654.

Li, Y. D., Iscan, T. B., and Xu, K. (2010). The impact of monetary policy shocks on stock prices: Evidence from Canada and the United States. *Journal of International Money and Finance*, 29(5):876–896.

Lin, S. and Ye, H. (2009). Does Inflation Targeting Make a Difference in Developing Countries? *Journal of Development Economics*, 89, 118–123.

Misati, N., R., & Nyamongo, M., E., (2012). Asset prices and monetary policy in Kenya. *Journal of Economic Studies, 39,* 451-468.

Mishkin, F. (2008). How should we respond to asset price bubbles? *The Wharton Financial Institutions Center and Oliver Wyman Institute's Annual Financial Risk Roundtable*, Pennsylvania.

Monetary Policy Committee Report, (2017). Retrieved from https://www.centralbank.go.ke/reports/monetary-policy-reports/

Muinde, P., M. (2017) Effects of Macroeconomic Volatility on Stock Prices in Kenya: A Cointegration Evidence from the Nairobi Securities Exchange (NSE). *International Journal of Economics and Finance*, 9.

Nairobi Securities Exchange (2017). *Annual Report*, 9. Retrieved from https://www.nse.co.ke/

Ndung'u, S. (2008). Financial systems and monetary policy in Kenya. *African Economic Research Consortium.*

Nineteenth Bi-Annual Report of the Monetary Policy Committee, October 201. *Central Bank of Kenya website*. Retrieved from http://www.centralbank.go.ke.

Nyang'oro, O., Mwega, F., & Gor, S. (2015). Estimating a monetary policy reaction function in a developing country: the case of Kenya. *African Journal of Social Sciences,* 5, 1-17.

Posen, S., A., (2006). Why the central bank should not burst bubbles. *Institute for International Economics.*

Rigobon, R., Sack, B. (2001). Measuring the Reaction of Monetary Policy to the Stock Market. *The Quarterly Journal of Economics, 118,* 639-669

Savioz, R. and Bengui, J. (2006). Asset price bubbles and monetary policy: what can be learned from the Swiss experience? *Paper presented at the BIS Autumn Economists Meeting*, Basel.

Selody, J. and Wilkins, C. (2006). Asset prices and monetary policy: how flexible should inflation targeting regimes be? *Paper presented at the BIS Autumn Economists Meeting*, Basel.

Singh, B., & Pattanaik, S., (2012). Monetary policy and asset price interactions in India: Should financial stability concerns from asset prices be addressed through monetary policy? *Journal of Economic Integration, 27,* 167-194.

Smaghi, L. (2009). Monetary policy and asset prices, opening address by member of the executive board of the ECB Freiburg.

Smets, F., (1997). Financial asset prices and monetary policy: Theory and evidence. *BIS working papers no. 47*

The Kenya Gazette (2005), CVII, 59. 1881. Retrieved from https://books.google.co.ke/books?id=PEpImTdslHEC&pg=PA1881&lpg=PA1881&dq=rise+in+kenya+stock+price+index+in+2005&source=bl&ots=UaKKk1HySB&sig=6brxqmy8zvwcdmH7KEJ-m1yFmYY&hl=en&sa=X&redir_esc=y#v=onepage&q&f=false

Thoma, M. (2012). New Classical, New Keynesian, and Real Business Cycle Models. Retrieved from https://economistsview.typepad.com/economistsview/2012/04/new-classical-new-keynesian-and-real-business-cycle-models.html

Trichet, J. (2009). After the crisis, keynote speech at the 19th Frankfurt European banking congress: Frankfurt am Main, Alte Oper

Tuuli, K. (2012). Monetary policy, asset prices and consumption in China. *Journal of Economic Systems*, 36(2), 308-309

Tymoigne, E., (2006). Asset prices, financial fragility, and central banking. *Economics Working Paper Archivewp_456.Levy Economics Institute*.

Vickers, J., (2000). Monetary policy and asset prices. *The Manchester School Supplement,* 1463-6786, 1-22.

Vuluku, G. and Gachanja, J. (2014). Supply side aspects of residential housing for low income earners in Kenya. *Kenya Institute for Public Policy Research and Analysis*.

Wadhwani, S., (2008). Should monetary policy respond to asset price bubbles? Revisiting the debate. *LSE financial markets group paper series.* Retrieved from http://www.lse.ac.uk/fmg/documents/

Wamalwa, P. (2018). Optimal monetary policy and asset price volatility in an open economy: evidence from Kenya. *Economic Research Southern Africa (ERSA) working pape*r 734, pp.2-4

Were, M., Kamau, A., Sichei, M., Kiptui, M. (2013). A theoretical framework for Kenya's central bank macroeconometric model. *Africa Growth Initiative,* 10.

Were, M., Kaminchia, S., Ndirangu, L. (2013). Measuring inflation persistence in Kenya. *Kenya School of Monetary Studies*, 003.

Yao, S., Luo, D., & Loh, L. (2013). On China's monetary policy and asset prices. *Applied Financial Economics, 23,* 377-392.

Yi, P. (2013). *Essays on Uncertainty, Asset Prices and Monetary Policy: A case of Korea.* A published Doctoral Thesis in Economics, University of Bath. Accessed on 02/02/2019, Retrieved from: https://purehost.bath.ac.uk/ws/portalfiles/portal/48990087/