EFFECTS OF FISCAL POLICY ON THE CONDUCT AND TRANSMISSION OF MONETARY POLICY IN KENYA

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Abstract
The purpose of this paper is to analyse the effects of fiscal policy on the conduct and transmission of monetary policy in Kenya. It follows a new-Keynesian approach to address this issue. The parameters of the model are calibrated based on evidence from both theory and empirical findings. The main findings of the study are as follows: fiscal policy impacts on the conduct of monetary policy—large holding of government deposits in the central bank creates liquidity challenges which then feed into the inter-bank bank though high interest rates. It is also found fiscal expansion calls for monetary policy response to ensure stability in the exchange rate and inflation.

I Introduction

The debate about the effect of fiscal policy on the conduct of monetary policy dates back to the Tobin-Mundell debate regarding the 'proper mix' after higher taxes and faster money growth occasioned stagflation during the post-war period in the United States of America. During this period fiscal fine-tuning was the core policy while monetary policy was viewed as a tool for stimulating debt-financed purchases by keeping interest rates low. The stagflation phenomenon prompted macroeconomists to patch together a Keynesian-neoclassical synthesis (Reynolds, 2001) in which James Tobin's 'funnel' theory attempted to show how both fiscal and monetary policies could be used by government to shape the economy.

Although the Tobin-Mundell debate over proper policy mix is still relevant today much interest in the fiscal-monetary policy mix arises out of the recognition that both the fiscal and monetary policies have different impacts on the economy (see Tobin, 1986; Brimmer and Sinai, 1986; and Ribe and Beeman, 1986, Levy, 2001). In view of these implications, Brimmer and Sinai (1986) suggests that policy mix, especially in an open economy with flexible exchange rates must be monitored, analysed, and understood as much as the individual state of monetary or fiscal policy itself, in order to grasp the likely patterns of behaviour in the financial markets and the economy.

1 Study conducted for the COMESA Monetary Institute (CMI) as part of the regional study on the 'effects of fiscal policy on monetary policy operations and transmission'. The study draws from previous studies on this area and the FPAS for Kenya. The findings are preliminary, however.
For a central bank focusing on price stability recognising the role of fiscal policy on prices, real interest rates and risk premia as well as aggregate demand and potential output is critical (ECB, 2003:37). This view is reinforced by the Reserve Bank of New Zealand (1992:224) which points out that fiscal policy decisions can affect the appropriate short-term monetary policy stance directly and indirectly. Directly, the fiscal policy works through its impact on prices by changing taxes and other charges, and indirectly by affecting aggregate demand. Also, the impact of monetary policy on, *inter alia*, short term interest rates, inflation expectations and the risk premia incorporated in long-term yields is essential as these are the variables that affect the environment in which fiscal policy operates.

Therefore, the monetary-fiscal policy mix emanates from the fact that both types of policies have an impact on key macroeconomic variables which in turn creates interdependencies in the pursuit of policy objectives. Although monetary and fiscal policies use different policy instruments, they are closely related in terms of achieving certain objectives by affecting the levels of output in the economy. The close relationship between monetary and fiscal policies carries with it the possibility of conflict and sub-optimal policies, should their implementation be at cross purposes (Swanepoel, 2004). The policy mix could consist of various combinations of expansionary and restrictive policies, with a fiscal stance being either supportive or non-supportive of monetary policy.

According to the ECB (2004:47), there are three channels through which fiscal policy can affect the short-term environment for monetary policy. Firstly, fiscal policy may affect economic growth and prices through discretionary fiscal policy stabilization. Secondly, the operation of automatic stabilizers can contribute to reducing short-term volatility. Thirdly, governments have some instruments at their disposal that have a quick or even immediate effect on prices, such as the VAT rates. Also, the long-term effect of fiscal policy on monetary policy occurs via its impact on the sustainability of public finances and on potential growth (ECB, 2004:49).

In view of the above a coordinated monetary-fiscal policy mix is mutually reinforcing and therefore more effective. Failure to coordinate these policies is potentially dangerous as it may lead to slow growth of the economy and cause surges in inflation. This study seeks to answer the following questions the following specific questions:

- How does the fiscal policy affect the conduct of monetary policy?
- How does the fiscal policy affect the monetary policy transmission?
THE FISCAL AND MONETARY POLICY OBJECTIVES IN KENYA

Monetary policy in Kenya

The principal objective of the Central Bank of Kenya is stated on the Central Bank Act (CAP 491) Section 4 which states that the principal object of the Bank shall be to formulate and implement monetary policy directed to achieving and maintaining stability in the general level of prices. The Bank shall foster the liquidity, solvency and proper functioning of a stable market-based system. As amended in 2007, the Act also states that the Bank shall support the economic policy of the government, including its objectives for growth and employment.

From the late 1960s to mid 1980s monetary policy in Kenya was generally passive and focused mainly on the protection of the country’s foreign exchange reserves and supporting the import substitution policy.

From the mid 1980s to date to June 2008, Kenya has been implementing monetary policy within an IMF supported programs through the use of facilities such as Structural Adjustment Facility (SAF) in 1986, Enhanced Structural Adjustment Facility (ESAF) and Poverty Reduction and Growth Facility (PRGF) from 1997 to June 2008.

In all of these programs the underlying monetary policy formulation and management rely on the IMF’s policy formulation tools particularly the financial programming framework. Monetary policy operations seek to ensure that monetary expansion is in line with the inflation objective and adequate to support transactions with the potential economic.

Monetary policy in Kenya is directed towards achieving price stability (ultimate target). However, since monetary policy affects prices with a lag, one needs a variable to anchor policy decisions and expectations of economic agents. The current approach is to use monetary aggregates as nominal anchors, and in particular, broad money supply (M3) as an intermediate target and reserve money (RM) as an operational target growth. Here one of the critical issues in monetary policy is an estimate of demand for broad money. There are two approaches to estimating demand for money.

Following the amendment of the CBK Act in 1996, the bank submits a monetary policy statement to the Minister of Finance every six month, which *inter alia* specifies the monetary policies and the means by which the bank intents to achieve them.

Three elements of the monetary policy formulation and implementation in Kenya are relevant in the monetary-fiscal policy co-ordination and pro-counter cyclicity of policy debate. First, there is constant dialogue between CBK and the Ministry of Finance through setting of
targets for growth and inflation within a Macro Working Group (MWG), the preparation of the Budget Outlook Paper (BOPA) and the entire budget preparation cycle under the Medium Term Expenditure Framework (MTEF). These processes create an in built co-ordination mechanism.

Secondly, government fiscal operations play a major role in the implementation of monetary policy. This can be seen from the asset side definition of reserve money as net foreign assets (NFA) plus net domestic assets (NDA). As shown in Figure 1 NDA is further subdivided into net credit to government (NCG), net credit to banks (NCB and other items net (OIN). Thus government daily operations either increases or reduces liquidity and may determine the decision for monetary operations. For instance if government builds up deposits at CBK, it effectively withdraws liquidity from the economy. Similarly, commercial banks invest their surplus funds either in government securities or at CBK using repurchase agreements (repos).

Third, monetary policy under the financial programming framework is generally pro-cyclical (i.e. does not lean against the wind). In other words, when the economy is in a boom, money supply increases and vice versa.  

*Figure 1: Components of Reserve Money*

\[
RM = NFA + NCG + NCB + OIN
\]

NFA-Net Foreign assets, NCG-Net Credit to Government, NCB-Net Credit to Banks, OIN-Other Items Net, TAD-Term Auction deposits

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2 This is a group comprising of Ministry of Finance, Ministry of Planning, Central Bank of Kenya (CBK) and other ministries which deliberates/consults on setting of targets within the MTEF. CBK is a critical member.
2.0 LITERATURE REVIEW

How fiscal policy affects monetary policy: analytical and empirical studies

A burgeoning literature on monetary and fiscal policy interactions exists since the work of Sargent and Wallace (1981). This literature can be divided along three strands: (i) studies that address issues related to coordination of the two policies (e.g. Šehović, 2013; Beetsma and Jensen, 2004; Lauren and Piedra, 1998 and Sargent and Wallace, 1981); (ii) those that seek to characterize an optimal path for both monetary and fiscal policy (e.g. Lambertini and Rovelli, 2005; Benigno and Woodford, 2003; Cochrane, 2001), and; (iii) studies that investigate the channels through which fiscal actions affect monetary variables and the constraints imposed on the latter (Uribe and Yue, 2006; Zoli, 2005; Canzoneri, et al., 2001; Tanner and Ramos, 2002). This third line of research has largely been inspired by the insights of Sargent and Wallace (1981) and Woodford (1995). In this current study we tend to lean towards an investigation through which fiscal policy affects monetary variables.

The literature reveals various channels through which fiscal policy can affect monetary policy. The most direct is through the government inter-temporal budget constraint on monetary policy. Some fiscal measures, such as a value added tax, have a direct effect on inflation. Other fiscal measures have indirect effects on inflation through their impact on aggregate demand and spillovers from public wages into private sector. More importantly, budgetary actions can also have a bearing on economic variables that are important in monetary policy transmission, notably interest rates, interest rate spread and exchange rates.

Government Budget Constraint and Monetary Policy

Sargent and Wallace (1981) provided the first formal presentation of the implications of the government budget constraint on monetary policy. They describe the case of fiscal dominance, under which the fiscal authority determines the financing needed for any given budget deficit through bond sales and seigniorage. The monetary authority loses its ability to control inflation whenever the real interest rate exceeds the growth rate of the economy. Monetary actions aimed at reducing inflation in such circumstances will increase the ratio of debt to GDP as it leads to an increase in the real stock of bonds held by the public. This in turn raises interest payments and deficits in the future. Eventually, deficit financing requires more money growth and generates higher inflation in the future. They show that when the demand for base money depends on expected inflation, “tighter money today can lead to higher inflation not only eventually, but starting today”.

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On the other hand, the traditional macroeconomic analysis assumes that the fiscal authority sets primary surpluses in order to assure fiscal solvency, for any path the price level could take. In this way, the monetary authority is expected to set the price level, without facing any constraint; whereas fiscal authority would adjust, so that the budget surplus path would be endogenous. This scenario is referred in the literature as the Ricardian or “monetary dominant” (MD) regime.

However, another approach — the fiscal theory of the price level (FTPL)—emerged in the 1990s. The FTPL models assume that fiscal authorities are able to set primary surpluses that follow an arbitrary process, not necessarily compatible with solvency. In such a context, the budget surplus would be exogenous, and the endogenous adjustment of the price level would be required in order to achieve fiscal solvency. Hence, it is the government inter-temporal budget constraint that determines the price level. In this case the monetary authority could only control the timing of inflation. This is the so called non-Ricardian or “fiscal dominant” (FD) regime. The FTPL builds on the contributions of, among others, Woodford (1994, 1995, 2001); Cochrane (2001, 2005); Sims (1994) and Leeper (1991). Carlstrom and Fuerst (2000) provide a survey.

The empirical evidence regarding the FTPL, however, is not too abundant and has yielded mixed support. For instance, Bohn (1998) and Canzoneri, et al. (2001), who pioneered the two main approaches employed to test for the FTPL, namely, the so-called backward-looking and forward-looking approaches, respectively, do not support the existence of fiscal dominance for the US. A number of other studies in industrialised countries find that monetary policy typically was not accommodative of fiscal policy in the 1990s, and some even suggest that monetary policy has tended to tighten in response to loose fiscal policy (e.g. Melitz (1997, 2002), Favero (2002). Von Hagen et al (2002) find that the monetary condition index reacted negatively to an increase in fiscal deficits in EMU and OECD countries over the period 1972–89, but that during the 1990s the same variable was not significantly affected by fiscal deficits.

Komulainen and Pirtilä (2002) examine the influence of fiscal deficits on inflation for several transition economies and conclude that a FD regime cannot be always identified. However, Tanner and Ramos (2003) show some evidence of a monetary dominant regime for 1995–97, but not for the decade of the 1990s as a whole. Similarly, Zoli (2005) examines a sample of six emerging countries (Argentina, Brazil, Colombia, Mexico, Poland and Thailand). She concludes that Argentina and Brazil show clear evidence of FD in 1990s and early 2000s, whereas Colombia and Mexico exhibit clear FD in pre-inflation targeting period only. Other countries show mixed results. Baldini and Ribeiro (2008) examining a sample of 22 sub-

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3 Does the government cut its primary deficit when liabilities rise?
4 Do current reductions in primary deficit help pay down debt as implied by MD?
Saharan countries for the period 1980-2005. He finds that while Cameroon, Kenya, Nigeria, Rwanda, and South Africa seem to have been characterized by a MD regime throughout the study period 1980–2005, Botswana, Burundi, Tanzania, and Zimbabwe seem to have been characterized by a FD regime. The evidence was less clear cut for other countries in their sample. Nyamongo et al. (2010) corroborated Baldini and Ribeiro (2008) results for Kenya. Using annual data, they found that Kenya was characterized by an MD regime during the period 1979 to 2007.

**Impact of Fiscal Policy on Transmission of Monetary Policy**

Fiscal policy may also affect monetary policy through its impact on interest rates and spreads. There seems to be a consensus with regard to the relationship between fiscal policy and interest rates. Higher fiscal deficits are associated with higher medium- and long-term interests rates, that is, it crowds out private investments. This is supported by many empirical studies in emerging markets. For instance López *et al* (2011), using panel data of the long-term interest rate for the period 1990–2009 in 54 emerging and developed countries, find that when the fiscal deficit expands by 1% long-term interest rates rise between 10 and 12 basis points. Ardagna (2007), based on a sample of 16 developed countries, finds that a 1% increase of the primary deficit ratio on GDP increases the 10-year nominal interest rate by 10 basis points. In addition, it is found that the response of the interest rate to a 1% change in the stock of debt to GDP is low, both in countries with extremely low or high values of public debt. Baldacci and Kumar (2010) find that the impact of a 1% increase in the deficit on the real interest rate is approximately 3-4 basis points. Dumičič and Ridzak (2011) use panel data for eight central and eastern European countries and find that, if general government debt-to-GDP ratio increases by 5 percentage points, spreads increase by 19 basis points.

Some empirical literature has investigated different channels of interaction and transmission from fiscal policy to monetary variables (e.g. Blanchard, 2004 and Favero and Giavazzi, 2004). These papers analyse the case of an inflation-targeting regime in an emerging market that is particularly vulnerable to capital flows reversal. A key result is that high public debt, by boosting credit default risk, can push the economy into a bad equilibrium, where a restrictive monetary policy has unconventional effects. The dynamics of the bad equilibrium arises from the following: in a country where the public debt is large, and mainly short-term, an increase in interest rates aimed at keeping inflation within the target raises the cost of debt service, the debt level, the default probability and the country premium, triggering capital outflows and leading to a depreciation, rather than an appreciation, of the exchange rate. If debt is largely denominated in foreign currency, or linked to a foreign currency, the exchange rate depreciation causes a further increase in the value of debt. Moreover, the exchange rate depreciation affects inflation expectations and, eventually, inflation itself. To reduce inflation, the central bank has to increase the interest rate again, which further raises the cost of debt
service, and so on. Such an environment is fundamentally a regime of fiscal dominance, even though there is no monetary relaxation as in Sargent and Wallace’s model, because country premium, interest rates, exchange rates and even inflation are largely affected by fiscal policy. In fact, the only way out of the bad equilibrium just described is through a substantial fiscal adjustment that reduces public debt and the default probability.

Zoli (2005), estimates the impact of news concerning fiscal variables and fiscal policy on daily movements in sovereign spreads and exchange rate in Brazil from 2002–04. Results show that fiscal events significantly influenced Brazil’s sovereign spread and its exchange rate in that period. Similarly, Baig, et al. (2006) using high-frequency data for Brazil, Turkey, and Poland, show that when vulnerabilities are high, budget news has the most significant impact on spreads and the interest rate, and the impact of monetary policy is weakened. They observe that since the fiscal environment can exert a significant impact on the efficacy of monetary policy directly and through expectations, high public sector debt could reduce the independence of monetary policy and the efficacy of the transmission mechanism. Thus, in high-debt economies, the monetary-fiscal nexus needs to be taken into account in analyzing economic trends and vulnerabilities and in the design and implementation of policy. We turn to the empirical strategy used in this paper to investigate the effects of the fiscal stance on monetary policy.

2.0 EFFECT OF FISCAL VARIABLES ON THE CONDUCT OF MONETARY POLICY IN KENYA

In view of the interaction of fiscal and monetary policy variables in Figure 1, we now seek to investigate how the conduct of fiscal authority, with regard to the deposits it holds in the CBK, impact on the monetary policy outcomes. Here we focus on the Inter-bank market as shown below.
From the scatter plots above it may be observed as follows: (i) the changes in government deposits held in the banking system appear to be related to interbank volumes. (ii) The inter-bank rate responds to the changes in government deposits. Higher level of government holds therefore results in higher inter-bank market. This because the government deposits are held, to a large extent in the central bank, constraints availability of liquidity among commercial banks resulting in higher inter-bank lending rates. Suggesting that the central bank may desire to pursue a loose monetary policy but because liquidity is trapped in government deposits it ends up with a tight policy. This is preliminary evidence that the conduct of fiscal policy has a bearing on the conduct of monetary policy.

III THE BEHAVIOUR OF MONETARY AND FISCAL POLICY

In order to analyse the effect of fiscal policy on the conduct of monetary policy the starting point is to reflect on the functions of government. Public finance indicates that this is divided into: allocation, distribution and stabilization. Several ways are available to show how policy is then used to achieve these objectives. The Government has at its disposal a number of policies, such as, fiscal and monetary policy. Therefore, for example, if the intention of the government is to stabilise the economy then both fiscal and monetary policy ought to respond in the same version. In this paper we seek to analyse how both fiscal and monetary policy behave and whether they are coordinated. In this regard we assume that the intention of the Government is stabilization- managing the business cycle.

(a) Fiscal policy and the business cycle

The fiscal policy is conducted through changes in spending and taxes. Therefore a reasonable way to ascertain whether or not government is engaging in tight or loose fiscal policy is to examine the data on the fiscal balance. However, some studies have analysed fiscal policy by focusing on the nature of government expenditures and revenues (Lane,
1992; Thornton, 2007, Swanepoel and Schoeman, 2003). In the analysis of the stance of fiscal policy using the fiscal balances reference is made to the overall balance, primary balance and the structural fiscal balance. To examine the nature of fiscal policy, different authors have exploited different measures of the fiscal balance. Some studies have used the overall and primary balance (Thornton, 2007; Swanepoel and Schoeman, 2003) while others have used the structural fiscal balance (Du Plessis et al. 2007; Ajam & Aron, 2007; Swanepoel, 2004; Horton, 2005).

In this study we use the structural fiscal balance to analyse the nature of fiscal policy in Kenya. This is motivated by the fact that the impact of the budgetary stance needs an understanding of the role of the automatic and discretionary changes which have a bearing on how the structural and cyclical fiscal balances behave. The structural fiscal balance is measured using the gap-elasticities approach\(^5\). Two steps are followed. In the first step an attempt is made to measure the output gap which is used to assess the position of the economy in the business cycle (as discussed in section 2.0). The second step involves estimating the elasticities of the cyclically sensitive government revenue and expenditure categories (aggregate or components are used) with respect to GDP is measured\(^6\).

Figure 3: Fiscal balance in Kenya: 2005-2015

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\(^5\) The structural budget deficit is a deficit that prevails if income is at full employment, yielding a corresponding level of full-employment revenue. To calculate the structural fiscal balance we first estimate the elasticities associated with the government expenditure and revenue. The results are available from the authors on request.

\(^6\) The estimated elasticities provide a measure of the cyclical response of particular revenue and expenditure categories or their aggregate form. Once these procedure is conducted, the calculation of the structural fiscal balance is measured using:

\[ D_i = G_i - T_i = G(1-\eta_G \text{GAP}) - T(1-\eta_T \text{GAP}) \]

where \( \eta_G \) and \( \eta_T \) elasticities of expenditures and tax revenues, respectively. \( D_i \) is measured as a share of potential output: \( d_i = \frac{D_i}{Y_p} \). While the cyclical budget deficit is given as the difference between the actual and the structural budget deficit.
Figure 3 shows the relationship among the various measures of the fiscal balance in Kenya during the period 2005 to 2015. Figure 4 shows the relationship between the fiscal stance and output gap in Kenya. From the figure it is evident that the fiscal policy has exhibited different characteristics at different times during the period. Ideally, the government is expected to exercise restrictive fiscal stance when the output gap is positive, that is, when the economy is operating above trend, but, evidence from Figure 4 (Quadrant 1) shows that there are times when the fiscal policy was accommodative even when the output gap was positive. Also, on a few occasions (Quadrant 3) did the government pursue restrictive fiscal stance when the output gap was negative suggesting that instead of the government giving a stimulus to the economy, it instead, pursued restrictive fiscal stance. This is clearly a mild evidence of the fiscal stance being procyclical in nature.

However, it is also noted that on many occasions the government pursued counter-cyclical fiscal policies. For example, on Quadrant 2 when the output gap was positive the government responded appropriately by pursuing a restrictive fiscal stance. Furthermore, Quadrant 4 where negative output gap is associated with accommodative fiscal stance seems to be the common feature during the sample period. Also, from the figure it appears that there is generally a negative relationship between the fiscal stance and the output gap with a negative output gap being associated with an accommodative fiscal stance and otherwise. From the figure therefore it can be suggested that although the government had the fiscal instruments to fine tune the economy, on a number of occasions, however, these instruments were not used appropriately which brings to question the ability of the fiscal authority to identify the business cycle movements that can inform the direction of use of these instruments.

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7 Figure 5 shows the 4 quadrants of the relationship between the fiscal stance and output gap in Kenya. The 1st quadrant shows a case where the output gap is positive accompanied by accommodating fiscal stance; 2nd quadrant shows a negative output gap associated with restrictive fiscal stance; 3rd quadrant shows a negative output gap and a restrictive fiscal stance while the 4th quadrant shows a negative output gap accompanied by accommodating fiscal stance.
A number of studies have measure the monetary policy stance in different ways. Some studies have used the reserve money as a proxy for monetary policy (Baldini and Ribeiro, 2008;). Others have focused on the rate of interest as a monetary policy tool (*) while others have utilised the real rate of interest as a proxy of monetary policy (Swanepoel 2004, Du Plessis et al. 2007). In this study we use the real rate of interest as a measure of monetary stance.

From Figure 5\(^8\), during the period under study the Central Bank of Kenya pursued monetary policy which displays both procyclical and countercyclical behaviour which was either accommodative or restrictive. Ideally when the monetary stance is positive it reflects tight monetary policy while a negative stance reflects loose monetary policy. Therefore a countercyclical response by the central bank would be to loosen policy during negative output gaps or to ease policy during positive output gaps. During the period the government pursued monetary policy in different ways.

\(^8\) The central bank response can be categorised into four responses. As shown in Figure 6 the first quadrant the central bank pursues a countercyclical monetary tightening; the 2\(^{nd}\) quadrant reflects procyclical monetary loosening; the 3\(^{rd}\) quadrant shows countercyclical monetary loosening; while the 4\(^{th}\) quadrant shows a procyclical monetary tightening.
During the period under study it appears there are a number of years when the government pursued monetary policy in a countercyclical version. This is evident as there appear many observations on the 1st quadrants where the government was pursuing countercyclical monetary policy tightening in view of the output gap being positive. Also, on the 3rd quadrants where the economy was experiencing negative output gap and the government pursued a countercyclical monetary policy loosening. However, it is also found that there are years when the government pursued procyclical monetary policy loosening (2nd quadrant) and procyclical monetary policy tightening (4th quadrant). All these taken together, therefore, suggest that there is no clear direction of monetary policy in Kenya over the period.

**IV EVIDENCE OF POLICY COORDINATION**

Policy coordination exists when both the fiscal and monetary policies are consistent in terms of addressing a particular macroeconomic problem. Two situations that give rise to policy coordination are the following; first when the fiscal and monetary policy simultaneously display policy tightening; and second when the fiscal and monetary policy simultaneously display policy loosening. Evidence of any of these outcomes in a particular year will display policy coordination. In view of this therefore policy coordination will be evident when the fiscal and monetary policies play out on either the 1st quadrant where both show evidence of policy tightening or the 3rd quadrant where both display evidence of policy loosening.
On the other hand, absence of policy coordination will arise if the monetary policy shows evidence of tightening while the fiscal policy shows evidence of policy loosening or monetary policy displays policy loosening accompanied by fiscal policy tightening. This is possible in the 2\textsuperscript{nd} quadrant where there is evidence of fiscal policy loosening and monetary policy tightening while the 4\textsuperscript{th} quadrant displays evidence of fiscal policy tightening and monetary policy loosening.

Figure 6 shows graphical illustration of fiscal and monetary policy behaviour over the sub-periods. During the period there is evidence that in most of the years the policy mix was on the 1\textsuperscript{st} quadrant which marked fiscal and monetary policy tightening. Also, both fiscal and monetary policy loosening is evidence with many observations being on the 3\textsuperscript{rd} quadrant. Uncoordinated policy responses during this period is characterised by fiscal tightening accompanied by monetary policy loosening. Therefore during the period the policy environment was that of policy coordination. From the figure therefore, it can be inferred that, to a large extent, there was policy coordination.

\textit{Figure 6: Monetary-fiscal policy mix in Kenya}

In view of fact that policy coordination is not witnessed in all the years in our sample and that the years of uncoordinated responses are not restricted to a particular period, then there is need to investigate what uncoordinated policy responses portend for the country. Available evidence from the literature suggests that absence of coordination is harmful to the economy when there is evidence of fiscal policy dominance. However, where there is evidence of monetary policy dominance, coordination does not matter. Therefore in order to investigate the potential dangers of poor policy coordination we need to investigate the nature of policy dominance in the country in Kenya.
3.0 THE EMPIRICAL STRATEGY

In view of the discussion in Section 2 we follow the new-Keynesian paradigm in formulating the model to show how fiscal policy influences monetary policy in Kenya\(^9\). With the nominal and real rigidities underpinning this framework it is assumed that the main mechanism driving inflation over the business cycle is the fluctuations of real variables around their long-term trends. We therefore formulate a gap model which is semi-structural in nature — the model is a loose short-cut for a full structural model derived from optimization. Such model allows calibration flexibility in order to account for many empirical phenomena that theory has difficulty in capturing (Laxton \textit{et al.}, 2009).

3.1 The model

The model consists of five main behavioural equations which represent aggregate demand, aggregate supply, the uncovered interest rate parity condition, the monetary policy behaviour and the fiscal policy equation. The equations are discussed in turns here below.

**Demand side: The IS-curve**

The aggregate output is split into two components\(^10\): agricultural and non-agricultural output. Therefore the aggregate output will be the weighted horizontal summation of the two components as:

\[
y_t = b_1 \cdot y^\text{agr}_t + (1 - b_1) \cdot y^\text{agt}_t\]

(1)

Here \(y_t\) - total output, \(y^\text{agr}_t\) - non-agriculture output \(y^\text{agt}_t\) and \(b_1\) is the weight of non-agriculture output in total output. Following this approach we formulate the open-economy version of the traditional IS curve as:

\[
\hat{y}^\text{agr}_t = b_2 \cdot \hat{y}^\text{agr}_{t-1} + b_3 \cdot E_t(\hat{y}^\text{agr}_{t+1}) - b_4 \cdot \hat{r}_t + b_5 \cdot FIS_t + b_6 \cdot \hat{z}_t + b_7 \cdot \hat{y}^* + \varepsilon_t^\text{agr}
\]

(2)

Where \(\hat{y}^\text{agr}_t\) is the non-agriculture output-gap. In this formulation the output gap depends on its past value \(\hat{y}^\text{agr}_{t-1}\) and future expectations \(E_t(\hat{y}^\text{agr}_{t+1})\). In addition, it is driven by the (i) monetary policy through a gap in real interest rates, \(\hat{r}_t\), (i.e., a deviation of the real interest rate, \(r_t\), from its neutral trend level \(\bar{r}_t\)), and through a gap in the real exchange rate \(\hat{z}_t\), i.e., a

\(^9\) The model presented here is an extended version of the CBK model for forecasting and policy analysis. We have extended the model by explicitly incorporating the fiscal policy. In addition, it benefits from the IMF staff papers which have used this kind of framework to analyze policy.

\(^{10}\) The split into two components is occasioned by the volatility witnessed in the aggregate output arising from the seasonal behavior of agriculture output. To overcome this we split the data into non-agriculture output (which is less volatile) and agriculture output (volatile component). The non-agriculture component is taken to representation the economy’s business cycle. For simplicity we model the agricultural sector IS curve as an auto-regression (AR1) containing only a lag term and own shock as: \(\hat{S}^\text{agr}_t = b_k \cdot S^\text{agr}_{t-1} + \varepsilon^\text{agr}_t\).
deviation of the real exchange rate, \( z_t \), from its trend level \( \bar{z}_t \); and (ii) by the foreign output gap, \( \hat{y}_t \) and FIS, i.e. the deviation of the fiscal deficit from its trend (structural deficit). The demand shock to the non-agriculture output gap is captured by \( e_t^{agr} \).

In this framework the long-term trends of the two components of output are represented by the autoregressive mean-reverting processes centred on the steady states of the respective long-run relationships. The equilibrium output growth is a weighted average of equilibrium growth rates in agricultural and non-agro sectors, as shown below.

\[
\Delta \bar{y}_t = a_t \cdot \Delta \bar{y}_t^{agr} + (1-a_t) \cdot \Delta \bar{y}_t^{agr} ,
\]

while the equilibrium growth patterns of both sectors are modelled separately as processes converging to the same steady state growth rate:

\[
\Delta \bar{y}_t^{agr} = b_{11} \cdot \Delta \bar{y}_{t-1}^{agr} + (1-b_{12}) \cdot \Delta \bar{y} + e_t^{agr} \quad (3a)
\]

\[
\Delta \bar{y}_t^{agr} = b_{12} \cdot \Delta \bar{y}_{t-1}^{agr} + (1-b_{12}) \cdot \Delta \bar{y} + e_t^{agr} \quad (3b)
\]

Supply side: The Phillips curve

Here we formulate the Phillips curve as follows:

\[
\pi_t = b_{10} \cdot \pi_{t-1}^* + (1-b_{10}-b_{11}-b_{12}-b_{13}) \cdot E_t(\pi_{t+1}) + b_{11} \cdot \pi_{im} + b_{12} \cdot (\pi_{t-1}^* - \pi_{t-1}^* - \Delta z_{t-1}) + b_{13} \cdot (\pi_{t-1}^* - \pi_{t-1}^* - \Delta z_{t-1}) + b_{14} \cdot \Delta y_{t-1} + b_{15} \cdot \hat{y}_{t-1} + b_{16} \hat{p}_{t-1}^* + b_{17} \hat{p}_{t-1}^* + e_t^\pi \quad (4)
\]

And

\[
\pi_{im} = b_{18} \cdot \pi_{im} + (1-b_{18}) \cdot (\pi_t^* + \Delta s_t - \Delta \bar{z}_t) + e_t^\pi \quad (4a)
\]

Where CPI inflation, \( \pi_t \), depends on several groups of factors. Firstly, these are inflation expectations \( E_t(\pi_{t+1}) \), and past inflation indexation (in Y-o-Y terms), \( \pi_{t-1}^* \). The second group of factors is composed of imported inflation of oil (adjusted by relative price trends), \( \pi_{t-1}^* - \pi_{t-1}^* - \Delta z_{t-1} \), imported inflation of food prices (adjusted by relative price trends), \( \pi_{t-1}^* - \pi_{t-1}^* - \Delta z_{t-1} \), and imported foreign inflation, \( \pi_{t-1}^* \) from Equation (3a). Furthermore, inflation is driven by real demand and cost conditions, captured by (i) the non-agriculture output gap, \( \hat{y}_{t-1} \), (ii) the real exchange rate gap, \( \hat{z}_{t-1} \), and (iii) the relative prices of oil and food, \( \hat{p}_{t-1}^* \) and \( \hat{p}_{t-1}^* \), respectively.

Uncovered interest rate parity condition

The uncovered interest rate parity condition (UIP) is presented as:

\[
E_t(s_{t+1}) - s_t = (i_t - i_t^* - prem_t) / 4 + e_t^s \quad (5)
\]

\(^{11}\) The real exchange rate is against the USD and is defined as the nominal exchange rate adjusted for price level differential: \( z_t = s_t - p_t + p_t^* \)
where $s_t$ is the nominal exchange rate; $E_t(s_{t+1})$ expected nominal exchange rate; $i_t$ is the domestic nominal interest rate; $i_t^*$ is the foreign nominal interest rate (both annualized); $\text{prem}_t$ is the risk premium; and $\epsilon_t$ is the exogenous innovation to the exchange rate. This equation suggests that expected depreciation of the currency must equal inflation differential adjusted by difference in country risk premium. The long-run UIP version expressed in real terms is expressed as:

$$\tilde{r}_t = \Delta \tilde{\pi}_t + \bar{r}_t^* + \text{prem}_t \quad (5a)$$

The equation determines the equilibrium level of the domestic trend real interest rate $\bar{r}_t$ in relation to the equilibrium foreign trend real interest rate, $\bar{r}_t^*$, and the change in the equilibrium real exchange rate and the risk premium, $\Delta \tilde{\pi}_t$ and $\text{prem}_t$ respectively.

**Monetary policy rule**

We model the monetary policy maker’s behaviour using the reaction function as follows:

$$i_t = b_{19} \cdot i_{t-1} + (1-b_{19}) \cdot (\tilde{i}_t + b_{20} \cdot \tilde{\pi}_t + b_{21} \cdot \tilde{\pi}_t^{\text{long}}) + \epsilon_t \quad (6)$$

Where $\tilde{i}_t$ represents the Central Bank Rate (CBR) and $\tilde{\pi}_t$ is the divergence between expected inflation $E_t(\pi_{t+3})$ and, the inflation target $\pi_t^{\text{tar}}$ ($\tilde{\pi}_t = E_t(\pi_{t+3}) - \pi_t^{\text{tar}}$). The policy-neutral rate, $\tilde{i}_t$, is the rate of interest that does not cause any demand pressures. It is calculated as the sum of the equilibrium real interest rate and model-consistent inflation expectations: $\tilde{i}_t = \tilde{r}_t + E_t(\pi_{t+1})$.

**The fiscal policy equation**

To incorporate the fiscal sector into this framework there are two basic approaches: (i) appealing to the information content of the fiscal deficit— decomposing it into the structural and the cyclical component on the basis of which we compute the fiscal impulse- essential to assess the effect of fiscal policy on key macro variables in Kenya (ii) appealing to the term-structure of interest rates- here the thinking is that there exists a link between the market interest rates and therefore the effect of fiscal policy can be assessed through the effect of short term rates on long-term government paper rates and its impact on the credit conditions and therefore growth and inflation. As a starting point we work with the first approach where we decompose the fiscal deficit into two components as follows:

$$f\text{def} = f\text{def}_{-cy} + f\text{def}_{-st}$$

Where $f\text{def}$ is the total fiscal deficit, $f\text{def}_{-cy}$ is the cyclical fiscal deficit and $f\text{def}_{-st}$ is the structural fiscal deficit. For this model we assume these components evolve as follows:

$$f\text{def}_{-cy} = -b_{22} \cdot l \_ Y \_ \text{gap} + \epsilon f\text{def}_{-cy}$$

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12 To compute the structural fiscal balance we use the revenue and expenditure elasticities from past studies on Kenya
Where $L_y$\_gap is the output gap and is the cyclical fiscal deficit shock. And the structural deficit evolves as:

$$f\_st\_def = b_{23} * f\_def\_st_{t-1} + (1-b_{23}) * SS\_st\_def + \epsilon_{t}$$

Where $SS\_st\_def$ is the steady state of the fiscal deficit.

### 3.2 Calibration of main behavioural equations

Let’s start with aggregate demand for non-agriculture production (also called IS curve). The forward-looking term in this equation is rather weak (parameter value is 0.1) compared to backward-looking term (0.6). This reflects credit constraints the Kenyan households are facing. The low-income level, insufficient collateral, and undeveloped financial markets make the intertemporal substitution in consumption difficult, and thus less forward-looking. Regarding the channels the monetary policy uses to affect aggregate demand, the interest rate channel (captured by real interest rate gap in the IS curve) is weaker (0.03) than the exchange rate channel (0.04). This reflects openness of the Kenyan economy on one hand, and relatively weak linkage between the central bank rate and commercial bank rates limiting CBK ability to affect credit conditions.

Regarding the remaining part of the aggregate output – the agriculture production – the persistence parameter $a_7$ in the equation (3) is calibrated as a low value of 0.5, making shocks to agricultural output relatively short-lived. This is because shocks to the agricultural sector such as bad weather which results in a bad harvest last only till the next crop harvest.

With respect to aggregate supply block, represented by the Phillips curve for inflation, is much more backward-looking (0.6) than forward-looking (0.2). This is a very common feature in economies without an effective nominal anchor. Because the producers’ expectations about price level in the economy are not well anchored, the producers are more inclined towards indexation of prices according to recently observed inflation. As a result, it is more difficult for the central bank to control inflation and bring it back at the target. Nevertheless, this may change in the future when the central bank provides better guidance on future developments, and gains more credibility through transparent and well-communicated forward-looking policy.

As Kenya is an open economy, the imported inflation components have relatively strong effect on prices in Kenya. This results also in a strong pass-through of the exchange rate to inflation, which is in line with the past experience.

The calibration of the monetary policy rule reflects somewhat dovish attitude of the CBK. The interest rate smoothing is relatively high (0.7), which makes the policy more conservative about changes in the interest rate. Reaction of the rates to inflation gap is not strong (value
of parameter $a_{20}$ is 1.3). The monetary policy does react neither to output nor to exchange rate movements directly.\(^\text{13}\)

Apart from the calibration of the behavioral equations, special attention has to be devoted to calibration of steady state values. The steady state values are the values that the key variables converge to in the long-run. The steady state of inflation rate is set to 5 percent ($\pi^{tar}$), which coincides with the recent targets the government set for a medium term inflation. This rate is also consistent with the convergence rate set by the East African Community (EAC) and the Common Market for Eastern and Southern African (COMESA) countries. The steady state of the real GDP growth rate ($\Delta y$) is calibrated at approximately 5.5 percent. The steady state value of real exchange rate appreciation was set to 4 percent. This is based on the historical behavior of real exchange rate which appreciated by approximately 4 percent per annum on average. The steady state value of the country risk premium was calibrated at 4.5 percent which is consistent with the historical average as well. In addition, the steady state value of the structural fiscal deficit is set at 5 percent.

4. Results: Impulse Responses

Following the model described above we now discuss the effect of fiscal policy on key macro-economic variables. The aim is to demonstrate how the actions of fiscal policy play out to occasion changes in key macro-economic variables, including how the monetary policy responds. Figure 2 shows the impulse response functions based on a one percent fiscal shock, that is, a sudden rise in the fiscal deficit.

From the figure it is evident that a one percent increase in fiscal deficit is associated with the following effects; (i) An increase in the fiscal deficit by one percent will occasion an increase in output which reaches its maximum effect within two quarters before it starts to decline. In terms of magnitude, within two quarters, output increases by approximately 4 percent. The accumulated growth effect during 4 quarters is found to be 0.6 percent per annum. This therefore suggests a one off increase in the fiscal deficit during any year will result in a 0.6 percent increase in GDP. However, it is worth noting that the maximum effect is reached very rapidly—within 2 quarters before it starts to decay. The rapid decay may be on account of the structure of the government spending. If most of the resources go into government consumption then it is expected to have a short term effect. This appears to be the case here.

**Figure 8: Effect of fiscal shock on key macroeconomic variables.**

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\(^\text{13}\) IMF classifies Kenyan exchange rate arrangement as floating.
The exchange rate appreciates following the fiscal shock, reaching an appreciation of about 0.5 percent in the first quarter following the fiscal shock. The appreciation of the currency could be on account of the high domestic interest rates relative to the rest of the world which occasions higher capital inflows and therefore strengthens the exchange rate.

In terms of its effect on inflation, it is shown that a fiscal expansion by one percent will cause inflation to rise by 0.2 percent in the first quarter and accelerating by approximately 0.4 percent in the 3rd quarter. With observed inflation, the monetary authority is expected to react to stem the rise in inflation and anchor expectations. In view of the expansionary fiscal stance, monetary policy is expected to tighten marginally by raising rates by approximately 0.25 percent in the 4 quarters following a fiscal shock.

Following these results, it is therefore evident that while the fiscal policy is aimed at enhancing economic growth which it succeeds to achieve within a relatively short span of time, this action causes a movement in exchange rate and inflation which ultimately will cause the monetary policy to react by tightening.

5. Conclusion

From the evidence available it is found that there is no clear pattern of behaviour witnessed during the period under investigation. When the economy is experiencing a downswing the fiscal policy is expected to enlarge and when it is experiencing an upswing the fiscal policy is expected to decline, both aspects which project a countercyclical fiscal posture. However, from the available evidence it is shown that the fiscal policy did not behave as expected.
Second, examining how the monetary policy behaves relative to the cyclical conditions. It appears that on many occasions the government pursued monetary policy in a countercyclical version. This was mainly characterised by countercyclical monetary policy tightening and loosening. However, it is also found that there are years when the government pursued procyclical monetary policy loosening and tightening. This suggests that, just like the fiscal policy, monetary policy was not exhibiting the expected pattern during some of the years.

This paper set out to analyse how fiscal policy influences monetary policy in Kenya using the new-Keynesian model. The model is semi-structural in nature, and comprises of five main behavioural equations representing the aggregate demand, aggregate supply, the uncovered interest rate parity condition, the monetary policy behaviour and the fiscal policy equation.

Some measures of fiscal policy can affect monetary policy through direct effect on inflation, while others have indirect effects through their impact on aggregate demand and spillovers from public expenditure into private sector. More importantly, fiscal policy influences economic variables that are key in monetary policy transmission such as interest rates, interest rate spreads and exchange rates.

Based on impulse response functions from the model, the results show that:

(i) A one percent increase in the fiscal causes output to rise reaching a maximum effect within two quarters before it starts to dissipate. A one off increase in the fiscal deficit during any year will result in a 0.6 percent increase in GDP. However, it is worth noting that the maximum effect is reached very rapidly—within 2 quarters before it starts to decay.

(ii) The exchange rate appreciates following the fiscal shock, reaching an appreciation of about 0.5 percent in the first quarter. The appreciation can be explained by the high domestic interest rates relative to the rest of the world which occasions higher capital inflows.

(iii) A one percent fiscal expansion causes inflation to rise by 0.2 percent in the first quarter and accelerating by approximately 0.4 percent in the 3rd quarter.

In view of the expansionary fiscal stance, we observe that monetary policy is expected to tighten by raising rates by about 0.25 percent in the 4 quarters following a fiscal shock.

It is therefore evident that while the fiscal policy is aimed at enhancing economic growth which it succeeds to achieve within a relatively short span of time, this action causes a movement in exchange rate and inflation which ultimately will cause the monetary policy
to react by tightening. This indicates that fiscal policy tends to influence monetary policy in Kenya.

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