



Assessing the effectiveness of monetary policy in Kenya: Evidence from a macroeconomic model[☆]



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ABSTRACT

This paper examines the effectiveness of monetary policy in Kenya based on policy simulations from a structural macroeconometric model. The analysis is conducted using the policy rate, i.e. the central bank rate (CBR) and the cash reserve ratio (CRR) with respect to the interest rate and bank lending channels, respectively. The results indicate that whereas a change in the policy rate is effective in influencing short term rates, the long term lending rates respond marginally. Consequently, the transmission to the real economy and the overall impact on inflation is minimal. However, a change in CBR has a comparatively higher impact on inflation while a change in CRR has a relatively larger impact on aggregate demand. Enhancing the effectiveness of the CBR and strengthening of the interest rate channel have the potential of anchoring inflation expectations and boosting the effectiveness of monetary policy in Kenya.

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1. Introduction

Macroeconomic models are increasingly playing a significant role in modern central banks, particularly in providing insights to the conduct of monetary policy and the dynamics that arise out of the complex interactions between different economic agents in the economy. Models differ in their design depending on the kind of questions and specific issues to be addressed. Of particular interest to central banks is the understanding of monetary policy transmission channels and the impact of monetary policy with respect to the realization of the desired policy objectives. However, despite their significance, the application of economic models in policy analysis in African countries is still relatively low in comparison to the developed and emerging economies. Moreover, most of the empirical evidence on monetary policy transmission mechanisms is generally based on vector autoregression (VAR)

models,³ notwithstanding some of the common short comings of the VAR methodology, such as parameter instability and deficiency when judged by structural benchmarks (Rudebusch, 1998). The fact that results depend on the restrictions imposed has also contributed to conflicting empirical evidence in the literature (Ivrendi and Guloglu, 2010). This paper makes a contribution by assessing the effectiveness of monetary policy in Kenya based on policy simulations from a structural macroeconometric model developed by the authors to aid in policy analysis and short term forecasting at the Central Bank of Kenya (CBK). The model provides a comprehensive analysis since it captures the economy in totality, including the direct and indirect feedback effects and interactions across different sectors of the economy. Moreover, the model can be used to evaluate different policy options and alternative scenarios and in the process, also identify weaknesses in structural inter-linkages in the transmission mechanisms.

Two key channels of monetary transmission mechanisms are examined, i.e. interest rate and bank lending channels. In conducting monetary policy, these channels are mainly relied on as a means of influencing the desired outcomes, and hence the need to study and understand them. Policy simulations are conducted with respect to the two channels using the Central Bank Rate (CBR) which is the policy rate, and the Cash Reserve

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³ Examples include Aleem (2010), Boivin (2003), Cheng (2006), Christiano et al. (1996), Disyatat and Vongsinsirikul (2003), Morsink and Bayoumi (2001), Peersman and Smets (2001), among others.

Ratio (CRR), respectively. To undertake the simulations, the structure of the economy as modeled in the macro model is held constant.

The results show that a change in CBR has an effective impact on the short term rates. The transmission to the long term lending rates is, however, sticky and hence, the ultimate impact on aggregate demand and inflation is minimal. The results further show that a change in CRR, which works through the bank lending channel, has a stronger effect on the aggregate demand while CBR has comparatively higher impact on inflation. Additionally, there are time lags, particularly in the transmission of monetary policy to the real economy via the interest rate channel, and substantive effects are realized after some quarters or almost a year later. Monetary policy interventions should be therefore, timely to allow for adjustments and interactions in the economy. CRR is likely to be more effective particularly where faster results in managing demand-driven inflation are needed. However, given its frequent use and the link with domestic interest rates, CBR has the potential of anchoring inflation expectations and its effectiveness should be therefore, strengthened.

The rest of the paper is structured as follows. Section 2 gives an overview of the CBK macroeconomic model including the background and theoretical framework of the model. Section 3 describes the transmission channels of monetary policy while Section 4 presents the results of the simulation analyses. Section 5 concludes.

2. Background and overview of the macro model

Kenya is one of the few African countries that have made some notable efforts in application of macroeconomic models to planning and policy analysis. Macro modeling efforts started with the development of fairly simple models like the *macroeconomic policy model*⁴ and the *medium to long term model* (MELT3) but these were short-lived (Karingi and Ndung'u, 2000). The first relatively well known comprehensive macro model was the *KIPPRA-Treasury macroeconomic model* (KTMM)⁵ developed in 2000 with a view to support the government in the planning process under the Medium Term Expenditure Framework (MTEF), by providing annual projections of key macroeconomic variables (Were and Karingi, 2002). KTMM was a major improvement of the previous models which among other things suffered from lack of sound theoretical foundations and had ceased to exist by the time KTMM was developed. That notwithstanding, the major limitation of KTMM lies in the weak formulation of the monetary sector, with little or no inter-linkage between monetary policy and the rest of the economy. The main focus of the model was on the fiscal sector since the aim was to support the government in medium-term planning. Consequently, the model is not suited for the analysis of monetary policy issues.

In contrast, the CBK macro model is a quarterly macroeconomic model developed in 2011 to aid in the analysis of monetary policy in addition to providing short term macroeconomic forecasts.⁶ The model contains the core sectors of the economy, i.e. monetary, external, fiscal and real sectors, with a detailed monetary block tailored towards monetary policy operations of the bank. A brief description of the model is given below.

2.1. The logical and theoretical framework of the model

The logical framework of the model and structural inter-linkages between the various sectors of the economy are illustrated in the flow chart in Fig. 1. The clear boxes denote different domestic prices that are determined in the model (consumer price, exchange rate and

domestic interest rates) while the dark-shaded outer boxes denote the core economic sectors (e.g. government, external and real sector). The arrows show the direction of the linkages. For instance, the domestic interest rates are determined in the money market. Actions on the fiscal side have implications on the domestic interest rates e.g. through the price effect of crowding out or through the effects on return to government securities relative to other assets. Aggregate demand, price level, interest rate and the exchange rate determine the money demand. Consumer price/inflation is primarily influenced by excesses in money demand, prices of imported goods and services (imported inflation), price expectations⁷ and output gap, which is determined as the difference between the actual and potential output.

Nominal exchange rate is determined in the foreign exchange market by the differentials between domestic and world interest rates, as well as between domestic price and world price. For instance a rise in domestic interest rates relative to foreign interest rates will lead to an appreciation of the local currency. World price and foreign interest rates are exogenously determined. The real exchange rate follows by definition (given the nominal exchange rate, foreign and domestic prices), and impacts on exports and imports of goods and services in the external sector.

Fig. 2 provides a more detailed breakdown of the monetary block of the model illustrating the central role that monetary policy instruments play and the main channels through which monetary policy influences other variables in the economy. Money supply is determined via the money multiplier (mm) and reserve money (RM), and is disaggregated by sources, i.e. net foreign assets (NFA), net credit to Government (NCG), private sector credit (PSC) and other items net (OIN). Each of the sources has two components, the CBK component and other depository corporations (ODC) which, in the case of Kenya, are basically the commercial banks. The summation of the CBK components constitutes RM. The NFA is determined in the external sector i.e. through the Balance of Payments (BOP) accounts. NCG is determined in the fiscal sector by the government's borrowing requirements net of government deposits at the CBK. On the liabilities side, money demand is disaggregated into currency outside bank (COB) and deposits. Deposits are further disaggregated into demand deposits, quasi deposits and foreign currency deposits.

Excess money demand acts as one of the triggers of monetary policy actions. Monetary policy tools include open market operations (OMO), CBR and CRR. The transmission works through the short term to long term interest rates which in turn, have a bearing on PSC and demand for investment in the real sector. The behavioral equations in the monetary block include domestic interest rates (interbank rate, 91-day Treasury Bill Rate (TBR), deposit and lending rates), money demand and PSC. The non-behavioral equations include identities for the various sources of money supply and mm.

In the external sector block, behavioral equations are specified for the determination of the exchange rate, exports and imports. Exports and imports are disaggregated into goods and services. Export of goods is determined based on small country assumption, as a function of relative price (weighted export price as a ratio of world non-fuel commodity price index) and income of Kenya's key trading partners. Import of goods is determined by domestic income and relative price (weighted producer price of trading partners relative to domestic price), while import of services is a function of domestic income. The external sector also contains all the core BOP accounts, that is, current, capital and financial accounts.

In the real sector, total demand equals the sum of final consumption expenditure by households, investment, government expenditure, exports less imports. At the aggregate level the model follows the aggregate demand-aggregate supply Keynesian framework along similar lines like the KTMM. In the short run, income is determined in the real economy from the demand side through aggregate demand. Given that CBK's central objective of formulating and implementing monetary

⁴ Otherwise known as the 'Chakrabarti' model.

⁵ The model was developed by a team of modellers at the Kenya Institute of Public Policy Research and Analysis (KIPPRA) in collaboration with the Treasury and hence the name. See Huizinga et al. (2001) for a description of the theoretical underpinnings of the model.

⁶ The model was developed by the authors while at the Research Department of the Bank.

⁷ These are modeled as adaptive expectations given the inflation persistence in Kenya.

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