THE EFFICACY OF MONETARY AND FISCAL POLICIES IN EAST AFRICA: AN EMPIRICAL INVESTIGATION

A Dissertation

Submitted to the Faculty of the National Graduate Institute for Policy Studies (GRIPS) in Partial Fulfillment of the Requirements for the Degree of

DOCTOR OF PHILOSOPHY IN DEVELOPMENT ECONOMICS

by

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January, 2016

Acknowledgements

Dedication

To my beloved son, late Jefferson Wendeline, who passed away prematurely on August 31, 2015 while I was enroute to Cape Town for the presentation of Chapter 3 of this dissertation at the Biennial Conference of the Economic Society of South Africa. I will always remember you Jefferson for many but mostly for being there for my comfort as I was trekking this unprecedented and arduous but rewarding journey of writing and rewriting this dissertation. May His Soul Rest in Eternal Peace, AMEN.

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Abstract

This dissertation examines the effectiveness of monetary and fiscal policy for the three members of the East African Community (EAC), namely Kenya, Tanzania, and Uganda. The countries are forging strong economic ties as they gravitate to becoming members of the monetary union by 2024. To understand the historical genesis of the community, chapter 1 lays out the evolution of the monetary and fiscal cooperation amongst these countries since the pre-independence era when each of them was under the British patronage. Chapter 2 updates about the recent monetary and fiscal developments as well as some empirical evidence on how the demand management policies have been conducted since becoming members of the reestablished East African Community. An important takeaway from this chapter is that East African countries have made great strides in both fiscal and monetary performance but empirical evidence on the effectiveness of these policies is still cluttered with the inconsistent findings. To this end, this dissertation explores these topics with a more recent, and more reliable approach than those applied in the existing literature.

Chapter 3 studies the effectiveness of monetary policy on output and other macroeconomic fundamentals for each country using structural VAR with sign restrictions. To the best of the information available, this is the first study to apply this empirical strategy to identify monetary policy shocks and estimate their effects on output for each of the three EAC countries. Monetary policy shocks, identified by an unexpected, temporary changes in interest rate and reserve money, appear to affect output and other macroeconomic variables significantly. Further, the response of output to a shock in interest rate is more pronounced than similar response to a reserve money shock for each country. And as expected, monetary policy shocks are not the main determinants of the output variability in these countries as they explain a

maximum of 10 percent of the fluctuations of output. Moreover, interest rate shock seems to contribute more to output variability than reserve money for each country and almost for each forecast horizon. Regarding the channels with which the monetary policy shocks propagates to the economy, the findings point to channels pertaining to interest, credit to private sector and exchange rates. Finally, although monetary policy is found to be effective for each country, differences exists with respect to the magnitude, timing and persistence of the responses to monetary shocks amongst the EAC country. The difference may partly be attributed to the prevailing differences in the levels of financial developments as well as policy frameworks.

The analysis in chapter 3 meant to provide an overview of the national transmission mechanisms of monetary policy that may corroborate the transmission mechanisms at the regional level. This analysis helps to investigate the presence of the cross-country differences in the transmission mechanisms that may be of concern for the operations of the supranational monetary policy. However, as countries in the monetary union relinquish their monetary policy autonomy, few instruments are at their disposal to countervail idiosyncratic shocks. Since country-specific shocks are prevalent among the East African member countries, subscription to monetary union will deprive them of their ability to use monetary policy as well as the exchange rate to address these shocks. With customs union and common markets still not at fully operational, fiscal policy is the only policy instrument that can be used to counteract country-specific shocks in these countries. This offers the rationale for understanding how effective fiscal policy is for counter-cyclical purposes in each of the East African economies.

Chapter 4 delves in examining whether fiscal policy can be used for countercyclical purpose in the event of economic slowdowns, that is whether fiscal policy can stimulate output in the economy. This is done with the aid of structural VAR with sign restrictions in which fiscal policy shocks are identified by imposing sign restrictions on the impulse responses of fiscal variables for some horizons after the shock and requiring that fiscal shocks

be orthogonal to both business cycle and monetary policy shock. By so doing, this empirical strategy captures much of the fiscal dynamics present in each of these countries. A number of key findings are worth noting. First, deficit spending works well for Tanzania while balanced budget performs better for Uganda. None of these fiscal options works for Kenya and thus fiscal policy is least effective in Kenya. Fiscal shocks are found to have modest contributions to output fluctuations. Finally, as each of these countries is about to reap the resource-based revenues, fiscal space may be widened and thus be used for countercyclical purpose in the event of economic slowdown or other structural transformations of the economy.

Overall, these findings show that monetary policy is effective in each of the three East African countries and that, of the two instruments of monetary policy, interest rate appear to be more effective than reserve money. The findings therefore offer support to the ongoing efforts among the central banks in East Africa countries to adopt interest rate as the main policy instrument. Furthermore, fiscal policy may be used to counteract country-specific shocks as the cumulative fiscal multipliers are found to be significant especially for Tanzania and Uganda. The results based on structural VAR with sign restrictions may therefore be used as benchmark for further theoretical and empirical analysis of the transmission mechanisms of monetary policy and cyclical behaviour of fiscal policies in East Africa. As the new data flow during the run up to the launch of the East African Monetary Union (EAMU), monitoring how these results change is imperative as the observed differences may rapidly disappear and thus attenuate the adverse effects that could have resulted from the loss of policy autonomy.

CHAPTER 1

Introduction

The establishment of the East African Community has since been attributed to the political ambitions of the heads of states of the respective countries and that no economic rationale has thus far been given since its rebirth. Since its inception in 2000, EAC has already phased in customs union and common market and thorough preparations are in place to establish the most critical and yet subtle phase of the integration, the East African Monetary Union (EAMU). Empirical evidence and theoretical underpinnings of the monetary union, as propounded by Mundell (1961) underscore the importance of deeper understanding of the interactions between monetary and fiscal policies. Against this backdrop, this dissertation endeavors to contribute to these efforts by examining how each EAC country's monetary policy performs and establish the extent to which fiscal policy is amenable to counteract idiosyncratic shocks in the context of the supranational monetary policy, which is less likely to attenuate the impact of idiosyncratic shock a member country in a monetary union faces.

The EAC is already 15 years old since its rebirth, an age that has never been lived by its predecessor. As such it suits to have a historical context of the genesis of monetary and fiscal cooperation among Kenya, Tanzania and Uganda, which are pioneer members of the reestablished East African Community (EAC) and case studies in this dissertation[1].

The history of monetary and fiscal cooperation amongst the EAC countries – Kenya, Tanzania and Uganda in particular – dates back to December 1919 when the East African Currency Board (EACB) was established to provide for and to control the currency of Kenya and Uganda, then known as Kenya Colony and protectorate and the Uganda protectorate,

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[1] Burundi and Rwanda are also members of EAC but are not covered in the analytical chapters of this dissertation due to lack of data on key variables.

respectively [2]. Tanganyika (now Tanzania mainland) became a member of the currency area a year later after it was handled over to the United Kingdom for administrative purpose by the Leagues of Nations. Over the course of its evolution, EACB membership enlarged to include Zanzibar in 1936 and the East African shilling was introduced as a legal tender to other countries in the region, notably British-occupied Italian Somaliland, Eritrea, Ethiopia and the British protectorate of Somaliland.

Despite the monetization role the currency board rendered to its constituent economies, it was not without shortcomings (Abdel-Salam, 1970). First, EACB was operationally rigid and institutionally limited because it lacked the power of monetary control and was unable to supply credit to facilitate the process of money creation and hence the potency of monetary policies. Second, member countries were left with less diversified portfolio due to the requirement that they must invest their external balances in sterling securities, which were characterized with low profit due to low yields of the sterling securities in the post-war II period. Consequently, members of the currency board became net lenders to Britain following the denied opportunity of investing in securities with higher yields that could have been easily converted into liquid assets.

The afore-mentioned flaws inherent in the operation of the EACB prompted constituent members to initiate deliberate movements of replacing the EACB with autonomous central banking arrangements. These movements and struggle for political independence concurred in many constituent members of the EACB, starting with Ethiopia's exit and the subsequent establishment of its own currency then known as the Ethiopian dollar. The quest for the

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[2] This was one of the three currency boards in Africa under the British sterling. Other currency boards were the West African Currency Board which included the former British West Africa Countries, namely Gambia, Gold Coast (now Ghana), Nigeria, Sierra Leone, and later Cameroon and the Southern Rhodesia Currency Board which was also known as the Central African Board After 1953. This Board comprised of Southern Rhodesia (now Zambia) and Northern Rhodesia (Now Malawi). The main purposes of these currency boards were threefold: issue of local currency, maintenance of its convertibility into sterling at a known exchange rate, and the provision of some revenue to the colonial governments. For Details, see (Abdel-Salam, 1970).

independent monetary authorities in Kenya, Tanzania and Uganda promulgated on June 10, 1965 when finance minister of each country announced his government's intention to establish its own central bank and issue its own currency thereafter. This initiative had finally came into fruition in 1966 when each constituent country enacted a legislation that heralded the establishment of the Central Bank of Kenya (CBK), the Bank of Tanzania (BOT) and the Bank of Uganda (BOU).

Though the mere presence of the independent central banks had practically marked the demise of the EACB, Kenya, Tanzania and Uganda continued to help out each other in various issues, including those related to monetary policy. For example, the triad had a joint account with each other to facilitate interterritorial transactions. Their cooperation deepened further in 1967 when the treaty for the establishment of East African Community was officially signed. The treaty encompassed six broad areas of cooperation, including monetary and fiscal cooperation aimed at ensuring free convertibility of current account by cushioning any member with balance of payments difficulties through loans from fellow members[3]. It was this cooperation that presided over all services then under the EACB. The community, however, broke up in 1977 due asymmetrical economic benefits in favor of Kenya, political strains between Tanzania and Uganda, ideological differences between Kenya and Tanzania and lust for state sovereignty that persisted over the course of its life(Hughes, 1977; Eken, 1979; Otieno, 2000).

It was not until 1999 that the three heads of states recalled the profound importance of reinstating the cooperation among their neighbouring and culturally related nations for the betterment of their citizens[4]. The revived East African Community came into existence in 2001 with a broad purpose of pooling their individual country potentials for the regional economic

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[3] Other areas cited in the treaty are the East African Community, the Common Market, the Common Services and Industrial Development.

[4] The then heads of state were Benjamin Mkapa of Tanzania, Mwai Kibaki of Kenya and the incumbent president of Uganda, Yoweri Museven

development. The new EAC embodies essential attributes of its predecessor except common services. On its evolution to a fully-fledged integration, EAC is envisaged to phase in customs union, common market, monetary union and finally political federation. With Kenya, Tanzania and Uganda as pioneer member states, Burundi and Rwanda joined the block in July 2007 and subsequently became members of the customs union in 2009. To date, EAC is in common market phase and concerted efforts are underway to expedite the establishment of the East African Monetary Union (EAMU) in 2024. These efforts include but not confined to studying the macroeconomic convergence criteria and setting up supportive institutional arrangements like the East African Monetary Institute. To understand the progress made so far, it behoves to summarize the recent developments of the East African Community.

Although EAC member countries have already phased in customs union and customs union stages of their integration, these phases are far from complete as they are getting prepared for the next phase: monetary union. According to the Optimum Currency Area (OCA) theory, the benefits of a monetary arrangement outweigh its costs given the prerequisites for that arrangement are taken on board the potential member countries. The prerequisites include, among other things, the well functioning customs union and common market because the two phases contributed to the synchronicity of business cycles among member countries. Moreover, to have a well-functioning monetary union, a clear understanding of how monetary policy impacts each member country is indispensable. This entails precise identification of policy instruments and pathways through which changes in policy instruments are transmitted into changes in economic activity and prices and how potent each channel is in each country. In the event of a remarkable heterogeneity among constituent economies in terms of policy instruments or transmission channels, the conduct of a common monetary policy is likely to be engulfed by unprecedented complications if the potential heterogeneity is deliberately or unwittingly left unaddressed. The unprecedent challenge of this would would be idiosyncratic

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responses to an exogenous shock or even to common monetary policy shocks among the members.

Since monetary policy conducted in a monetary union is intended to deal with common shocks within the region, fiscal policy can become increasingly important in dealing with idiosyncratic shocks. It is on this recognizance that the second analytical chapter of this dissertation, which studies the efficacy of fiscal policy on output, is written. Loss of monetary policy autonomy may force national government to rely heavily on fiscal policy to finance their finance deficits. Following the temptations for excessive borrowing by members countries,Weber (2011) argues that strong fiscal institutions are imperative in any monetary arrangement to ensure that member countries adhere to the rules of sound public finance to forfend free riding among members.

Empirical studies of the monetary transmission mechanisms derive their paramount nobility not only for countries in transition to a monetary arrangement but also they still retain relevance for countries already in a monetary union and even those which are not. This pertinence emerges as a consequence of the dynamism of monetary policy partly caused by the ongoing financial innovations, which alter the relative importance of policy instrument or channel through which monetary policy impacts the economy, and financial globalization.

Notwithstanding the urgency of understanding the Monetary Transmission Mechanism to developing countries in this era of complex financial products and systems and an ever increasing financialization, a voluminous literature has been devoted to developed countries while a growing literature in developing countries still at the *work-in-progress* stage. The observed bias in literature may partly be attributed to the dearth of high-frequency, quality data in the developing world or frailty of the financial sector inherent in most developing countries. Furthermore, literature of the two worlds is subtly different as those in advanced economies tend to focus primarily on prices–interest rate, exchange rate, and other asset prices–

while those in in developing countries use quantities like monetary aggregates, credit, bonds, and foreign assets and products. This dichotomy may partly be attributed to the presence of weak institutional framework, oligopolist banking structure, shallow financial markets, and extensive central bank intervention in the foreign exchange markets in the developing world. Next is an overview of the findings of this dissertation

Chapter 3 explores how monetary policy shocks affect output and other macroeconomic aggregates in Kenya, Tanzania and Uganda. The findings point to the presence of consistent and significant responses of output to both reserve money and interest rate shocks. Using either instruments, a contractionary monetary policy shock triggers a significant fall of output for each country. Further, the average contribution of these shocks to output fluctuation is modest and of equal magnitude especially for Kenya and Uganda. The difference in the responses to and contributions of monetary policy shocks can be attributed to the differences in the level of financial development among these countries. Addressing the structural differences inherent in the financial sector of each country is therefore important to ensure smooth transition to the new regime with a common monetary policy.

Chapter 4 examines the effects of fiscal policy on output in Kenya, Tanzania and Uganda using Bayesian SVAR with sign restrictions. In addition to identifying fiscal shocks as it is for monetary policy, this approach has an advantage of making the effects of fiscal shocks less contaminated by first filtering the effects of business cycle shocks and monetary policy shocks. It is thus pertinent to these small economies with deficits in infrastructure network and prone to weather vagaries. A key finding is that deficit spending works well for Tanzania while balanced budget performs better for Uganda. None of these fiscal options seems to work for Kenya. Fiscal shocks are found to have modest contributions to output fluctuations. Thus, as these countries are in the offing to reap the resource-based revenues, building up fiscal space is imperative for counter-cyclical purpose in the event of economic slowdown.

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The contributions of this dissertation to the existing literature are two-fold. First, by using Bayesian SVAR with sign restrictions, it adds to the existing literature new identification and estimation strategy for both monetary and fiscal policy studies. Second, since no multi-country study on fiscal policy has been done, to the best of my knowledge, this dissertation initiate the literature on fiscal policy for East Africa that can help stimulate more studies and thus enhance our understanding of the dynamics of fiscal policy in this region.

The rest of this dissertation is structured as follows. Chapter 2 is dedicated to reviewing important literature on the effects of monetary and fiscal policy shocks on macroeconomic aggregates in developing countries. In this chapter, both theoretical underpinnings and empirical evidences are covered. The review, however, is limited to empirical studies on the effects of monetary and fiscal policies for Kenya, Tanzania and Uganda. Recent macroeconomic developments and stylized facts of the of the business cycles in East Africa are also presented in 2. Chapter 3 presents empirical findings on the effects of monetary policy shocks on output and other macroeconomic aggregates. It also introduces an econometric technique applied in the penultimate chapter, which examines the effects of fiscal policy shocks on macroeconomic aggregates. Chapter 5 concludes the main findings and derive policy implications for the candidate members of the envisaged East African Monetary Union.

CHAPTER 2

Stylized Facts and Literature Review

This chapter performs three main tasks. First, it presents the recent macroeconomic development in East East Africa using various macro-fiscal indicators. The second section describes the synchronicity of business cycles among the East African Economies. And the last section reviews both theoretical and empirical literature on the efficacy of monetary and fiscal policy in Kenya, Tanzania and Uganda.

2.1 Recent macroeconomic Developments

East African Economies of Kenya, Tanzania are small open economies located on the eastern part of Africa, with Uganda being a landlocked country with no outlets to the Indian ocean as Kenya and Tanzania do. Of the three, Kenya is the largest in terms of economic size as its GDP stood at US$60 billions as of 2014 while Tanzania is the largest in terms of the land size and population (table 2-1). The trio are in many ways similar to many Sub-Saharan Africa (SSA) countries in the low and middle income categories as each or a subgroup of them is a typical representative of a subset of SSA countries. Kenya, for instance, is the giant economy with a middle-income status while Tanzania and Uganda are still locked in the low–income group of countries. Kenya has also experienced a steady and moderate GDP growth for decades and above all, it serves as the financial services hub for the East African region. On the other hand, Tanzania and Uganda dichotomise SSA into countries with common pattern of dramatic political and economic turmoil that began in the 1970s and persisted through the 1990s. Tanzania, for instance, went through socialism until the end of cold war whilst Uganda went through civil wars. Despite the different political and ideological paths taken, the three countries have been cited as among the leading success stories in SSA since

mid-1990s owing to the multi-dimensional transformations that culminated in the achievement of macroeconomic stability and rapid economic growth (figure 2-6).

[Insert table 2-1 here]

The economic structure of the triad broadly mimic the characteristics of the low and middle income countries in SSA. Figure 2-3 indicates that these economies still have low trade shares, reliant on commodity exports (mainly primary, unprocessed products) and natural resources, oil and gas in particular, have been added to the list for each of these economies [5]. In terms of foreign aid, a lion's share of the external debt in 2014 is dominated by concessional loans – a typical characteristic of a developing country's external development finance. A high share of rural population coupled with reliance on raw materials exports uncovers that these economies are predominantly agrarian.

[Insert figure 2-3 here]

Figure 2-4 presents the financial and monetary developments among the East African countries for the last 15 years. With to the contributions of the financial sector to the development of private sector, the figure shows that the region lags behind an average Sub-Saharan Africa. Of the three countries, Kenya seems to be far ahead of Tanzania and Uganda in terms of the supply of credit to the private sector. The difference in credit supply amongst these countries is also mirrored in panel (d) of the figure that presents the trends of broad money supply as a share of GDP. On average, interest rate spread has been on the declining trend for each country and for the period under consideration, inflation has been, on average, in single digits but with turbulence caused by the food price crisis of 2007-2008. With the ongoing

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[5] Statistics on the natural resources discoveries in East Africa shows that Kenya has an estimated oil reserves of about 600 millions of barrels of oil, Tanzania has about 23-24 trillion cubic feet of offshore gas resources and Uganda has about 3.5 billion barrels of oil reserves – a figure that is likely place Uganda as the fourth largest producer of oil in Sub-suharan Africa behind the giants Nigeria, Angola and South Sudan (Drummond et al., 2015).

modernization of central banking in these economies as a preparation for the East African monetary union, these indicators are expected to improve further.

[Insert figure 2-4 here]

EAC countries have in recent years strengthened the management of demand management policies, fiscal policy to be specific. This is evident in the years priors to financial crisis of 2008–2009 in which fiscal performance was fairly strong. Panel (a) of figure 2-5 shows that revenue as share of GDP has been within the range of 12% to 20% for two and half decades, a figure which is below the average LIC–SSA at any given year. Over this period, however, performance in revenue collection is particularly impressive for Kenya and Tanzania in which both experience an increase in revenue by over 5 percent of GDP. Kenya has even began to surpass an average revenue collection for LIC-SSA. The performance for Uganda is less dramatic as the share of revenue has actually slid down by about 3 percent.

[Insert figure 2-5 here]

Panel (b) of figure 2-5 shows that strong revenue has been associated with an increase in government spending as a share of GDP. Both Kenya and Tanzania have experienced a surge in their expenditure, with Kenya surpassing the average share of expenditure for LIC-SSA in 2012. Government spending as a share of GDP has increased by about 10% and 7% for Kenya and Tanzania, respectively, between 2001 and 2015. The share of government expenditure in Uganda has been fluctuating year after year, a trend that may echo fluctuations in aid flows.

Despite an upward trend in government expenditure for both Kenya and Tanzania and LIC–SSA in general as shown in panel (b), panel (c) of 2-5 portrays a striking fiscal development. The ratio of gross national debt to GDP has been declining steadily in the years prior to financial crisis. The national debt has declined from above 40% in 2002 of GDP to about 20% in 2007, with Tanzania and Uganda representing a typical LIC-SSA country. The dramatic

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fall in ratios of national debts can largely be attributed to debt relief initiatives, such as the Heavily Indebted Poor Countries (HIPC) Initiative and the Multilateral Debt Relief Initiative (MDRI). The relatively higher debt ratio for Kenya may be due to fact that Kenya was not a beneficiary of any of these initiative as already argued elsewhere in chapter 1.

Figure 2-6 shows the contribution of some expenditure side items of Gross Domestic Product (GDP) to its Growth for the period between 2001 and 2013. Of the three components of GDP, consumption seems to be the main contributor to the growth of GDP and thus its trend is similar to that of GDP growth. It is also observed that consumption is perhaps the most volatile of all the three items of the expenditure side of GDP.

Following the 2008–2009 global financial crisis, as figure 2-6 shows, exports has declined sharply in each country but the decline was more severe for Uganda and then Kenya following a negative growth of exports which eroded about 6 and 2 percent of GDP growth, respectively. Of notable is the decline of exports in Tanzania where growth was above the negative territory. The contribution of exports to Tanzania's GDP growth slowed to about 2 percent while all other countries experienced negative contribution of exports. It is also notable that while Kenya, and Tanzania were hit hard by the financial crisis in 2009, Uganda went through it a year later with a considerable decline in exports at the time in which other countries began their path to recovery.

[Insert figure 2-6 here]

2.2 Business Cycles in East Africa

For countries in the offing to having a common monetary regime business cycle synchronization is often regarded as a prerequisite for a well-functioning common currency. The synchronicity is sought because its absence renders common monetary policy fail to satisfy the needs of all its members and even exacerbate the cyclical divergence. The degree of syn-

chronicity of the business cycles among members of the common currency is determined by the degree of symmetry between macroeconomic shocks, transmission channels, institutional features and the level of economic integration between member countries. All these are the recipes of the Optimum Currency Area(OCA) theory propounded by Mundell (1961). As the project of monetary union entails a loss of monetary policy autonomy, OCA theory postulates that the benefits of the monetary arrangement outweigh the costs of that loss if member countries share similar business cycles, have higher mobility of both labor and capital and risk-sharing mechanism is in place to cushion member countries against asymmetric shocks. In the absence of this prerequisites, a common monetary policy cause a decoupling of the business cycles of the member countries. For example, Dr. Marcus Kappler (2013) indicates that countries like Greece, Spain, Portugal and Ireland were adversely affected following the inception of the EURO as their interest rates dropped significantly. This low real interest rate fuelled a rising domestic demand and further wage increases. The inception of the euro therefore dichotomized the euro area into periphery group of countries and the core group of countries. While the former had their international competitiveness deteriorated, the later group was favoured following the remarkable improvement in their current account. Thus, this observation underscore the importance of symmetry of business cycles for countries in common monetary arrangement as the East African Community countries plan to be.

Next follows the description analysis in which an investigation of the symmetry of output fluctuations among the three countries is done and determine whether there has been some degree of synchronicity since the inception of the East African community in 2000. Figures 2-7 and 2-8 show that prior to the establishment of the East African Community there has a great divergence in output amongst Kenya and Uganda on one side and Tanzania on the other side. For example, throughout the 1990s, Tanzania had been in economic slumps while, for large part of that decade, Kenya and Uganda had been experiencing positive growth. However,

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from the early 2000s, there has been some convergence of growth among the three countries. Drummond et al. (2015) also find similar trend of business cycle synchronicity for East African Countries.

[Insert figure 2-7 and 2-8 here]

2.3 Monetary Policy: Theory, Conduct and Evidence

2.3.1 Theoretical Literature

Monetary transmission mechanism refers to how policy-induced changes in the nominal money stock or the short-term nominal interest rate affect real variables such as aggregate output and employment (Ireland, 2008). This mechanism tends to work through various channels, affecting both real and nominal variables and different sectors of the economy, at varying speeds and intensities (Belke & Polleit, 2009). Understanding the monetary transmission mechanism is thus of special interest to economist, policy makers and investors because it allows to identify the most effective set of policy instrument, the timing of the policy changes, and in turn, the limits central banks face in making their decisions. For example, the real variables to be impacted depends on the mandate of the monetary policy of the respective countries. For many developing countries these variables tend to be price and output stabilization following the dual mandate of their monetary policies. A number of channels has been identified in the literature as the likely pathways through which monetary policy affects the economy, namely: money, interest rate, Exchange Rate, Credit, Asset Price, and the Expectation channels. However, not every channel is likely to be active for East African Countries given that their levels of financial development are less advanced compared to those in advanced or emerging economies where each of these channels was reported to be active. Theoretically, the channels of monetary policy can be presented as in schematic diagram in figure 2-1. Findings in 3 offer some insights on the potency of some of these channels.

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2.3.2 The Conduct of Monetary Policy in the EAC Countries

Open market operations (OMO) is the main platform with which EAC central banks use to implement their monetary policies, but sometimes they complement it with standing facilities, changes in reserve requirements, required reserve averaging, and foreign exchange operations. However, differences exist in applying these instruments among the Central Bank of Kenya (CBK), Bank of Tanzania (BOT) and Bank of Uganda (BOU). This is especially the case with regard the computation of the cash reserve requirements. For an extending period of time, reserve money has been used as the main instrument while broad money has been used as an intermediate target for each country. Under the existing legal framework with which each of the central bank operates, price stability is an overriding goal of monetary policy but due to the nature of these economies, monetary policy has to support economic growth and financial stability (figure 2-2).

In the aftermath of the 2008-2009 financial crisis, many central banks have been provoked to rethink about the conduct of monetary policies in their territories. Bank of Uganda (BOU) and Central Bank of Kenya (CBK) were not exceptions. Central Bank of Uganda shifted to inflation-targeting lite as its monetary policy framework in July, 2011. Under this framework, inflation forecasts are often the intermediate target by which a central bank attempts to anchor inflation expectations. In November 2011, the Central Bank of Kenya followed suit by adopting a new monetary policy framework that gives more prominence to its policy interest rate , which is somewhat different from the practices of inflation- targeting lite. Though Tanzania has not changed its monetary policy framework as of now, concerted efforts and preparation are underway to shift to interest rate targeting in the near future. Thus these countries are now experimenting the conduct of a new monetary policy framework, which can better attain the objectives of monetary policy.

For the sample period in which time series used in this dissertation are drawn, reserve money targeting has been used as a monetary policy framework by each central bank. This framework is part of the implementation of the IMF program known as the reserve money program (RMP) in which central bank uses reserve money as a primary instrument of monetary policy. RMP involves setting broad money as an intermediate target and reserve money an operating target (See figure 2-2). The choice of broad money as an intermediate target is due to the fact that it is informative enough about the future movements of inflation and output but not under the direct control of the central bank while the opposite is true for reserve money, i.e. it is under the direct control of the central bank but tends to have a longer policy lag than broad money. However, in the event the relationship between the broad money and reserve money weakens, central bank is likely to miss its policy targets. This is perhaps the ground under which BoU and CBK decided to change their monetary policy framework following the dramatic financial deepening and innovations in their countries that might alter the relationship between the two monetary aggregates.

It is worth insisting that the monetary transmission depicted in figure 2-1 is just illustrative since not every channel is expected to be active in EAC countries. As argued elsewhere in this dissertation, presence and identification of each channel depends on how close the financial sector is to the real sector of the economy as well as the availability of high–frequency data on real economic activity, which are often not readily available in most developing countries. A bone of contention in literature on the effect of monetary policy is the identification of exogenous monetary policy shocks. As illustrated in figure 2-1, identification of exogenous monetary policy shock is difficult because monetary policy influences the development of policy variables like inflation and output but, through a feedback rule, monetary policy responds to the developments in these variables. The question of how best to identify monetary policy shocks has therefore remain to be an empirical one. Literature offers a number of identification

strategies with which one can respond to this empirical question. The next section thus revisits various identification techniques that have been applied to identify exogenous monetary policy shocks in East Africa.

2.3.3 Empirical Evidence on the Effectiveness of Monetary Policy

In the period following the structural adjustment programs, many central banks in developing countries began using convectional monetary policy instruments to achieve conventional goals and this practice in itself makes global literature on monetary policy and central banking in advanced and emerging economies relevant. However, subtle differences still exist between central banks of the two worlds as those in developing countries operate under different structural and institutions setups. For example, Mishra & Montiel (2013) point out that the financial structure, the main determinant of the monetary transmission mechanisms, of low income countries is characterized by the less efficient markets for fixed income securities, equities and real estates; dominance of commercial banks as the formal financial intermediaries; and a small formal financial sector relative to the size of the economy. They have also learned that low income countries tend to be at the periphery of the private international capital markets while the portfolio behavior forces central banks in these countries to intervene massively in foreign exchange markets. These distinctive features tend to have distinctive implications for the conduct, design and effectiveness of the monetary policy in developing economies compared to advanced and emerging economies. Against this backdrop, the review of the studies that follows shortly highlights some of the progress made with respect to understanding the effectiveness of monetary policy in East Africa.

Literature on the effectiveness of monetary transmission in East Africa is at infancy stage but growing, and the few existing studies are not without contradictory conclusions. Davoodi et al. (2014) provide a multi-country study for five constituent members of the East Africa Community (EAC)–Burundi, Kenya, Rwanda, Tanzania and Uganda. They estimated the

response of output and other macroeconomic variables to monetary policy shocks: surprise changes in interest rates (discount rate and short-term treasury bills) and reserve money. To do this, they used six–variable VARs using recursive identification approach with endogenous variables ordered as real GDP, consumer price index (CPI), reserve money, short-term interest rate, credit to private sector and the nominal effective exchange rate. Four exogenous variables believed to affect endogenous variables were also included, which are a global oil price index, a global food price index, U.S. federal funds rate, and U.S. industrial production. Despite of the multiple approaches they used, their study yield mixed findings. Reserve money shock concludes with a non-significant response of output for none of these countries except for Rwanda in which output responds significantly over a horizons of 8–12 months and marginally significant for Uganda over a short period of 2 months (between 2nd and 4th months). The response of price to this shock is not statistically significant for any of the EAC countries. Further, conventional monetary policy shock, interest rate shock, do not have significant impact on output for any country while price response is statistically significant only for Kenya.

Studies examining the potency of monetary policy for individual countries in East Africa have also find mixed results despite different instruments and identification strategies applied to identify monetary policy shocks. For Kenya, for example, Cheng (2006) finds that interest rate shock has significant impact on both price level and exchange rate but not on real output. For Tanzania, Montiel et al. (2012)find that monetary policy shocks do not have significant effects on neither output nor price despite using both structural identification scheme and reserve money as the policy variable. Mugume (2011) found muted responses of output and prices to monetary policy shocks for Uganda.

In sum, empirical evidence shows that transmission mechanisms of monetary policy in East Africa is weak regardless of the instruments and identification strategy applied to identify monetary policy shock.

2.4 Fiscal Policy: Theory, Conduct and Evidence

2.4.1 Theoretical Literature

With monetary policy effectiveness constrained by the shallow financial markets in developing countries, fiscal policy has an active role as a demand management policy in developing countries. Fiscal policy analysis entailing estimating the impact of fiscal policy on output and its components has been of interest to both academician and policy makers, at least in advanced economies. With a lions share of the literature devoted to advanced economies, less is known about the impact of fiscal policy on macroeconomic fundamentals, the channels through which these effects are transmitted and the variations of these effects and channels with respect to economic conditions (Auerbach & Gorodnichenko, 2012). To put it differently, the size of fiscal multiplier is far from certain in developing countries and perhaps varies with business cycle of the economy. The recent past fiscal stimulus packages by advanced and some developing countries were provided in support of Keynesian arguments that government spending is likely to have larger expansionary effects in recessions than in expansions. However, theoretical underpinnings of the potency of fiscal policy are hardly at harmony as argued hereafter.

The first school of thought belongs to the basic Keynesian theory in which, due to rigidity of prices, aggregate demand determines output. In this view, consumption tend to follow current income, making fiscal expansion to have multiplier effect on growth. An opposite view pertains to the basic Ricardian theories, commonly known as Ricardian Equaivalence, in which fiscal multiplier is considers to be zero between taxes and debt in the context of dynamic framework. In this framework, consumers are assumed to be forward-looking and aware of the government's intertemporal budget constraint. Generally, dissension exists, at least theoretically, among economists on whether fiscal policy can stimulate the economy or not.

2.4.2 Empirical Evidence on the Effectiveness of Fiscal Policy

The effectiveness of fiscal policy in any country depends on its cyclicality. Empirical evidence shows that, until 2009, fiscal policy was pro-cyclical in both Kenya and Uganda while while countercyclical in Tanzania (Végh, 2013)[6]. Literature offers at least three explanations to account for procyclicality of fiscal policy in developing countries. First, many developing countries tend to be disconnected from the international capital markets in bad times and thus they are forced to reduce government spending and/or raise tax rates (Aizenman et al., 2000). Second, Riascos & Végh (2005) argue that developing countries tend to encounter credit markets that are more incomplete that those in advanced economies and thus leading to more procyclical tax rates during economic downturns. Lastly, weak domestic fiscal institutions attribute to the procyclicality of fiscal policy in developing countries as they fail to make public sector save in good times and dissave in bad times (Talvi & Végh, 2005; Alesina et al., 2008). It is therefore possible that a positive change to any of these conditions may help developing countries graduate from procyclical to acyclical or countercyclical fiscal policy.

Since the pioneering work by Blanchard & Perotti (2002), a flow of literature on the effects of fiscal policy on the economy has been sluggish but gained momentum after the financial crisis of 2008–2009, especially among advanced and emerging economies where monetary policy turned to be too blunt a tool to stimulate the economy. However, similar literature for developing countries is almost nonexistent. Scanty availability of literature for developing countries may be because high frequency and quality fiscal data are not readily available while identification of an exogenous fiscal shock imposes stringent data requirements (World Bank, 2015). The few empirical studies that estimate fiscal multipliers for developing countries are methodically panel using annual data for a cross section of countries. The review of literature

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[6] Végh (2013) derives cyclicality of fiscal policy by computing correlations between the cyclical components of real government expenditure and real GDP, 1960–2009. Fiscal policy is said to be procyclical (countercyclical) if correlations between the two series is positive (negative)

that follows is of this scope since no study on country by country is currently available for EAC countries.

Kraay (2012; 2014) estimate government spending multiplier for developing countries– including Kenya, Tanzania and Uganda – using World Bank Loan level dataset in annual frequency. Kraay identified exogenous fiscal shock using fluctuations in aid-related financing approval from the World Bank Loan disbursement. The use of this instrument variable is justifies on two grounds. First, World Bank loans tend to be a major source of finance for government spending in Low–Income countries. Second, the timing and approval of such loans tend to be independent of cyclical macroeconomic conditions of recipient countries. Following this identification strategy, Kraay finds that one year fiscal multiplier, government spending multiplier in particular, tend to be small at about 0.5.

World Bank (2015) estimates fiscal multipliers for developing countries by applying Panel Structural Vector Autoregressions (PSVAR) model to annual macro-fiscal series. A fiscal shock is identified as in Blanchard & Perotti (2002) except that discretionary fiscal policy is assumed to take place at least a year, instead of a quarter, to respond to macroeconomic conditions. The need for a prolonged lag in the response to discretionary fiscal in Low income countries is justified by two reasons. First, as argued by Kraay (2012; 2014), LICs often finance their government spending using concessional loans and these are disbursed less frequently than every quarter and thus may be unrelated to the prevailing macroeconomic conditions. Second, GDP data is extensively revised in these economies so that the government would likely to take more than one quarter to collect reliable GDP data (Ley & Misch, 2014). With a sample of 34 countries, both impact and a one years fiscal multipliers are found to just above 0.6 , thus corroborating with Kraay's findings.

Since we are unaware of any similar being done in East Africa, the study in chapter 4 serves as a springboard to steer debate on the effectiveness of fiscal policy in East Africa.

To this end, the contribution of chapter 4 is three-fold. First, it is the first study to catalogue quarterly data on fiscal and other macroeconomic variables to study the effects of fiscal policy in East Africa. The data is reasonably sufficient to have robust inference of the results as similar sample size has also been used by Jha et al. (2014). Second, this multi-country applies uniform methodology across the three countries, making it more informative about the cross-country differences in the effectiveness of fiscal policy. Lastly, since the methodology, Bayesian SVAR with Sign Restrictions, relies entirely on time series to identify fiscal shocks, it can easily be replicated to any country with quarterly data on fiscal variables.

The review of the literature above uncover two caveats. First, although the literature on monetary policy in East Africa has been growing, the findings are very inconsistent and that no study has applied SVAR with sign restrictions to estimate the effects of monetary shocks in these countries. And second, the literature focusses more on monetary policy and less on fiscal policy but the recent euro crisis informs us that fiscal policy is equally important for countries that are in or about to be members of the monetary union. Against this backdrop, the contributions of this dissertation to the existing literature are two-fold. First, by using SVAR with sign restrictions, it adds to the existing literature new identification and estimation strategy for both monetary and fiscal policy studies. Second, since no multi-country study on fiscal policy has been done, this dissertation initiate the literature on fiscal policy for East Africa that can help stimulate more studies and thus enhance our understanding of the dynamics of fiscal policy in this region.

TABLE 2-1: SELECTED ECONOMIC INDICATORS FOR KENYA, TANZANIA AND UGANDA

	2000	2005	2010	2014
Nominal GDP (US$ billions)				
Kenya	12.71	18.74	40.00	60.94
Tanzania	10.19	16.93	31.11	49.18
Uganda	6.19	9.01	18.80	26.31
GDP per Capita (US$)				
Kenya	406.12	523.61	977.77	1,337.91
Tanzania	308.14	448.93	712.23	998.06
Uganda	255.12	313.80	553.26	677.38
Population (millions)				
Kenya	31.29	35.79	40.91	45.55
Tanzania	34.02	38.82	44.97	50.76
Uganda	24.28	28.72	33.99	38.84
Inflation (CPI based, % change)				
Kenya	9.98	10.31	3.96	6.88
Tanzania	5.92	5.03	6.20	6.13
Uganda	3.39	8.45	3.98	4.29
Gross Public Debt (% of GDP)				
Kenya	51.27	47.04	44.16	41.04
Tanzania	–	55.97	37.12	40.51
Uganda	61.73	52.82	26.84	33.26
Credit to Private Sector (% of GDP)				
Kenya	28.43	25.93	27.23	34.42
Tanzania	4.09	8.50	11.94	13.83
Uganda	6.23	8.61	13.34	14.39
Broad Money (% of GDP)				
Kenya	35.16	38.91	40.31	42.93
Tanzania	17.14	22.24	25.12	23.43
Uganda	16.12	19.32	22.92	22.35
Stock Market Capitalization (% of GDP)				
Kenya	10.10	34.07	36.15	–
Tanzania	2.29	3.47	4.06	–
Uganda	–	1.14	9.51	–
General Government Revenue(% of GDP)				
Kenya	20.89	22.46	24.57	26.62
Tanzania	13.74	18.26	21.01	23.49
Uganda	18.57	17.75	15.49	15.6

Sources: World Development Indicators Database (2015), World Economic Outlook Database (2015).

TABLE 2-2: SELECTED FINANCIAL INDICATORS, 2011

Country or Group of Countries	Credit to Private Sector (% of GDP)	Bank Credit to Private Sector (% of GDP)	5-Bank Asset Concentration (%)[a]	Stock Traded, Total Value (% of GDP)	Dollarization [b]	Chinn-Ito Financial Openness Index [c]
Kenya	38.1	33.6	60.5	2.6	10.8	1.1
Tanzania	17.8	15.8	67.6	0.1	20.3	-1.1
Uganda	17.9	13.8	73.6	0.1	21.8	2.5
EAC(Average)	24.6	21.1	67.2	0.9	17.6	0.8
Low Income Countries	19.6	18.8	80.0	4.9	12.8	-0.4
Emerging Economies	60.9	49.1	69.6	26.6	4.0	0.3
Advanced Economies	145.3	133.7	84.8	70.2	0.5	2.2

Source : Berg et al. (2013)

[a] Assets of five largest commercial banks as a share of total commercial banking assets.

[b] Foreign Currency Deposits as a share of total deposits in the banking system .

[c] Index values are for 2010. The Index takes a maximum value of 2.5 for the most financially open economies and a minimum of -1.9 for the least financially open. For more information, see (Chinn & Ito, 2006).
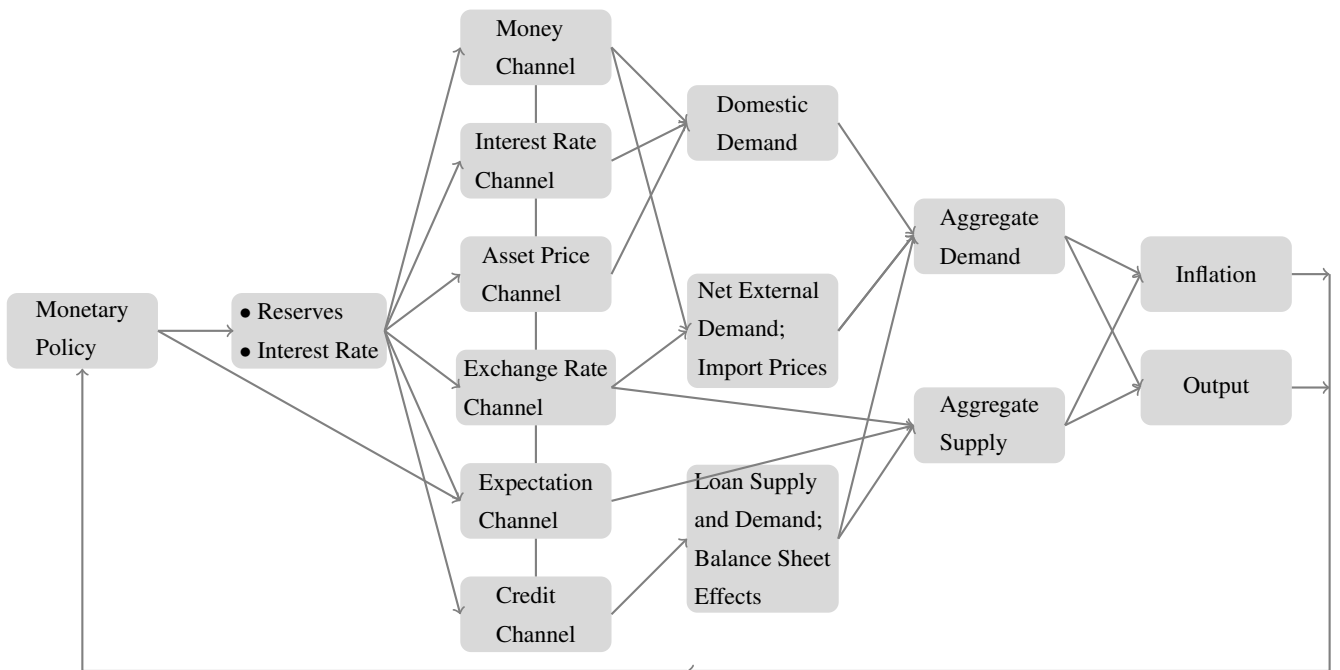
FIGURE 2-1: TRANSMISSION MECHANISM OF MONETARY POLICY

Source: Davoodi et al. (2013)
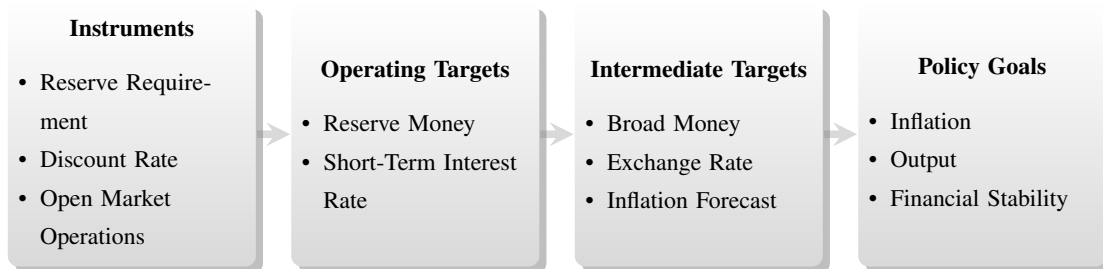
FIGURE 2-2: EAC MONETARY POLICY INSTRUMENTS, TARGETS AND GOALS

Source: Modified from Davoodi et al. (2014)
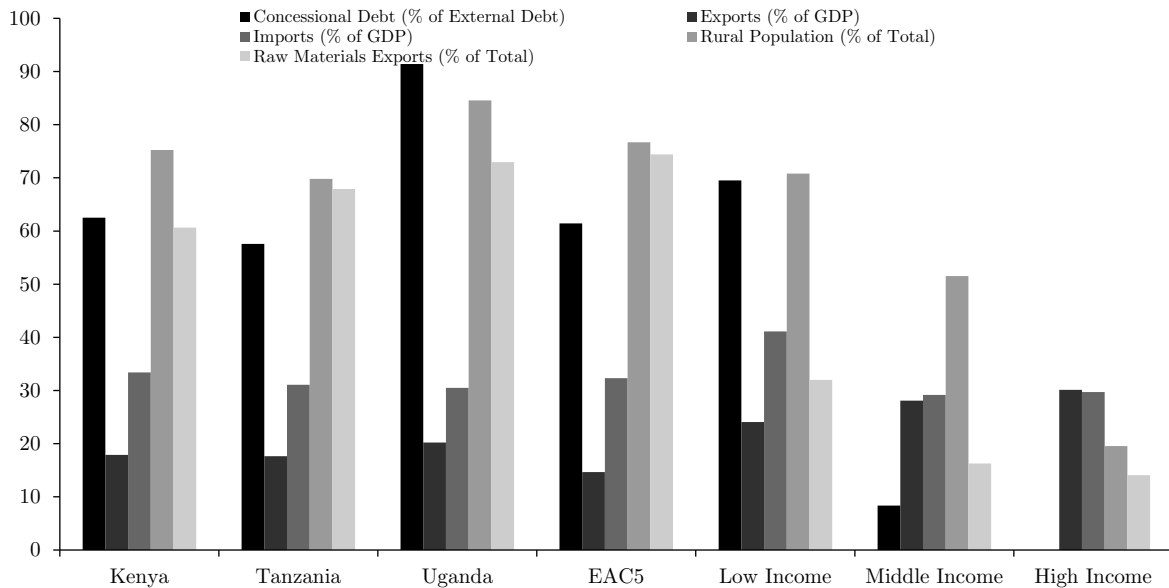
FIGURE 2-3: SELECTED ECONOMIC INDICATORS FOR EAST AFRICA, 2000 – 2015

Notes: EAC5 refers to the 5 country members of the East African Community: Burundi, Kenya, Rwanda, Tanzania and Uganda

Source: The World Bank, World Development Indicators Database,September 2015
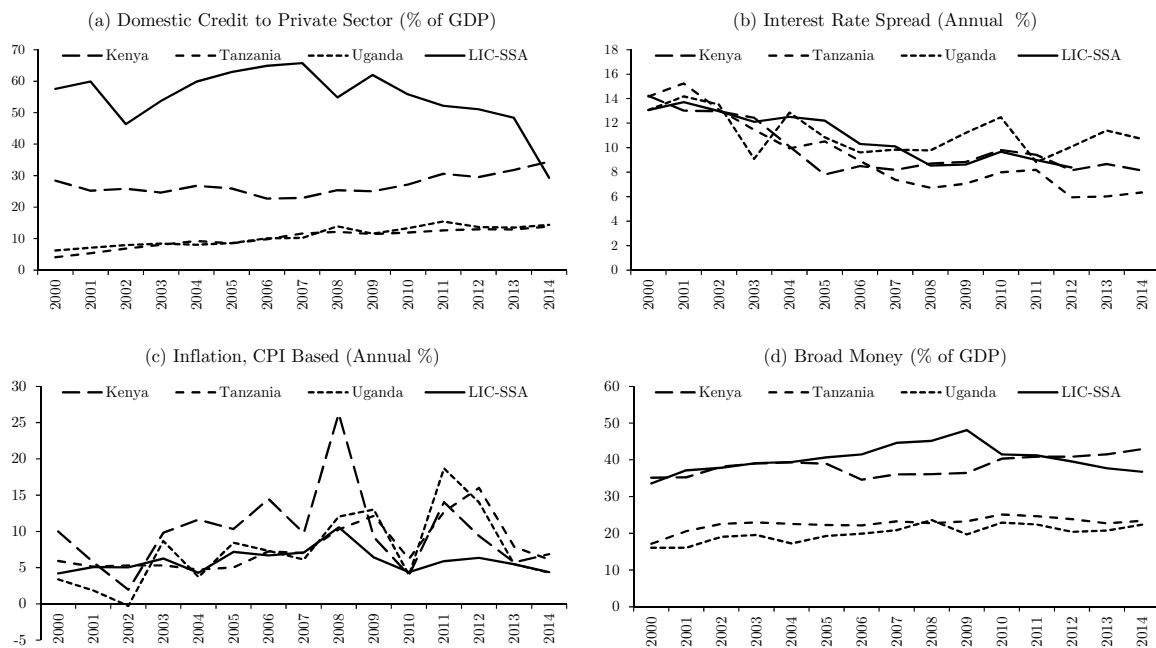
FIGURE 2-4: SELECTED MONETARY INDICATORS FOR EAST AFRICA, 2000 – 2015

Notes: LIC-SSA refers to Low–Income Countries in Sub–Saharan Africa

Source: The World Bank, World Development Indicators Database,September 2015

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(a) Revenue (% of GDP)

(b) Expenditure (% of GDP)

(c) Gross Debt (% of GDP)

(d) Primary Balance (% of GDP)
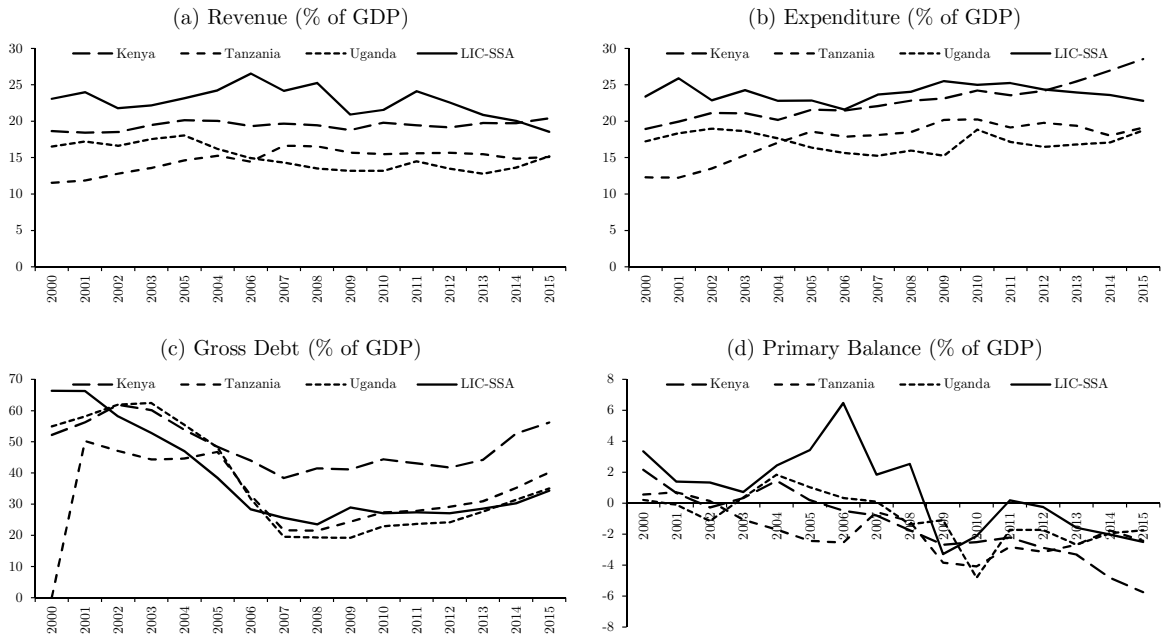
FIGURE 2-5: SELECTED FISCAL INDICATORS FOR EAST AFRICA, 2000 – 2015

Notes: LIC-SSA refers to Low–Income Countries in Sub–Saharan Africa

Source: IMF Fiscal Monitor Database, IMF World Economic Outlook

(a) Kenya

(b) Tanzania

(c) Uganda
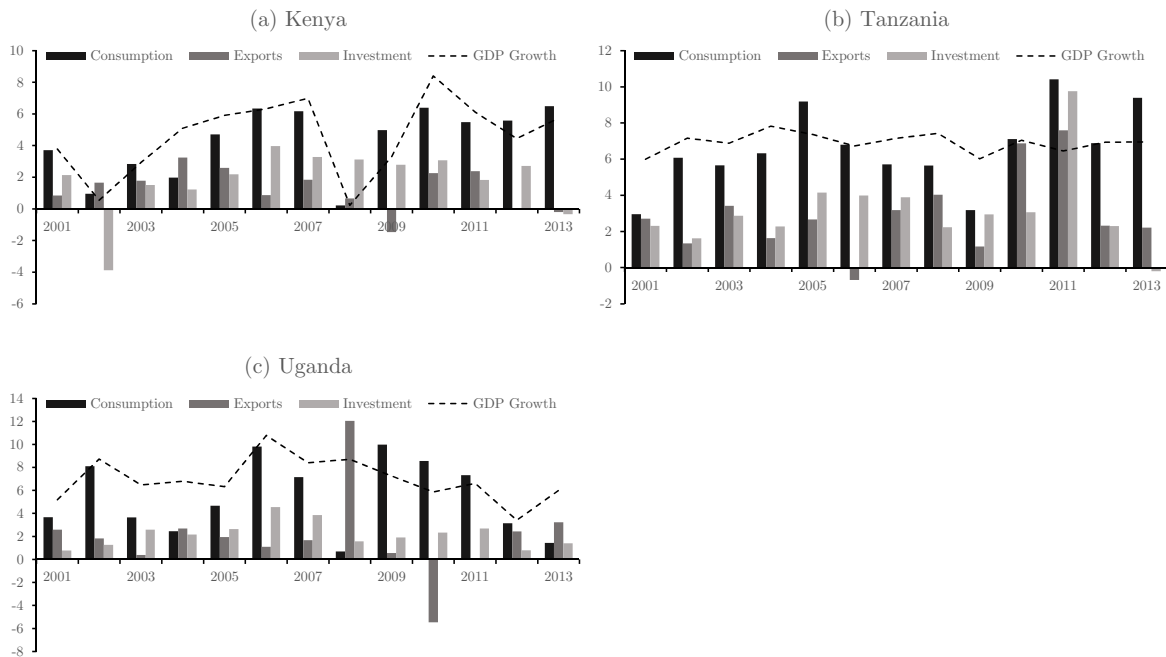
FIGURE 2-6: CONTRIBUTIONS OF EXPENDITURE COMPONENTS OF OUTPUT TO GDP GROWTH

Source: The World Bank, World Development Indicators Database,September 2015

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(a) Kenya

(b) Tanzania

(c) Uganda
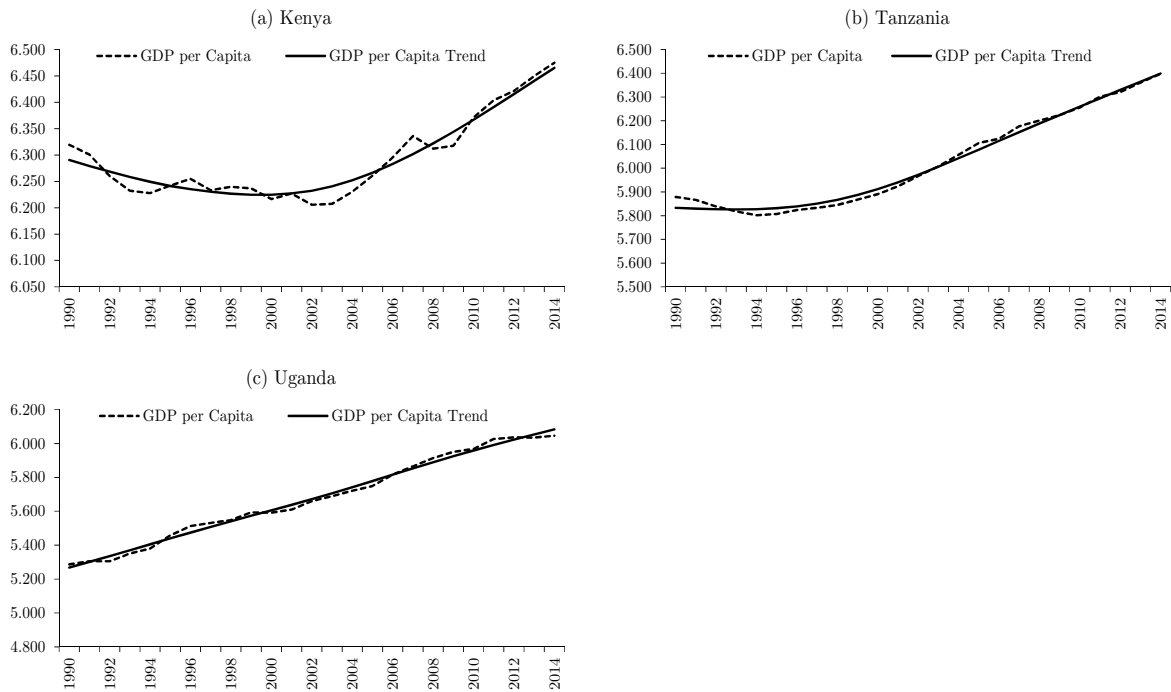
FIGURE 2-7: REAL GDP PER CAPITA TREND IN EAST AFRICA: 1990–2014

Source: Author's Calculations.
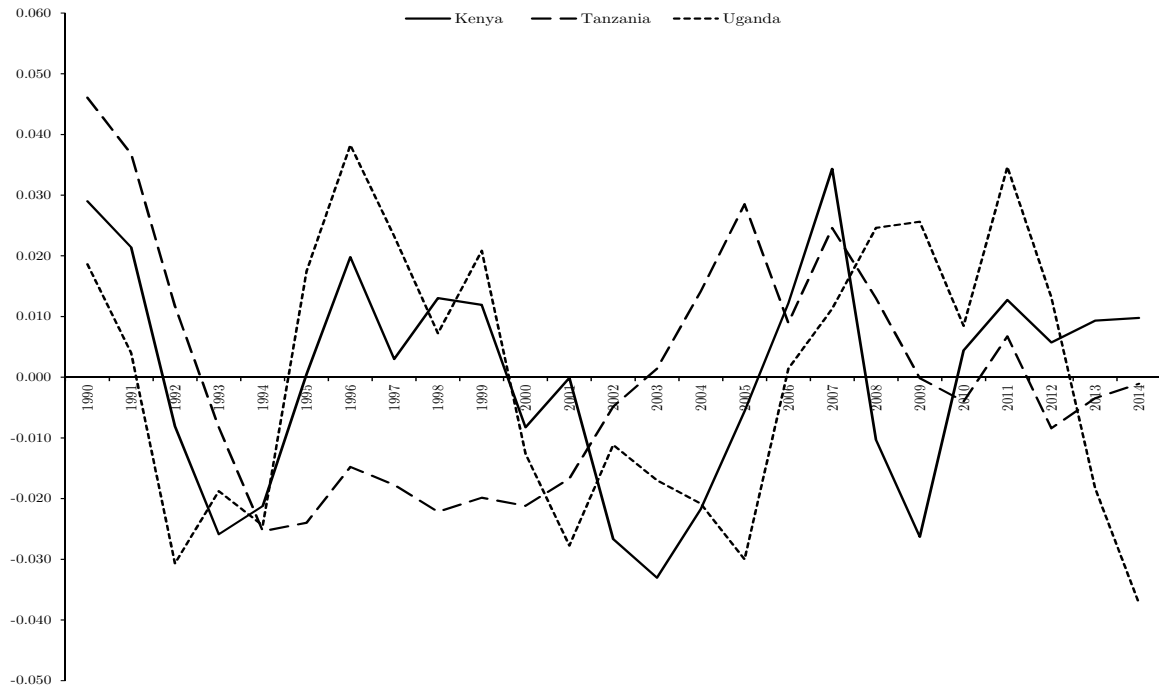
FIGURE 2-8: BUSINESS CYCLES IN EAST AFRICAN ECONOMICS: 1990–2014

Source: Author's Calculations.

Appendix

2.A Studies on Monetary Transmission Mechanisms in the EAC

Country	Paper	Methodology	Data and Transformations	Main Findings
	Cheng (2006)	Five variable recursive and structural VARs (following Kim and Roubin 2000). A monetary policy shock is identified as a shock to interest rate.	Monthly data (January 1997 – June 2005) in log levels for all variables except interest rate: real GDP, CPI, broad monetary aggregate (reserve money and M3), short-term interest rate (Repo rate, interbank rate) nominal effective exchange rate (NEER), oil price, U.S. federal funds rate, and U.S. commodity prices. The first five variables are endogenous with ordering as listed in the recursive VAR; the last three variables are exogenous.	A monetary contraction (a positive shock to interest rate) (i) does not have a statistically significant effect on output; (ii) lowers prices persistently after an initial increase in inflation; (iii) leads to an initial depreciation of the exchange rate followed by an appreciation that persists for almost two years and is statistically significant. Shocks to interest rate account for 33 percent of the forecast error variance of inflation, 50 percent of forecast error variance of NEER, and 10 percent of forecast error variance of output.

Table 2-A1: Literature Review on MTM in the EAC – *continued from previous page*

Country	Paper	Methodology	Data and Transformations	Main Findings
	Maturu et al. (2010)	Five variable recursive and structural VARs (following Kim and Roubini (2000). Monetary policy shock is identified primarily as a shock to M3.	Quarterly data (2000Q1–2010Q2) in log levels for all variables except interest rate: real GDP, CPI, monetary aggregates (M3, reserve money), interest rate (repo rate, interbank rate), NEER, oil price, commodity price index, and U.S. federal fund rate. The first five variables are endogenous with ordering as listed in the recursive VAR; the last three variables are exogenous.	A monetary contraction (a negative shock to M3) (i) decreases output and is marginally significant, (ii) leads to a lower price level which is statistically significant for almost four years, (iii) leads to an appreciation of the exchange rate though it is not statistically different from zero; and (iv) increases the interest rate but it is not statistically different from zero. Shocks to M3 account for 30 percent of forecast error variance inflation but only 4 percent of forecast error variance of output.
	Buigut (2010)	A five-variable VECM. Monetary policy shock is identified as a shock to T-bill rate.	Annual data (1979 – 2008) in log level except CPI in first difference of log: real GDP, real private sector credit, lending rate, T-bill rate.	A positive shock to T-bill rate has positive but transitory effects on inflation (price puzzle), small negative impact on real GDP, and leads to a permanent fall in loan quantity while loan rates respond positively. Impulse responses are shown with no confidence bounds.
	Misati et al. (2010)	Single equation methods: ARDL and 2SLS. Dependent Variable: Output gap. Monetary Policy Instrument is real repo rate.	Monthly data (1961m1–2007m2) : real repo rate, measures of financial innovation (ratio of bank assets to GDP, ratio of M3 to M1), and output gap.	Coefficient on real interest rate is negative and statistically significant, indicating contractionary monetary effects. The coefficient on the interaction of real interest rate and measures of financial innovation is positive and statistically significant, thus moderating effect of negative interest rate.
	Sichei & Njenga (2010)	Static panel data estimation : 3SLS	Annual data (2001–2008) in log levels for 37 banks: private credit, private deposit, total bank reserves, prudential and liquidity measures, and total capital ratio.	(i) Strong evidence for the bank-lending channel through quantities rather than lending rate; (ii) credit of small, less capitalized and less liquid foreign-owned banks is more responsive to lending rate.

Table 2-A1: Literature Review on MTM in the EAC – *continued from previous page*

Country	Paper	Methodology	Data and Transformations	Main Findings
Tanzania, Kenya, and Uganda	(Buigut, 2009)	Three–variable recursive VAR A monetary policy shock is identified as a shock to interest rate	Annual data (1984–2005) in log levels: real GDP, CPI Inflation, and T-bill rate (discount rate for Tanzania). The variables are odered in the recursive VAR as listed above	Weak interest rate channel: interest rate shock has insignificant effects on output and inflation in all three countries.
Tanzania	Montiel et al. (2012)	VAR	Monthly data (December 2001–May 2010)in log levels; four VARs: two recursive (three– and six–variables) and two non–recursive (three– and six–variables). Ordering in three–variable recursive VAR : exchange rate, reserve money, and price level; ordering in the six variable VAR: exchange rate, broad money, reserve money, loan rate, price level and output.	A positive shock to reserve money (an expansionary monetary policy) increase the price level in both recursive models; effects are statistically significant but not economically; no output effect in either VAR. In the non–recursive VAR, there are no statistically significant price or output effects.
Uganda	Saxegaad (2006)	Threshold VAR	Quarterly data (1990Q1–2004Q2) in log levels: deposit rate, lending rate, ratio of excess reserves to total deposits, private credit to GDP ratio, except real GDP for which output gap is used.	(i) The presence of excess reserves lowers the negative effect of monetary contraction on inflation, thus weakening monetary transmission; (ii) excess reserves are high, implying low transmission in Uganda.
	Mugume (2011)	Five variable recursive VAR. Monetary policy shock is indentified as a shock to interest rate (91 day T–bill rate)	Quarterly data (1999Q1–2009Q1) in the first difference of log except for interest rate which is in levels: real GDP, CPI, broad money, three month T-bill rate (lending rate), nominal exchange rate, credit to private sector.	A contractionary monetary policy drives output and inflation down. Only output effect is significant, lasting up to two quarters. Interest rate, credit, and exchange rate channels are weak. Innovation in M2 has no statistically significant effect on output and inflation.
	Peiris (2005)	Six–variable recursive VAR	Monthly data (1993M6–2004M6) in log difference: international oil prices, coffee price, output gap, exchange rate, monetary aggregate (or interest rate) and consumer prices. Variables are ordered as listed above	A 1 percent increase in M2 leads to a 0.2 percent rise in core inflation in three months. Interest rate has no effect.

Dynamic Effects of Monetary Policy on Output in East Africa

Monetary policy is a powerful tool, but one that sometimes has unexpected or unwanted consequences. To be successful in conducting monetary policy, the monetary authorities must have an accurate assessment of the timing and effect of their policies on the economy, thus requiring an understanding of the mechanism through which monetary policy affects the economy.

Symposium on the Monetary Transmission Mechanism, JEP
MISHKIN (1995)

3.1 Introduction

The onset of the global economic and financial crisis of 2008-2009 and its aftermath brought unprecedented challenges on the theoretical constructs, institutional arrangements and the implementation of monetary policy around the world and Africa in particular. Following the great recession, policymakers have been compelled to rethink their understandings of monetary policy with respect to its objectives, rules and tools. Prior to the crisis, there has been a consensus among most policymakers about the *divine coincidence* aphorism that keeping inflation stable could ensure low inflation, robust economic growth and financial stability. The consensus caused most central banks in both developed and developing countries to focus primarily on price stability as their sole responsibility to the extent that some have shifted to an inflation targeting framework to ensure its achievement.

Until recently, central banks in East Africa have been using reserve money as their instrument for implementing monetary policy with the objective of achieving and maintaining price stability. However, the recent crisis brought a lesson that attaining low and stable inflation alone does not guarantee sustained macroeconomic stability. In the aftermath of the crisis,

East African economies have been struggling with the external shocks that complicated the attainment of low inflation, robust economic growth and stable exchange rates but advanced and emerging countries were trapped in the low inflation environment during and after the crisis.

Notwithstanding the externally driven economic disturbances, economic and financial characteristics inherent in EAC economies continue to pose a challenge to the workings of monetary policy. Two of the challenges are salient. First, many developing countries are characterized by institutional weaknesses as reflected in weak property rights, a smaller financial sector relative to the size of their economies and secondly, commercial banks tend to dominate the financial sector in these countries following weak capital markets (Mishra & Montiel, 2013). Mishra & Montiel argue that the predominance of banks in the financial sector may suggest credit channel should be the main vehicle for the monetary transmission in these economies but empirical evidence does not offer support to this proposition. For instance, Sacerdoti (2005)'s findings disclose that about 30% to 50% of deposits held by commercial banks at the central bank are either in short-term foreign assets or government bonds. The limited supply of credit to the private sector may this weakens monetary transmission because aggregate demand is likely to be decoupled from the dynamics of monetary policy.

Although there is a general consensus in the literature about the qualitative effects of monetary policy shock triggered by a surprise increase in interest rate on output and other macroeconomic aggregates, dissension exists on how to identify this shock (Christiano et al., 1999)[7]. The disagreement proliferated a number of identification strategies since the inception of VAR modelling. The dominant ones, however, are of two broad categories: those identifying

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[7] Consensus on the qualitative effects of monetary policy shows that a contractionary monetary policy shock concludes with a fall in aggregate output, employment, profits and various monetary aggregates, a rise in the short-term interest rate and that aggregate price has a sluggish response while wages fall modestly. It has also been learnt that monetary policy shocks account for only a modest percentage of the volatility of output and that their contribution to price volatility is even less.

shocks by causal ordering of the variables (Sims, 1980) and those identifying shocks through their long- or short-run impacts (Blanchard & Quah, 1989; Galí, 1992).

Empirical evidence on the effects of monetary policy in East Africa is on the rise especially after the rebirth of the East African Community, which is envisaged to gravitate towards monetary union in 2014. In an attempt to understand how effective monetary policy is in each of the EAC economies, various econometric techniques have been applied in VAR studies. For Kenya, price responds significantly to monetary shock triggered by upside surprises in interest rate (Davoodi et al., 2013; Cheng, 2006). No significant response of output to either interest rate shock or reserve money shock was found by similar studies. Using either instruments of monetary policy, Davoodi et al. (2013) and Montiel et al. (2012) do not find any evidence of potency of monetary policy shocks in Tanzania. However, using a nonrecursive identification strategy, Montiel et al. (2012)'s paper find significant effects of a reserve money shock on price in Tanzania. For Uganda, output responds positively to a reserve money shock but not to an interest rate shock (Davoodi et al., 2013), while Mugume (2011) finds that both output and price do not respond to monetary policy shocks. Evidently, none of these studies find an unambiguous evidence of a large and statistically significant effects of monetary policy shocks on both aggregate demand indicators. A recent comprehensive review of literature on the effectiveness of monetary policy by Mishra & Montiel (2013) attribute ambiguity in the findings to ad hock assumptions made by the respective studies in identifying monetary policy shocks.

Following the inconsistent findings of the VAR studieS just reviewed, a new strand of literature has emerging that uses microdata, bank level data to be specific, in the dynamic panel data analysis. In sum, this literature find that monetary transmission mechanism in East Africa is active. For example, Kabiro & Nyamongo (2014) and Opolot & Nampewo (2014) find that bank lending channel is active in Kenya and Uganda, respectively.

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The contribution of this chapter is two-fold. First, in contrast to the just reviewed studies based on VAR, monetary policy shocks are identified by imposing sign restrictions on a set of impulse responses as in Uhlig (2005). This agnostic approach has the advantage of explicitly imposing restrictions that are known to be correct while allowing uncertainty over other aspects of the impulse responses and parameters. This Bayesian approach allows us to distinguish the known from the unknowns (Sims, 2012). Second, the chapter contributes to the growing literature of monetary policy in developing countries as these countries are on the verge of using conventional monetary instruments to achieve common monetary policy goals. The studies briefly reviewed have shown that key findings are sensitive to a number of identification assumptions, as well as variables included in the model, their transformations, and the data sampled. In contrast, robust responses of output to monetary policy shocks in East African economies have been found using a relatively credible identification strategy.

Findings of the chapter uncover that monetary policy in East Africa is alive and effective. Following an unexpected increase in interest rate, output falls significantly in each country though the response for Tanzania is more persistent that those of Kenya and Uganda. Similar results are also found for reserve money shock. In terms of the contributions of monetary policy shocks to output variability, our findings show that these contributions are modest for each country. The forecast error decomposition results show that interest rate shock contributes, on average, more to output variation than do reserve money shock and this trend holds for each country. Finally, monetary policy shocks in Tanzania have the lowest contributions to output gyrations compared to Kenya and Uganda.

The rest of the chapter is structured as follows. Section 3.2 explains the empirical methodologies by describing the architecture and underlying assumptions of the Structural VAR (SVAR) with sign restrictions and how it differs from the traditional SVAR. Data sources, their transformation and identification strategy of the monetary policy shock are also in section 3.2.

Empirical findings and their discussions are presented in section 3.3 and section 3.4 concludes by providing some policy recommendations based on the empirical findings.

3.2 Methodology

3.2.1 Structural VAR with Sign Restrictions

This section briefly describe how a SVAR with Sign restriction is estimated from the the reduced-form VAR:

$$Z_t = \beta + \sum_{j=1}^{q} B_j Z_{t-j} + u_t, \qquad t = 1, \cdots, T. \tag{3.1}$$

where Z_t is a 6×1 vector of endogenous variables: Output (Y), Price (P), Interest Rate (I), Reserve Money (M), Credit to Private Sector (C) and Exchange Rate (E). By stacking these variables at each quarter into a 6×1 vector, then Z_t can be written as:

$$Z_t = [Y_t \quad P_t \quad I_t \quad M_t \quad C_t \quad E_t]' \tag{3.2}$$

q is a nonnegative integer and u_t is a 6×1 vector of zero-mean disturbances composed of

$$u_t = [u_t^Y \quad u_t^P \quad u_t^M \quad u_t^I \quad u_t^C \quad u_t^E]', \qquad \text{such that } E u_t u_t' = \Sigma \tag{3.3}$$

B_j's can consistently be estimated by running OLS equation by equation on equation 3.2 and Σ can subsequently be estimated from the fitted residuals. However, knowing B_j's, u_t's, and Σ does not allow us to compute the dynamic response function of Z_t to structural shocks in the economy because u_t is just a one step ahead forecast error in Z_t. Note that each element of u_t in equation 3.3 reflects the effects of all structural shocks.

To recover structural shocks from the VAR disturbances u_t, we need to find a matrix A_0 such that $u_t = A_0 \varepsilon_t$, where ε_t is a vector of structural shocks. Given that A_0 is an invertible,

square matrix and $E\varepsilon_t\varepsilon_t' = D$, we can obtain our structural VAR model by premultiplying equation 3.2 by A_0:

$$A_0 Z_t = \alpha + \sum_{j=1}^{q} A_j Z_{t-j} + \varepsilon_t, \qquad t = 1, \cdots, T. \tag{3.4}$$

Thus, $u_t = A_0 \varepsilon_t$ defines a one-to-one mapping from the reduced-form residuals u_t to the vector of orthogonal structural shocks such that

$$\Sigma = E[u_t u_t'] = A_0 E[\varepsilon_t \varepsilon_t'] A_0' = A_0 D A_0' = A_0 A_0' \tag{3.5}$$

Since the variance matrix Σ of the reduced-form innovations contains only $[(n^2+n)/2]$ known independent elements, at least $n^2 - [(n^2+n)/2] = (n^2-n)/2$ restrictions on the matrix A_0 are needed to identify the structural shocks from the information set contained in the reduced form.

There are three approaches commonly applied to this identification problem. First is the recursive approach put forward by Sims (1980) in which matrix A_0 is set to be the Cholesky factor of Σ with variables arranged in descending order according to their degree of endogeneity, that is, the least endogenous variable is ordered first while the most endogenous is ordered last. The second approach applies contemporaneous restrictions on error terms as in Bernanke (1986), Blanchard & Watson (1986) and Sims (1986) and the third one follows the lead of Blanchard & Quah (1989), which disaggregate temporary and permanent effects of the shock. Instead of these approaches, this chapter applies an agnostic approach suggested by Uhlig (2005) in which identification is achieved by imposing sign restrictions on impulse responses of a set of variables.

Similar to the parametric identification strategies afore-mentioned, the sign restrictions approach constructs structural impulse response functions by estimating an $n \times n$ matrix A_0

in $e_t = A_0 \varepsilon_t$. A brief exposition of the VAR with zero short-run restrictions that follows help to explain this approach. In this strategy, the variance–covariance matrix of the reduced form residual is reduced to $\Sigma = A_0 A_0'$ since $E[\varepsilon_t \varepsilon_t'] = I$. With the Cholesky decomposition approach, $\Sigma = P'P$, identification is successfully achieved by setting $A_0 = P'$, where P' is a lower triangular matrix. However, with the sign restrictions approach, a random othonormal matrix Q is introduced such that $Q'Q = I$ and we have $A_0 = P'Q'$. In this case, A_0 ceases to be a lower triangular and the solution to the identification problem comes by restricting the sign of impulse response functions. Due to this, we construct a set **A** of admissible models by drawing from the set **Q** of rotation matrices and discarding candidate solutions for A that do not satisfy a set of a priori restrictions on the implied impulse response functions.

In implementing this agnostic approach, Uhlig (2005) applies the Bayesian approach that treats parameters of the reduced-form VAR as random variables. With this approach, realizations of reduced–form parameters that do not match with the imposed sign restrictions are assigned a prior probability of zero. Uhlig (2005) calls this strategy a pure sign restrictions approach. As far as these restrictions do not cause overidentification, no constraint is imposed on the reduced-form VAR. We can therefore apply standard Bayesian methods for estimation and inference as the resulting impulse responses are statistically reliable. It follows that the posterior density of the reduced–form VAR parameters are proportional to standard normal–wishart given the standard diffuse prior on the reduced-form VAR parameters $B_j's$ and Σ and assuming normal distribution of the sampled data. Analysis of the chapter thereby follows Uhlig (2005) by drawing the posterior distribution of impulse responses consistent with sign restrictions imposed by jointly drawing from Normal-wishart posterior for $B_j's$ and Σ while discarding those that do match with the restrictions.

3.2.2 Data

Benchmark results of this chapter are based on the estimation of a six–variable structural VAR model. These variables are Output (Y), Price (P), Interest Rate (I), Reserve Money (M), Credit to Private Sector (C) and Exchange Rate (E), which are in quarterly frequency and covers a sample period 2000:Q1–2013:Q4. The use of quarterly data is opted as real GDP or other proxies of economic activity in monthly frequency are not available in many developing countries. By so doing, the use interpolated data as in Davoodi et al. (2013) is avoided as it is likely to taint the findings. A host of previous studies also used either quarterly or annual data to avoid this problem (See Saxegaad, 2006; Maturu et al., 2010; Mugume, 2011). Moreover, no exogenous variable is included as in some previous studies because dynamics of the external sector are likely to be reflected in the movements of the exchange rate (Ngalawa & Viegi, 2011). This argument is further reinforced by the fact that the constituent countries are open, small economies and thus significant responses of exchange rates are expected. With the exception of GDP data, that are gathered from the respective national authorities (i.e. central banks and statistics agencies), all other series are extracted from the International Monetary Fund's International Financial Statistics (IFS). Seasonal adjustment is performed for GDP data using the X-13 ARIMA approach and all series are transformed into logarithmic form except the interest rate.

The six variables are chosen in such a way that it is possible to identify and estimate the effects of monetary policy shocks on the economic activity. Output, which is measured by the real GDP, is a variable of interest as it represents the level of economic activity in each country. Interest rate (short-term treasury bill rate) is a traditional instrument of monetary policy and an unanticipated change to this variable is commonly referred to as a monetary policy shock. Reserve money, also known as monetary base or high-powered money, adds to the list of monetary policy instruments because some EAC countries use reserve money

is used as policy instrument in following the Reserve Money Program of the International Monetary Fund (Davoodi et al., 2013; Berg et al., 2013). Since each of the three countries is relatively a small, open economy, exchange rate is included to capture any dynamics emanating from the external sector. Alternatively, some studies include exogenous variables to capture similar dynamics. However, that path is not followed as any external shock exogenous to the economy is likely to be reflected in the exchange rate. Exchange rate also helps to determine whether exchange rate channel is active or not. To understand the pathways in which monetary policy shocks affect the economy credit to private sector is important and it is therefore included. Credit channel has been cited as one of the most effective channel in which monetary policy shock propagates to the economy in developing countries given their levels of financial development (Mishra & Montiel, 2013). Lastly, bearing in mind that price stability is the overriding objective of monetary policy in each of these countries, consumer price indexes, or shortly prices are included to ascertain how effective are instruments of monetary policy in attaining this objective.

The variables are subjected to stationarity tests and the results indicate most series are $I(1)$. Traditionally, to continue with estimation of VAR models, these series need to be stationary by taking first differences of their logs, which was done and the results indicate that they are all stationary in first differences. However, inclusion of differenced variables in VAR models especially structural models is one of the contentious debate in the VAR literature. Sims (1980) and Sims et al. (1990) argue that the overarching goal of a VAR analysis remains to be the determination of the interrelationships among variables and not to determine the parameter estimates. Owing to this, they further argue that differencing causes a loss of valuable information about the co-movements of the variables and that variables in the VAR analysis need to mimically reflect the true data generating process. Since VAR models to be

estimated in this chapter are structural in nature, a suggestion by Sims is followed as in similar studies (Ngalawa & Viegi, 2011; Davoodi et al., 2013).

3.2.3 Identification Strategy

Monetary policy is conducted in such a way that a change to it has to reflect the dynamics of the economy. This is commonly done with the help of the central bank's reaction function or feedback rule. However, not all changes to the policy account for reaction to the state of the economy. It is the unaccounted variation of the policy that economists treat as a monetary policy shock (Christiano et al., 1999). In this respect, two types of such variations are considered in this chapter: namely surprise changes in interest rate (discount rate from the central bank to commercial banks) and size of the central bank's balance sheet (reserve money). The choice of the short term interest rate as a measure of monetary policy is based on the argument advanced by McCallum (1983), Bernanke & Blinder (1992) and Bernanke & Mihov (1998) that interest rate is the most informative about the future movements of real macroeconomic variables and thus its circularity in the monetary policy literature. Treatment of a sudden decrease in reserve money as a contractionary monetary policy shock is born out of the fact that the sample of the study covers the period in which constituent countries were following the Reserve Money Program (RMP) of the International Monetary Fund in which central banks use reserve money as their main instrument of monetary policies. Similar treatment has been done by (Davoodi et al., 2013). Estimation of the effects of these shocks on the macroeconomic aggregates is done with a set of sign restrictions, comprising of minus and plus signs on the contemporaneous impact matrix A_0 of equation 3.2. Thus the expected responses for each of the monetary policy shocks identified is presented in table 3-1.

[Insert table 3-1 here]

Table 3-1 shows the expected responses for each of the monetary policy shocks based on the assumptions made in order to identify monetary policy shocks. The restrictions imposed

are based on the arguments set out in the standard Mundell-Fleming-Dornbusch model, which assumes that a contractionary monetary policy triggered by a surprise increase in interest rate raises interest rates, appreciates the real exchange rate and reduces prices, money supply and real output. It is also assumed that this monetary policy shock reduces credit given to the private sector. No restrictions are imposed on the impulse responses of output and reserve money to interest rate shock. The choice of not restricting the impulse response of output to interest rate shock is done to avoid prejudgement of its impulse response because some empirical studies show that there is neutrality of monetary policy shock to output fluctuations (Uhlig, 2005; Davoodi et al., 2013). It is worth noting that impulse responses of reserve money to interest rate shock are not restricted to help to ascertain whether the two instruments are reinforcing or offsetting each other in case a hybrid monetary policy is in use. In the event the response of one instrument to the impulse of the other is found significant, then it is a signal that reinforcing or offsetting effect is at work.

Similarly, contractionary monetary policy shock prompted by a surprise decrease in reserve money is postulated to decrease reserve money, price, economic activity and exchange rate (an appreciation of the domestic currency). However, for similar reasons given above, no restrictions are imposed on the impulse responses of output and interest rate to reserve money shock. The set of sign restrictions imposed in table 3-1 has a unique response pattern for each monetary policy shock and following Uhlig (2005), they are expected to bind only for horizons in which impulse responses are restricted but not thereafter.

3.3 Empirical Results

Benchmark results of the chapter are presented in the form of impulse responses of the macroeconomic variables to the monetary policy shocks in figures 3-3 through 3-8. Prior to presenting these results, figures 3-1 and 3-2 show how restrictions in table 3-1 result in shaped distribution for the initial responses, which are impulse responses at quarter 0 (impact impulse responses) obtained when drawing the impulse vectors. Generally, the distributions confirms most of the restrictions imposed in table 3-1. One policy implication from these distribution is whether common monetary policy, be it interest rate or reserve money, can counteract idiosyncratic shock in a given country. The results in figure 3-1 show interest rate shock immediately lowers output for both Kenya and Uganda as the initial response of output is skewed to the left while for Tanzania, the initial response of output is ambiguous as the response of output centred around zero and is within ± 5 percent. Similar results can also be inferred in figure 3-2. Therefore, the results in the two figures connote that the immediate response of output to either monetary policy shocks differ among these countries it is negative for both Kenya and Uganda but neutral for Tanzania.

[Insert figures 3-1 and 3-2 here]

The impulse responses in figures 3-3 through 3-8 include 16% quartile, the median response, and 84% quartile of the posterior distribution. These impulse responses and the error bands are generated from 10,000 candidate draws with which the imposed sign restrictions are satisfied. The responses are plotted to a one standard deviation shock in either interest rate or reserve money and are calculated for up to 20 quarters after the shock, excluding an impact quarter.

3.3.1 Dynamic Responses to an Interest Rate Shock

Following a contractionary monetary policy shock triggered by an unexpected increase in interest rate, output, price, reserve money,and credit to the private sector decline while domestic currency appreciates. These results are found in figures 3-3, 3-4 and 3-5 for Kenya, Tanzania and Uganda, respectively. Impulse responses in these figures are in line with the sign restrictions prescribed in table 3-1 in which, for a set of variables in which sign restrictions apply, impulse responses are restricted with $k = 3$ i.e. impulse responses are expected to be positive or negative for at least 3 quarters after the shock.

[Insert figures 3-3, 3-4 and 3-5 here]

As we would have expected a priori following a contractionary shock to interest rate, the output response is negative across countries, although positive on impact for Tanzania. Top left panels of figures 3-3, 3-4 and 3-5 show the negative response of output is statistically significant for each country a quarter after the shock. While output response peaks at 7.5 percentage points for both Kenya and Uganda, it is constantly at 1 percent for Tanzania after the first quarter. The difference in the magnitude of the output response between Kenya and Uganda on one hand and Tanzania on the other may be attributed to the differences on how fast credit and exchange rate market adjust following initial shock to an interest rate. As can be seen on the respective figures, reserve money, credit and exchange rate adjust more quickly to the shock for both Kenya and Uganda compared to Tanzania where adjustment is sluggish, making the shock to have a prolonged impact on output. These findings are in sharp contrast with Davoodi et al. (2013) for all countries and Mugume (2011) for Uganda.

Each of the top middle panels of figures 3-3, 3-4 and 3-5 reports a significant decline of reserve money due to an interest rate shock for each country. It bears noting that our identification strategy in table 3-1 shows that no restriction has been imposed on the impulse response of reserve money. This has been done deliberately to determine whether reserve

money, an alternative instrument of monetary policy for a country that practises hybrid monetary policy, offsets or reinforces the impact of the negative interest rate shock. Our findings show that reserve money reinforces the effect of interest rate shock. The findings therefore confirms the presence of the liquidity effect.

Top right panels of figures 3-3, 3-4 and 3-5 shows that interest rate shock result lowers credit to the private sector significantly for each country. Against, the magnitude of the responses differ between Kenya and Uganda on one hand and Tanzania on the other. The response of credit to the shock is more pronounced for both Kenya and Uganda compared to Tanzania. For Kenya and Uganda, credit falls by more than 2 percent while for Tanzania it falls for less than 2 percent. These findings suggest that credit channel is likely to be active in these countries because the response of credit is significant and persistent even beyond the restricted horizons. It is thus in harmony with the recent wave of literature that uses bank level data to determine whether banking lending channel is active (Opolot & Nampewo, 2014; Kabiro & Nyamongo, 2014) as well as the narrative study by Berg et al. (2013).

For each country, the initial response of the price to the interest rate is negative and of the same magnitude of about 6 percentage points. These responses are shown on the bottom left panels of figures 3-3, 3-4 and 3-5. What is more clear across countries is that price continue to decline behind the quarters in which its response is restricted to be negative. It is also noticeable that no price puzzle has been found for any country as it was in the previous literature despite the fact that no exogenous variable has been included to deal with the puzzle.

Finally, the response of the exchange rate for the three EAC countries is considered in the bottom right panels of figures 3-3, 3-4 and 3-5. Following an interest rate shock, exchange rate decrease in each country (domestic currencies appreciate against the US dollar) and the initial responses are statistically significant. The initial response for both Kenya and Uganda is relatively larger than that of Tanzania. While local currencies for Kenya and Uganda appreciate

for about 1.5 percent, Tanzanian shilling appreciates for about half of the appreciation in Kenya and Uganda. Given that these countries have similar exchange rate regime *dejure*, differences in the size of appreciation due to interest rate shock may be attributed to different levels of financial development.

In sum, the significant impulse responses to the interest rate shock imply that monetary policy is effective in each of the East African Economies. The potent effect of interest rate shock on credit, interest rate and exchange rate informs that monetary transmission mechanisms associated with these variables are likely to be at work in EAC countries. The difference in timing of the responses may be an outcome of differences in the levels of financial development amongst these countries as already explained elsewhere. To a larger extent, these findings corroborate Berg et al. (2013)'s findings but are at odds with the findings of similar studies in East Africa (Davoodi et al., 2013; Buigut, 2009; Mugume, 2011).

3.3.2 Dynamic Responses to a Reserve Money Shock

Impulse responses to a reserve money shock for Kenya, Tanzania and Uganda are shown in figures 3-6, 3-7 and 3-8, respectively. This exercise has indeed been motivated by Berg et al. (2013) cited that the Bank of Tanzania is implementing a hybrid monetary policy regime in which both interest rate and reserve money are used as policy instruments. It is thus important to estimate the impulse response to a reserve money shock as this instrument carries information about the stance of monetary policy. This approach has also been followed by Ngalawa & Viegi (2011).

A monetary tightening triggered by a surprise decrease in reserve money conclude with a negative response of output for each country. The response is statistically significant over a window of 2–8 and 2–6 quarters after the shock for Kenya and Uganda, respectively. For Tanzania, the response of output is persistently significant from the second quarter onwards. Compared to the response to the interest rate shock, the response of output to the reserve money

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is somewhat less for each country and the window over which the response is significant is relatively shorter especially for Kenya and Uganda. These results are illustrated in top left panels of figures 3-6, 3-7 and 3-8 for Kenya, Tanzania and Uganda, respectively.

[Insert figures 3-6, 3-7 and 3-8 here]

In response to a reserve money shock, credit to private sector exhibits a persistent and statistically significant decline in each country, with both Kenya and Uganda having the largest initial response of about 2.5%. Our results in top right panels of figures 3-6, 3-7 to 3-8 shows therefore that the negative impact of reserve money shock takes longer to vanish in the Tanzania's credit market compared to Kenya and Uganda.

Economic theory posits that a decline in money supply has to be accompanied with a decline in price. This proposition is confirmed in the bottom left panels of figures 3-6, 3-7 and 3-8, where price declines significantly and persistently following a contractionary reserve money shock. It is worth noting that the decline in price is significant even beyond the quarters in which its responses are restricted to be negative, with the initial response to the shock for each country appearing to be of the same size. These findings imply that information contents of reserve money are still relevant for the conduct of monetary policy in each of these countries

Similar to interest rate shock, in estimating responses to the reserve money shock no sign restriction is imposed on the impulse response of interest rate in order to determine how the two supposedly instruments of monetary policy relate to each other. Following the onset of reserve money shock, interest rate increases for the first two quarters and then slides below the baseline for each country. The response of interest rate is therefore not different from zero and is of the same shape for each country as can clearly be seen on the bottom middle panels of figures 3-6, 3-7 and 3-8. This finding connotes that, in the event a respective country uses reserve money as a policy instrument, interest rate neither reinforces nor offset the impact of the reserve money shock.

Literature shows that a contractionary monetary policy concludes with persistent, significant appreciation in the nominal exchange rate (Christiano et al., 1999). This is behavioral relationship is also evident on the bottom right panels of figures 3-6, 3-7 and 3-8 where a contractionary reserve money shock induces local currency to appreciate against the US dollar in each country. The responses are persistent and statistically significant for all quarters in which the impulse responses functions are calculated.

These empirical results therefore show that, as the instrument of monetary policy, reserve money is still effective in influencing economic activity and price in each of the East African economies. They further show that controlling money supply may help influence credit and exchange rate in the economy. Thus if any of these economies is implementing hybrid monetary policy, no evidence is found that interest rate offsets the expected impact of reserve money shock as the interest rate responds neutrally to a shock in reserve money.

3.3.3 Forecast Error Variance Decomposition of Output

Having answered a primary question of how monetary policy shocks affect output and other macroeconomic aggregates, it is logically imperative now to answer a subsequent question of how much variation in output and other macroeconomic aggregates do monetary policy shock explain. Results of this exercise are presented in table 3-2. By construction, this table allows us to compare contributions of the two monetary policy shocks to the variability of output for each country and across countries. Of the two shocks, the contribution of interest rate shock to output fluctuations slightly dominates reserve money shock for each horizon and country.

A year after the initial shock, the contribution of interest rate is the highest in Uganda, about 9.3%, and it is the lowest in Tanzania (5.7%). In the same horizon, interest rate accounts for about 9% of the variation in output in Kenya. Over the longer horizons, however, Kenya tend to have the highest contributions of interest rate shock to output gyrations followed by

Uganda. For example, after two years, interest rate accounts for about 10.6%, 6.5% and 10.6% for Kenya, Tanzania and Uganda respectively.

[Insert table 3-2 here]

Table 3-2 also portrays the percentage of the variability of output that is triggered by the reserve money shock for each country. Reserve money accounts for about 8.7%, 5.8% and 8.5% of the variations of Output for Kenya, Tanzania and Uganda, respectively, a year after shock. Lowest contribution of monetary policy shock to the variability of output is also observed for Tanzania. The relatively small contributions of monetary policy shocks to the variability of output is consistent with the real business cycle finding that a large share of the variation in output is attributed to the productivity shocks rather than monetary policy shocks.

3.4 Concluding Remarks

This chapter estimated the effects of monetary policy shocks on output and other macroeconomic fundamentals for East African Countries using Structural VAR with explicit Sign restrictions that are commonly used implicitly in the SVAR literature. Monetary policy shock have been identified by imposing restrictions on the impulse responses of a set of variables while leaving the impulse responses of output and one supposedly instrument of monetary policy unrestricted. The findings show that output declines significantly following monetary policy shocks and that the responses of other variables are also significant and free from puzzles found in previous studies.

A host of insights can be derived from the findings of this chapter. First, based on quarterly data, an unanticipated increase in interest rate significantly concludes with a fall of economic activity for each country. Second, as some of the East African countries practise hybrid monetary policy, a negative shock to reserve money also leads to a fall in output albeit at a lesser magnitudes compared to those of interest rate shock. Third, forecast error variance

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decomposition analysis has shown that monetary policy shocks are not the main sources of output fluctuations for any of the countries studied and it has been learnt that interest rate shock accounts for a slightly more variation in output than reserve money shock for each country and each horizon. Finally, in search for a common instrument for monetary policy amongst EAC countries, the findings seem to suggest interest rate despite the initial ambiguous responses of output for Tanzania.

TABLE 3-1: IDENTIFICATION OF MONETARY POLICY SHOCKS

	Output	Price	Reserve Money	Interest Rate	Credit to Private Sector	Exchange Rate
Interest Rate Shock (↑)	?	−	?	+	−	−
Reserve Money Shock (↓)	?	−	−	?	−	−

Notes: A + (-) indicates that the impulse response of the variable in question is restricted to be positive (negative), respectively, for 3 quarters after the shock, including the quarter of the impact. A ? implies that no restriction is imposed on the impulse response of the respective variable.

TABLE 3-2: FORECAST ERROR VARIANCE DECOMPOSITION OF OUTPUT

Quarters	Kenya		Tanzania		Uganda	
	i^s	m^s	i^s	m^s	i^s	m^s
1	7.07	6.24	4.00	3.94	7.19	6.55
4	9.01	8.64	5.69	5.78	9.25	8.48
8	10.62	10.26	6.47	6.46	10.56	10.00
12	11.38	10.98	7.21	7.17	11.15	10.68
16	11.55	11.35	7.83	7.61	11.30	11.19
20	11.75	11.54	8.40	8.20	11.51	11.46

Notes: Forecast error results reflect the sign restrictions imposed and thus are not identified via a Cholesky decomposition. i^s and m^s are the interest rate shock and the reserve money shock, respectively.
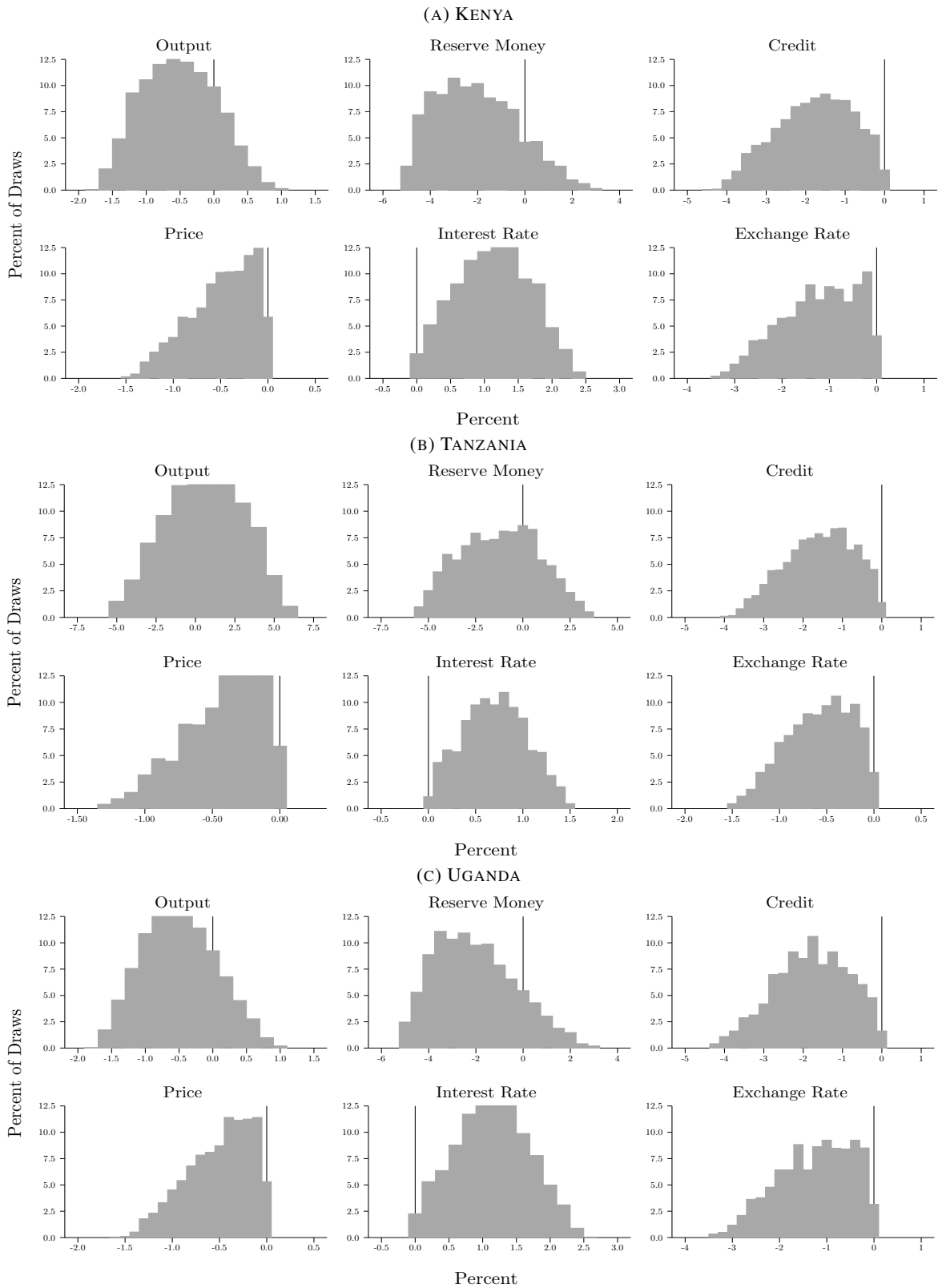
(A) KENYA

(B) TANZANIA

(C) UGANDA

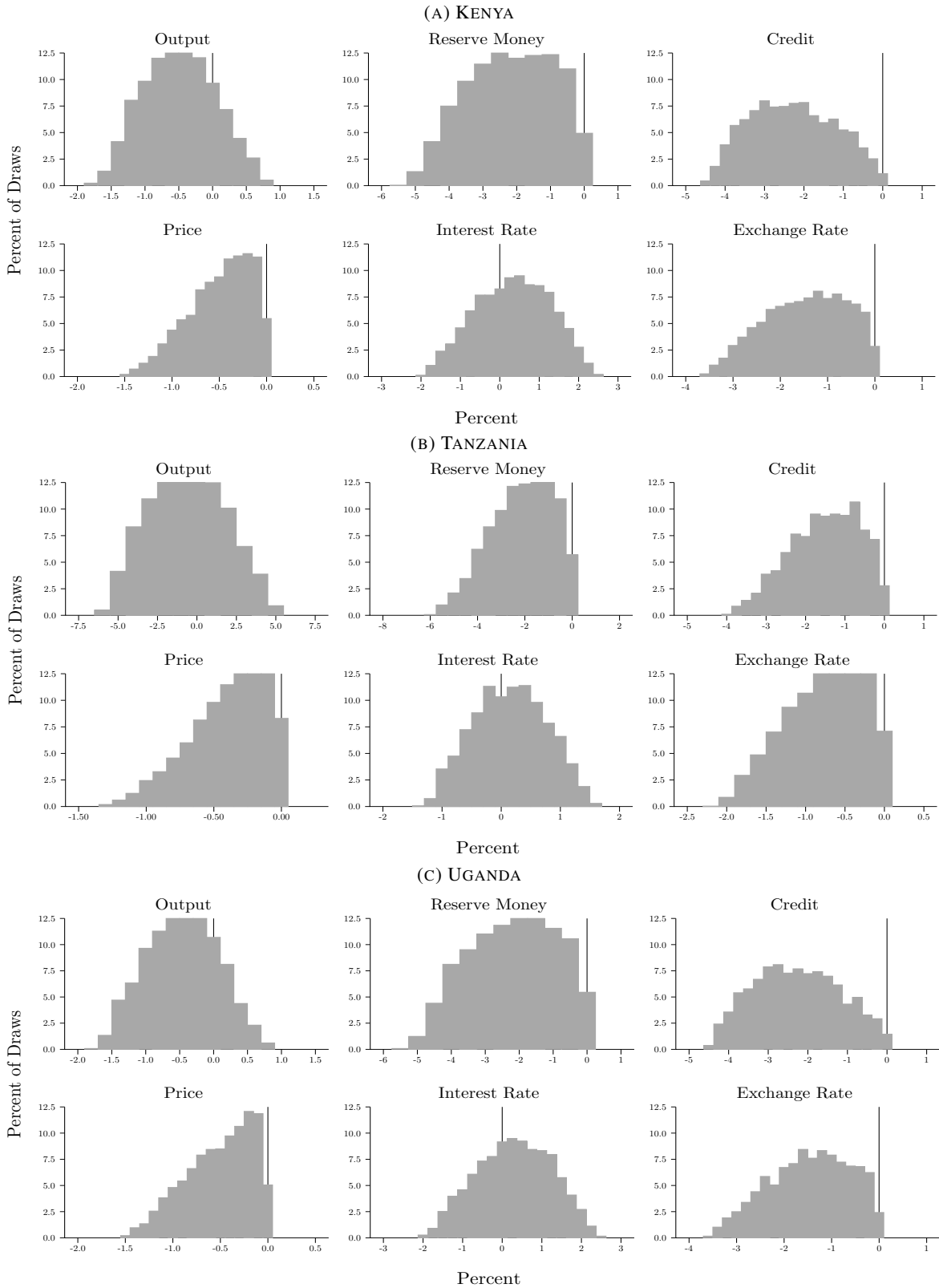FIGURE 3-1: DISTRIBUTION OF IMPACT IMPULSE RESPONSES TO AN INTEREST RATE SHOCK

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FIGURE 3-2: DISTRIBUTION OF IMPACT IMPULSE RESPONSES TO A RESERVE MONEY SHOCK
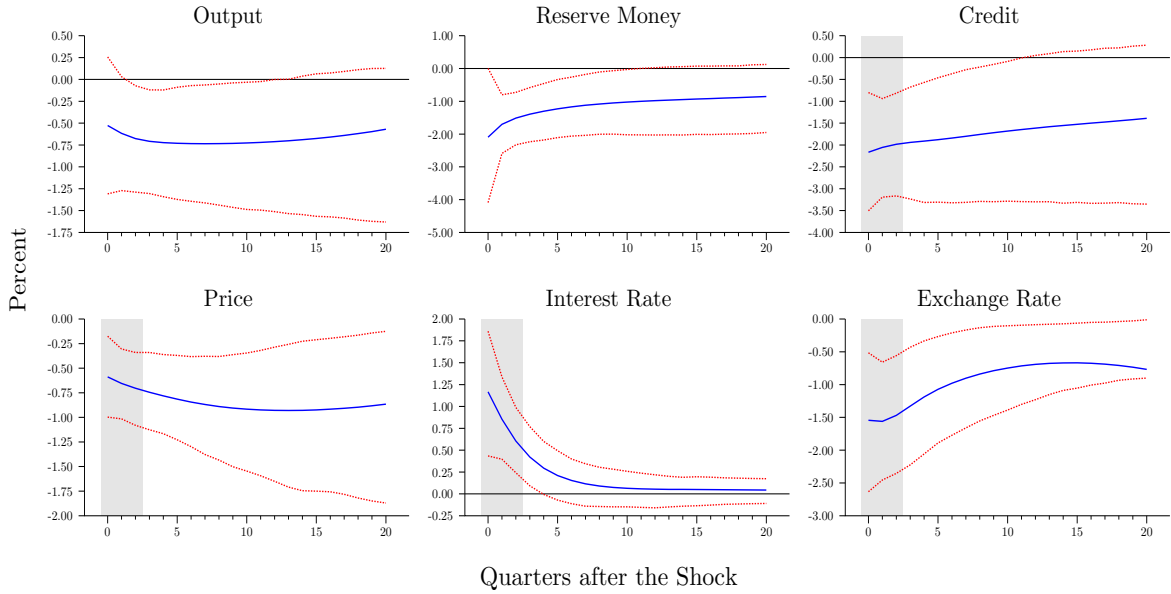
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FIGURE 3-3: DYNAMIC RESPONSES TO AN INTEREST RATE SHOCK FOR KENYA

Notes : The solid lines are the median impulse responses due to an interest rate shock and the dotted lines are the 16% and the 84% quartiles of the posterior distribution. The shaded area indicates the impulse response of the respective variable is directly restricted by the identification procedure as in table 3-1.

FIGURE 3-4: DYNAMIC RESPONSES TO AN INTEREST RATE SHOCK FOR TANZANIA

Notes : The solid lines are the median impulse responses due to an interest rate shock and the dotted lines are the 16% and the 84% quartiles of the posterior distribution. The shaded area indicates the impulse response of the respective variable is directly restricted by the identification procedure as in table 3-1.

FIGURE 3-5: DYNAMIC RESPONSES TO AN INTEREST RATE SHOCK FOR UGANDA

Notes : The solid lines are the median impulse responses due to an interest rate shock and the dotted lines are the 16% and the 84% quartiles of the posterior distribution. The shaded area indicates the impulse response of the respective variable is directly restricted by the identification procedure as in table 3-1.
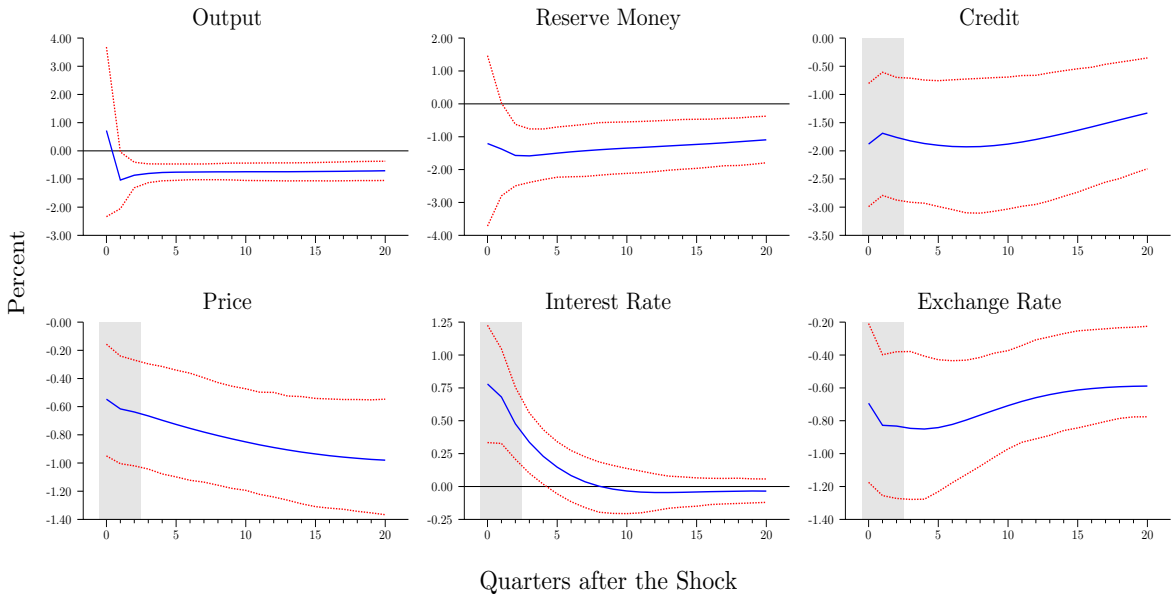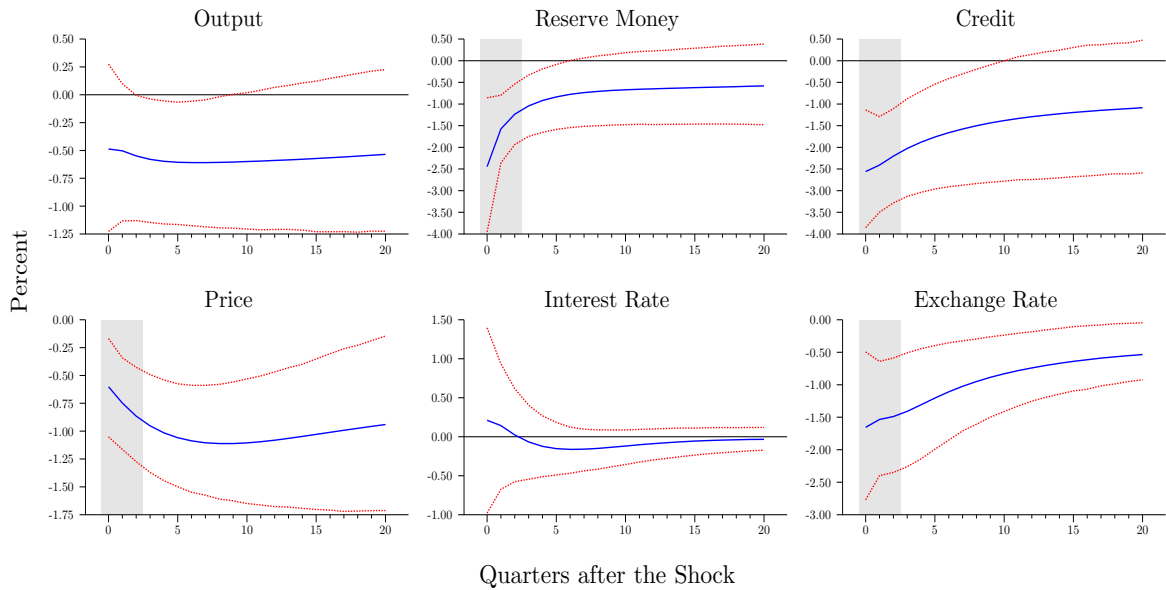

FIGURE 3-6: DYNAMIC RESPONSES TO A RESERVE MONEY SHOCK FOR KENYA

Notes : The solid lines are the median impulse responses due to an interest rate shock and the dotted lines are the 16% and the 84% quartiles of the posterior distribution. The shaded area indicates the impulse response of the respective variable is directly restricted by the identification procedure as in table 3-1.
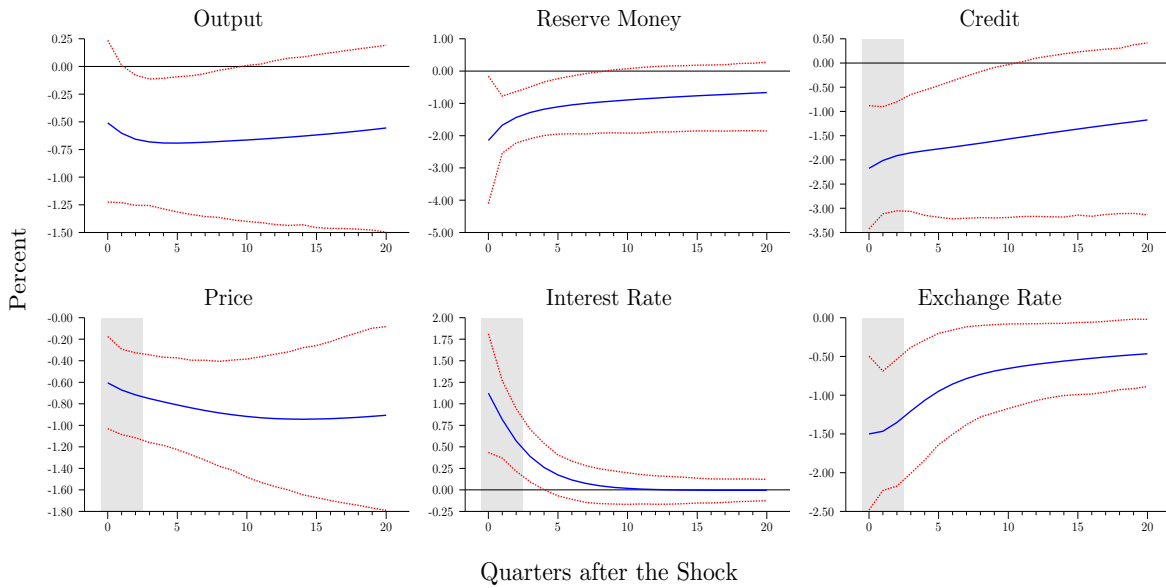
56
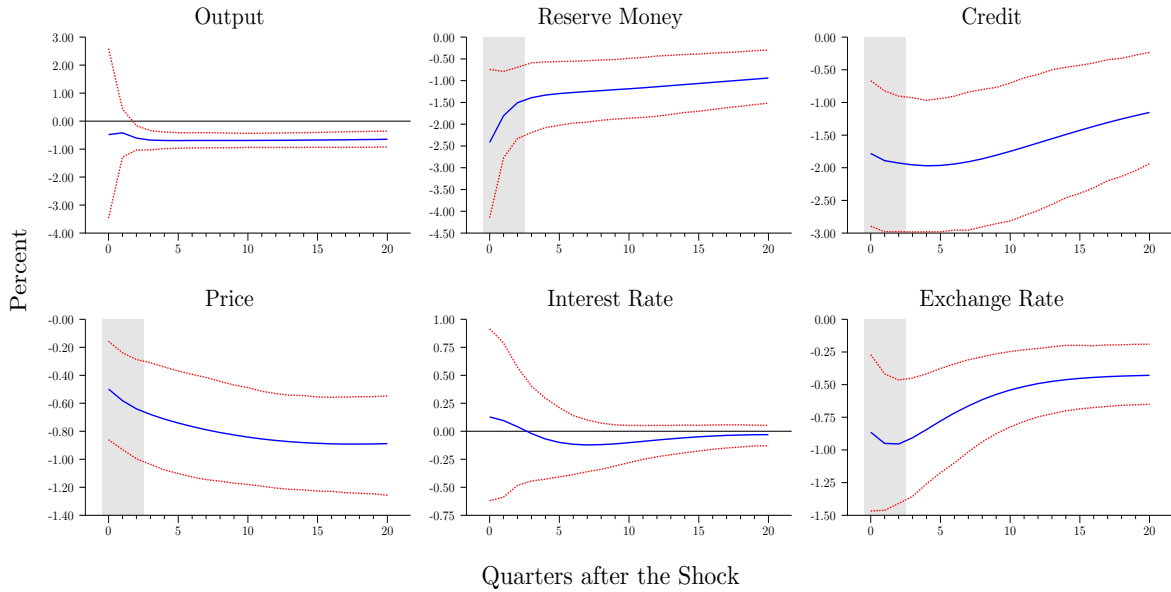
FIGURE 3-7: DYNAMIC RESPONSES TO A RESERVE MONEY SHOCK FOR TANZANIA

Notes : The solid lines are the median impulse responses due to an interest rate shock and the dotted lines are the 16% and the 84% quartiles of the posterior distribution. The shaded area indicates the impulse response of the respective variable is directly restricted by the identification procedure as in table 3-1.

FIGURE 3-8: DYNAMIC RESPONSES TO A RESERVE MONEY SHOCK FOR UGANDA

Notes : The solid lines are the median impulse responses due to an interest rate shock and the dotted lines are the 16% and the 84% quartiles of the posterior distribution. The shaded area indicates the impulse response of the respective variable is directly restricted by the identification procedure as in table 3-1.
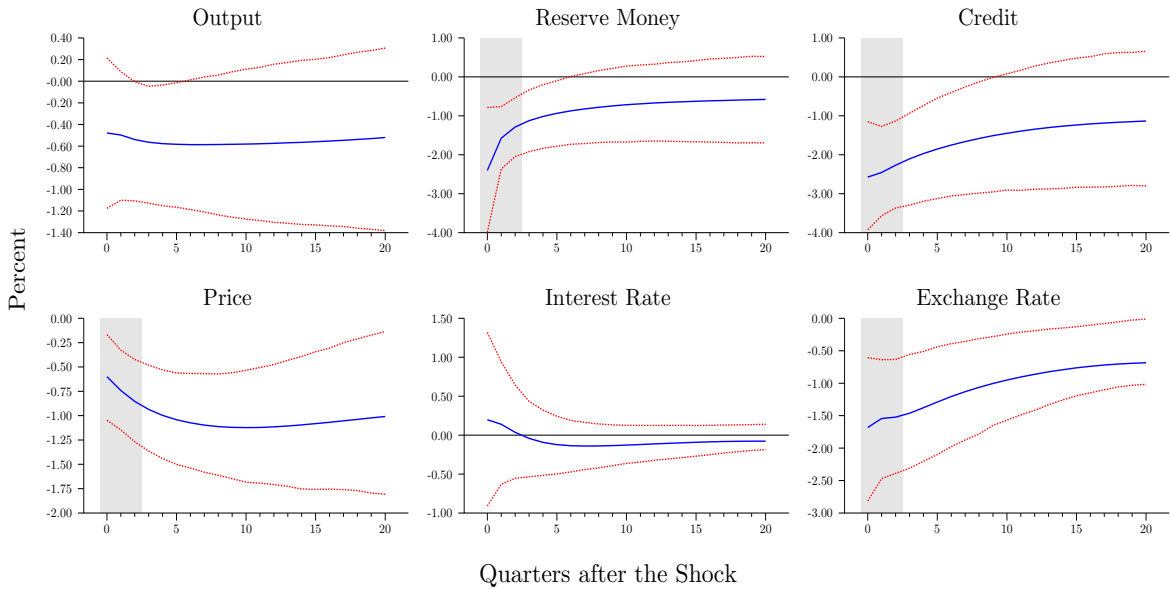
CHAPTER 4

The effects of Fiscal Policy on Output in East Africa

Policymakers have been willing to delegate monetary policy to technocrats (central bankers), but they keep fiscal policy close to their chest. This is because spending programs and tax rates are the bread and butter of what politics is all about: politicians build coalitions within generations and across generations. Politicians rarely, if ever, are willing to delegate fiscal policy.

Fiscal Policy after the Financial Crisis
ALESINA & GIAVAZZI (2013)

4.1 Introduction

The role of fiscal policy in stimulating the economy has been a subject of a growing debate among macroeconomists for a prolonged period. Prior to the 2008/2009 financial crisis, the debate hovered around whether the movements of the key variables were in support of Keynesian or neoclassical views of fiscal policy (Blanchard & Perotti, 2002). In the advent of the 2008/2009 financial crisis, however, there has been a dramatic shift in this debate as now is it focusses on the empirical estimation of the size of the fiscal multipliers and justify the differences observed in the estimated multipliers from both the methodological and institutional perspectives (See Barro & Redlick, 2011; Auerbach & Gorodnichenko, 2012; Perotti, 2012; Kraay, 2012; 2014; Ramey, 2013; Ilzetzki et al., 2013; Jha et al., 2014; World Bank, 2015). This shift can largely be attributed to enormous fiscal stimulus packages spent by developed and emerging economies in boosting domestic demand following the tumbling of external demand. This policy option has been pursued with a belief that fiscal multipliers, spending multipliers in particular, are greater than one (Barro & Redlick, 2011). However, economic theory postulates that spending multiplier does not necessarily have to be greater

than one. Advocates of the basic Keynesian theory argue that, in the context of price rigidity, aggregate demand determines output. In line of this argument, consumption tends to respond to current income and thus fiscal expansion has a positive multiplier effect on growth. In contrast, proponents of the Ricardian theory (Ricardian Equivalence) argue that fiscal multiplier is zero in a dynamic framework of taxes and debt because consumers are forward looking and fully aware of the government's intertemporal budget constraint. Consumers are said to be aware that a tax cut today must be financed by higher taxes in the future and thus their consumption does not change because their permanent income is unaffected. Likewise, they are aware that an increase in government spending by borrowing today will be offset by future spending cuts and thus leaves their income unchanged. This dichotomy of the theoretical underpinnings of fiscal policy unveils that the size of fiscal multiplier is somewhat uncertain.

Estimating the effects of fiscal policy, fiscal multiplier in particular, plays pivotal role in ensuring accuracy of macroeconomic forecast and in the realm of policy advice and design. Failure to estimate precisely and use fiscal multipliers effectively may render fiscal policy or program futile. Blanchard & Leigh (2013), for instance, show that under-estimation of fiscal multipliers early in the crisis had detrimental errors in growth forecast. Moreover, Eyraud & Weber (2013) argue that underestimated fiscal multipliers may cause countries set un-achievable fiscal targets and miscalculate the amount of adjustment necessary to curb their debt ratio and thereby exacerbate a vicious cycle of slow growth, deflation and further tightening.

The previous discussion justify why there has been a growing interest in studying the effects of fiscal policy in developed countries and less of the same for developing countries where fiscal policy is likely to dominate the policy space and have a considerable distributive consequences. The inherent nature of developing countries, at least theoretically, makes it harder to estimate size of fiscal multiplier relative to those of developed or emerging

economies. For example, Batini et al. (2014) argue that fiscal multipliers are likely to be larger in developing countries due to a number of factors inherent in these economies. First, consumption behavior is almost absent due to liquidity constraints caused by weak financial markets and that consumers are less forward looking owing to too much instability. Second, reinforced by less developed financial market, there is a weak transmission mechanisms of monetary policy and thus fiscal policy become prominent. And lastly, lower automatic stabilizers and lower levels of government debts may widen fiscal space of developing countries and make it feasible for fiscal policy to be used for countercyclical purpose during economic slackness. In contrast, Batini et al. (2014) also argue that fiscal multipliers may be low in developing countries as compared to developed and emerging countries due to a host of reasons. First, there are increasingly larger precautionary saving due to a more uncertain environment. Second, inefficiencies in public expenditure management and revenue administration. Third, lasting positive output gaps due to supply constraints. Fourth, developing countries still have more room for confidence and credibility effects due to higher interest spread, and lastly, most economies in developing countries are small and open. Thus, from the theoretical point of view, it is unclear whether fiscal multipliers in developing economies are larger or smaller than those of the developed and emerging economies.

The recent macroeconomic developments across the globe further underscore the urgency and pertinence of fiscal policy studies on both developed and developing countries. With monetary policy loosing its splendor as augured by a zero lower bound interest rate following the 2008/2009 financial crisis, advanced economies have been left with an option of pursuing activist fiscal policy to boost domestic demand. In another development, the recent wave of establishing common monetary arrangements among developing countries in which national monetary policies have to be replaced by a supranational monetary policy implies that policy space for the potential members of the respective arrangement will only be confined to fiscal

policy and thus its prominence. This is particularly true for East African Economies case studied in this chapter. Furthermore, the ongoing discovery of oil and gas reserves in some of the developing economies, Tanzania and Uganda in particular, is likely elevate the prominence of fiscal policy in policy space as the resource-based revenues may widen fiscal space which could then be used prudently to reorient the economy structurally.

Though the macroeconomic requisites hint the urgency for understanding the extent to which fiscal policy can influence economy activity, empirical evidence is scantily available and the available slim literature treats developing countries as a homogenous group. Ironically, the structural characteristics and conjectural factors show that developing countries are far less homogenous.

This chapter therefore undertakes a multi-country study of the effects of fiscal policy on output for developing economies of Kenya, Tanzania, and Uganda using SVAR with Sign Restrictions. Despite the limited experience of using fiscal policy for countercyclical purposes, there are at least three reasons to believe that these countries will fiscal policy for countercyclical purpose in the near future. First, Kenya, Tanzania and Uganda are expected to become members of the expected East African Monetary Union in which they will be subjected to the supranational monetary policy that deals only with regional shocks and yet, according to Drummond et al. (2015), country-specific shocks have been prevalent in EAC countries for the last two decades. Second, the adoption of a single currency in a monetary union will deprive each of the union member another country-specific shock absorber: the exchange rate. And third, the triad are on the verge of becoming resource-based economies due to the recent discovery of enormous amount of oil and gas reserves. Revenues to be generated from these resources may widen fiscal space that could be used for countercyclical purpose.

The remainder of this chapter is divided into four sections. Section 4.2 sets out the empirical methodology, identification strategy, and describe data and their sources. Section 4.3

presents main empirical evidence on the effects of fiscal policy shocks. Counterfactual fiscal experiments to determine how each of the economy is likely to respond to the three distinct fiscal scenario are found in section 4.4. Section 4.5 portrays the extent to which fiscal shocks are responsible for output fluctuations by graphing Forecast Error Variance Decomposition for each fiscal shock over different forecast horizons. Section 4.6 concludes the chapter by deriving policy implications from the findings.

4.2 Empirical Strategy and Data

In this chapter fiscal shocks are defined as exogenous changes to fiscal instruments: government spending and government tax revenue. These shocks are identified using Mountford & Uhlig (2009)'s strategy in which fiscal shocks are identified by means of imposing sign restrictions on the impulses responses of fiscal variables and requiring that the shocks to fiscal variables be orthogonal to business cycle and monetary policy shocks. Although Fry & Pagan (2011) argue that SVAR models with this identification strategy tend to be more restrictive that standard SVAR models, penalty function approach of the model is used to obviate this problem.

To estimate the effects of fiscal shocks on output, the following system of VAR system is estimated:

$$Y_t = A(L)Y_{t-1} + U_t \tag{4.1}$$

where Y_t is a vector of endogenous variables that includes logs of real GDP, real government spending, real government revenue, real money supply, consumer price index, real household consumption, real private investment and nominal interest rate in percentage. U_t and $A(L)$ are reduced–form error and a polynomial in lag operator, respectively. With the help of Akaike Information Criterion, model equation 4.1 is fitted with 2 lags for each country and a quadratic time trend as in Blanchard & Perotti (2002).

Data on fiscal and macroeconomic variables are in quarterly frequency and covers a sample spanning 2000:Q1–2013:Q4. The choice of the sample period is largely determined by the availability of quarterly GDP data. These series are collected from multiple sources because, as argued by Ilzetzki et al. (2013), dearth of quality data is the Achilles' heel of macroeconomic research in developing countries. Specifically, fiscal variables are extracted from the Statements of Government Operations (SGOs) normally prepared jointly by the ministry of finance and central bank of the respective country. Quarterly GDP are from the national statistical agency of the respective country while other macroeconomic series are gathered from the IMF's International Finance Statistics and the World Bank's Development Indictors' Database. Efforts have been made to ensure that fiscal variables are consistent for each country by following definitions outlined in the IMF's Government Financial Statistics (GFS) manual.

GDP and its expenditure side components of household consumption and private investment serve two purposes. First, aggregate GDP helps to identify business cycle shock, which is filtered first before monetary and fiscal shocks. Secondly, their responses to fiscal shocks helps to determine how fiscal policy can affect the economy. Though GDP data are readily available at quarterly frequency, its expenditure components are not. These expenditure items are generated from their annual values using Chowlin Disaggregation Approach with which quarterly GDP and exports are used as indicators. The generated series are then seasonally adjusted using X-13 algorithm.

Monetary and price variables are included to identify monetary policy shocks. A conventional view that monetary policy shocks are well captured through surprise changes in short-term interest rate is adhered to. Narrow definition of reserve money is used to collect money supply variable (M0) for each country while interest rate is a 91-day treasury bill and it

has been considered because it uniformly defined across EAC countries. Due to unavailability of GDP deflator at quarterly frequency, consumer price index is used instead.

Government spending and revenue are the two fiscal variables used to identify fiscal shocks. These variables are deflated by CPI to get the real series. Government revenue is limited to tax revenue and government spending is confined to government consumption, which includes consumption of goods and services net of transfers and interest payments. Next is the section on empirical results.

4.3 Empirical Results

Benchmark results are presented in the form of the impulse responses of the macroeconomic variables to fiscal shocks for each country. The estimated impulse response functions include median responses, 50% quartile, and lower and upper bands, which are 16% and 84% quartiles of the posterior distribution, respectively, and they extend for 24 quarters after the initial shock. The error bands are derived from Bayesian Wishart sampling using a set of 10,000 candidate draws.

4.3.1 Dynamic Responses to a Government Revenue Shock

Figures 4-1, 4-2, and 4-3 display the dynamic responses of output and related macroeconomic variables to an exogenous fiscal shock for Kenya, Tanzania, and Uganda, respectively. The expansionary fiscal shock takes the form of a negative realization of the government revenue shock of sizes 4.5, 2.5, and 2.0 percent for Kenya, Tanzania, and Uganda, respectively. For each country, the impulse corresponds to a one standard deviation of the log of government revenue. As the figures illustrate, the response of output to this shock is on the direction we would have expected a prior at least for the first two quarters. They are statistically significant for both Tanzania and Uganda for about two quarters after the shock, with Uganda having the largest initial response of 1.0 percent while Tanzania's is 2.5 percentage points . Although the

initial response of output for Kenya is of the same magnitude as for Uganda, it is not different from zero as the error bands span below and above the baseline. Moreover, the expenditure components of output for Tanzania and Uganda respond significantly to the shock on impact. Household consumption is statistically significant for each country, but reverts back to the baseline after a year. And private investment increases significantly for Tanzania and Uganda up to a fourth and second quarter, respectively. Since consumption and investment are main drivers of economic growth in EAC economies as shown in the stylized facts in chapter 2, the pattern of responses of output and its components to the shock is not accidental as the two variables, output and consumption in this case, are positively correlated.

[Insert figures 4-1, 4-2, and 4-3 here]

The figures also show that an exogenous shock to government revenue concludes with an increase in government spending on impact for Kenya and Tanzania and a decrease of the same for Uganda. However, the responses are only significant for Tanzania and Uganda though in the opposite directions. The decline in government spending for Uganda is intuitive but that of Tanzania is less clear though not without justification. There are likely two channels as to why Tanzania's spending is increasing despite declining government revenue. First, the government may be financing the increase in spending by borrowing from the public with expectation that it will finance it with tax revenue as the economy grows and second, the increase in spending may be financed by concessional loans and grants from development partners as Tanzania is one of the major recipient of official development assistance (ODA). There is a weak evidence of the first channel as the interest rate does not seem to respond significantly on impact while no evidence is available to invalidate the second channel. Last but not least, it is also important to note that despite the expansionary fiscal policy, the response of price for each country is neutral, implying that this instrument of fiscal policy is non-inflationary.

4.3.2 Dynamic Responses to a Government Spending Shock

Figures 4-4, 4-5, and 4-6 display the dynamic responses of output and other macroeconomic variables to an exogenous fiscal shock for Kenya, Tanzania, and Uganda, respectively. The expansionary fiscal shock takes the form of a positive realization of the government spending shock of sizes 5.0, 7.5, and 7.5 percent for Kenya, Tanzania, and Uganda, respectively. The figures show that output increases following a government spending shock, for Tanzania and weakly so for Kenya, especially for the first quarter. For Uganda, output has a positive response for about a year. It is also interesting to note that in Tanzania, government spending clouds out household consumption on impact but boosts private investment while for Uganda, private investment is being affected negatively by the increase in government spending. The evidence from Tanzania and Uganda shows that government spending affects output through its impact on private investment, but again in the opposite directions.

[Insert figures 4-4, 4-5, and 4-6 here]

On the other hand, government spending shock lowers government revenue on impact for each country though the responses in the subsequent quarters vary. For example, after the quarter of the impact, government spending shock has a positive impact on government revenue for Uganda–the response that is persistently significant up to 9th quarter. The responses of monetary variables is different for each country. While reserve money and price respond neutrally to the government spending shock for Kenya and Tanzania, they respond significantly for Uganda. For example, reserve money increases while price falls as a result of the shock. The response of price for Uganda is somehow puzzling as the it falls with an increase in government spending. The decline in price may be attributed by reduced demand from both consumers and investors. However, the negative relationship between price and government spending is also evident in Mountford & Uhlig (2009).

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4.4 Policy Analysis with Fiscal Consolidation Scenarios

This section combines the basic fiscal shocks identified above to study the effects of different fiscal policy scenario. Although there can be multiple ways of combining the two shocks linearly, the analysis that follows is confined to three possible fiscal scenarios: deficit spending, deficit financed tax cut and a balanced budget contraction. Deficit Spending scenario entails an increase of government spending by 1% for the first four quarters while holding government revenues constant, Deficit financed tax cut is set to be the opposite the deficit spending scenario, and the balanced budget scenario encompasses reducing both government spending and government revenues proportionally according to their shares to GDP.

A Deficit-Spending Fiscal Policy Scenario

The impulse responses of the macroeconomic variables to this scenario for Kenya, Tanzania, and Uganda are presented in figures 4-7, 4-8, and 4-9, respectively. Numbers attached to these figures show that deficit–spending works best for Tanzania following a significantly positive response of output. Since government revenue is held constant for a year, much of the responses in these figures echo those to government spending shock in figures 4-4, 4-5, and 4-6. The findings are therefore that an exogenous shock significantly stimulated the economy in Tanzania but have a weak impact for Kenya and that of Uganda is in opposite direction as output decline marginally on impact due to this shock.

[Insert figures 4-7, 4-8, and 4-9 here]

A Deficit-Financed Tax Cut Fiscal Policy Scenario

The impulse responses for a deficit financed tax cut fiscal policy scenario for Kenya, Tanzania, and Uganda are presented in figures 4-10, 4-11 and 4-12, respectively. The shock to this scenario is designed as a combination of the basic fiscal shocks such that tax revenue falls by 1% and government expenditure remains unchanged for four quarters following the initial

shock. As the results in the figures unfold, tax cuts stimulates output for Uganda for the first three quarters. The significance of output response may be through boosted household consumption due to a combinations of lower interest rate, prices and tax bills. Similar response is marginally significant for Tanzania and neutral for Kenya it is above the baseline. In short, deficit financed tax cut scenario seem work best for Uganda where an increase in both consumption and investment translate into an increase in output without pushing up prices and interest rate.

[Insert figures 4-10, 4-11 and 4-12 here]

The Balanced Budget Scenario

This policy scenario is constructed as in Mountford & Uhlig (2009) in which both government revenues and expenditure decrease, instead of increasing as in the Mountford & Uhlig paper, for four quarters after the initial shock. For each country, the combination of basic fiscal shocks depends on the share of revenue and expenditure to GDP for a sample period. Based on this, balanced budget contraction for Kenya is identified as one in which government spending decrease by 1% for each country and government revenues decrease by 0.87%, 0.86%, and 0.89% for Kenya, Tanzania and Uganda, respectively. For each country, government revenue is set below 1% because over the sample period the government revenue's share of GDP is lower than the share government expenditure to GDP. Thus, for the balanced budget to hold, government spending must decrease faster than government revenue.[8]

[Insert figures 4-13, 4-14 , and 4-15 here]

Responses of the macroeconomic variables to the balanced budget scenario are presented in figures 4-13, 4-14 , and 4-15 for Kenya, Tanzania and Uganda, respectively. For Kenya,

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[8] Over the sample period, an average share of government revenue to GDP has been 19%, 15% and 15% for Kenya, Tanzania and Uganda, respectively, and the average share of government revenue to GDP has been 22%, 17% and 17% for the same countries.

household consumption is statistically significant for a window of three quarters but this response is not significant enough to trigger an increase in output. For Tanzania, both household consumption and private investment have positive response on impact, probably through a fall in interest rate. And output declines with significantly with a lag of four quarters. Thus, for Tanzania, while Balanced Budget seems to increase consumption and investment in the short-run, it has adverse impact on output in the medium term. For Uganda, output and its components respond significantly in the first three quarters as both consumers and investors increase their demands following low interest rates, low price and reduced tax bills. Thus, this finding shows that Balanced Budget Contraction works best for Uganda compared to the other two EAC countries.

Though the responses of output to the deficit spending and deficit financed tax cut scenarios may not be significant at each forecast horizon, the impact could accumulate and become significant over time. Given this possibility, present value multipliers for the two policy scenarios are computed and presented in table 4.2. Statistics in this table uncovers that 1 year spending multiplier ranges from 0.2 in Uganda to 0.6 in Kenya. This range of spending multipliers is in line with the spending multiplier estimated by Kraay (2014; 2012) and Ilzetzki et al. (2013). On the other hand, tax multiplier seems to be significant for both Tanzania and Uganda only for the first year. Although both multipliers are positive and relatively larger for Kenya compared to Tanzania and Uganda, none of them is statistically significant. This finding echoes the impulse responses analysis already presented in which both government spending and revenues were not found to influence Kenya's output in a significant magnitude.

[Insert table 4.2 here]

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4.5 Variance Decomposition Analysis

This section presents the results of the variance decomposition in which an analysis of what proportion of the variance in GDP is explained by identified shocks is done. The variance decomposition from the estimated SVAR model is presented in figure 4-16. With the exception of Kenya, where the contribution of business cycle shock is less than 50%, Tanzania and Uganda have over 50% of the variation in GDP attributed to business cycle shock with the rest explained by both the monetary and fiscal shocks. The high output variance due to business cycle shock could reflect higher output volatility that could be due either demand or supply shocks. In this respect, the relatively lower output variance could be demand-driven in Kenya due to its somehow industrialized economy compared to Tanzania and Uganda. The high output variance in Tanzania and Uganda could still be a reflection that these countries rely on volatile agricultural sector which tend to be supply-driven as indicated by the stylized facts in chapter 2.

[Insert table 4-16 here]

Of the three countries, monetary policy shock has a higher contribution to the variation of GDP in Kenya compared to Tanzania and Uganda. It is also crystal clear that over long horizons, much of the variation in economic activity in Kenya is explained by monetary policy shock than business cycle shock. This is perhaps true as Kenya is the financial hub in the East African region. The contribution of monetary policy shocks to output gyrations is almost the same for both Tanzania and Uganda, with a maximum of about 10%.

Regarding the fiscal shocks, Tanzania has about 20% of the variation in output attributed to government revenue shock while that of Uganda is less than 10%. For both Kenya and Uganda, the contribution of government spending shock is comparatively higher than that of Government revenue shock while the opposite is true for Tanzania, especially after 1 year. The

finding thus mirrors the results in sections 4.3.1 and 4.3.2 in which fiscal shocks were found to be of less important in influencing aggregate output and it components for Kenya.

4.6 Conclusions

The purpose of this chapter was to estimate the macroeconomic effects of fiscal shocks in the East African Economies of Kenya, Tanzania and Uganda using Bayesian Structural VAR with Sign Restrictions, which allows us identify fiscal policy shocks exclusively based on time series and not on rare events of war spending with which data are not available for developing countries.

A number of findings are worth noting from this chapter. First, assuming symmetric effects, tax cuts tend to stimulate economic activity in each country with much of the boost coming from household consumption. Second, government expenditure appears to work for Tanzania and Uganda but not for Kenya and, for Uganda, government spending seems to increase government revenue in the medium term. The findings are therefore in favour of Keynesian view for Tanzania and Uganda but perhaps Ricardian equivalence holds for Kenya.

Three policy counterfactuals to understand how the linear combinations of the two policy instruments work together. The first scenario is a deficit-financed spending in which government spending increases while government revenues is held constant. This scenario concludes with immediate increase in economic activity for Tanzania but a delayed increase of the same for Uganda. No significant response is recorded for Kenya. A deficit-financed tax cut is the second scenario in which government revenue is set to decline while government spending is held constant. This policy has a marginal effects for both Tanzania and Uganda but not Kenya. Balanced budget scenario–decrease in both government spending and revenues–culminates in a significant increase in economic activity for Uganda only. This findings imply that Ricardian Equivalence my be holding for Kenya but not for Tanzania and Uganda. To cap it all, it appears that deficit-financed spending scenario works well for Tanzania as the discounted present

value cumulative multiplier of this policy is significant for a wider window of horizons for both Tanzania and Uganda. Cumulative tax cut do not exert significant impact on output for Kenya but only marginally for both Tanzania and Uganda.

Finally, variance decomposition analysis shows that fiscal shocks have modest contributions to the GDP variability. In tandem with business cycles models, much of the variation of output in these economies is attributed to business cycle shocks, especially for Tanzania and Uganda. And for Kenya, contributions of both monetary and business cycle are equally important in explaining the variations in output especially over a year or more. Government revenue shock has much contribution to the variations of output in Tanzania whereas Government spending shock has a much higher contribution to output fluctuations in Kenya and Uganda.

TABLE 4-1: IDENTIFICATION OF FISCAL SHOCKS

	Real GDP	Real Spending	Real Revenue	Real Money	Policy Rate	GDP Deflator	Real Consumption	Real Investment
Non-fiscal shocks								
Bus. Cycle Shock (↑)	+	?	+	?	?	?	+	+
Mon. Policy Shock (↓)	?	?	?	+	−	+	?	?
Fiscal shocks								
Govt. Rev. Shock(↓)	?	?	−	?	?	?	?	?
Govt. Spend. Shock(↑)	?	+	?	?	?	?	?	?

Note: A + (-) indicates that the impulse response of the variable in question is restricted to be positive (negative) for 4 quarters following the shock, including the quarter of the impact. A ? means that no restriction has been imposed.

TABLE 4-2: CUMULATIVE MULTIPLIER

Country	Spending			Revenue		
	1 Year	2 Years	3 Years	1 Year	2 Years	3 Years
Kenya	0.6	1.1	0.9	1.2	1.3	0.3
Tanzania	0.3*	0.5*	0.6*	0.3*	-0.2	-0.5
Uganda	0.2	0.9*	1.6*	1.1*	0.8	-0.9

Note: * means the multiplier is statistically significant at 16% and 84% quartiles
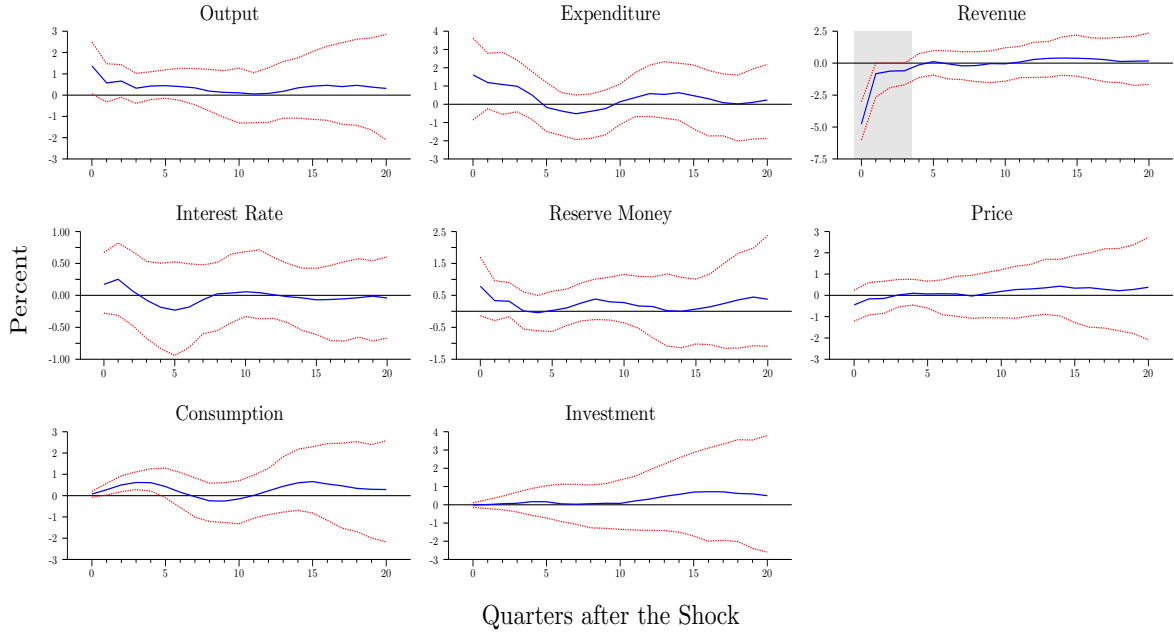
FIGURE 4-1: DYNAMIC RESPONSES TO A GOVERNMENT REVENUE SHOCK FOR KENYA

Notes: The solid lines (blue) are impulse responses due to a one standard deviation shock to the government revenue, and the dotted lines (red) are one standard deviation error bands. The shaded (gray) area indicates that the impulse has been restricted for 4 quarters after the shock, including the quarter of the impact.
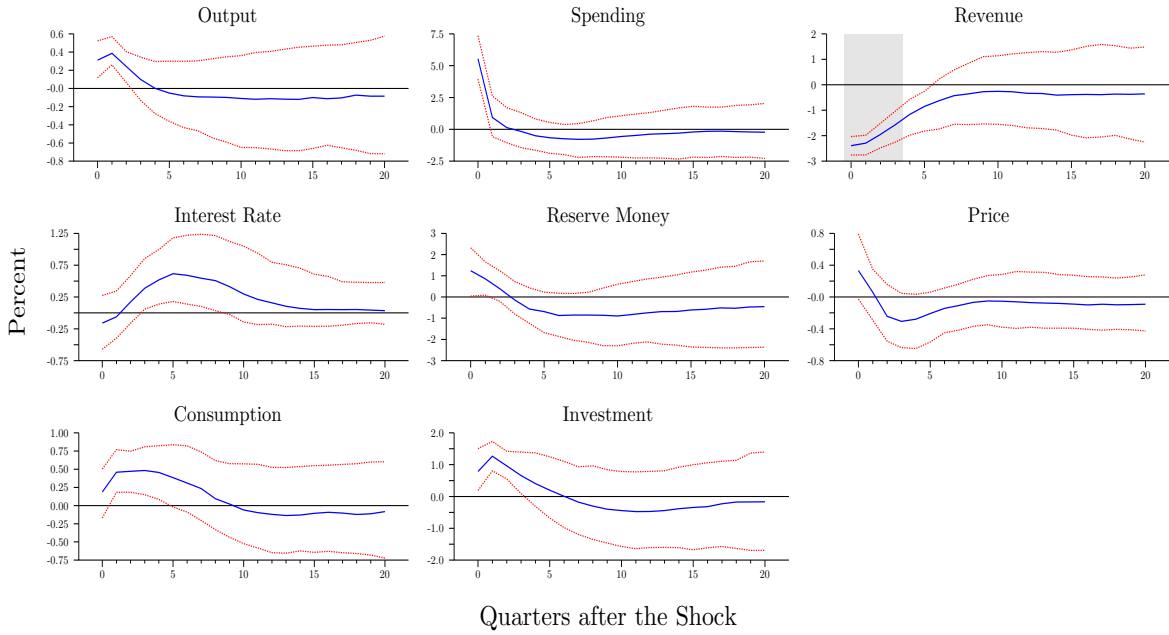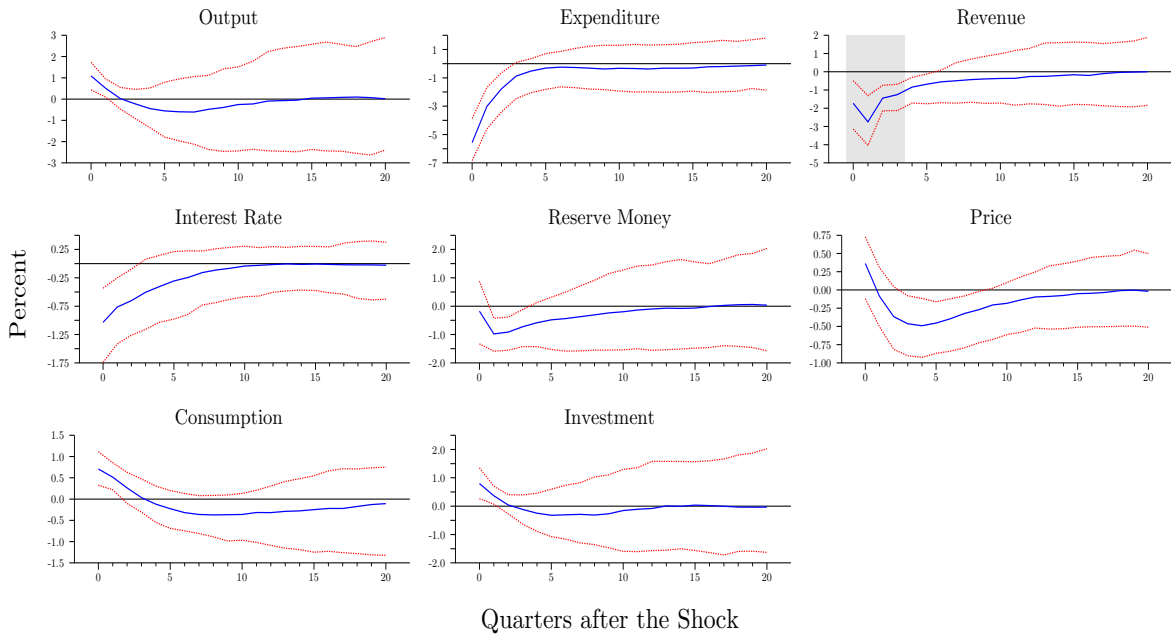

FIGURE 4-2: DYNAMIC RESPONSES TO A GOVERNMENT REVENUE SHOCK FOR TANZANIA

Notes: The solid lines (blue) are impulse responses due to a one standard deviation shock to the government revenue, and the dotted lines (red) are one standard deviation error bands. The shaded (gray) area indicates that the impulse has been restricted for 4 quarters after the shock, including the quarter of the impact.

FIGURE 4-3: DYNAMIC RESPONSES TO A GOVERNMENT REVENUE SHOCK FOR UGANDA

Notes: The solid lines are impulse responses due to a one standard deviation shock to the government revenue, and the dotted lines are one standard deviation error bands. The shaded area indicates that the impulse has been restricted for 4 quarters after the shock, including the quarter of the impact.
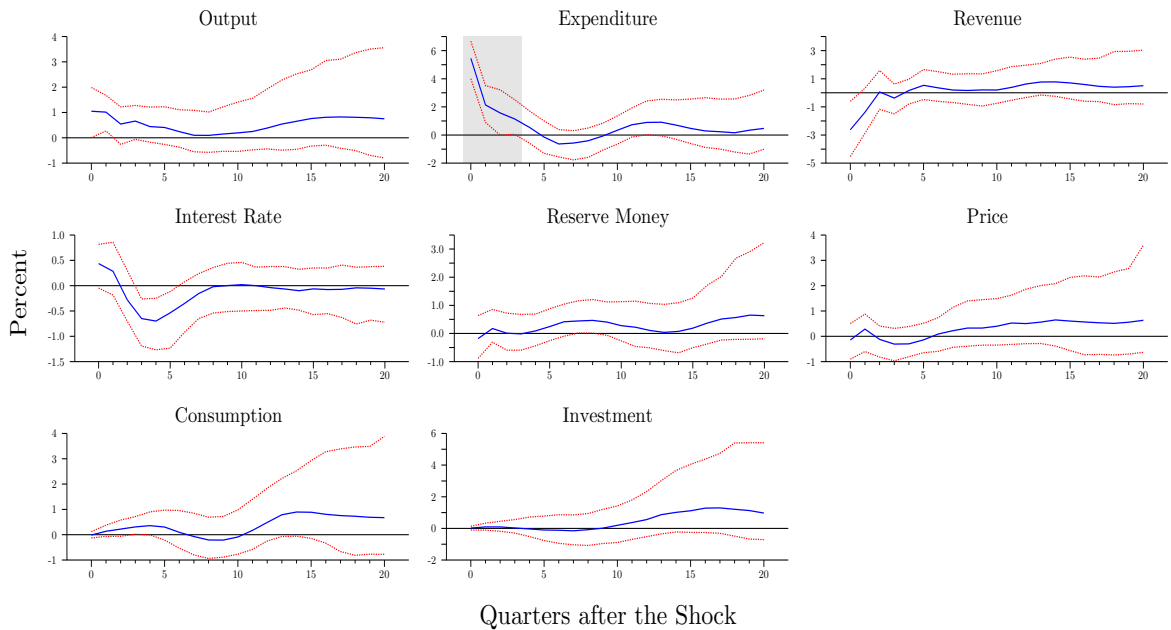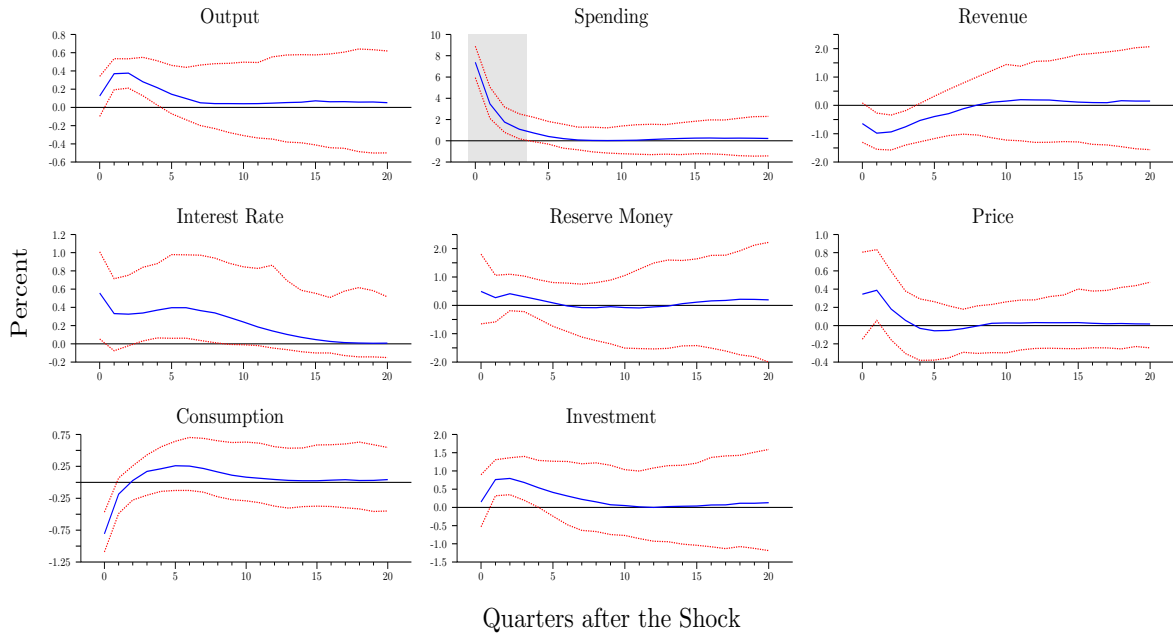

FIGURE 4-4: DYNAMIC RESPONSES TO A GOVERNMENT SPENDING SHOCK FOR KENYA

Notes: The solid lines (blue) are impulse responses due to a one standard deviation shock to the government spending, and the dotted lines (red) are one standard deviation error bands. The shaded (gray) area indicates that the impulse has been restricted for 4 quarters after the shock, including the quarter of the impact.
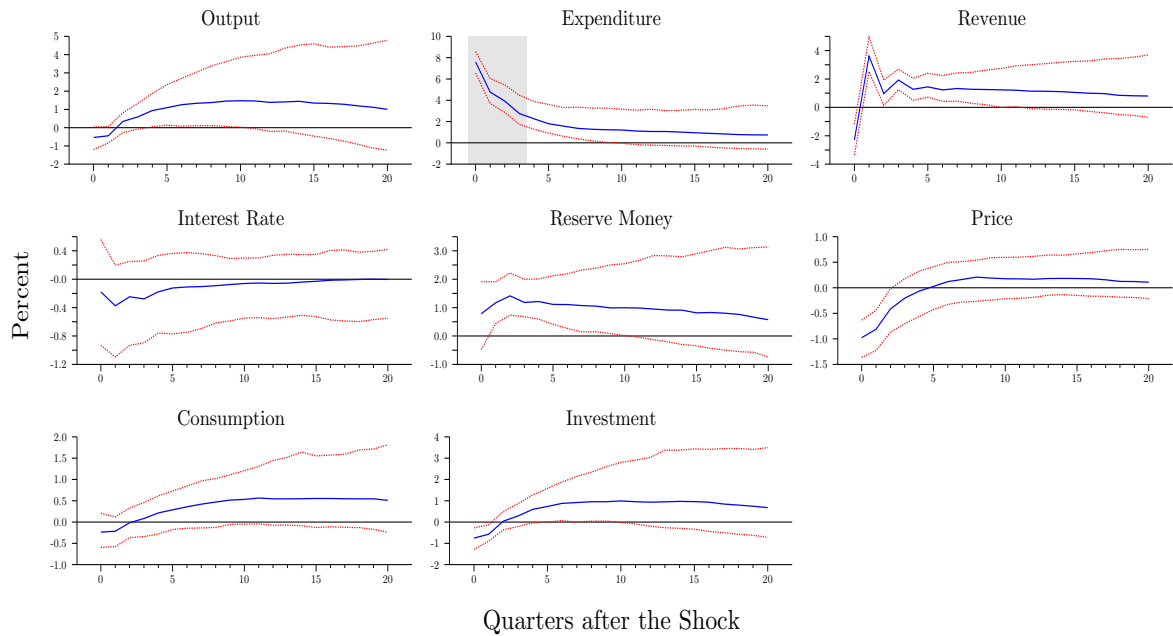
FIGURE 4-5: DYNAMIC RESPONSES TO A GOVERNMENT SPENDING SHOCK FOR TANZANIA

Notes: The solid lines (blue) are impulse responses due to a one standard deviation shock to the government spending, and the dotted lines (red) are one standard deviation error bands. The shaded (gray) area indicates that the impulse has been restricted for 4 quarters after the shock, including the quarter of the impact.

FIGURE 4-6: DYNAMIC RESPONSES TO A GOVERNMENT SPENDING SHOCK FOR UGANDA

Notes: The solid lines (blue) are impulse responses due to a one standard deviation shock to the government spending, and the dotted lines (red) are one standard deviation error bands. The shaded (gray) area indicates that the impulse has been restricted for 4 quarters after the shock, including the quarter of the impact.
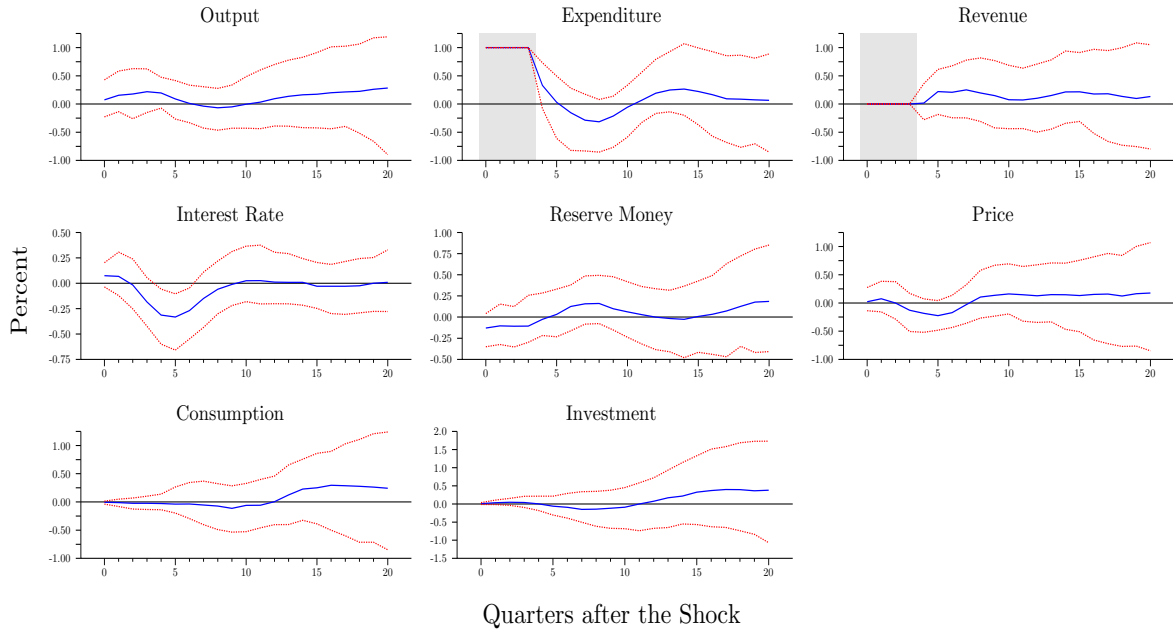
FIGURE 4-7: DYNAMIC RESPONSES TO A DEFICIT SPENDING SHOCK FOR KENYA

The deficit spending policy scenario refers to a setup in which government spending increases by 1% for four quarters after the initial shock while government revenue remained unchanged.
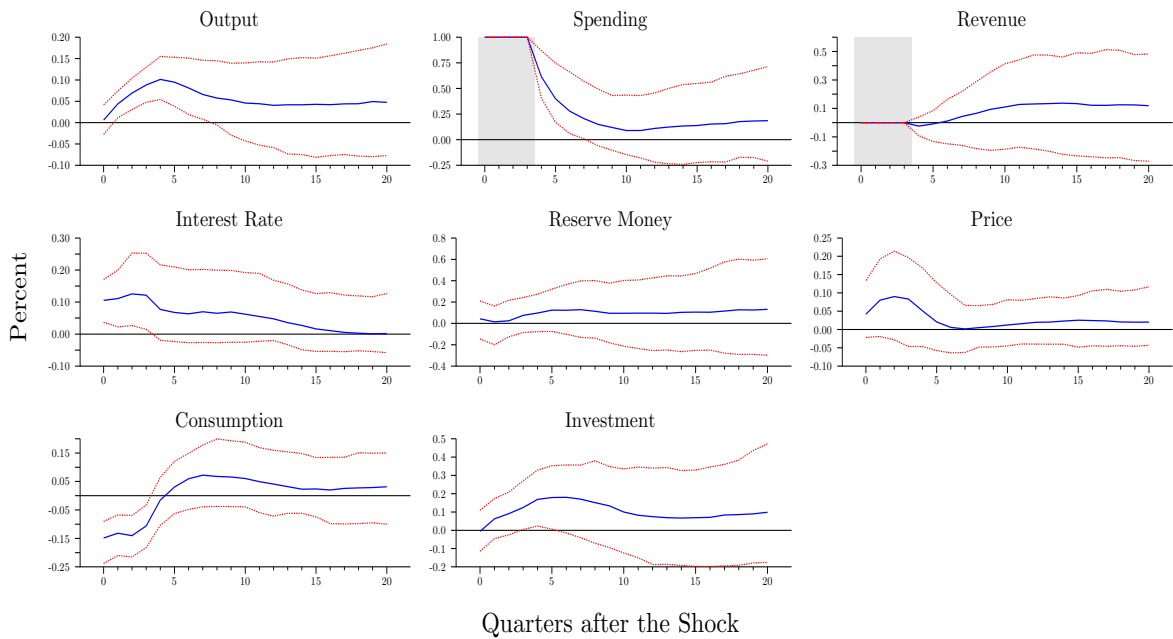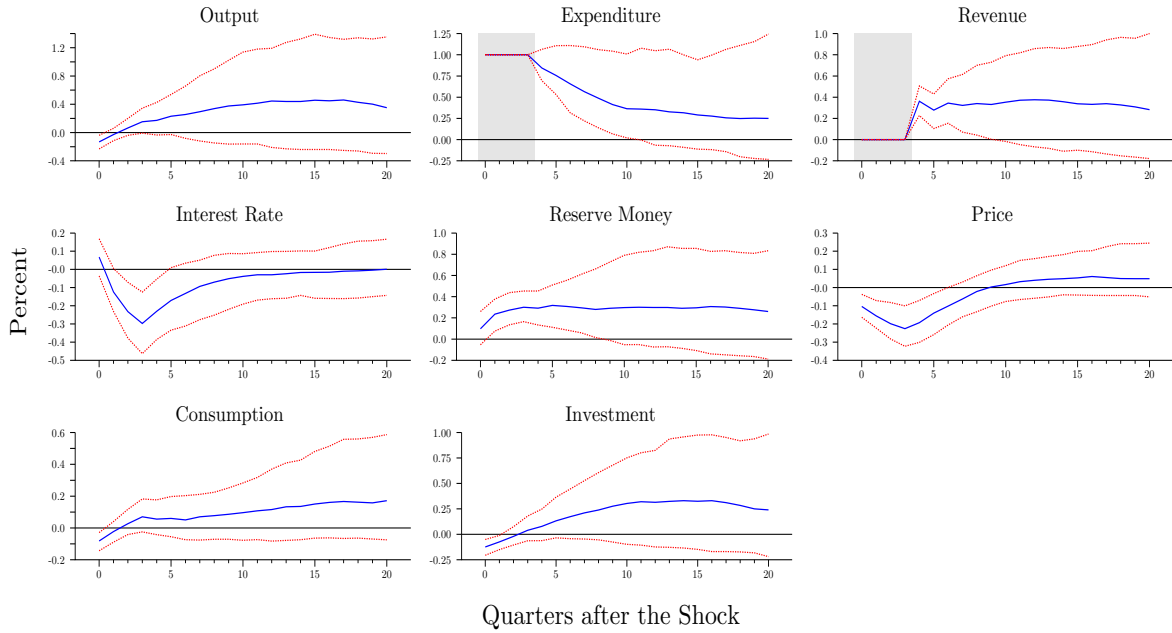

FIGURE 4-8: DYNAMIC RESPONSES TO A DEFICIT SPENDING SHOCK FOR TANZANIA

The deficit spending policy scenario refers to a setup in which government spending increases by 1% for four quarters after the initial shock while government revenue remained unchanged.

FIGURE 4-9: DYNAMIC RESPONSES TO A DEFICIT SPENDING SHOCK FOR UGANDA

The deficit spending policy scenario refers to a setup in which government spending increases by 1% for four quarters after the initial shock while government revenue remained unchanged.
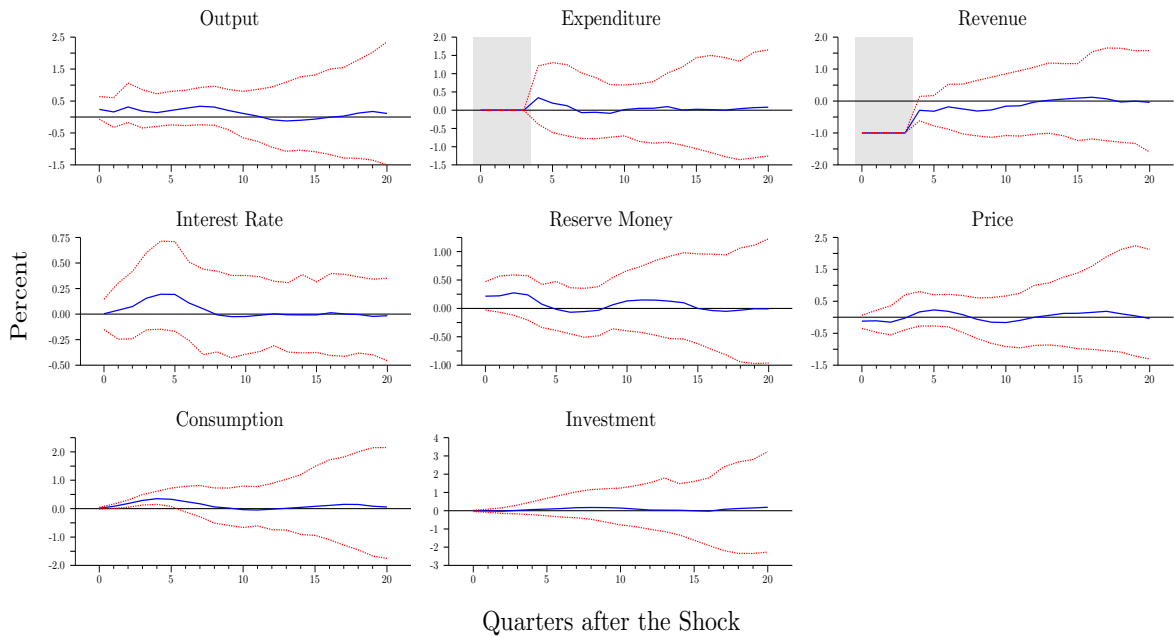

FIGURE 4-10: DYNAMIC RESPONSES TO A DEFICIT TAX CUT SHOCK FOR KENYA

The deficit-financed tax cut scenario refers to a setup in which government spending remained unchanged while government revenue is reduced by 1% for four quarters after the initial shock.
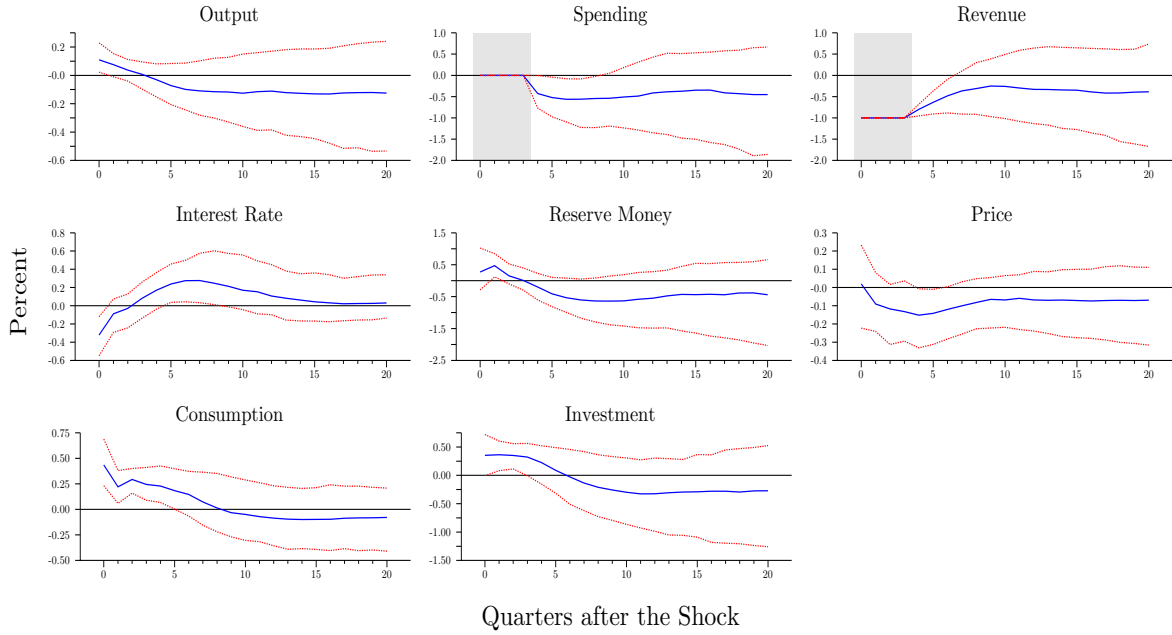
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FIGURE 4-11: DYNAMIC RESPONSES TO A DEFICIT TAX CUT SHOCK FOR TANZANIA

The deficit-financed tax cut scenario refers to a setup in which government spending remained unchanged while government revenue is reduced by 1% for four quarters after the initial shock.
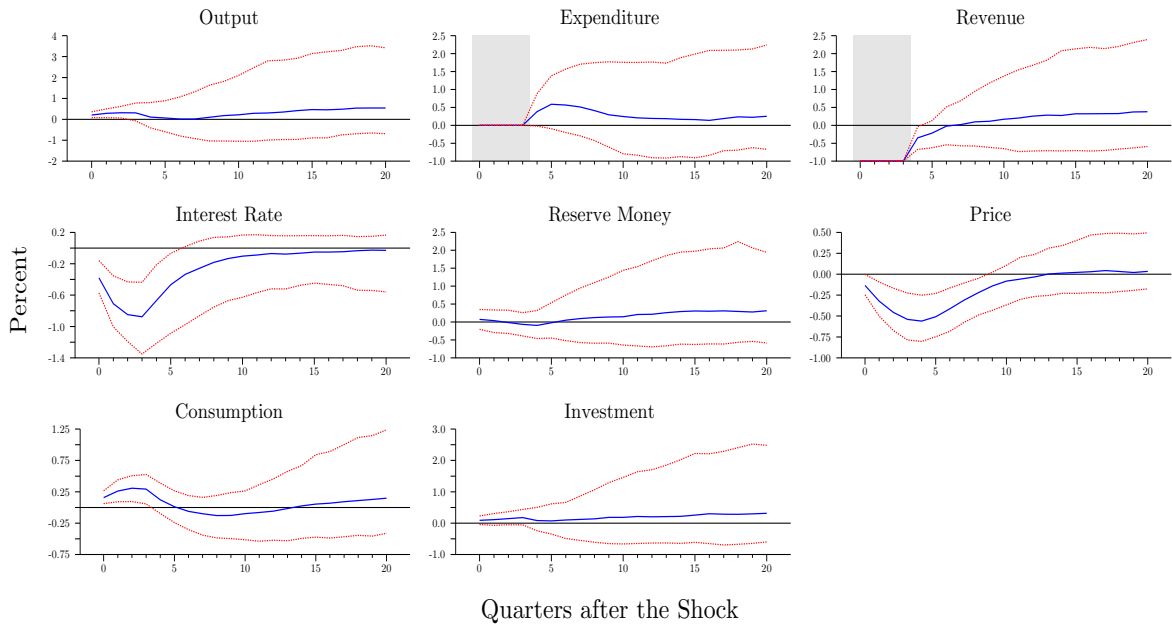

FIGURE 4-12: DYNAMIC RESPONSES TO A DEFICIT TAX CUT SHOCK FOR UGANDA

The deficit-financed tax cut scenario refers to a setup in which government spending remained unchanged while government revenue is reduced by 1% for four quarters after the initial shock.
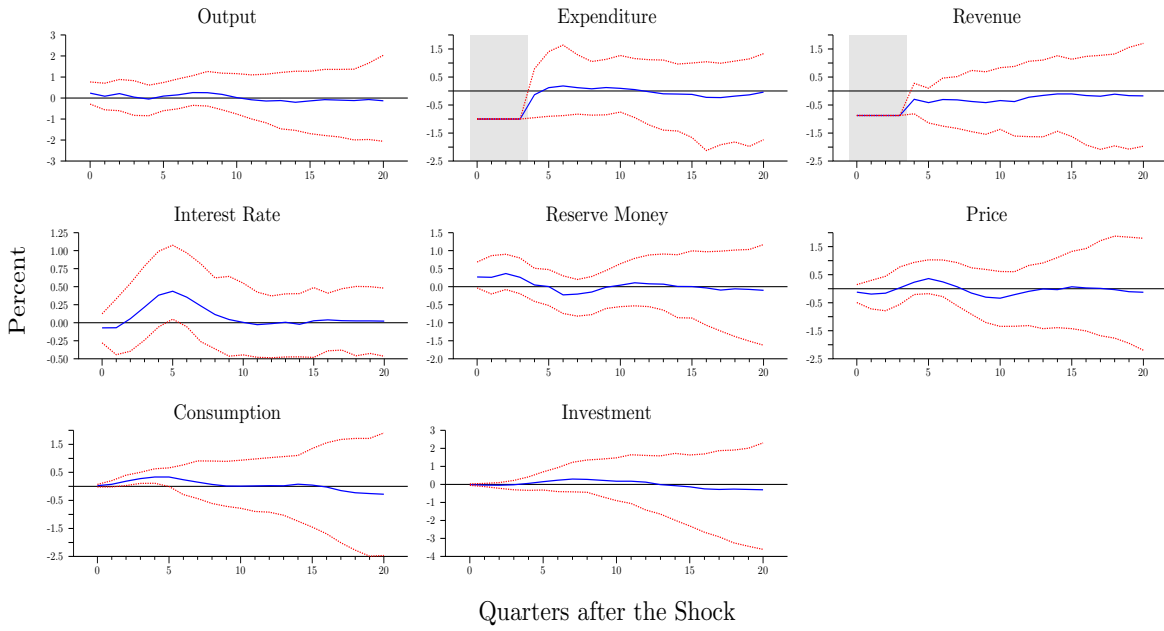
Output   Expenditure   Revenue

Interest Rate   Reserve Money   Price

Consumption   Investment

Quarters after the Shock

FIGURE 4-13: DYNAMIC RESPONSES TO A BALANCED BUDGET SHOCK FOR KENYA

Output   Spending   Revenue

Interest Rate   Reserve Money   Price

Consumption   Investment
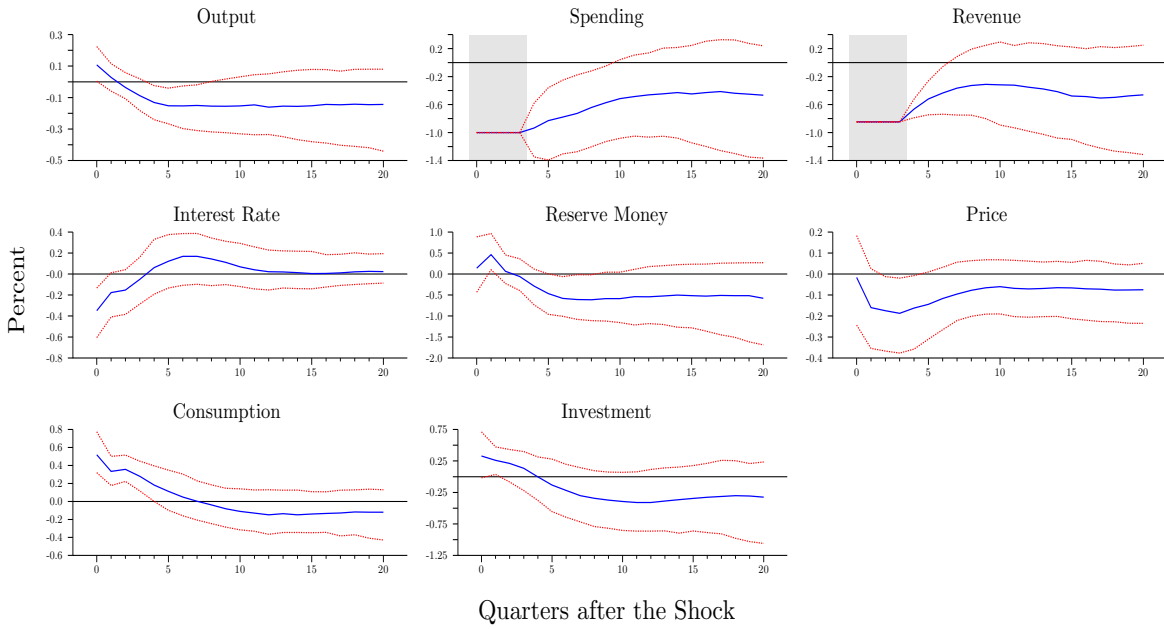
Quarters after the Shock

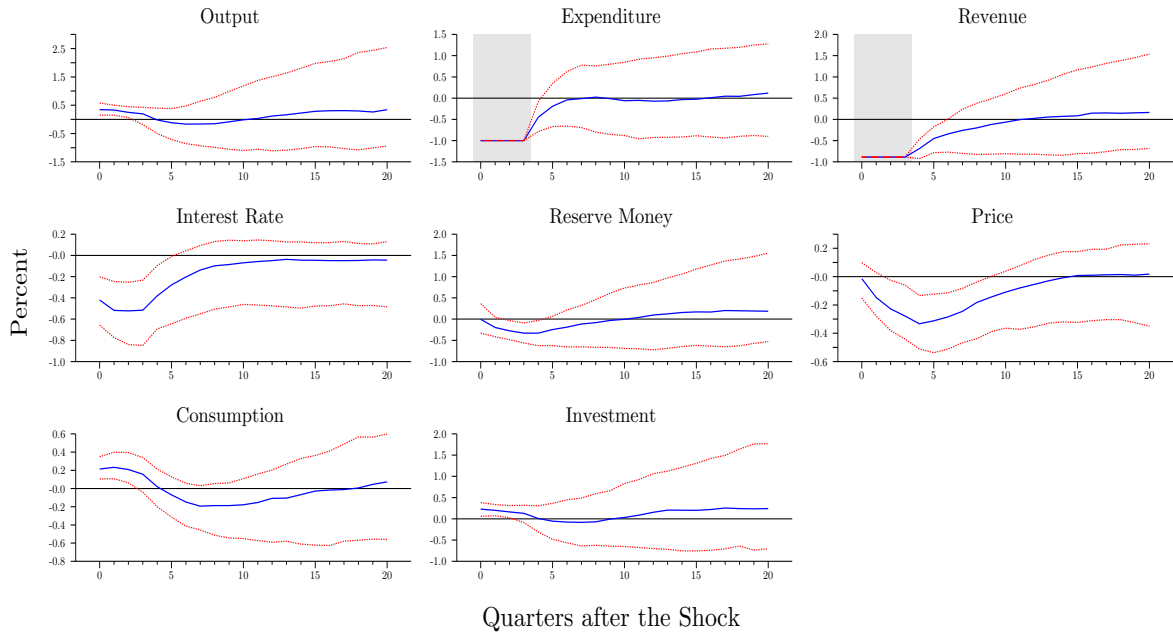FIGURE 4-14: DYNAMIC RESPONSES TO A BALANCED BUDGET SHOCK FOR TANZANIA

FIGURE 4-15: DYNAMIC RESPONSES TO A BALANCED BUDGET SHOCK FOR UGANDA

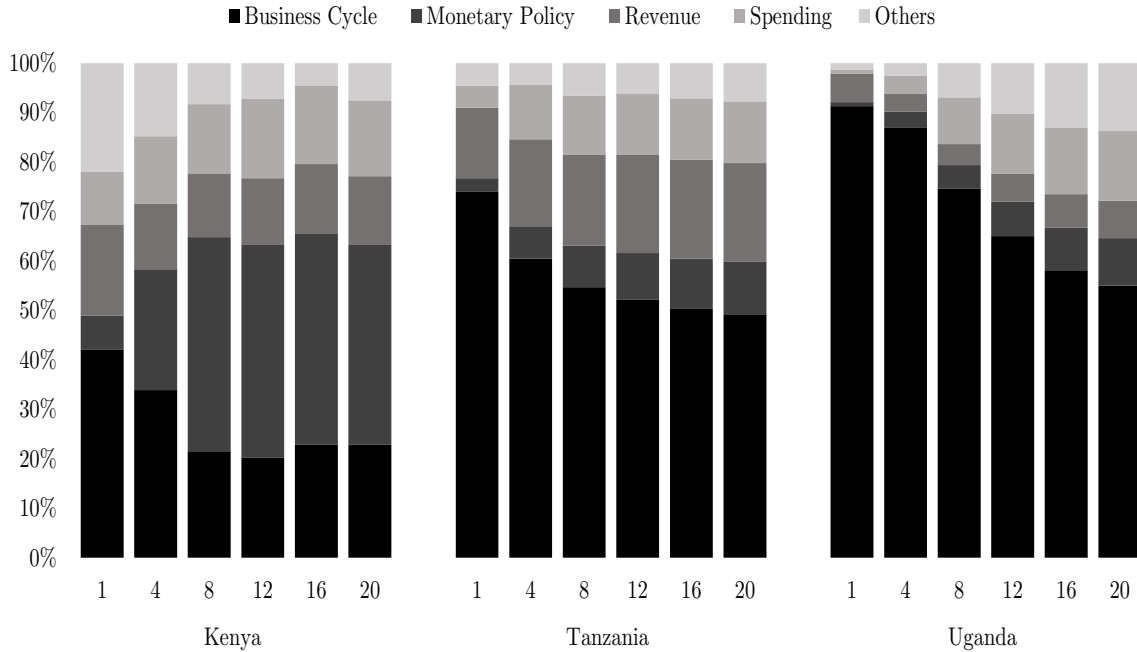FIGURE 4-16: DECOMPOSITION OF VARIANCE FOR OUTPUT

Notes: Four shocks have been identified from a VAR fitted with eight endogenous variables. The variance decomposition is presented for $k = 1, 4, 8, 12, 16, 20$. This figure shows that these shocks account for about 90% of the variation in GDP over a shorter horizons. Decomposition of other variables are not presented but are available upon request.

Appendices

4.A Responses to the Business Cycle Shock

FIGURE 4-A1: DYNAMIC RESPONSES TO A BUSINESS CYCLE SHOCK FOR KENYA

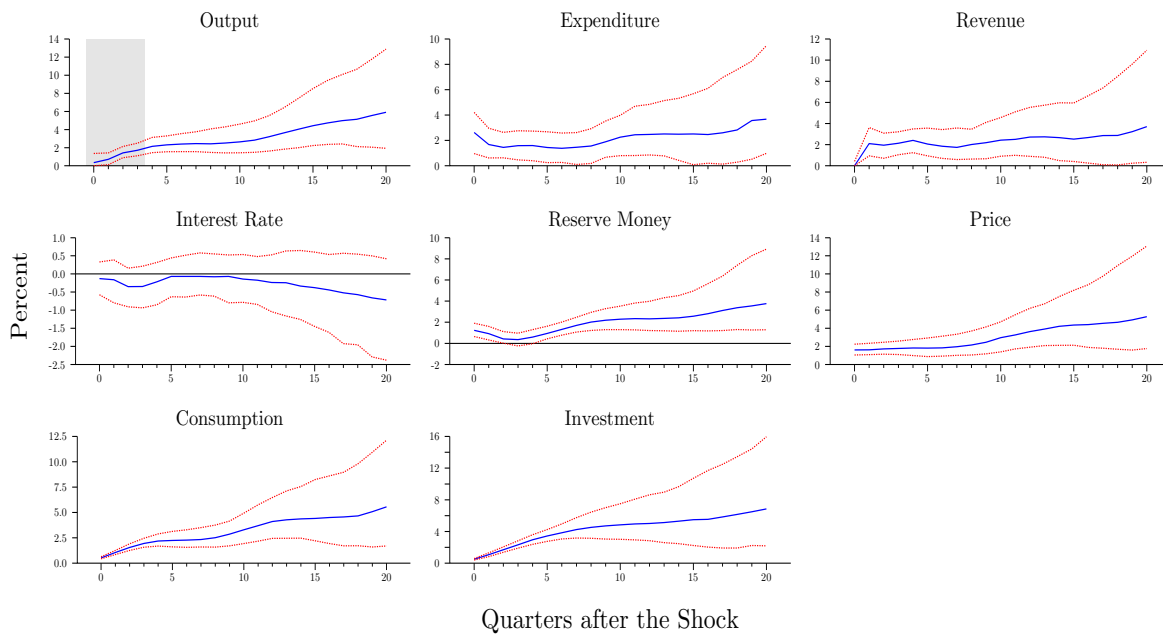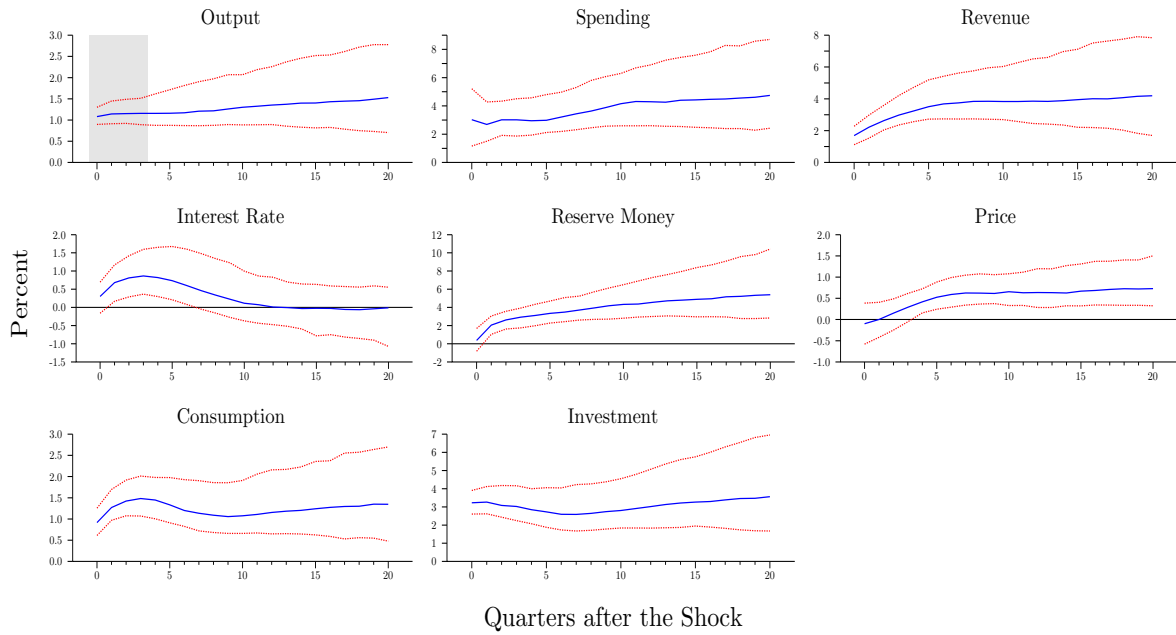FIGURE 4-A2: DYNAMIC RESPONSES TO A BUSINESS CYCLE SHOCK FOR TANZANIA
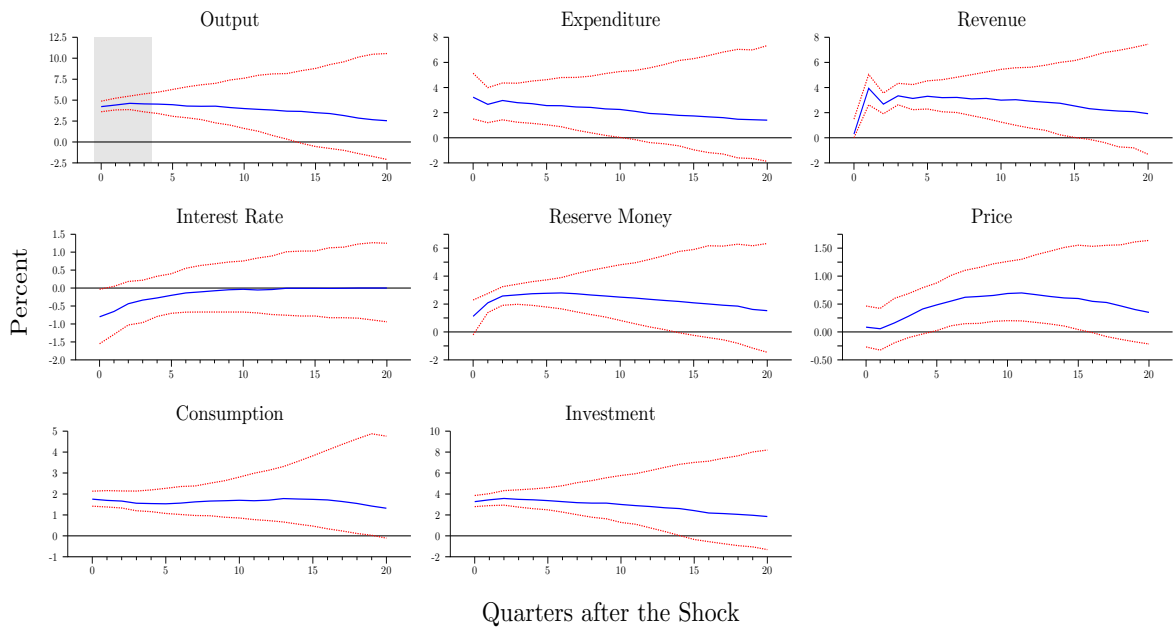

FIGURE 4-A3: DYNAMIC RESPONSES TO A BUSINESS CYCLE SHOCK FOR UGANDA

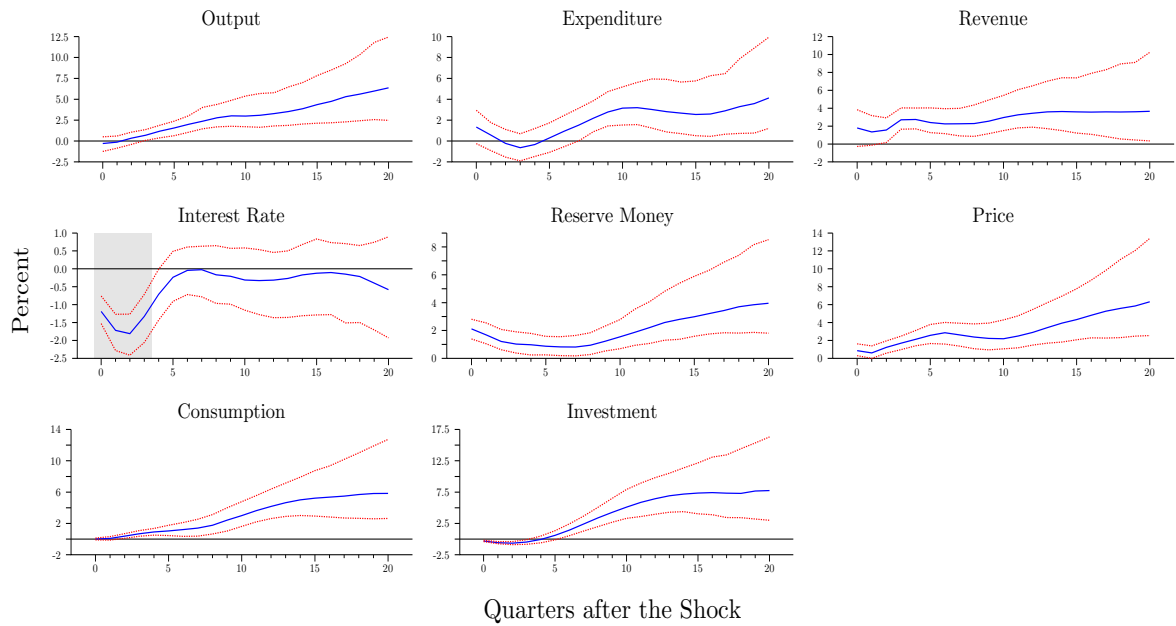# 4.B Responses to the Monetary Policy Shock

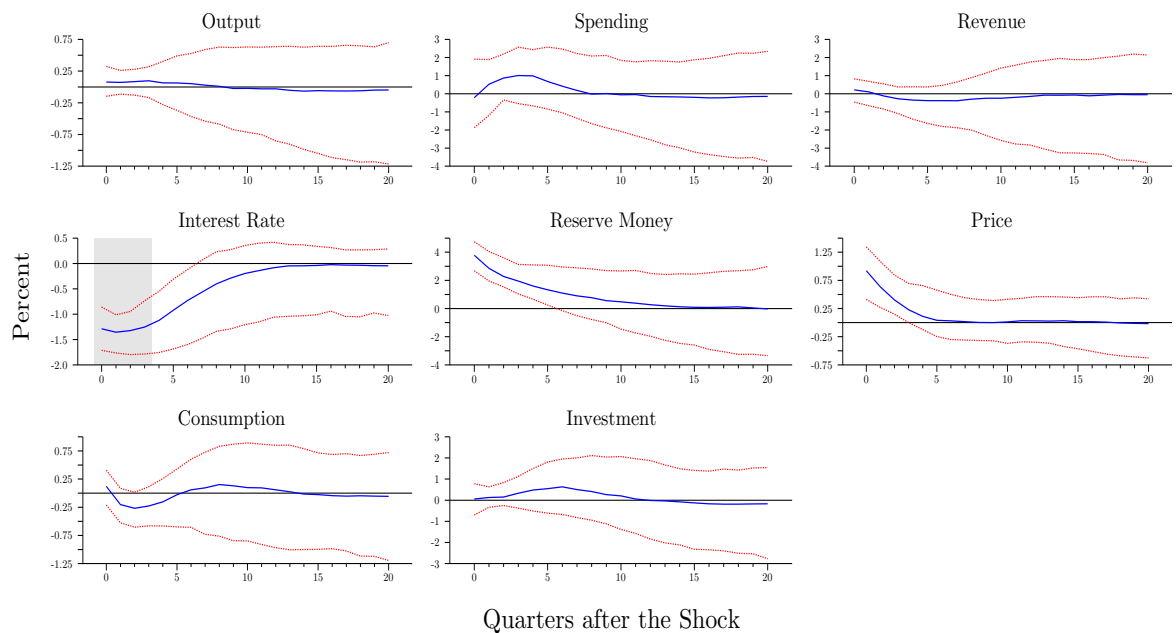FIGURE 4-A4: DYNAMIC RESPONSES TO A MONETARY POLICY SHOCK FOR KENYA

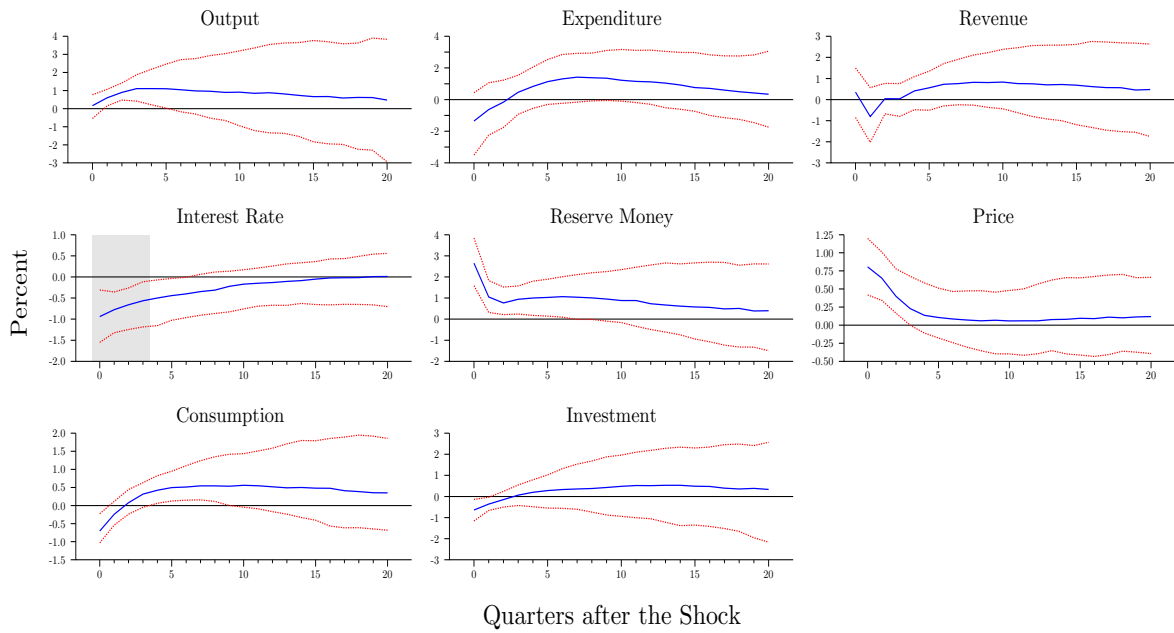FIGURE 4-A5: DYNAMIC RESPONSES TO A MONETARY POLICY SHOCK FOR TANZANIA

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FIGURE 4-A6: DYNAMIC RESPONSES TO A MONETARY POLICY SHOCK FOR UGANDA

CHAPTER 5

Conclusions

This dissertation has examined the effects of monetary and fiscal policies for small, open economies of Kenya, Tanzania and Uganda, which are members of the East African Community (EAC). Pursuance of this task involved the use of Bayesian Structural VAR with Sign Restrictions proposed by Uhlig (2005) and extended by Mountford & Uhlig (2009) for identification of multiple shocks. This study is perhaps the first to apply this empirical strategy to study fiscal and monetary issues in East Africa and is thus expected to offer new insights to the existing literature. The analytical chapters of this dissertation used quarterly data for a period spanning 2000:Q1–2013:Q4.

Chapter 2 presents the recent monetary and fiscal developments as well as literature reviews. On average, Kenya, Tanzania and Uganda have made dramatic progress in some of the indicators of both fiscal and monetary policy. For example, due to debt relief initiatives and prudent fiscal policies, Tanzania and Uganda have been able to widen their fiscal space by reducing debt to GDP ratios. As a narrow measure of fiscal space, they debt to GDP ratio is less than 40 percent. Similar progress has been recorded on revenue collection where both Kenya and Tanzania have achieved tremendous progress between 2000 and 2014 in which the share of revenue to GDP has increased by 6% and 10%, respectively. With regard to the dynamism of the private sector, each country record a significant increase in credit to the private sector with Kenya leading the league. Since 2000, the economic size, as measured by GDP, has more than quadrupled in each country with Kenya having twice the size of Uganda and about one and half size of Tanzania. This achievement of macroeconomic developments made these countries to be listed as successful stories among the peer countries in Sub-Saharan Africa.

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The macroeconomic outlook of these countries is likely to improve further as efforts are underway to harmonize existing differences in the conduct of different policies, fiscal and monetary policies in particular. For example, in order to qualify for membership in the envisaged monetary union, EAC members have agreed to have a scorecard that involves both fiscal and monetary convergence criteria. As an achievement of the harmonization process, Tanzania has recently opened its capital account to the residents of East Africa. There is also plan for Tanzania to gradually liberalize its capital account to the rest of the world. On the monetary front, Kenya and Uganda have already shifted a new monetary policy framework that elevates interest rate as the primary monetary policy instrument. Monetary authorities in Tanzania are in the offing for smooth transition to interest rate regime in the next three or four years from the current regime that uses multiple instruments to archive monetary policy goals[9].

Furthermore, chapter 2 surveys recent literature regarding the effectiveness of fiscal and monetary policy in each of these countries. Of the two, monetary policy has received more attention in literature than fiscal policy probably due to the difficulties associated fiscal studies. Empirical evidence on the effectiveness of monetary policy are tainted by ambiguous findings, which to some extent depends on the methodology applied. Most of the studies applying standard VAR find that transmission mechanisms of monetary policy is weak while few studies using narrative approach or bank-level data tend to confirm the effectiveness of monetary policy, especially the bank-lending channel. Mishra & Montiel (2013) attribute these irreconcilable findings to identification strategies that do not take on board institutional aspects of the respective authorities conducting the policies. Literature on the effects of fiscal policy on output on individual countries in East Africa is lacking. The existing panel studies just

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[9] In 2013, IMF had this advice regarding the conduct of monetary policy in Tanzania "...it would be appropriate for the BoT (Bank of Tanzania) to complement the reserve money targeting framework with a more flexible approach to policymaking that gives a greater role to the policy interest rate. Greater exchange rate flexibility could play a useful role in the event of renewed pressures on the exchange rate".

point to estimate fiscal multiplier a group of countries and thus do not consider intricacies of individual economies that may be critical for the potency of fiscal policy. The existing literature so far shows that Tanzania's fiscal policy is countercyclical while that of Kenya and Uganda is procyclical (Végh, 2013). For the groups in which Kenya, Tanzania and Uganda belong, fiscal multipliers, spending multipliers in particular, are estimated to be between 0.4 and 0.6 (World Bank, 2015; Kraay, 2012; 2014).

Chapter 3 presents the empirical evidence of the effectiveness of monetary policy in Kenya, Tanzania and Uganda. As already explained elsewhere in the text, two instruments of monetary policy are in use and thus we have to identify two monetary policy shocks. Findings of this chapter point to the fact that monetary policy in East Africa is active and this activeness differ according to the policy instrument used to measure the stance of monetary policy. For example, for each country, responses to interest rate shocks are found to be more pronounced than those of reserve money. The findings that exchange rate, credit and interest rate respond significantly to monetary policy shocks suggest that interest rate, credit and exchange rate channels are likely to be active in each of the three countries. Moreover, monetary policy shocks are found to contribute modestly to the variability of output, with contributions of interest rate shock dominating those of reserve money for each country and almost at each horizons. These results offer support to the recent developments by Central Banks of Kenya (CBK) and Uganda (BOU) to shift to interest-based monetary framework. The results are equally informative for the ongoing preparation of the Bank of Tanzania (BOT) to transit to interest-rate based monetary policy. An important takeaway from this chapter is that interest rate may be best instrument for the supranational monetary policy on condition that the ongoing harmonization addresses the challenges of initial impact of this instrument's shock on the response of output in Tanzania.

The last analytical chapter, chapter 4, studies the effects of fiscal policy on the output of East African Economies. Findings of this chapter show that positive revenue shock significantly boosts output in both Tanzania and Uganda but not Kenya while positive spending shock have positive impact on output for both Kenya and Tanzania but it clouds out investment in Uganda and thus depresses output. With regard to the responses to different fiscal policy scenario, deficit spending seems to work better for Tanzania and marginally for Kenya though not at a significant level. Deficit tax cut is marginally significant on impact but significantly boost consumption and investment for Tanzania. Balanced budget is one of the fiscal rules countries may adopt to enforce fiscal discipline in reining in government spending. However, our results show that this rule works for Uganda only where decrease of both revenue and government spending boosts output and its expenditure components, i.e. private consumption and investment. The contribution of fiscal shocks to output variability differs among countries. Our findings unveil that contribution of revenue shock to output gyrations tend to dominate in Tanzania while the contribution of spending shock dominates in Uganda.

In summary, this dissertation unveils that monetary policy in East Africa is active and, in the offing to the launch of the East African Monetary Union, member countries can elevate interest rate as the principal instrument of monetary policy. As subscription to a common monetary arrangement entails a loss of monetary policy autonomy, monetary policy ceases to counteract country-specific shocks as the supranational policy only cares for the regional shocks. In the event of this, labor and capital market adjustments can help to the lessen the adverse impacts of the idiosyncratic shocks. Given that country-specific shocks are prevalent and customs union and common market phases of the East African community are far from complete, fiscal policy is elevated as one of the plausible lever member countries can use to counteract their idiosyncratic shocks as the findings show that a proper mix of fiscal instruments can be countercyclical. Finally, the results presented and discussed in this dissertation can

be used as a benchmark for further theoretical and empirical analysis of the transmission mechanisms of monetary policy and cyclical behaviour of fiscal policies in East Africa. As the new data flow in the run up to the launch of the East African Monetary Union (EAMU), monitoring how these results change is imperative because the observed differences may rapidly disappear and thus attenuate the adverse effects that could have resulted from the loss of policy autonomy.

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