

**EFFECTS OF FISCAL POLICY ON CONDUCT AND TRANSMISSION MECHANISM
OF MONETARY POLICY IN RWANDA**

**A study commissioned by Common Market for Eastern and Southern Africa
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ABSTRACT

The study analyses both direct and indirect effect of fiscal policy on conduct of monetary policy and monetary transmission channels in Rwanda covering the period from 2000Q1 to 2015Q2. To achieve this objective, the study employed three Structural Vector Autoregressive (SVAR) Models to find out if really the fiscal policy affects monetary policy, if does by how much and how long does the effect take to die out.

The observed results show that a shock in fiscal deficit is positively interlinked with inflation through direct channel supporting the proposition that fiscal deficit influences the conduct and transmission of monetary policy in Rwanda as in other countries with similar economic features. The evidence of relationship between fiscal policy and monetary variables pushed the both policy authorities to adopt a close cooperation in coordination of their actions. This close coordination is evidenced by moderate inflation maintained at single digit for a period near to two decades. For some hikes of inflationary pressures existed in previous periods under review, have been mainly resulted from other important factors such as external supply shocks. The deposit rate, the lending rate as well as the exchange rate were less responsive to fiscal deficit and to its financing components.

This has been due to good record of prudent and coherent macroeconomic management that maintained exchange rate relatively stable. Thirdly, the less responsiveness of lending rate to deficit financing of fiscal deficit compared to deposit rate made the interest rate spread to slowdown. This is also featured by co-movement between T-bills rate and deposit rate. The study therefore recommends the policy authorities to continue the strengthening policy coordination as an appropriate tool for controlling external shocks and stability of the economy.

Key Words: Fiscal Policy, Monetary policy, Coordination, SVAR and Rwanda

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INTRODUCTION

Fiscal and monetary policies are tools policymakers use either independently or in combination to direct changes in national economy. Although both authorities are independently responsible for their respective areas of policy, they work within a framework which takes into consideration the actions of the other. Generally, several economic scholars in their theoretical and empirical studies relate these policies as they operate interdependently to ensure stability of the economy. However, several results of these studies further sum up that the degree of effectiveness vary depending on the country's economic priorities.

In fact, the relative effectiveness of fiscal and monetary policies in stabilizing demand pressures requires a coordinated effort of both policies to deal with huge fiscal deficits and high inflationary pressures. Mohammad et al., (2010) says in his study that these policies are dependent to each other and pursuing only one policy without considering the other may not produce the desired results. This implies that lack of good policy coordination in the management of the economy may cause economic distortions even when policies seem strategically oriented to achieving their respective objectives.

Nordhaus (1994) under certain assumptions, countries may suffer huge budget deficits and higher real interest rates than expected when fiscal and monetary authorities operate independently. This may happen especially when fiscal authorities are reluctant towards reducing spending decisions. As result, financing of such deficits tend to deviate inflation developments away from their policy targets. In another study by Shabbir and Ahmed (1994) postulate that fiscal deficits directly affect inflation through viable transmission channel of price expectations.

Likewise, in poorly coordinated macroeconomic environment, monetary policy has remained passive to fiscal policy. In this regard, fiscal policy directly affects monetary policy through substantial increases in indirect tax rates, which have direct impact on inflation. The fiscal measures also indirectly affect the aggregate demand via their impact on monetary variables such as interest rates, interest rate spreads and exchange rate. Albeit the fiscal expansion is not monetized, the persistence of higher deficits may instigate the increase in net credit demands, driving up interest rates and crowding out private sector investment.

In view of the above, Sargent and Wallace (1981) establish that high inflation and inflation expectations result when fiscal authorities set their expansionary spending objectives that ultimately need to be monetized independently of public sector liabilities. In an amended version of their model, they note that where fiscal policy is unsustainable, monetary authority loses its ability to control inflation.

Calvo and Vegh (1999) postulate that the coordination of policies may not arise in developing economies where monetary policy is subservient to the fiscal policy. However, the study by Arby and Hanif (2010) contends that regardless of the dependence or independence of the two policies, the institutional framework may enforce the interaction. Under these arrangements, several institutional reforms including the reforms for reinforcing the central banks independence have been executed in many developing countries.

Under this context, in Rwanda, the law no 55/2007 of 30/11/2007 governing the National Bank of Rwanda sanctions the Central Bank as a national institution with legal personality and independence in operational, administrative and financial areas. The Bank preserves this autonomy in pursuit of macroeconomic missions. However, fiscal discipline is required for achieving the objectives of the monetary and exchange rate policy. Unsound fiscal policy usually creates expectations leading to political pressures on the Bank to either accommodate higher inflation or lower interest rate in order to lessen the debt of the Government sector.

In this regard, in its mandate to support the Government's macroeconomic policies, the central bank adopted a collaborative strategy with the government to provide a clear pathway for pursuing a consistent policy mix. Thus, the BNR is liaised with the Ministry of Finance and Economic Planning (MINECOFIN) through Treasury Management Committee (TMC) and Debt Management Committee (DMC). The TMC serves as an analytical platform for refining policy implementation and forecasts. This framework has quite significantly improved the basic nature of the interaction between monetary and fiscal authorities.

In view of this, the Rwanda's fiscal and monetary policy coordination focus on different areas including the area of supply shocks, treasury management and investments in treasury bills. The central bank also participates in the issuing and distribution of treasury securities, transactions

relating to public debt servicing, negotiation of securities, as well as the issue of advance to government at most 11% of the state current revenue collected during the previous financial year.

Nevertheless, the central government continues to incur large fiscal deficits, which are agreed to have implications for the demand management by the Central Bank. In this stance, the little work is known on likely effects of fiscal policy on conduct of monetary policy transmission since no specific empirical study has been done on Rwanda. In this framework, the purpose of this study arises to investigate whether there are existing channels through which fiscal policy may be affecting the conduct of monetary policy transmission in Rwanda between periods 2000Q1 – 2015Q1.

Subsequently, the rest of the paper is organized as follows: Section II briefly discusses the key features of the operational framework for fiscal policy, monetary policy and interaction between fiscal and monetary policy. Section III presents a brief review of the theoretical and empirical literature on different channels through which fiscal policy can affect monetary policy. Section IV lays out the trends in Rwanda's fiscal performance, legal and institutional developments as well as challenges of the existing fiscal regime. In Section V presents model specification, data source and type. Section VI discusses the empirical results. While the final section sums up the concluding remarks and policy recommendations.

II KEY OPERATIONAL FEATURES OF MONETARY AND FISCAL FRAMEWORKS

II.1 Fiscal Policy Framework

Fiscal policy refers to the use of government spending and taxes to influence the pattern of the economic activities. Usually the government affects the economy through changes in the levels of spending and revenue collection to influence the level and growth of aggregate demand, output and employment. Alesina and Tabellini (1990) provide that fiscal policy is repeatedly subjective towards attaining higher growth and employment even at the cost of the high inflation. Anyanwu (1993) and Sheffrin (2003) add on that the ultimate objective of fiscal policy is to promote economic conditions conducive to business growth while ensuring that the government actions are consistently used to stabilize the economy over the course of the business cycle.

In this regard, the policy makers intervene through policy activist, discretionary and counter cyclical policy in an effort to achieve the objective of macroeconomic stability and growth. In times of low economic activity, the government carries out fiscal stimulus to boost economic growth. However, the large budget deficit will generate higher demand for government credit.

For Rwanda during post genocide of 1994 against Tutsi, a broad long-term strategy was put in place under “Vision 2020” umbrella with objectives to transform economy from a low income and agro-based economy into a middle-income service based economy by the year 2020. Under this framework, the Government is committed to achieving a rapid growth while maintaining macro-economic stability. With these two important objectives, the management of the fiscal revenues and expenditures are streamlined in line with the government medium term macroeconomic framework. Therefore, these are set under fiscal consolidation strategy (FCS) program aimed to increase revenue mobilization, expenditure prioritization with a view to reduce dependence on foreign aid.

In view of this, countries have self-imposed legal measures that suggest strict limits on government spending and public sector borrowing to regulate the overall budget deficit over the period. Such measures admit fiscal policy to operate mutually in harmony with other policy measures in order to smoothen out business cycles leading to economic growth and stability. In the current economic context, fiscal governance has been a key instrument in supporting fiscal consolidation and economic recovery. This is useful to curtailing high deficit and increasing debt, reducing cyclicity of fiscal policymaking, improving the efficiency of public spending as well as spurring enhanced coordination among government decision makers.

Through this fiscal framework, transparency about the government short-term and long-term fiscal intentions has been important to promoting sound fiscal policies and providing good signal for monetary policy and other economic players to set their timely policy responses. The main components of national fiscal frameworks include numerical fiscal rules, medium-term budgetary frameworks (MTBFs), fiscal institutions, as well as budgetary procedures governing the preparation, approval, and execution of budget plans. These are mutually interconnected and functioning of one affects the working of the remaining elements. Generally, a well-designed

fiscal framework is associated with better budgetary outcomes in terms of deficit and debt management.

II.2 Monetary Policy Framework

Several scholars including Blinder (1998) agree that the appropriate objective of monetary policy is the maintenance of low and stable inflation. The emphasis on sustainable price stability is an essential feature of sound monetary policy and has been widely adopted in policy frameworks of several central banks. In order to control inflation expectations and to provide a standard measure against which it can be held accountable, inflation is defined quantitatively as a year-on-year increase in Consumer Price Index (CPI). However, the inflation targets vary across countries depending on status of their economic performance.

The central bank also has secondary mandates of supporting economic growth, promoting the soundness of financial sector as well as protecting the balance of external payments and exchange rate stability. Monetary authorities control the credibility of monetary system by choosing a control variable in response to developments in state variables. Though, this choice may be constrained by the structure of the economy, which defines how state variables grow over time in response to policy actions and exogenous economic drawdowns.

In practice, inflation-targeting central banks use an interest rate as an operational target while reserve money is used for monetary targeting central banks. Under both targeting frameworks, several policy instruments mainly open market operations, discount rate, reserve requirement are used by central banks to monitor movements in control variables. The specific operational tools employed to deliver price stability continue to differ across countries due to significant differences in policy challenges across the national economies.

In addition, whereas there is a consensus on the significance of price stability, the overall approach to potential risks to price stability varies considerably across major central banks. Greenspan (2004) advocates the risk-management approach to monetary policy, stipulating that policy-makers should not consider only the most likely future path of the economy but also the distribution of possible outcomes about that path.

European central bank (ECB) relied on its second monetary pillar to identify medium-term risks to price stability in order to exploit the long-term relationship between money and price developments (Stark, 2011). The Bank of Japan in 2006 introduced a new framework for the conduct of monetary policy comprising two perspectives to examine economic activity and prices. The first perspective examines whether the outlook for economic activity and prices from one to two years ahead follows a path of sustainable growth under price stability. The second perspective identifies potential risks beyond the forecast period in order to address the risk of low-probability.

Additional policy tools have been used for the monetary policy implementation. Apart from injecting liquidity into the financial system to curb excessive monetary contraction, large-scale asset purchases (LSAPs) in many central banks is used as a tool for easing long-term interest rates in order to fuel investment growth. This also serves as a monetary communication device to disclose the intention of the monetary authorities in relation to stance of the monetary policy. In the same way, several other central banks are using Foreword Guidance (FG) to indicate their expected future policy rate path as part of their overall macroeconomic projections. On the other hand, others use policy rate set by monetary policy committee to signal the stance of monetary policy.

Coming to the case of Rwanda, the conduct of monetary policy by the National Bank of Rwanda has undergone profound changes. The period 1964-1990 was characterized by direct monetary controls by BNR, regulating the demand and supply of money, controlling exchange rates and directing credit to priority sectors for the government. The main missions were to maintain monetary stability, implement credit and exchange rate policies conducive to harmonious economic development, issue national currency and play the role of the Government treasury. But in 1981, the role of BNR expanded to the formulation of the monetary policy, the credit and exchange policy to support the implementation of the Government economic policy and ensure the internal and external stability of the national currency.

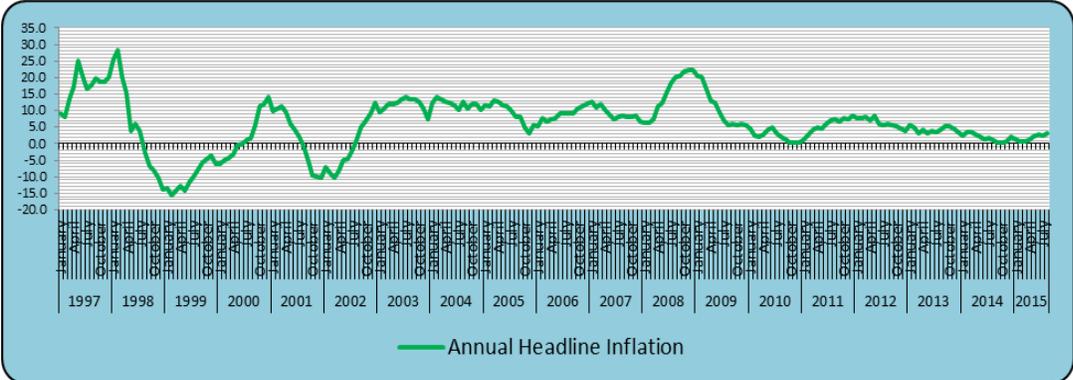
In 1990s, direct monetary policy was perceived to be inefficient, especially in terms of optimal allocation of resources. Following this drawback and its adverse effects on the economy, the

BNR embarked on financial liberalization since 1990 but then became a fully-fledged liberalized financial system in 1995. Therefore, direct measures were progressively replaced by mechanisms that relied more on market forces to regulate the liquidity in the banking sector (indirect instruments) such as open market operations (Repos, reverse repos, key repo rate, treasury bills, lending and deposit facilities to mention), the discount window and the required reserve ratio. The BNR policy rate (Key Repo Rate) was first introduced in 2008.

Those reforms were carried out within a framework of successive economic stabilization programs such as the Structural Adjustment Program (SAP) in 1990, Enhanced Structural Adjustment Facility (ESAF) and Poverty Reduction and Growth Facility (PRGF) in 1998 as well as Policy Support Instrument (PSI) in 2010. These programs have been largely supported by International Monetary Fund (IMF) and World Bank (WB).

Since 1995, BNR is using a monetary targeting regime with broad money as nominal anchor, reserve money as operating target and price stability as ultimate objective. The objective of price stability has been attained as indicated by the single digit inflation in the chart below. This essentially triggered by BNR’s operational independence, effective coordination between fiscal and monetary policies as well as improved transparency and accountability of its monetary policy communication strategy with the public through briefings, press releases, press conferences, publications together with financial awareness campaigns. This effort is aimed to influence economic agent’s expectations and to engage the public support for the long run goal of price stability.

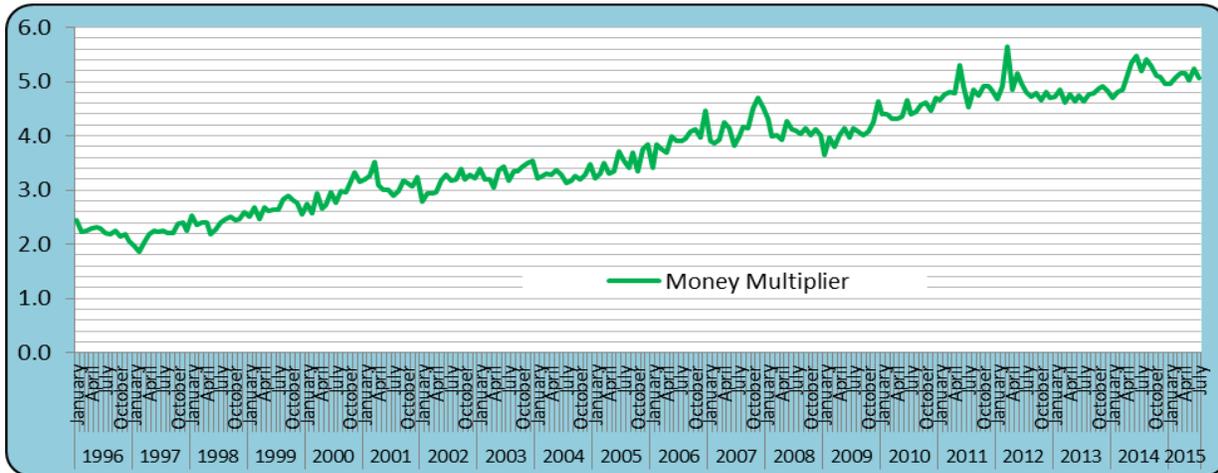
Figure II.1 Inflation developments (YoY % changes)



Source: BNR, Statistics Department

This framework is however challenging following the indication of instability of money demand and money multiplier (in short term), weak monetary transmission mechanism and significant lag in the relationship between money supply and prices depicted by the charts below.

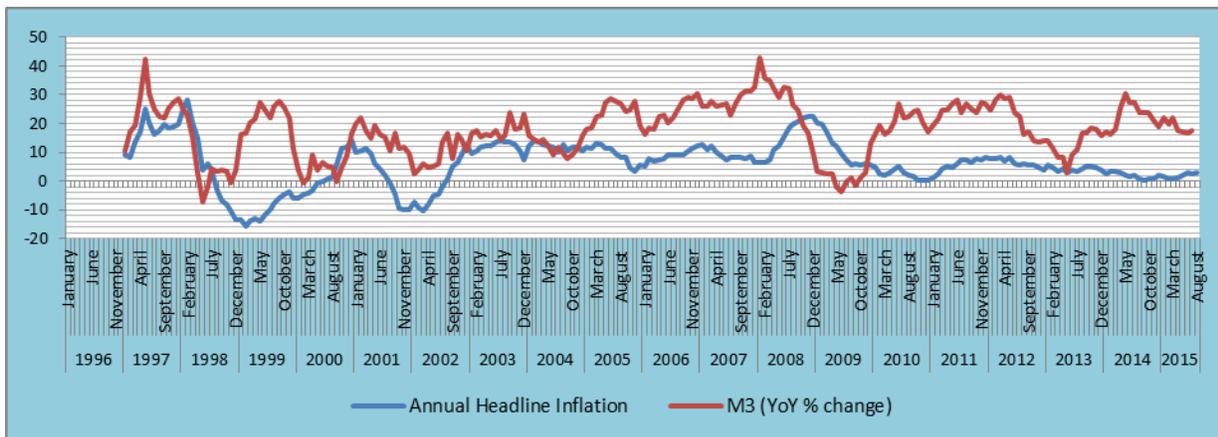
Figure II.2 Money multiplier developments



Source: BNR, Monetary Policy and Research Department

The trend in money multiplier is no longer stable and difficult to predict due to the predominance of currency in circulation as a component of the base money (about 69% on average between Dec.2009 and Dec.2014).

Figure II.3 Link between Money Supply and Inflation (YoY % changes)



Source: BNR, Statistics Department

The monetary targeting regime by the Bank is also constrained by the low development of the financial sector. Therefore, BNR is currently using a flexible monetary policy regime whereby a range of reserve money is targeted. Looking forward, BNR reflects transiting to the inflation-targeting framework to improve its monetary policy implementation.

II.3 Fiscal and Monetary Policy Coordination

Although authorities autonomously implement fiscal and monetary policies, various studies have underscored the importance of coordination between fiscal and monetary authorities if to achieve macroeconomic stability and growth in the economy. For policymakers to attain the desired optimal mix of macroeconomic objectives of growth and price stability there is a need for mutual complementarity of these two policies. In fact, the interaction between monetary and fiscal policies relates that both types of policies have an impact on key macroeconomic variables, which creates the need for interdependency in pursuit of their policy objectives. In practice, a single policy cannot achieve the desired macroeconomic objectives without employing a macroeconomic policy framework in which all policies are steered toward the same objectives.

According to Mishkin (2006), monetary policy cannot successfully control consumer-price inflation save monetary and fiscal authorities agree on some concepts. Among other these include, no long-run trade-off between output and inflation; expectations are critical to monetary policy outcomes; inflation has high costs; monetary policy is subject to the time-inconsistency problem; central bank independence improves the effectiveness of monetary policy; and a strong nominal anchor is the key to producing good monetary policy outcomes.

Several studies have confirmed that discretionary fiscal policy and monetary policy are perfect complements and thus can be used jointly to manage shocks in the economy. In this view, the monetary and fiscal authorities in Rwanda like others in many countries chose this policy coordination to share the burden of maintaining stable growth and low inflation. This requires fiscal and monetary authorities to coordinate whereby each consider the other to avoid macroeconomic inconsistencies.

Blinder (1982) offers that uncoordinated behavior arises when monetary policy decides to tighten in response to loosening in fiscal policy or monetary policy carries out loosening accompanied

by tightening in fiscal policy. He further notes that poor coordination between authorities stems from three folds notably differences in objectives of what is best for society; adherence to different theories about the effects of policy actions on the economy; as well as on divergence in forecasts about the likely state of the economy in absence of policy intervention.

As result, the available evidences from various studies suggest that the lack of coordination may lead to inevitable suboptimal outcomes such as huge budget deficits, high price levels, exchange rate pressures and an adverse impact on economic growth. For instance, the mid-1980s hyperinflation in Brazil resulted when authorities implemented restrictive monetary policy against fiscal policy loosening (Loyo, 2000).

In the case of Europe, Feldstein (2005) argues that the European institutional structure with a centralized monetary policy and decentralized fiscal policies creates a very strong bias towards persistence of fiscal deficits and rising debt burden in the euro area. In his opinion, the reason for this prejudice is that there was no market feedback to discipline large budget deficits run by the euro-area member states.

Following the Rwandan experience, BNR independently conducts monetary policy, but to attain the objective of the price stability found it necessary to combine the effort of key stakeholders involved in actions of economic management to mitigate the impact of supply shocks on inflation. Consequently, for efficient support of the government's general economic policies, BNR adopted a collaborative strategy with the government to provide a clear pathway for pursuing a consistent policy mix. The success of monetary policy has been result of amicable coordination between the two policies achieved under TMC and DMC joint frameworks. The effectiveness of these joint efforts is evidenced by sustainability of price stability as reflected by single digit inflation since 2009 (see figure 1 above). Fiscal discipline has been a key for the government to preserve BNR's independence.

III LITERATURE REVIEW

III.1 Theoretical Literature

The effect of fiscal policy on conduct of monetary policy is a controversial issue among vast number of economic scholars. Several economic writings have shown that there are both direct and indirect channels through which the actions of fiscal policy may affect monetary policy variables. Under this posture, the effectiveness of one policy is realized after imposing its effects on the other. Consequently, this section concentrates on discussion of key channels through which the actions of fiscal policy may impede the proper implementation of monetary policy.

III.1.1 Direct Channel

The theory suggests that as long as consumers are furnished with rational expectations, fiscal policy impose no effect on aggregate demand, as well as on inflation. However, with recent literature, changes in fundamentals of fiscal policy affect aggregate demand and the specification of fiscal policy matters even when the monetary policy rule is explicitly independent (Woodford, 1996).

Subsequently, in a poorly coordinated macroeconomic environment, monetary policy is passive to fiscal policy. Fiscal authority takes the first move and leads by setting the path of primary balance. This directly affects monetary policy through substantial increases in indirect tax rates which impact on prices (Andrea, 1991). These changes influence the aggregate demand through both changes in the government spending and in household disposable income. Here the concern is that the change in demand conditions consecutively leads to a wage-price spiral and price setting behavior and hence influences inflation and inflationary expectations. The monetary policy reacts in response to stabilize the overall demand at the level that maintains inflation at a level below or equal the target range.

The short run increase in fiscal deficit raises aggregate output above its potential output, importantly induced by rising aggregate demand. In this regard, this result into a fall in domestic saving, low investments and subsequently reduces output in the long run. Consequently, the

monetary authorities retaliate countercyclically with tightening of monetary policy in the short run and then accommodative in the long run to counter the long run fall in output.

Although currently is less likely for governments to finance their deficits with direct monetization, large dependence on domestic budget financing through financial markets may cause crowding out effect on private sector investment. This is due to the expensiveness of credit for private sector. Eventually, the economy is negatively affected leaving monetary policy with the task to keep inflationary pressure under control. Therefore, with central bank's reluctance to intervene on the market would undermine the country's objective of having private sector based economic growth due to crowding out effect of private sector credit.

III.1.2 Indirect Channel

Indirect channel views the number of ways through which the operations of the government would indirectly affect the behavior of monetary variables such as interest rate, interest rate spread and exchange rate. These relations between fiscal policy and monetary variables are exclusively discussed in the proceeding sub sections.

III.1.2.1 Interest rate Channel

A consensus among several policy discussions with regard to impact of fiscal policy on interest rate channel of monetary policy transmission state that higher fiscal deficits through expansionary fiscal policy may lead to higher medium-term and long-term interest rates (Greenspan, 2002). In fact, many scholars support the idea that monetary authorities regard fiscal policy as an important determinant of long-term interest rates (Mohanty and Scatigna, 2003). Indeed, another broad compromise exhibits the channel as a way through which public debt impacts on long-run interest rates. This postulates that higher indebtedness increases the risk of default on sovereign debt, in so doing translates into higher interest rate spreads on government bonds (Ferrucci, 2003).

In his analysis, Andrea (1991) highlights three aspects under which fiscal policy may affect monetary policy through interest rates channel. Firstly, fiscal policy via its impact on aggregate domestic demand affects interest rates by changing the demand for funds in the economy.

Second is the effect of the overtime unsustainability of fiscal settings on the expectations of the future monetary policy to monetize the growing fiscal deficit. The reduced credibility of the government commitment raises the inflation expectations and hence increases the cost for the monetary policy to maintain price stability. While in the third aspect, the effect of fiscal policy is manifested through capital markets financing.

An increase in government demand for funds may raise domestic interest rates especially if domestic and foreign debts are not perfect substitutes. Fiscal deficit financing may have signaling effect on interest rates and the yield curve if the authorities' debt portfolio decisions appear inconsistent with their policy objectives.

III.1.2.2 Exchange rate Channel

With regard to effect of fiscal policy on monetary policy through exchange rate channel, the theory stipulates that the impact of fiscal actions on exchange rate movements depend on changes related to sovereign default risks, openness of the economy and on the exchange rate system. Although temporarily, fiscal expansion results into an appreciation of the exchange rate mainly in a system with a high flexible exchange rate regime under capital mobility and a constant country premium. However, with low capital mobility, expansionary fiscal policy is expected to cause depreciation in exchange rate boosting import costs and current account deficit.

In fact, the theoretical literature mentions that the risk of too much dependence on foreign funding of increasing government deficits results in exchange rate risks, which eventually lead to rise in the probability of default, generate capital outflows and cause pressures on currency. Under economies with large share of government debt denominated in foreign currency, Goldstein and Turner (2003) state that central banks are stressed by control of exchange rate depreciations. Contrary to economies with a large share of interest rate linked public debt where the monetary authorities become reluctant to increase domestic interest rates in order to counter currency pressures.

In summary, though these transmission channels are separately explored, it is essential to sum-up their reactions in response to fundamentals of fiscal policy. In an economy vulnerable to capital

flows with high short-term dominated public debt, an increase in interest rates for monetary objective raises the cost of debt service, debt level, probability of default, and country premium, leading to capital outflows and eventually to exchange rate depreciation. Moreover, in case the foreign currency dominated government debt, the exchange rate depreciation will broaden the value of debt, rise inflation expectations mainly due to high import cost that eventually change the inflation level. In practice, the central bank takes the charge to curb inflationary pressures, however considerable fiscal adjustments are also required to reduce the level of public debt and default probability to smoothen the existing economic uncertainties in a sustainable manner.

III.2 Empirical Literature

This section explores in detail the relevant empirical studies on both country and cross-sectional cases seeking to review how significant the fundamentals of fiscal policy may be influencing the conduct of monetary policy transmission. Indeed, numerous studies have been empirically tempted to verify the existence of this effect.

In their research conducted on sub-Saharan African countries, Baldini and Ribeiro (2008) found mixed results with some countries dominated by fiscal regime, others by monetary policy while the remaining did not show any clear result. The study also reveals that changes in nominal debt could be the basis of price variability through aggregate demand effects. Their results are consistent with the fiscal theory of price level suggesting that the effects of fiscal actions could be direct source of price distortions. Indrawati (2007) on Indonesia had the same results that changes in fundamentals of fiscal policy have negative and enduring impact on inflation rate, which the central bank authorities respond by tightening of the monetary policy stance.

Zoli (2005) stipulate that fiscal policy actions contribute to fluctuations in the exchange rates more than unanticipated monetary policy actions. Agha and Khan (2006) conclude that inflation is a fiscal phenomenon. Hence, both affirm that fiscal policy significantly affects the conduct of monetary policy. For instance, in 2002 when the half of the Brazilian public debt was denominated in US dollars, the fluctuations in the exchange rate increased the debt burden to about 60% of GDP and policy rate to 26.5% due to high inflation and inflation expectations. However, after small changes in the fiscal stance accompanied by changes in investors'

perceptions for long run fiscal policy in early 2003, brought the economy back to normal conditions (Giavazzi, 2005).

Using a simple pooled regression, Kings (1995) portrays a negative relationship between inflation and government public debt for several OECD countries. In the same line, Papapetrou (1997) on case of United States also found the existence of the effects of fiscal policy on money growth and inflation. On the other hand, similar to other empirical studies, has also found a reverse causation that high inflation leads to growth of the government fiscal deficit.

Several conclusions have also been undertaken though remain diverse on a way fundamentals of fiscal policy affect other monetary variables. Such include mixed evidences on the impact of fiscal policy on exchange rate movements. For instance, studies on industrialized economies have shown a positive and significant relationship between fiscal expansion and exchange rate (Caramazza, 1993) and Feldstein, 1986). While others like Koray and Chan (1991) fail to find any significant relationship.

Kopits (2000) in the context of the emerging markets focused on the contribution of fiscal policy on vulnerability of the country's currency crises. The study evidenced that large explicit or implicit government deficit turns the country more vulnerable to such crises.

Many scholars empirically tested the interconnectedness between fiscal deficit and interest, but unfortunately found contradicting results. For instance Evans (1985) in his study on USA for the period stretched from 1858-1950 did not find fiscal deficit impacting interest rate. Kulkarni and Erickson (1996) on India obtained similar results for the period 1960-1988. However in context of United Kingdom for the 1960-1984, Balkan and Erol (1995) found a positive and significant impact of fiscal deficit on real interest rate.

In their study, Tanzi and Lutz (1993) conclude that either fiscal deficit or debt but not both have an important role in determination of global interest rates. However, their conclusion did not specify which fiscal variable has powerful impact on interest rates. Reviewing empirical literature with more emphasis on deficit variable, Gale and Orszag (2002) conclude that the effect is empirically quite large though some did not find any significant effect in either deficit or

debt variables on world interest rates. They certainly found that a 1% increase in the deficit to GDP ratio would boost interest rates by around 50-70 basis points. However, other recent findings have conversely reported the debt as an important variable in determination of world interest rates (Muechleisen and Towe, 2004).

Despite the mixture of findings, the common shared result is that the impact of fiscal deficit is substantially higher than that of debt. Indeed, after assuming a Cobb-Douglas production function, Engen and Hubbard (2004) suggest that even in extreme cases where the debt fully crowds out private sector credit, the impact of the debt is minimal. This has been conferred in a way that a 1% increase in the debt to GDP ratio is quantitatively small revolving around 2-3 basis points. The effect is smaller compared to the one of the deficit evidenced by Gale and Orszag in 2002.

IV. FISCAL POLICY PERFORMANCE IN RWANDA

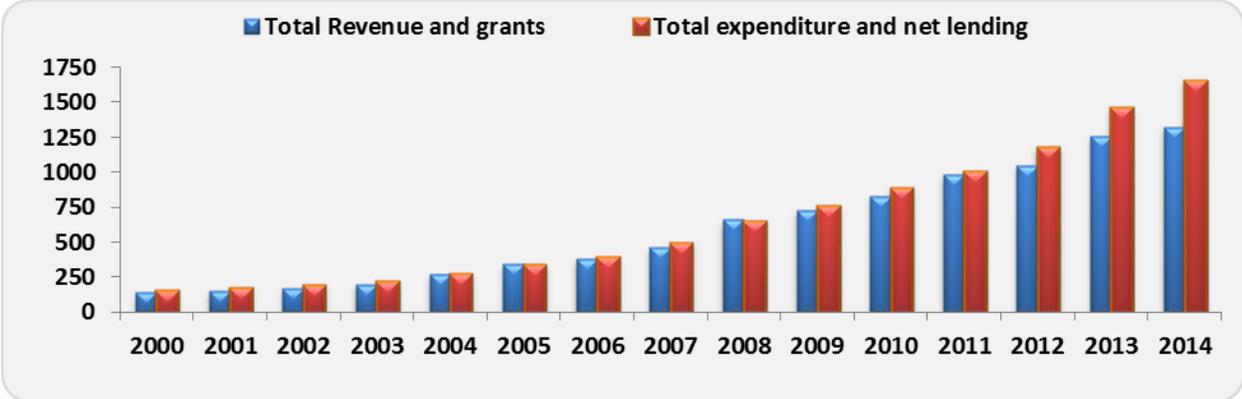
In the aftermaths of the 1994 Genocide against Tutsi, the government embraced different support programs streamlined to reestablish internal and external macro-economic balances in order to promote conditions for sustainable and equitable growth designed to alleviate poverty. All these programs contributed to the rejuvenation of the country's demolished economy. Rwanda made a good use of these support programs to achieve remarkable progress in terms of economic and financial developments. This brought Rwanda to a new policy Support Instrument (PSI) since 2010 in which its public finances are designed in line with priorities set by Rwandan authorities as agreed on with IMF.

Certainly, to ensure the restoration of the country's financial health, Rwanda Revenue Authority (RRA) was established in 1998 aimed to revitalize the tax capacity and tax administration equitable enough to raise revenues for the country's development ambitions. Definitely the Rwanda's fiscal position has been improving following the RRA's efforts through tax administration reforms and efficient collection mechanisms. Certainly, the government implemented new measures under fiscal consolidation strategy such as expenditure prioritization, improving revenue collection performance through increased tax recovery and expanding tax bases as well as the control of the budget outlays aimed reduce foreign dependence.

Due to aforementioned improvements in the economy, the total government resources registered an incessant increase to the level above the pre 1994 records. For instance, on average the overall receipts as percentage of GDP surpassed 21.2% realized between period 2000-2004 to 23.5% in period 2005-2009 and to 24.5% over 2010-2014. Similarly the average total outlays grew larger than receipts from 22.4% of GDP in 2000-2004 to 23.8% in 2005-2009 and then to 27.9% in 2010-2014.

Compared to the previous periods, total expenditures hiked significantly evidencing the role of the government in providing public goods and services, infrastructure and social developments, as well as taking care of market failures. As a result, this has made it difficult for the government to maintain a balanced budget due to scarcity of revenues compared to the spending needs (shown by the figure IV.1 below).

Figure IV.1 Overall Revenue and Expenditure Developments (in billions FRW)



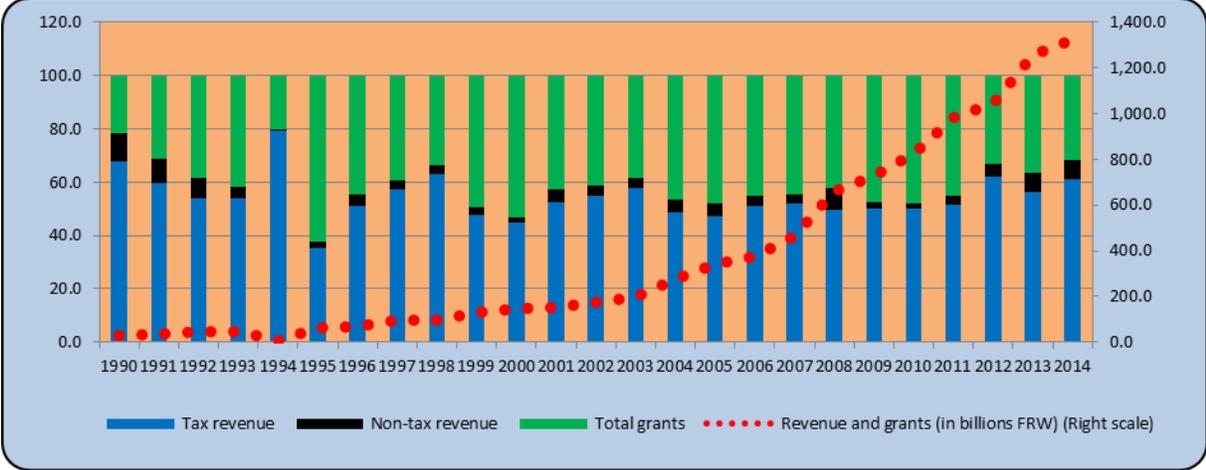
Source: Ministry of Finance and Economic Planning (MINECOFIN)

Over the period under review, the revenue collection gradually improved mostly boosted by high economic growth together with increased tax base and more efficient tax collection. This made the domestic revenues increase from Frw 67.9 billion (47.0% of the overall receipts and grant) in 2000 to Frw 379.9 billion (57.6% of the total) in 2008 and to Frw 903.0 billion (68.2% of the total) in 2014.

In addition, Rwanda benefited from external support under different policy support frameworks in form of direct financial aid, in kind support, and debt relief. In fact, the overall external grants

have been important as the country persistently pursued expansionary policy to retrieve the economy from atrocities of 1994 genocide against Tutsi.

Figure IV.2 Developments in key revenue indicators (% of GDP or otherwise indicated)

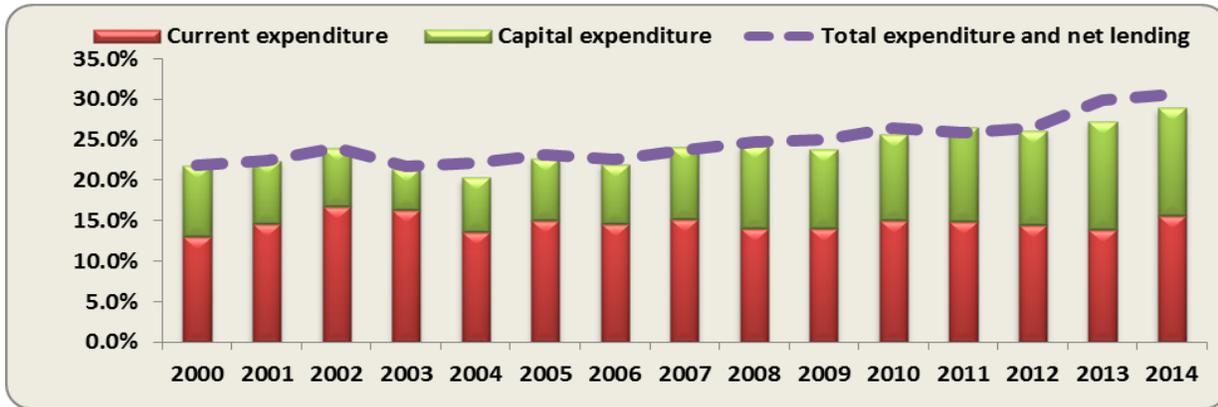


Source: Ministry of Finance and Economic Planning (MINECOFIN)

From the figure above, the government receipts have been increasing overtime mainly contributed by tax revenues that constitute around an average of 52.6% of the overall receipts and grants realized between 2000 and 2014. This strong revenue collection performance was mainly driven by gains in direct taxes due to increase in corporate tax, income tax, the widening of the tax base as well as from a general sensitization campaign for taxpayers’ compliance.

The Government expenditures increased from Frw 147.5 billion (21.8% of GDP) in 2000 to Frw 1,653.9 billion (30.7% of GDP) in 2014 of which capital spending increased to 13.3% of GDP and 15.6% in recurrent outlays from 8.7% and 13.0% respectively. The figure IV.3 below portrays that the government spending has generally been increasing as shares to GDP of both current and capital outlays overtime though current spending remains with major share at the expense of its counterpart in the overall spending basket.

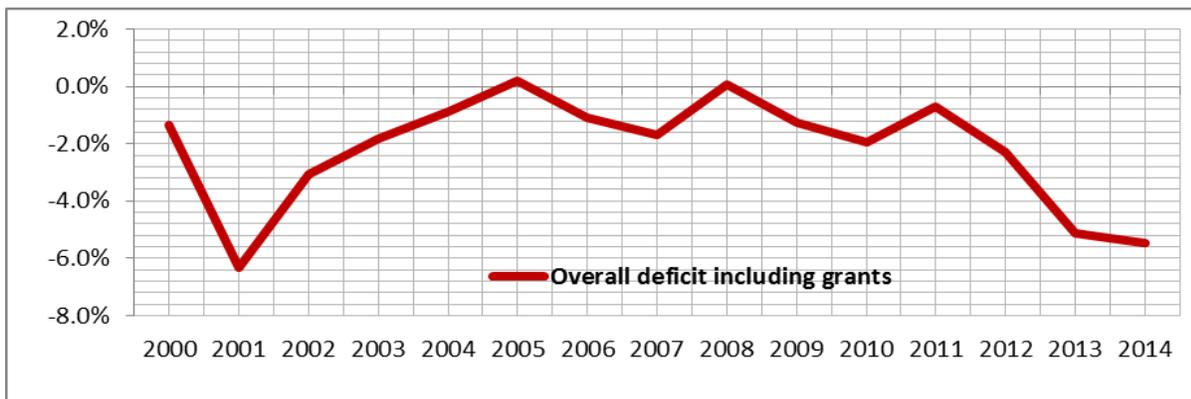
Figure IV.3 Government expenditures in % of GDP



Source: Ministry of Finance and Economic Planning (MINECOFIN)

Despite the effort to control government expenditures and mobilize maximum tax collection, the budget of the government consistently closed with deficits that sometimes mounted higher than expected. Such cases include periods of unexpected aid cuts and delays such as aid cut in 2012 onward that led to excess deterioration of the existing fiscal deficit. For instance during high aid reduction period, the budget closed with an average overall deficit including grants of around 4.3% of GDP in period between 2012-2014 from 1.3% of GDP during the same range of period from 2009-2011. The evolution of fiscal deficit as shown in figure IV.4 clearly indicates how the government has generously been using excess spending to influence the level and growth of the economic activities.

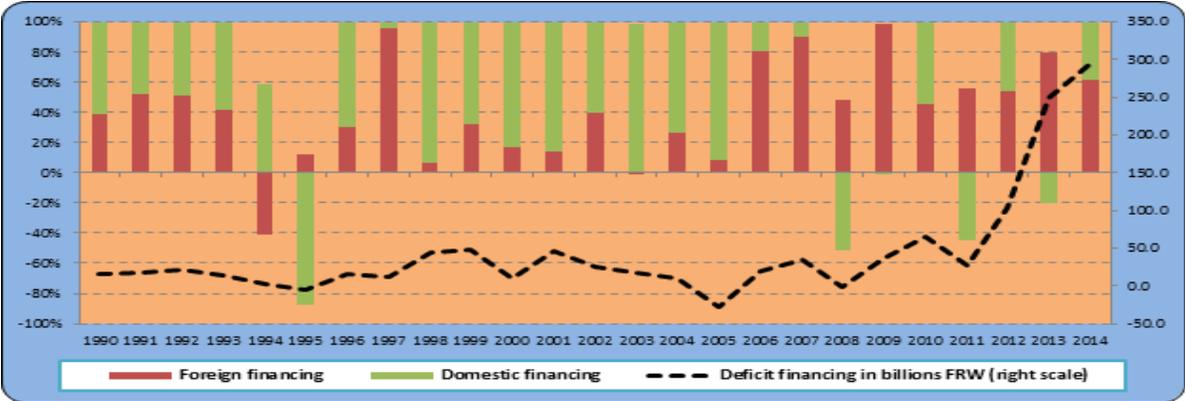
Figure IV.4 Evolution of Fiscal Deficit (billions FRW)



Source: Ministry of Finance and Economic Planning (MINECOFIN)

This inadequacy of available resources to cover the overall government outlays, made the government to resort for both domestic and external financing to support the effort to restore the economy. The government’s cash planning opted among other options for a longer period of use of the BNR short advances, frequent issuances of T-bills as well as newly initiated long-term T-Bonds. Generally, the public financing has been largely depending on external financing over period as depicted in the following figure. For instance, in 2013 the deficit was financed by Eurobond. However, this may put the country under problems of exchange rate risks, loss of credibility due to perceived probability of default and capital outflows (see figure IV.5)

Fig.IV.5 Structure of Fiscal deficit financing (% share and billion FRW)



Source: Ministry of Finance and Economic Planning (MINECOFIN)

In summary, the fiscal position of the government has consistently been closing with fiscal deficit over the reviewed period. This has mostly been result of lower revenues as well fluctuations in foreign aid disbursements. Consequently, this raises need for deficit financing to rely largely on foreign borrowing due to weak financial sector development.

V METHODOLOGY

V.1 Empirical model

Following the review of both direct and indirect channels through which the actions of fiscal policy can affect conduct and transmission of monetary policy, this study intends to disclose the firsthand evidence of such effect in Rwanda. This seems important for some reasons. The Rwandan government has been incessantly pursuing expansionary fiscal policy and as result, fiscal deficit remained persistent over the period under review. This arise concerns about its

effectiveness on conduct of monetary policy for Rwanda as in other developing countries. Secondly, so far, no specific empirical study has been conducted regarding the effect of fiscal policy on conduct of monetary policy and transmission in Rwanda.

Following the spirit by Sims (1986), Structural Vector Autoregressive (SVAR) model is considered for its effectiveness to chart out the way by how much fiscal policy may be affecting the conduct of monetary policy. This essentially draws out the link between theories and outcomes of the data by imposing contemporaneous structural restrictions based on the assumption underlying the structure of the economy. SVAR model is known mostly as reliable model over other macroeconomic models in analysis of the macroeconomic dynamics, the greatest advantage being the possibility to observe the macroeconomic system following a shock to the other variables.

The basic purpose of the application of SVAR approach is implicitly to see the behavior of trends of variables in response to shocks introduced in one of the endogenous variable. This helps in determining the extent and direction of the policy responses thereby indicating how quickly the shocks are absorbed by the economy. In addition, due to presence of multicollinearity among variables, SVAR model provides a more convenient and comprehensive way of analyzing the impact of unanticipated shocks to the macroeconomic variables by means of impulse response functions. These help to show time horizon the distortions in monetary variables last due to shocks in fiscal variable.

Given the above advantages of SVAR framework, we performed a SVAR model for three transmission channels categorized according to their respective transmission channels.

In this regard, after passing through necessary transformations of the below reduced VAR model;

$$X_t = A^{-1}C(L)X_{t-1} + u_t \dots\dots\dots(1)$$

Where; $X_t = (X_{1t}; X_{2t}; \dots\dots\dots X_{nt})$ denotes a $(n - 1)$ vector of endogenous variables t is a linear time trend and $C(L)$ is the is a lag polynomial of order L , while u_t is the stochastic error containing zero mean, constant variance and serially as well as cross uncorrelated innovations

Therefore, the study employs SVAR model of the form below for purpose of the giving it an economic interpretation that able to investigate different transmission channels through which fiscal policy may influence the conduct and transmission of monetary policy in Rwanda.

$$A X_t = C(L) X_{t-1} + B e_t \dots\dots\dots (2)$$

Where: $X_t = (X_{1t}; X_{2t}; \dots\dots\dots X_{nt})$ denotes a k-dimensional vector of endogenous variables, t is a linear trend, $C(L)$ is the matrix finite order polynomial. e_t is a vector of structural disturbances that captures any exogenous factors in the model and they are assumed to be uncorrelated with each other implying the variance-covariance matrix is diagonal. A is (n x n) matrix that describes the contemporaneous relations among the variables collected in vector X_t while the square (n x n) matrix B permits some shocks to affect directly more than one endogenous variable in the model.

The reaction between the VAR residuals in u_t and the structural disturbances in e_t is therefore expressed as;

$$A u_t = B e_t \dots\dots\dots(3)$$

Given the difficulty to identify relevant structural parameters, we are required to impose some restrictions on the parameters of A and B . The structural model is therefore identified by imposing exogenous constraints such as assuming orthogonality of the structural disturbances and imposing that monetary variables do not concurrently react to fiscal variables though reverse effect is allowed.

The matrix Σ is the variance -covariance of the estimated residuals, u_t , of the standard VAR. The σ^2 are the variance and σ_{ij} are the covariance terms where each

$$\sigma_{ij} = \frac{1}{T} \sum_{t=1}^T E e_{it} e_{jt} \text{ and where } \Sigma = \begin{pmatrix} \sigma_1^2 & \dots & \sigma_{1n} \\ \vdots & \sigma_2^2 & \vdots \\ \sigma_{n1} & \dots & \sigma_n^2 \end{pmatrix}$$

The estimation also involves estimating the variance-covariance matrix Σ on the residuals conditional on these restrictions as shown below.

$$\Sigma = E[u_t u_t'] = A^{-1} B E[e_t e_t'] B' A^{-1} = A^{-1} B \Omega B' A^{-1} \dots\dots\dots(4)$$

SVAR model is also more advantageous than the Cholesky decomposition, in the sense that impulse response functions and the variance decompositions functions as results of contemporaneous restrictions can be directly given an economic interpretation since they are derived using parameters from explicit economic models. The impulse response functions are then used to test whether the shocks affect each variable as economic theory would predict. These dynamic responses can therefore be checked to assess their consistency with theory. For the benefit of this study, we estimate three variable SVAR models to test whether the actions of the fiscal policy on monetary policy are temporary or permanent for Rwanda. The study also assesses whether or not the financial operations of the government complicate the effectiveness of the monetary policy in Rwanda.

V.2 Data and Variable Definition

This section describes the nature, format and source of data for the variables employed to estimate the effect of fiscal policy on conduct and transmission of monetary policy in Rwanda. The key variables for the long run equation developed in this study include budget deficit to GDP ratio (bd_gdp), domestic and foreign financing of deficit as percent of GDP (domfin_GDP and forfin_GDP) as proxies of fiscal policy while inflation (infl), depreciation in nominal exchange rate of the franc against USD (ner_perct), T-bill rate (tb_rate), lending rate (lending_rate) and interest rate spread (is) as monetary variables. For consistency, all variables are transformed to possess similar units. The analysis is performed on the basis of quarterly data covering the period 2000Q1 to 2015Q2. The data used for estimation were compiled from the National Bank of Rwanda (BNR) dataset, and from the ministry of finance and economic planning (MINECOFIN) website. We used Eviews 7 package for econometric modeling and estimation processes.

VI EMPIRICAL RESULTS

VI.1 Unit Root Test

Usually, the issue of inconsistency is an important feature of the most data on developing countries and if regressed without passing through diagnostic test might lead to spurious results. Therefore, it is essential to ascertain the stationarity of variables before we proceed to other empirical tests. We used Augmented Dickey-Fuller test to check for null hypothesis of non-stationarity and to determine the order of integration of variables as in table VI.1 below.

Table VI.1 Augmented Dickey-Fuller tests for non-stationarity

Variables	ADF test Statistic	Critical Values			Order of Integration	Equation tested (with)
		1%	5%	10%		
BFD_GDP	1.621	2.604	1.946	1.613	I(0)	None
GDP_GAP	3.107	2.604	1.946	1.613	I(0)	None
INFL	4.274	3.546	2.911	2.593	I(0)	With intercept
NER_CPT	3.030	2.603	1.946	1.613	I(0)	None
IS	4.079	4.116	3.485	3.171	I(0)	With Intercept & Trend
FORFIN_GDP	3.969	2.607	1.947	1.613	I(1)	None
DOMFIN_GDP	2.785	2.610	1.947	1.613	I(0)	None
TB_RATE	7.231	2.606	1.947	1.613	I(1)	None
DEPOSIT_RATE	6.573	2.604	1.946	1.613	I(1)	None
INTERBANK	7.972	2.604	1.946	1.613	I(1)	None
CPS_GDP	5.308	4.116	3.485	3.171	I(0)	With Intercept & Trend
LENDING_RATE	3.917	4.116	3.485	3.171	I(0)	With Intercept & Trend

Note: The critical values for ADF test and critical values at all levels of significance are in absolute values

Source: Author's computation

With an automatic lag length selection using Schwarz information criterion (SIC), the results of ADF unit root test reported in the table 4.1 above indicate that most of our variables are $\sim I(0)$ while four time series are $\sim I(1)$, non-stationary at level and has been transformed to stationarity after carrying out its first difference. Generally the results show that the variables are integrated of order zero $\sim I(0)$ and one $\sim I(1)$ at 1% and 5% level of significance.

Individually, variables may be non-stationary, but their linear combination falls stationary. These variables are said to be cointegrated. After testing for stationarity, the stability condition test was conducted for each model and results showed no root lies outside the circle (indicated in the appendices). Therefore, study proceeded with the use of SVAR model to estimate different channels through which fiscal deficit can affect the conduct and transmission mechanism of monetary policy in Rwanda.

V.2 Behavior of fiscal policy on conduct of monetary policy in Rwanda

To exhaust the possible ways through which fiscal deficit may be affecting the conduct and transmission of monetary policy, three equations have been estimated reflecting different pre-identified channels. These equations reflect the impact of overall deficit, domestic and foreign financing of fiscal deficit on monetary variables including inflation, deposit rate as a proxy of interest rate spread and depreciation of nominal exchange rate. The first two equations rely on aggregate demand which is assumed to increase following an increase in the fiscal deficit pushing upward the GDP gap and the inflation. The first one uses the overall deficit while the second tests for the existence of the crowding out of the private sector by the domestic financing of the fiscal deficit. The third equation incorporates foreign financing effect on exchange rate.

a. Direct Channel

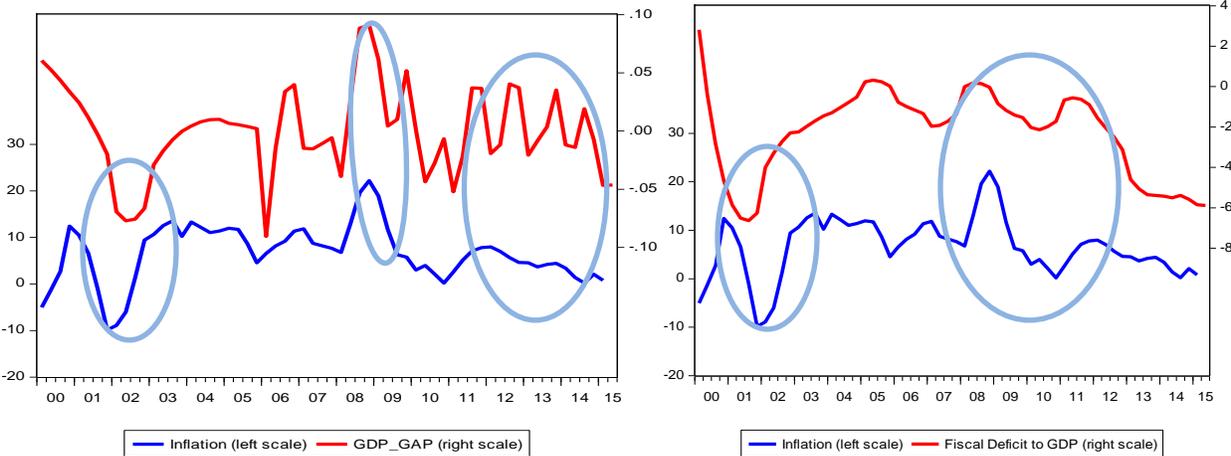
Overall fiscal deficit and inflation

The tested equation uses the overall fiscal deficit, the GDP gap as a proxy of the aggregate demand, the inflation as the ultimate objective of the monetary policy and the deposit rate as response of the monetary reaction. Consistent with theoretical perspective, figures VI.1 below clearly indicate right signs of the direction through which the fiscal deficit leads to price dynamics via changes in aggregate demand. For instance, in periods of low economic activities, expansionary fiscal policy is undertaken to stimulate economic growth. As result, the aggregate demand picks up creating inflationary pressures, prompting monetary authorities to retaliate by tightening monetary policy stance. Evidently, this was the case in period 2008Q1-2009Q1 when Rwanda registered high level of growth together with the highest levels of inflation led by strong

domestic demand and increasing commodity prices. Monetary policy responded by increasing policy rate from 8.0% to 9.0%. However, from late 2009-2010, the economy slowed down because of weakening foreign demand caused by unleashing global crisis. In response to liquidity crunch during the period, monetary authorities retaliated by loosening policy rate to 7.5% in December 2009 accompanied by reduction in reserve requirement ratio from 8.0% to 5.0%. From there monetary policy remained accommodative up to 2011Q3.

Between 2011Q4-2012Q2, the economy recovered from the effect of the global financial crisis supported by expansionary fiscal policy and strong credit growth. The resulting high inflationary pressures were tamed by increasing nominal interest rate as monetary policy reaction. This prompted inflation to continue slowing down reaching 2.8% in June 2015 from 22.3% in 2008. Therefore, the fiscal influence seems to exist, but the coordination between fiscal and monetary policies have been effective in a way even where the fiscal deficit was progressively worsening, the central bank managed to keep inflation low and stable as shown by figures VI.1 below.

Figure VI.1 Developments in Inflation, GDP GAP and Fiscal Deficit to GDP ratio



Source: BNR, Monetary Policy and Research Department

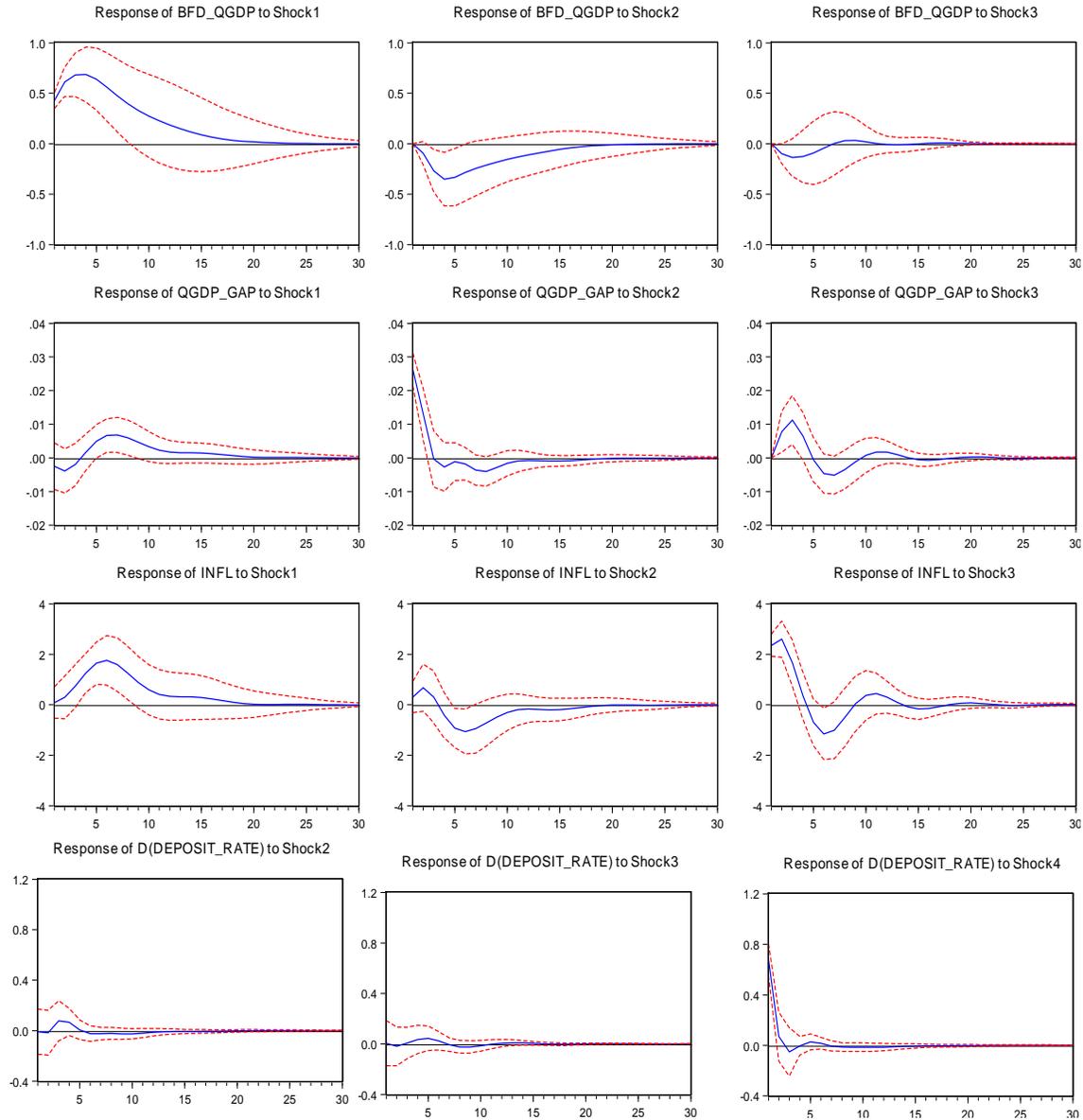
According to the first channel, results show a significant interaction between the budget deficit and inflation whereby the fiscal deficit contribute to increase of inflation. The response of inflation to overall fiscal deficit is positive and becomes significant from third to eleventh quarter and dies out after 24 quarters. The effect is attributed to the fact that the increase in fiscal deficit boosts the GDP gap which in turn fuels directly the inflationary pressures through increased

aggregate demand. Indeed, the budget deficit is found to increase the aggregate demand but becomes significant from fourth quarter to ninth quarter thereafter becomes insignificant with gradual waning. Therefore, the significant relationship between inflation and fiscal deficit reliably indicate the fact that the conduct of monetary policy can be influenced by actions of the fiscal policy if monetary policy authorities become reluctant.

Generally, the impulse response functions shown in the panel IV.1 below portray that most variables emerge correctly signed as expected. However, due to impatience of monetary policy to higher inflation, the central bank intervenes to curb inflationary pressures immediately from rising in the second quarter. This is also shown by positive response of deposit rate to inflation right from the central bank intervention in the same quarter. Looking at the reverse effect, fiscal deficit responds positively to inflation shock for duration of three quarters, but directly lowers in response of GDP gap.

Panel VI.1 Impulse response of inflation to the overall Fiscal deficit

Response to Structural One S.D. Innovations ± 2 S.E.



Domestic financing of fiscal deficit and inflation

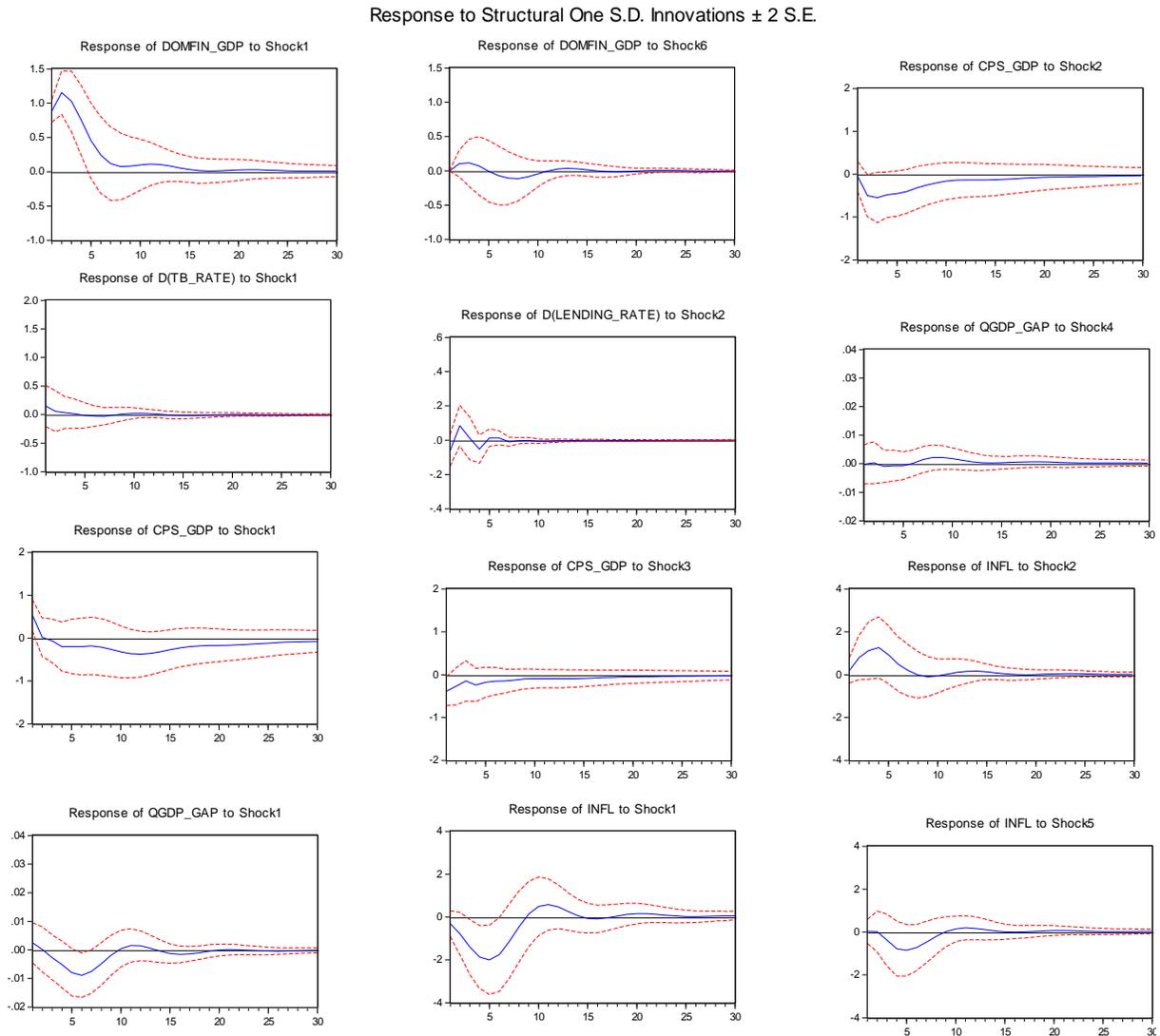
To capture which fiscal deficit-financing component that really affects inflation, we tested both domestic and external financing components, but via this channel the study opted to report domestic deficit financing component after comparing the consistency of results. This transmission channel used variables including domestic financing, T-bill rate, lending rate, credit to private sector, GDP gap and inflation as the ultimate objective of the monetary policy.

Consistent to the theoretical assumptions, estimates witness that the domestic financing of the government deficit significantly reduces credit to private sector by 24 basis points to its one unit change and in turn lowers the production of the economy by 0.1 basis points though not significant. In fact, both Treasury bill rate and lending rate are positively affected but not significantly. Similarly, domestic deficit financing significantly reduces inflation by 75 basis points. Inflation reacts following the two components of the aggregate demand that is lower consumption due to lower consumer credit and lower production led by increasing lending rate which affects the investment.

On one hand, the fiscal deficit would create a crowding out effect when the government resorts to domestic markets to finance its financing gap. As result, the cost of fund increases limiting the private sector ability to access finances and therefore impeding the economic developments. Holding other factors equal, if actual output falls below potential output over time, prices will begin to fall to reflect weak demand. This induces the response of the Central Bank with an accommodative monetary policy to inflate the economy.

The graph below portrays the impulse responses to increasing domestic financing of the government deficit of the selected variables. According to the panel VI.2 below, the T-bills and the lending rate though not significantly affected by the domestic deficit financing, increased and converged to the long run equilibrium after 3 and 6 quarters respectively. On the other hand, the credit to private sector declined for 19 quarters to come back to the equilibrium. The response of inflation to increasing government domestic borrowing becomes significant after 3 quarters and fully wanes at the seventh quarter. After 16 quarters, the inflation crosses the long run path following the increase in price levels.

Panel VI.2 Impulse response of inflation to the domestic fiscal deficit financing



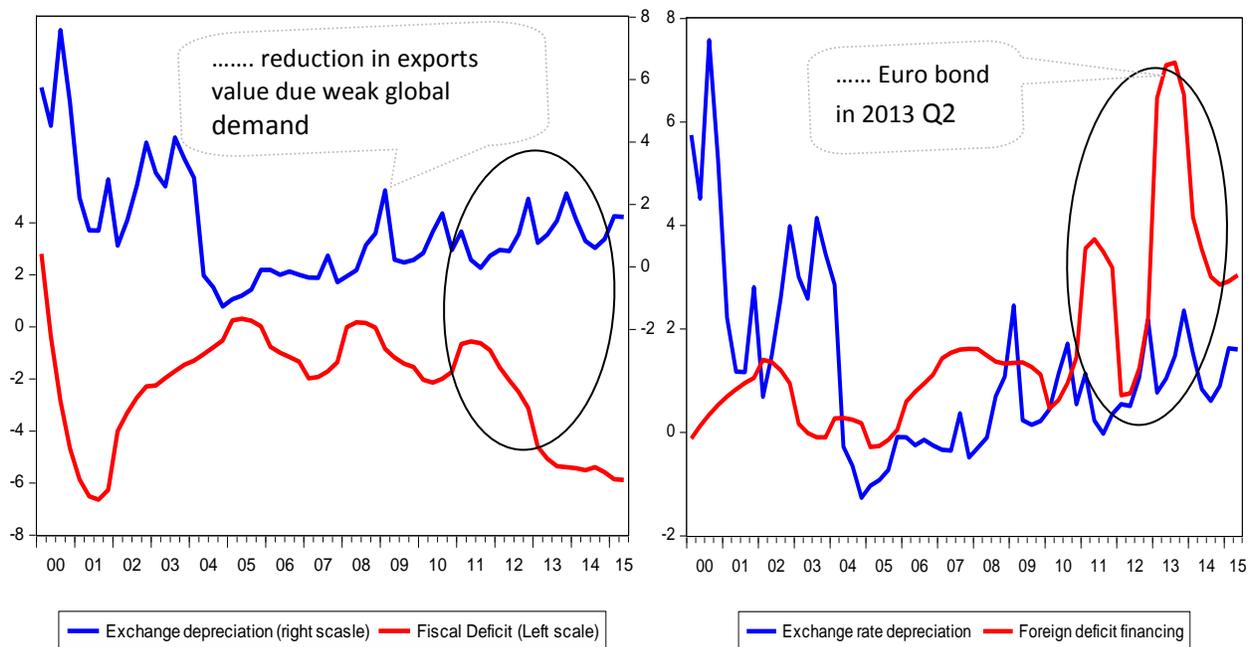
b. Indirect Channel

Exchange Rate Channel

Fiscal policy affects exchange rate movements and exchange rate policy following persistent fiscal or structural deficit. With the financing of the fiscal deficit, there is risk that too much addition on foreign financing results in exchange rate volatilities, balance of payments risks that may induce central Bank adjustment actions. The impact depends on the relative effectiveness of the fiscal and monetary sectors together with the degree of openness of the economy.

For instance, in the period under review Rwanda has been receiving significant foreign inflows. This accredited to the appreciation of Rwandan Francs due to accumulation of foreign reserves that maintained the confidence of forex market. The fact is seen from the second half of 2012 onward when the reduction in foreign disbursement among other factors exerted pressures on Rwandan Franc exchange rate. Thus this is consistent to our findings which show negative link between the foreign financing of the government deficit and exchange rate. However, to mitigate pressures on forex market the national bank of Rwanda increased intervention on the foreign exchange market to curb excessive exchange rate volatility (see figure VI.2 below).

Figure VI.2 Nominal Effective Exchange Rate Developments

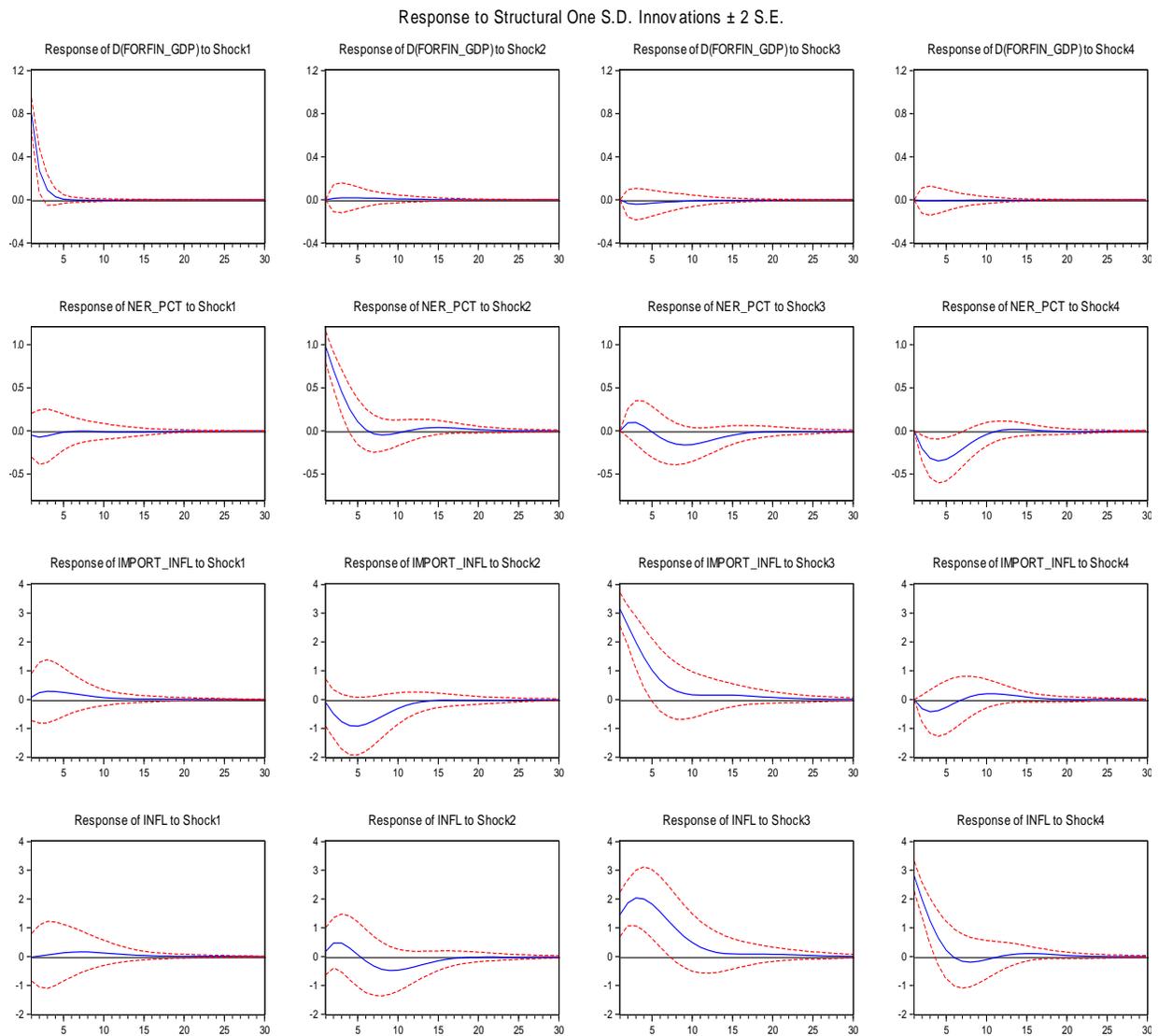


Source: BNR, Monetary Policy and Research Department

However, the impact of the foreign deficit financing will depend on the use of the fund and the currency denomination of the spending. In case of spending in foreign currency, no significant impact will be felt in both exchange rate and inflation. Indeed, spending in local currencies results in accumulation of reserves and pressures on consumer prices. The fact was evidenced by the period from 2004 to 2008 when the country was accumulating foreign reserves (more than 8 months of imports) as result of significant foreign inflows.

Looking to impulse response functions, the study notes that the fiscal deficit proxied by foreign financing of the government deficit has a negative but not significant impact on FRW exchange rate. As result, through this channel the exchange rate has been found not to be affecting imported inflation though possessed the right sign as expected. This decline in imported prices is however offset by a hike in domestic inflation led by spending of the additional resource inflows. As result, the net effect is positive dragging up significantly the overall inflation. Certainly, the central bank reacts by increasing the central bank policy rate which effects is transmitted to market rates.

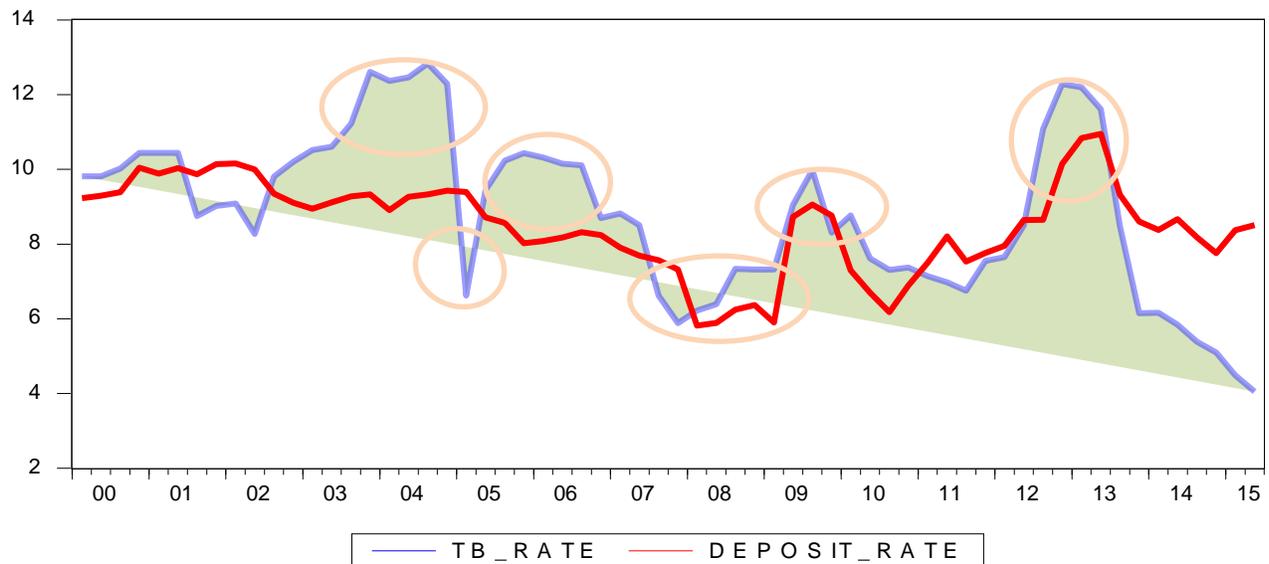
Panel VI.3 Impulse response of inflation to Foreign financing of fiscal deficit



Interest Rate Spread Channel

Changes in budget deficit could trigger pressures on interest rate and could therefore provide monetary policy with limited space for interest rate management. The result of demand for funds to finance fiscal deficit leads to upward pressure on interest rate that ends to financial crowding out. The findings of our study indicate a long run negative link between fiscal deficit and interest rate spread. The lending rate in Rwanda has been less responsive to debt financing of fiscal deficit unlike the deposit rate. The latter has been rising in response of monetary policy stance measured by T-bills rate over the period. This is featured by co-movement between T-bills rate and deposit rate. The behavior of the interest rate spread is reduced by the net impact on lending and deposit rates.

Figure VI.3 T-bills and Deposit rates



Source: BNR, Monetary Policy and Research Department

During the periods circled in the figure above, indicate both periods of high (low) domestic borrowings that brought up (down) interest rates. Deposit rates in early 2000s were none responsive due to weaker transmission channel together with low concentration of financial sector that depicted a kind of monopolistic behavior. Unlike from 2008 the new financial entrants together with growth in innovations in financial system upgraded the level of

competition that has been pushing up the degree of responsiveness to the behavior of monetary policy stance.

Variance Decomposition

For the direct channel, the variance decomposition analysis shows that during the first period the change in inflation comes mainly from its own shock at 98.2%, 0.2% from the budget deficit and 1.7% were from the output gap. This result shows less influence of other variables on inflation in short term and their gradual increasing contribution over time as its own share starts waning. Thus at the 10th quarter, contribution from inflation itself reduces to 49.10% while the budget deficit contributes 35.23%, the output gap to 12.2% and deposit rate to only 3.5%.

Variance Decomposition of Inflation

Period	S.E.	Budget deficit	Output gap	Inflation	Deposit rate
1	2.380371	0.126310	1.680497	98.19319	0.000000
2	3.604495	0.719778	4.230492	94.86696	0.182769
3	4.050187	3.900583	3.911765	92.03950	0.148147
4	4.279134	12.17205	4.462445	83.18365	0.181860
5	4.729728	22.07381	7.527589	70.23115	0.167456
6	5.297281	28.61021	10.04579	60.76849	0.575518
7	5.729115	32.17586	11.32352	55.07378	1.426838
8	5.961435	34.13141	11.94649	51.57621	2.345881
9	6.071137	35.02356	12.18010	49.73312	3.063230
10	6.133597	35.23532	12.18029	49.09954	3.484845

The same observation applies for the remaining channels. However, considering the domestic financing as a proxy of the budget deficit, the decomposition changes considerably whereby, for the first period, only 75.1% come from the inflation itself, both lending rate and credit to private sector contribute 9.7%, the output gap at 3.9% whereas the influence from the deficit and the T-bill rate was less significant. Overtime, shock from the deficit and the credit become more and more important in explaining inflation dynamics. Demand pressures are gradually losing weight in explaining inflation.

Variance Decomposition of Inflation

Period	S.E.	Domestic financing	T-Bill rate	Lending rate	Credit to private sector	Output gap	Inflation
1	3.143952	1.195902	0.470398	9.721653	9.672757	3.883100	75.05619
2	4.018407	2.326376	3.257343	6.406516	13.30553	2.677723	72.02651
3	4.650451	6.476671	5.659046	5.454941	15.74155	2.005037	64.66276
4	5.143633	11.77026	6.639551	4.589271	17.84370	1.752946	57.40428
5	5.557285	16.57548	7.252408	3.960006	19.52559	1.686785	50.99974
6	5.896790	20.30197	7.596132	3.517376	20.91218	1.685598	45.98674
7	6.166205	22.89395	7.810697	3.222442	22.08157	1.693333	42.29801
8	6.371770	24.54245	7.956268	3.034530	23.08566	1.691337	39.68976
9	6.522876	25.49291	8.065679	2.919434	23.94989	1.677879	37.89421
10	6.630293	25.96977	8.153560	2.851491	24.68553	1.657334	36.68232

Considering the deposit rate, no variable is found to significantly contributing to its changes in either short term or long run periods.

Variance Decomposition of Deposit Rate

Period	S.E.	Budget deficit	Output gap	Inflation	Deposit rate
1	0.682492	0.492701	0.018153	0.006386	99.48276
2	0.687997	0.901138	0.078541	0.093561	98.92676
3	0.694425	0.898717	1.321106	0.101885	97.67829
4	0.698546	0.895261	2.216772	0.354294	96.53367
5	0.700630	0.952394	2.208869	0.731191	96.10755
6	0.702439	1.179526	2.319574	0.836822	95.66408
7	0.704529	1.634192	2.421851	0.840309	95.10365
8	0.707499	2.196340	2.500085	0.953141	94.35043
9	0.710428	2.699433	2.610169	1.071294	93.61910
10	0.712594	3.061669	2.729355	1.111814	93.09716

Coming to the T-bill rate, its changes are likely to be influenced by the lending rate up to 2.4% across time and by the domestic financing around 1.3% while its changes come for a big part from itself.

Variance Decomposition of T-Bill Rate (91 days)

Period	S.E.	Domestic financing	T-Bill rate	Lending rate	Credit to private sector	Output gap	Inflation
1	1.290833	1.062195	98.93780	0.000000	0.000000	0.000000	0.000000
2	1.315047	1.448854	95.42691	2.335315	0.236059	0.007750	0.545115
3	1.317997	1.481495	95.13384	2.338994	0.299078	0.008015	0.738579
4	1.319132	1.479416	94.97360	2.386419	0.330343	0.009242	0.820982
5	1.319585	1.492633	94.90909	2.390056	0.341562	0.012224	0.854433
6	1.319983	1.528884	94.85200	2.392381	0.344576	0.017057	0.865103
7	1.320389	1.579697	94.79400	2.391803	0.344720	0.022816	0.866962
8	1.320790	1.632880	94.73707	2.390507	0.344570	0.028457	0.866514
9	1.321148	1.679867	94.68630	2.389212	0.345021	0.033243	0.866353
10	1.321439	1.716522	94.64517	2.388244	0.346122	0.036861	0.867079

The influence on exchange rate comes mostly from its own shock and increasingly from inflation rate. The foreign financing remains insignificant in explaining changes in exchange rate. This is consistent with results from of the impulse responses functions which found insignificant relationship between foreign financing and exchange rate.

Variance Decomposition of Nominal exchange Rate

Period	S.E.	Foreign financing	Exchange rate	Imported inflation	Inflation
1	0.979142	0.265073	99.73493	0.000000	0.000000
2	1.228992	0.534805	96.14452	0.565993	2.754686
3	1.352415	0.616097	90.68513	0.989951	7.708820
4	1.421016	0.612411	85.29087	1.034897	13.06183
5	1.463004	0.588996	80.99247	0.982972	17.43557
6	1.491189	0.568308	77.96840	1.199350	20.26394
7	1.511553	0.553246	75.93120	1.840110	21.67544
8	1.526904	0.542411	74.51159	2.814930	22.13107
9	1.538613	0.535213	73.45462	3.906826	22.10334
10	1.547455	0.531834	72.64173	4.908183	21.91825

Imported inflation is strongly explained by its own shocks (persistent) and somehow influenced by change in the nominal exchange rate.

Variance Decomposition of Imported Inflation

Period	S.E.	Foreign financing	Nominal Exchange rate	Imported inflation	Inflation
1	3.139468	0.072213	0.114721	99.81307	0.000000
2	4.109207	0.375114	1.585436	97.44163	0.597821
3	4.659284	0.660300	4.008038	94.04653	1.285135
4	4.989641	0.888268	6.822206	90.57576	1.713766
5	5.189577	1.054176	9.495573	87.59608	1.854172
6	5.309703	1.165016	11.67234	85.33242	1.830230
7	5.381166	1.232746	13.21893	83.76636	1.781965
8	5.423494	1.270339	14.18192	82.75574	1.792005
9	5.448776	1.289081	14.70393	82.13241	1.874574
10	5.464292	1.297275	14.94456	81.75705	2.001112

In nutshell, consistent with the previous findings, the overall fiscal deficit is significantly influencing the monetary variables. The noted influence to inflation is also noted when the fiscal deficit is financed by domestic resources. The deposit rate, the lending rate as well as the exchange rate were less responsive to fiscal deficit and to its financing components.

VI CONCLUSION AND POLICY IMPLICATIONS

The study analyses both direct and indirect effect of fiscal policy on conduct and transmission of monetary policy in Rwanda covering the period 2000Q1- 2015Q2. To investigate this effect, we estimated three variable structural vector autoregressive (SVAR) models. These variables include budget deficit to GDP ratio and its financing components as measures of fiscal policy whereas inflation, exchange rate and interest rate as key monetary variables.

After exploring the literature review, the findings of the study are consistent with the related literature and points out the fact that the operations of the monetary policy are somehow influenced by actions of fiscal policy in Rwanda. The observed results support the proposition that budget deficits have been exerting pressures on inflation but less significant on exchange rate and interest rate variations in Rwanda. The evidence of relationship between fiscal policy and monetary variables pushed the monetary authorities to adopt a close cooperation with the fiscal authority for a closer coordination of their actions. In Rwanda, a close coordination between the ministry of finance and the Central Bank together with good cooperation with other economic stakeholders enabled the central bank to keep inflation low and stable.

Looking at specific variable, inflation in Rwanda has been generally maintained moderate at single digit for a period near to two decades. Low and stable inflation has been also a result of other important factors such as effective monetary policy, sound policy coordination, easing inflationary pressures from trading partners, declining oil commodity prices as well as good agricultural harvest especially in food. Secondly, due to good record of prudent and coherent macroeconomic management, the exchange rate though fundamentally market driven remained relatively stable. Thirdly, the less responsiveness of lending rate to debt financing of fiscal deficit compared to deposit rate made the interest rate spread to slowdown. This happens in response to commercial banks' intention to attract more deposits to cover the gap caused by financing of the government deficit. This is also featured by co-movement between T-bills rate and deposit rate.

In view of the above findings, the study suggests that fiscal and monetary policies are two interlinked tools through which the controls of the economy are stationed. For this reason, both policies should continue the strengthening of policy coordination such that the task of sustaining

stable and low inflation together with high growth are consistently shared to avoid inconsistencies in management of the economy. Actually, the more policy makers are coordinated, the greater ability to control external shocks and stabilize the economy.

The government to continue prioritizing its expenditure policy that incorporates supply side of the economy among the priority sectors for development. This will always help to offset the inflationary pressures that might arise from demand side of the economy.

Consistent with the perspective to maintain stable exchange rate, diversification of other major sources of foreign currencies such as exports promotion strategy to mention should increasingly be maintained to continue minimizing reliance on highly volatile budget financing inflows.

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APPENDICES

FIRST SCENARIO: DIRECT CHANNEL - Containing overall deficit

I. VAR Lag Order Selection Criteria

Endogenous variables: BFD_QGDP QGDP_GAP INFL DEPOSIT_RATE

Exogenous variables: C

Sample: 2000Q1 2015Q2

Included observations: 56

Lag	LogL	LR	FPE	AIC	SC	HQ
0	-249.1084	NA	0.099072	9.039584	9.184252	9.095672
1	-102.3396	267.3289	0.000930	4.369271	5.092611	4.649708
2	-67.35567	58.72299*	0.000477*	3.691274*	4.993286*	4.196061*
3	-52.11489	23.40548	0.000501	3.718389	5.599073	4.447526
4	-44.32292	10.85311	0.000702	4.011533	6.470888	4.965020
5	-26.93673	21.73273	0.000720	3.962026	7.000054	5.139863

* indicates lag order selected by the criterion

LR: sequential modified LR test statistic (each test at 5% level)

FPE: Final prediction error

AIC: Akaike information criterion

SC: Schwarz information criterion

HQ: Hannan-Quinn information criterion

II. Cointegration

Sample (adjusted): 2000Q4 2015Q1

Included observations: 58 after adjustments

Trend assumption: Linear deterministic trend

Series: BFD_QGDP QGDP_GAP INFL DEPOSIT_RATE

Lags interval (in first differences): 1 to 2

Unrestricted Cointegration Rank Test (Trace)

Hypothesized No. of CE(s)	Eigenvalue	Trace Statistic	0.05 Critical Value	Prob.**
None *	0.528547	77.25218	47.85613	0.0000
At most 1 *	0.305254	33.63992	29.79707	0.0172
At most 2	0.138059	12.51582	15.49471	0.1338
At most 3 *	0.065012	3.898829	3.841466	0.0483

Trace test indicates 2 cointegrating eqn(s) at the 0.05 level

* denotes rejection of the hypothesis at the 0.05 level

**MacKinnon-Haug-Michelis (1999) p-values

Unrestricted Cointegration Rank Test (Maximum Eigenvalue)

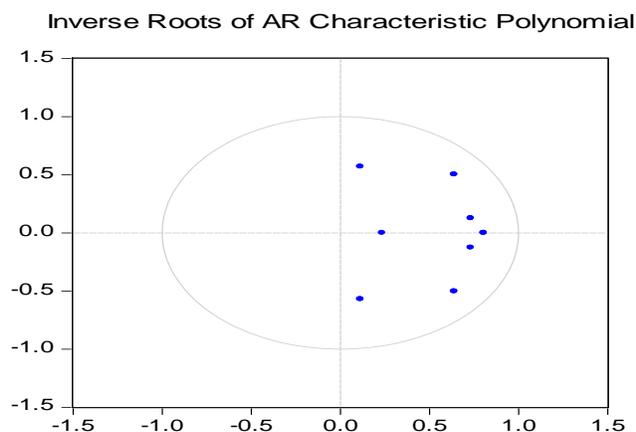
Hypothesized No. of CE(s)	Eigenvalue	Max-Eigen Statistic	0.05 Critical Value	Prob.**
None *	0.528547	43.61226	27.58434	0.0002
At most 1	0.305254	21.12410	21.13162	0.0501
At most 2	0.138059	8.616994	14.26460	0.3194
At most 3 *	0.065012	3.898829	3.841466	0.0483

Max-eigenvalue test indicates 1 cointegrating eqn(s) at the 0.05 level

* denotes rejection of the hypothesis at the 0.05 level

**MacKinnon-Haug-Michelis (1999) p-values

III. Stability Test



FIRST SCENARIO: DIRECT CHANNEL - Containing Domestic Financing

I. VAR lag order selection criteria

Endogenous variables: DOMFIN_GDP TB_RATE LENDING_RATE CPS_GDP QGDP_GAP INFL

Exogenous variables: C

Sample: 2000Q1 2015Q2

Included observations: 56

Lag	LogL	LR	FPE	AIC	SC	HQ
0	-447.8640	NA	0.441397	16.20943	16.42643	16.29356
1	-269.8811	311.4702	0.002793	11.13861	12.65762*	11.72753*
2	-220.6134	75.66099*	0.001817*	10.66477	13.48579	11.75847
3	-192.6758	36.91762	0.002722	10.95271	15.07574	12.55120
4	-156.8915	39.61829	0.003478	10.96041	16.38546	13.06369
5	-108.2814	43.40186	0.003421	10.51005*	17.23711	13.11812

* indicates lag order selected by the criterion

LR: sequential modified LR test statistic (each test at 5% level)

FPE: Final prediction error

AIC: Akaike information criterion

SC: Schwarz information criterion

HQ: Hannan-Quinn information criterion

II. Cointegration

Sample (adjusted): 2000Q3 2015Q1

Included observations: 59 after adjustments

Trend assumption: Linear deterministic trend

Series: DOMFIN_GDP TB_RATE LENDING_RATE CPS_GDP QGDP_GAP INFL

Lags interval (in first differences): 1 to 1

Unrestricted Cointegration Rank Test (Trace)

Hypothesized No. of CE(s)	Eigenvalue	Trace Statistic	0.05 Critical Value	Prob.**
None *	0.525044	122.3305	95.75366	0.0002
At most 1 *	0.482586	78.40307	69.81889	0.0088
At most 2	0.300789	39.52725	47.85613	0.2399
At most 3	0.169071	18.41686	29.79707	0.5354
At most 4	0.116340	7.489390	15.49471	0.5215
At most 5	0.003251	0.192109	3.841466	0.6612

Trace test indicates 2 cointegrating eqn(s) at the 0.05 level

* denotes rejection of the hypothesis at the 0.05 level

**MacKinnon-Haug-Michelis (1999) p-values

Unrestricted Cointegration Rank Test (Maximum Eigenvalue)

Hypothesized No. of CE(s)	Eigenvalue	Max-Eigen Statistic	0.05 Critical Value	Prob.**
None *	0.525044	43.92740	40.07757	0.0176
At most 1 *	0.482586	38.87583	33.87687	0.0116
At most 2	0.300789	21.11038	27.58434	0.2696
At most 3	0.169071	10.92747	21.13162	0.6546
At most 4	0.116340	7.297281	14.26460	0.4546
At most 5	0.003251	0.192109	3.841466	0.6612

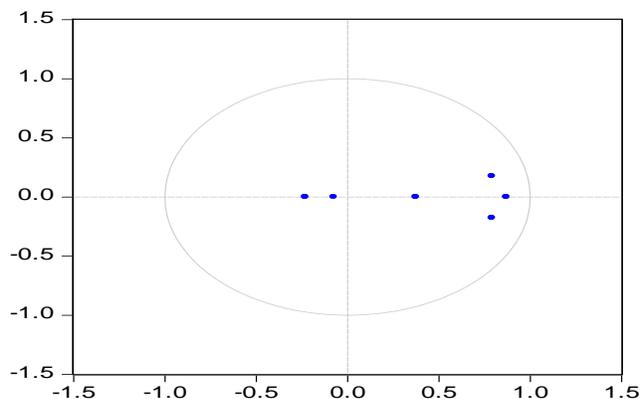
Max-eigenvalue test indicates 2 cointegrating eqn(s) at the 0.05 level

* denotes rejection of the hypothesis at the 0.05 level

**MacKinnon-Haug-Michelis (1999) p-values

III. Stability Test

Inverse Roots of AR Characteristic Polynomial



FIRST SCENARIO: EXCHANGE RATE CHANNEL - Containing foreign financing

I. VAR Lag Order Selection Criteria

Endogenous variables: FORFIN_GDP NER_PCT IMPORT_INFL INFL

Exogenous variables: C

Sample: 2000Q1 2015Q2

Included observations: 56

Lag	LogL	LR	FPE	AIC	SC	HQ
0	-542.6669	NA	3541.565	19.52382	19.66848	19.57990
1	-408.5500	244.2843	52.23514	15.30536	16.02870*	15.58579
2	-380.1325	47.70081	33.83888	14.86187	16.16389	15.36666*
3	-372.4659	11.77371	46.64054	15.15950	17.04018	15.88863
4	-364.1402	11.59644	64.14148	15.43358	17.89294	16.38707
5	-324.7309	49.26172*	29.95966*	14.59753*	17.63556	15.77537

* indicates lag order selected by the criterion

LR: sequential modified LR test statistic (each test at 5% level)

FPE: Final prediction error

AIC: Akaike information criterion

SC: Schwarz information criterion

HQ: Hannan-Quinn information criterion

II. COINTEGRATION

Sample (adjusted): 2000Q3 2015Q1

Included observations: 59 after adjustments

Trend assumption: Linear deterministic trend (restricted)

Series: FORFIN_GDP NER_PCT IMPORT_INFL INFL

Lags interval (in first differences): 1 to 1

Unrestricted Cointegration Rank Test (Trace)

Hypothesized No. of CE(s)	Eigenvalue	Trace Statistic	0.05 Critical Value	Prob.**
None *	0.339508	73.09625	63.87610	0.0069
At most 1 *	0.310929	48.62482	42.91525	0.0122
At most 2 *	0.272336	26.65254	25.87211	0.0399
At most 3	0.125254	7.895470	12.51798	0.2603

Trace test indicates 3 cointegrating eqn(s) at the 0.05 level

* denotes rejection of the hypothesis at the 0.05 level

**MacKinnon-Haug-Michelis (1999) p-values

Unrestricted Cointegration Rank Test (Maximum Eigenvalue)

Hypothesized No. of CE(s)	Eigenvalue	Max-Eigen Statistic	0.05 Critical Value	Prob.**
None	0.339508	24.47143	32.11832	0.3183
At most 1	0.310929	21.97228	25.82321	0.1488
At most 2	0.272336	18.75707	19.38704	0.0615
At most 3	0.125254	7.895470	12.51798	0.2603

Max-eigenvalue test indicates no cointegration at the 0.05 level
* denotes rejection of the hypothesis at the 0.05 level
**MacKinnon-Haug-Michelis (1999) p-values

III. Stability Test

Inverse Roots of AR Characteristic Polynomial

