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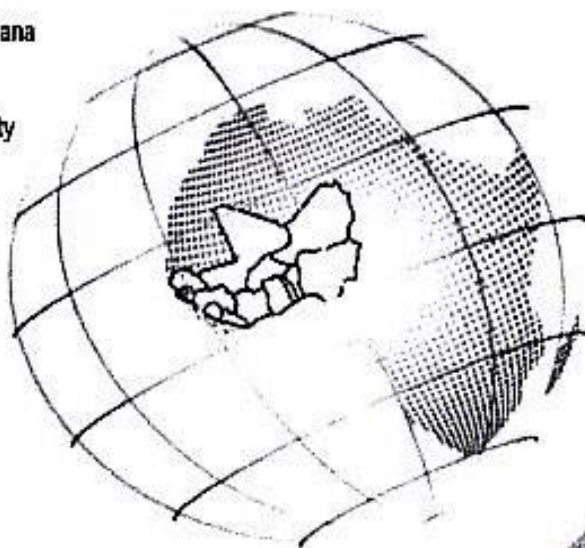
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The impact of fiscal dominance on monetary policy in Ghana

Akpan H. EKPO, Johnson P. ASIAMA and Nana K. AKOSAH

Abstract

We explore the presence of fiscal dominance in Ghana, and in particular how fiscal policy influences monetary policy. Fiscal dominance occurs when monetary policy is driven by fiscal policy, and this happens when the fiscal position of the economy effectively sets a target that monetary policy has to follow, such that monetary policy plays a subordinate role, keeping interest rates low and allowing inflation to erode the real value of government debt. We employ various tests and also estimate the monetary policy reaction function using a non-linear two-state Markov Regime Switching Model (MRSM). The results suggest evidence of fiscal dominance in Ghana over the period 2000Q1-2014Q2. The paper recommends the need for the conduct of monetary policy to internalize the fiscal stance of government, and to ensure fiscal consolidation with more effective fiscal anchors.

Key Words: *Fiscal dominance, intertemporal budget constraint, seigniorage.*

JEL Classification: E40, E52, E58, E62

1. Introduction

Fiscal dominance, by definition, is the extent to which government deficits condition the growth of the money supply. Generally, fiscal policy can affect monetary policy through: (i) inflationary process as a result of fiscal expansion requiring monetization and the effect on aggregate demand which may even be the main determinant of inflation; (ii) interest rates, (iii) exchange rates; and (iv) interest spreads. Fiscal dominance (FD), if not checked could create problems for economic management particularly monetary policy management. However, the precise impact of fiscal policy on monetary policy and vice-versa remains an empirical matter. In a period of economic depression when monetary management becomes ineffective, the aftermath of the utilization of fiscal stimulus creates further distortions when an economy finally recovers.

Fiscal developments in the ECOWAS sub-region in recent times suggest a resurgence of fiscal deficits which if not curtailed could pose problems for not only the management of individual economies but also could raise challenges for the proposed economic integration of the region (Ekpo and Afangideh, 2010). The recent global economic crisis which increased the expenditures of countries in the sub-region further underscores the importance of 'optimal' coordination between fiscal and monetary policy to ensure effective and efficient economic management. Moreover, in most of the economies in the region, deficits are not financed through the capital markets thus the heavy reliance on central banks through ways and means complicates the issue of FD. In addition, if external borrowing is an option then FD could result in excessive inflation, exchange rate instability, high interest rates etc. with inherent negative impact on growth and development. FD therefore remains one of the greatest threats to the smooth functioning of any monetary framework in the sub-region.

The main objective of this paper is to examine how fiscal policy influences monetary policy in one of the countries in the ECOWAS sub region, specifically Ghana. A research on the issue is important given the recent trends in central bank financing in the midst of fiscal imbalances over the last couple of years in the particularly country. The paper is organised in six sections. Section two (2) reviews the recent macroeconomic developments in Ghana and also outlines some of the fiscal trends in recent times. Section three (3) reviews the related literature with emphasis on the theoretical and empirical underpinnings. Section four (4) presents the empirical analyses; while Section five (5) discusses the findings. Section six (6) concludes the study with policy recommendations.

2. Background

2.1 Recent Macroeconomic Developments in Ghana

Ghana's economy recorded significant output expansion over the last two decades with real GDP averaging 8.3 percent from 2007 to 2012 in spite of the global economic slowdown. The economy grew consistently from 3.7 percent in 2000 to 7.9 percent in 2012 even though economic growth in 2013 subsequently fell below the target of 8.0 percent. The period also

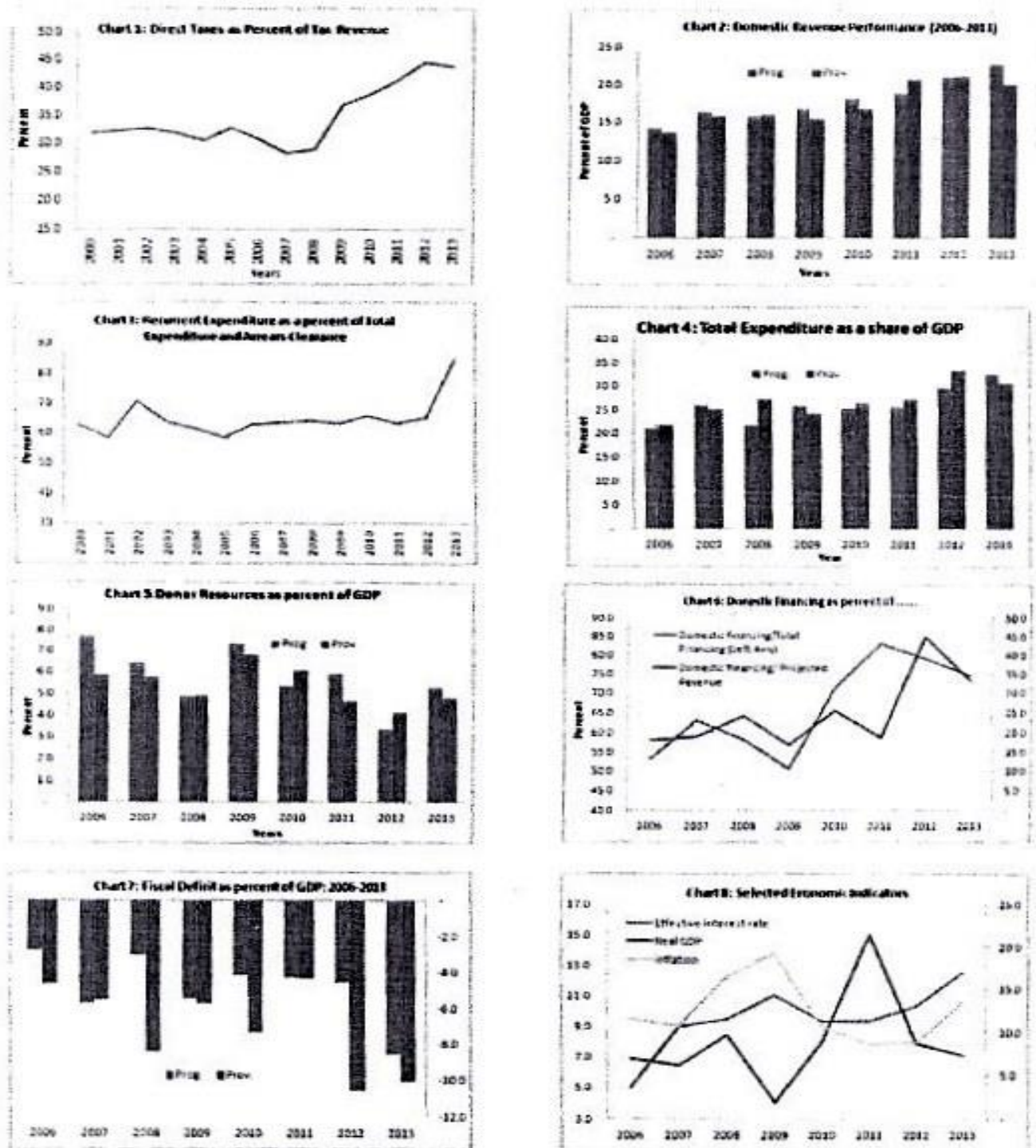
covered the declaration of Highly Indebted Poor Country (HIPC) status in the context of an IMF Program from 2002-06 and an ECF Program from 2009-12. This significant debt relief provided the country some fiscal space that enabled the Government to embark on critical infrastructure investments, particularly in energy and road sectors, as well as targeted social spending. The period also witnessed the commencement of production and export of petroleum in 2011, as prospects for Ghana's oil and gas resources attracted large foreign direct investment inflows. The rebasing of GDP in 2010 and the onset of oil production in 2011 boosted Ghana's growth further. This resulted in an improvement in per capita income from US\$1,292.5 in 2010 to US\$1,570 in 2012, and placed the country within a Lower Middle-Income Country (LMIC) category.

These developments led to a change in the country's classification by the multilateral institutions and, hence, its access to concessional financing. At the same time, Ghana has had to contend with the negative impact of winding down of stimulus and quantitative easing (QE) programs that were designed to stimulate growth in the major global economies. The main impact on the economy has been the continued slump in gold and cocoa prices on the international commodity markets which worsened external sector performance in 2013 and the first quarter of 2014, and continue to exert pressure on the country's international reserves. In 2013, a number of measures were taken to contain the mounting fiscal pressures among others. These included, the imposition of new direct and indirect taxes, moratorium on the award of new contracts, moratorium on the contracting of new loans, net freeze on employment into some sectors of the public service, refinancing of short term expensive debt, and adjustment of petroleum prices, among others. Even though these measures are helping to improve the situation, the adverse global and domestic pressures continue to pose challenges to economic management generally.

Generally, economic developments over the last two years were driven by volatility in prices of Ghana's major export commodities (cocoa and gold) as well as domestic pressures that impacted on the general economy. The persistent fiscal pressures and deteriorating external balances led to pressures in the foreign exchange market and a reduction in the country's international reserves, as inflation and inflation expectations also mounted due to cost push factors such as adjustments in petroleum and utility prices. To contain these pressures, the Bank of Ghana in 2014 implemented a cumulative 300 basis point increase in the policy rate this year and tightened the reserve requirements of banks while reducing the net open position for foreign Exchange. Additional measures were also taken to restore macroeconomic stability. These include the recent successful floatation of the \$1 billion Eurobond which is to be used to fund capital expenditure in the 2014 Budget as well as providing counterpart funding for pipeline projects and the refinancing of domestic and external debt.

There are early indications of declining pressures in the foreign exchange markets, as the earlier policy measures work through the system. The inflows from Ghana's third Eurobond which was issued in October 2014 and proceeds from the cocoa syndicated loan have evidently helped to boost liquidity on the foreign exchange market, while a formal engagement with the IMF could further support fiscal consolidation and provide balance of payments buffers. The declining pressure in the forex market is expected to continue with the onset of gas production which would also reduce the oil import bill going forward. These developments are expected

to help shore up the country's gross international reserves above prudential levels.
Figure 1: Fiscal Trends in Ghana



2.2 Trends in Fiscal Performance in Ghana

Ghana was on the path toward fiscal sustainability thanks to the HIPC/MDRI initiatives that were introduced in the early 2000s. The authorities were able to utilize the fiscal space created, coupled with the introduction of some new taxes, to successfully engineer fiscal consolidation that saw the overall level of fiscal deficit (cash basis) reduced from 9.81 percent of GDP in 2000 to 2.96 percent of GDP in 2005. The stock of public debt which was 187.3% of GDP in 2000, also declined to a low of 26.2% of GDP in 2006. Total interest payments as a share of total revenue also reduced from a high of 42.3 percent in 2000 to 15.3 percent in 2005, significantly reducing the burden of debt service on public finance. Things however turned different again from 2006 and this has brought to the fore, discussions about the inherent structural weaknesses in Ghana's revenue mobilization capacity and poor public financial management systems, in spite of decades of reforms in these areas.

One of the difficulties of revenue mobilization has been the existence of a large informal sector, and how to mobilise appropriate tax revenues from the sector. Consequently, the country depends largely on the formal sector for direct taxes as well as international trade taxes. For example, as seen in Chart 1, although direct taxes as a share of total taxes witnessed some improvement from an average of 31.2 percent over 2000-2008 to almost 37.0 percent from 2009, it has remained largely below 45 percent, even with the onset of oil production and the associated revenues from 2011. Another area of concern is about the setting of annual revenue targets. As seen in Chart 2, revenue targets have been missed for most of the years, over the period 2006-2013, suggesting either a non-effective forecasting framework or over optimism about revenues.

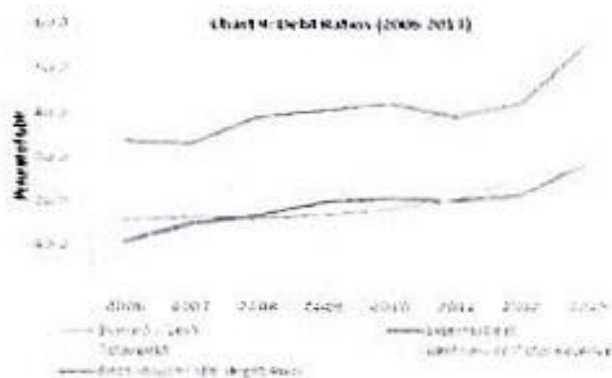
In 2009, the three tax revenue agencies, the Customs, Excise and Preventive Service (CEPS), the Internal Revenue Service (IRS), the Value Added Tax Service (VATS) and the Revenue Agencies Governing Board (RAGB) Secretariat were merged in accordance with the Ghana Revenue Authority Act 2009 (Act 791). This was done with the view to bring a number of benefits to taxpayers and tax administration; reduced administrative and tax compliance cost; better service delivery; Improved departmental information flow; holistic approach to domestic tax and customs administration; and enhanced revenue mobilization. This notwithstanding, the envisaged benefits from the restructuring of the revenue agencies are yet to be seen. In particular, this could be seen by adjusting for oil revenues for 2011-2013 which contributed an average of 1.46 percent of GDP, as well as the upward revision in GDP numbers in 2011.

Government's spending since 2006 has been generally high both relative to domestic revenue outturns and annual spending ceilings (compare Chart 2 and 4). The surge in spending in 2006 was to address the energy challenges in 2006, which probably started the new round of fiscal profligacy. In 2007, Ghana celebrated 50 years of nationhood with its associated large spending programs. Then the onset of the global financial crisis, coupled with some domestic activity regarding election 2008 and CAN 2008¹ widened significantly the gap between the end year spending outturn and the annual target. Spending restraint aimed at

1- (French: Coupe d'Afrique des Nations, also referred to as African Cup of Nations, African Nations Cup)

achieving some consolidation from 2009 was short-lived, as spending ceilings were breached consistently from 2010 to 2012. In particular, the relics of election 2012 coupled with the implementation of the Single Spine Pay Policy once again stretched the narrowed fiscal space which had placed public finance under severe stress resulting in austere fiscal measures in the 2014 budget statement aimed at some adjustment. It would be observed from figure 3, that disproportionately significant amount of government's spending has been executed in favour of recurrent expenditure, denying the country the opportunity to invest in critical capital projects to spearhead its growth agenda. After almost two decades of implementing a public financial management reform program (PUFMARP) which culminated in the launching of the Ghana Integrated Financial Management and Information System (GIFMIS), efficient management of public finance with the view to eliminating waste and getting value for money is still a challenge.

Ghana's fiscal operations are also susceptible to donor flows (both bilateral and multilateral). There have been instances where due to perceived lack of domestic effort and short falls in meeting some required conditions, donors failed to honour their pledges which always had a severe toll on the budget. Donor resources² since 2006 has generally experienced significant shortfalls which have been replaced with higher levels of domestic financing with its resultant crowding out effects. The country's inability to synchronize its spending programmes with its revenue mobilization capacities has resulted in persistent fiscal deficit levels at variance with programmed limits. With the exception of 2007, the fiscal targets have been consistently breached, a testament of the difficulties with the country's consolidation efforts.



It is evident from Chart 6, that besides the significant portion of total budget financing being domestically driven, the legal limit in the Bank of Ghana Act 2002, which restricts domestic financing of government's budget to the tune of 10 percent of projected revenues in the current year has hardly been met, not to think of the ECOWAS benchmark of central bank financing of 10 percent of previous year's tax revenue. It stands to reason that years of running budget deficits with overshooting annual deficit targets have

built some momentum in the evolution of the stock of public debt. The total public debt that amounted to US\$5,296.57 million (26.1% of GDP) in 2006, increased to US\$ 7,988.79 million (36.1% of GDP) in 2008 and further surged to US\$18,067.45 million (46.5% of GDP) and US\$23,454.55 million (55.2% of GDP) in 2012 and 2013 respectively. As seen in Chart 9, all the debt ratios are moving upward.

Ghana's access to concessional external borrowing has muted subsequent to completion of the enhanced HIPC initiative and the attainment of lower middle income status. Currently, the country borrows a lot from domestic sources and the international capital market with

2 - Define to include programme and project, loans and grants.

relatively higher debt servicing implications. From Chart 8, the average effective interest rate (defined as total interest payments/total stock of public debt) for 2006 to 2013 was 7.5 percent compared with an average real GDP growth rate of 8.1 percent (7.1% excluding 2011) for the same period. This implies that if this trend should continue, the cost of Ghana's total debt could outstrip the benefits generated from the debt.

TABLE 2: Ghana's Performance on the ECOWAS Convergence Criteria

| Primary Convergence Criteria | 2006 | 2007 | 2008 | 2009 | 2010 | 2011 | 2012 | 2013 |
|------------------------------------------------------------------------------------------------|-------|-------|--------|-------|-------|-------|-------|-------|
| Ratio of budget deficit (excluding grants) to Nominal GDP (commitment basis) $\leq 3\%$ of GDP | -6,38 | -8,86 | -10,64 | -7,04 | -8,22 | -3,03 | -7,07 | -8,07 |
| Ceiling on central bank Financing of budget deficit $\leq 10\%$ of Prev. Yr Tax Rev. | -9,86 | 15,63 | 17,28 | -2,16 | -3,92 | 10,5 | 22,47 | 9,41 |
| Secondary Convergence Criteria | | | | | | | | |
| Tax revenue / GDP Ratio $\geq 20\%$ of GDP | 12,44 | 14,31 | 14,25 | 12,73 | 13,62 | 17,37 | 17,24 | 15,31 |
| Salary mass / Tax revenue ratio $\leq 30\%$ of Tax revenue | 47,58 | 42,83 | 46,23 | 53,22 | 50,56 | 46,39 | 53,8 | 56,72 |
| Capital expenditure/Tax revenue $\geq 20\%$ of Tax revenue | 24,43 | 27,28 | 36,39 | 15,07 | 18,05 | 20,08 | 19,67 | 11,82 |

Source: MOFEP and authors' calculations

From table 2, Ghana's performance relative to some of the primary and secondary convergence criteria of ECOWAS has also not been encouraging. With the exception of the criteria on the ceiling for central bank financing of budget deficit where some successes were achieved, albeit on few occasions, the country largely and consistently failed as indicated above.

2.3 Evidence of Fiscal Dominance



A simple way to assess the dominance of fiscal policy on the path of monetary policy could be a plot of net claims on government as a ratio of the central bank's balance sheet, and to check for trends in the relationship. In the case of Ghana (Chart 10), the trend has been erratic since 2006. The ratio began to fall from 2005 thanks to relief from the HIPC/MDRI initiatives, and it got as far down as 12% of reserve money by 2007. In 2008, the ratio climbed back to as high as 68

percent apparently due to the impact of fiscal pressures brought on by the global financial crisis as well as increased government spending related to the national elections held that year. Thereafter, the trend declined again steadily until June 2011 before it began to pick up again sharply and currently almost equals the size of the central bank's balance sheet.

Even though monetary and fiscal policy coordination in Ghana is not formalized per se, there are frameworks for broad policy discussions and consultations between the monetary and fiscal authorities. The key committees whose functions have some elements of coordination include the Economic Management Team (EMT), Monetary Policy Committee, and the various technical committees which are constituted between the two institutions. The EMT is chaired by the Vice President of the Republic, and comprises the Finance Minister, the Governor of the Bank of Ghana, and other economic experts appointed from the private sector. The Finance Ministry is represented by two members of the MPC although they are expected to be independent in their roles. Finally, the budget process is also consultative with a high extent of coordination. The budget is formulated with inputs from various institutions such as the Bank of Ghana, business community, academia, and civil society organizations. After the budget is completed, it is submitted to Parliament where it goes through a lot of scrutiny before it is finally approved. In sum, there is an appreciable extent of fiscal and monetary policy coordination in Ghana. However, given the developments in fiscal stresses on the balance sheet of the central bank, the framework needs to be formalized and institutionalized to guide coordination efforts going forward.

3. Literature Review³

3.1 Theoretical Literature

The concept of *fiscal dominance* refers to a situation in which monetary policy is driven by fiscal policy. Theoretically, and as demonstrated by King and Plosser (1985), the effect of fiscal policy on monetary policy can be illustrated with a basic model as below. Assume a t -single period government budget constraint of the form:

$$D_t - D_{t-1} = G_t + TR_t + R_{t-1}D_{t-1} - Z_t - T_t \quad (3.1)$$

where D_t is the stock of public debt in year- t , R_t is nominal interest rate; TR_t is nominal transfer payments; Z_t is funds transferred from the Central bank to Treasury, (in other words, the seigniorage) and T_t is tax revenue.

We can divide all variables in equation (3.1) by the product of real income Y_t and the price level P_t and solving forward⁴ to obtain:

$$d_t + \sum_{j=1}^{\infty} \gamma_{t+j} g_{t+j} = \sum_{j=1}^{\infty} \gamma_{t+j} (\tau_{t+j} + z_{t+j}) \quad (3.2)$$

where lower case letters denote the fact that the variables have been divided by nominal income and γ_{t+j} denotes one plus real income growth divided by one plus the real interest rate. Thus, equation (3.2) represents the intertemporal budget constraint. To integrate monetary policy

3 - A disproportionately large share of the recent literature associated with fiscal dominance (Blanchard, 2004; Favero and Giavazzi, 2004; Razin and Sadka, 2004; Tanner and Ramos, 2002) focuses on Brazil, apparently because Brazil's perceived to be particularly susceptible to fiscal dominance.

4 - The real interest rate is denoted as $(1+r_{t,t}) = P_{t+1} \frac{(1+R_{t,t})}{P_t}$

in this intertemporal budget constraint, consider a t single-period behaviour of the Central bank⁵ :

$$F_t - F_{t-1} = r_{t-1}F_{t-1} + (MB_t - MB_{t-1}) - Z_t \quad (3.3)$$

where F_t is the stock of assets held by the Central bank in year t and MB is the monetary base. Transforming these variables in the same way as those of the single-period budget constraint and substituting Z in equation (2.2), the consolidated intertemporal budget constraint becomes:

$$(d_t - f_t) + \sum_{j=1}^{\infty} \gamma_j g_{t+j} = \sum_{j=1}^{\infty} \gamma_j (\tau_{t+j} + \Delta mb_{t,j}) \quad (3.4)$$

where $\Delta mb_{t,j} = mb_{t+j} - mb_{t,j}$

According to this constraint, fiscal policy is dominant when the fiscal authorities autonomously fix the path of spending, taxation and debt; leaving the monetary authorities to decide only about the rhythm of money creation revenues to satisfy such an intertemporal budget constraint. Thus, under a regime of fiscal dominance, the theoretical relationship is between deficits and the present value of the revenue from seigniorage. This implies that the hypothesis of fiscal dominance requires the existence of a dynamic causal link from deficits to money creation. Empirically, the interaction between monetary and fiscal policy has been investigated by several economists with different tendencies. One strand of the literature examines the issues related to the coordination of monetary and fiscal policy. Others examined the channels through which fiscal actions affect monetary variables emphasizing the constraints imposed by fiscal policy on central banks.

Fiscal policy can affect monetary policy in different ways such as: (i) through the impact of government inter-temporal budget constraint on monetary policy; and (ii) via the effect of fiscal policy on a list of monetary variables such as interest rates, interest spreads, and exchange rates. Consequently, fiscal dominance may be defined as "a situation in which the government adopts a stance that is incompatible with sustaining low inflation without recourse to distortionary measures such as heavy taxation of financial intermediations through reserve requirements or more draconian restrictions such as those underpinning the multiple exchange rate regimes prevalent in much of Africa throughout the 1980s" (Adam, 2008). Under extreme fiscal dominance, the actions of the central banks become fully subsumed to the over-riding requirements of funding fiscal deficits, so that it loses control over the size and composition of its balance sheet. Thus, its capacity to separate liquidity management objectives from its government funding obligations eliminates its capacity to conduct monetary policy beyond the very short-run.

In recent times, the fiscal theory of the price level has indicated another channel through which the monetary authority can lose control of inflation, even in the case of an independent central bank that need not accept seigniorage targets dictated by the treasury (Cochrane, 1999, Bergin 2000; Benhabib, et al 2001; Sala, 2003; Afonso, 2002). The fiscal theory of the price

5 - See King and Plosser (1985)

level perceives the government's inter-temporal budget constraint as an equilibrium condition and maintains that, "if the sequence of future budget surpluses is exogenously given, the price level is the only variable that can make the stock of nominal bonds inherited from the past consistent with the present value of these primary surpluses. Hence, it is the government's inter-temporal budget constraint that determines the price level" (Zoli, 2005, p.3).

The fiscal theory of the price level challenges the traditional notion that inflation is always and everywhere a monetary phenomenon (monetary dominance) and argues that rising and uncontrolled budget deficits may accelerate inflation if economic agents expect that monetary independence will not be possible under rising government debt. Thus, high inflation induced by expansionary fiscal policy may hinder the conduct of monetary policy (fiscal dominance). Consequently, the monetary authority will have to adjust to accommodate fiscal policy. Regarding the relationship between fiscal policy and interest rates, there appears to be some consensus that higher fiscal deficits are linked with higher intermediate-term and long-term interest rates.

3.2 Empirical Literature

The issues concerning the interaction between monetary and fiscal policy have long been subjected to empirical analysis in developed as well as emerging economies. However, studies on developing countries particularly sub-Saharan Africa (SSA) have been scanty. The present study is relevant in that regard.

Sargeant and Wallace (1981) discussed the difficulties of running monetary policy in an environment where fiscal policy is unsustainable. They introduce the concept of a "monetary dominant" regime, where the central bank independently sets monetary policy versus a "fiscal dominant" regime in which the fiscal authority independently sets its budget, announcing current and future deficits and thus determining the amount of revenues that must be raised through bond sales and seignorage. Sargeant and Wallace indicate that, under this second regime, the monetary authority loses its ability to control inflation whenever the real rate of interest exceeds the growth rate of the economy. Within that context, a decline in monetary growth today, meant to reduce inflation, will increase the debt to GDP ratio, as bond finance replaces money finance, thus raising interest payment and deficits in the future. Consequently, deficit financing will increase the debt to GDP ratio, as bond finance replaces money finance, thus raising interest payment and deficits in the future. Therefore, deficit financing will require more money growth which will in turn generate higher inflation. Most studies on industrialized countries have indicated mixed results (Melitz, 2002; Wyplosz, 1999; Favero, 2002; Von Hagen et al, 2002).

Melitz (2002) estimated reaction functions on a pool of 19 OECD countries for the period 1960-95 and found that monetary and fiscal policies have tended to move in opposite directions. Favero (2002) concludes that stabilization of inflation has been achieved independently from the absence of fiscal discipline, supporting the notion that the monetary authorities in the euro area have been able to affect inflation rates. Favero and Monacelli (2003) also found some evidence of fiscal dominance in the United states during the period 1960 - 87.

Agénor and Montiel (1996) and Easterly et al (1994) found some evidence of a significant impact of fiscal deficits and real interest rates. Fiscal policy can also affect exchange rate movements and exchange rate policy. However, the theoretical effect of a fiscal action on exchange rates depends on the changes in sovereign default risk, on the openness of the capital account, and on the exchange rate system. The evidence on the impact of fiscal policy on exchange rate movement is mixed. For developed countries, some studies found a positive and significant relationship between fiscal expansion and the exchange rate (Feldstein, 1986; Melvin et al, 1989. Beck, 1993). Others do not find any statistically significant relationship (McMillan and Koray, 1990; Chan, 1991; Kopits, 2000).

A very recent study on the subject matter investigates the cyclical behaviour of fiscal and monetary policy in Kenya during the period (1979 – 2007) using an output gap as a benchmark (Nyamongo et al 2010). Their findings show that fiscal and monetary policy coordination in Kenya was absent in some years while monetary dominance was evident in few years. Furthermore, fiscal and monetary policy exhibited pro-cyclical and countercyclical behaviour and that even years in which both fiscal and monetary policies were not coordinated, the economy maintained macroeconomic stability. According to Adams (2008), what matters from a monetary policy perspective, is not just the *ex post* fiscal outcome but also the *ex ante* risk that fiscal dominance problems might re-emerge and, in particular, that the private sector doubts the willingness of the fiscal authorities, or capacity, to resist such pressures.

Empirical work for emerging market countries includes Tanner and Ramos (2002), who evaluate whether the policy regime in Brazil during the 1990s can be better characterized as fiscal or monetary dominant. Another study on Brazil by Loyo (2000) find evidence consistent with the fiscal theory of the price level where a tight monetary policy along with loose fiscal policy resulted in hyperinflation even without seignorage increase. A relatively recent study by Baldini and Ribinciro (2008) reported that in the case of Sub-Saharan Africa for the period 1980-2005, the evidence was mixed. Their findings suggest that whilst some countries were dominated by fiscal regime, others were dominated by monetary regimes and some still had no clear results. They also reported that changes in nominal debt impact price variability via aggregate demand effects suggesting that fiscal outcomes could be a direct source of inflation variability, as predicted by the fiscal theory of price level. The results of these studies seem to suggest that fiscal dominance might be an issue for developing economies just as for developed ones.

4. Methodology

4.1 Testing for Fiscal Dominance

Generally, it is straight forward to show the difference between a monetary dominant (MD) regime in which the government adjusts primary balances to limit debt accumulation and a fiscal dominant (FD) regime where fiscal balances are set independently of public sector liabilities. Yet, it is a challenge to build a formal test to discriminate between MD and FD. Following Canzoneri et al. (2001) and Tanner et al. (2002), an empirical test for fiscal dominance can also be done based on the VAR model. This model allows an assessment as to whether primary

balances⁶ are set exogenously and independently from public sector liabilities in the country of interest:

$$X_t = a_0 + a_1 X_{t-1} + a_2 X_{t-2} + a_j X_{t-j} + U_t \quad (4.1)$$

where:

- X_t = real primary balances, real public sector liabilities
- a_j = vector of coefficients
- u_t = vector of error terms

From equation (4.1), considering the temporary relationships running from current liabilities to future primary balances, a MD regime is ruled out if future primary balances respond negatively to increases in liabilities or if no relationship exists between the two variables implying that primary balances are exogenous. A positive relationship between current primary balance innovations and future liabilities could indicate that higher primary balances are created to compensate for positive changes in liabilities in order to limit debt accumulation, which would be consistent with a MD regime. But considering the fiscal theory of the price level, a positive relationship could arise also under the FD regime in which the price level falls and the real value of liabilities increases in anticipation of future highest primary balances (Zoli, 2005). In addition, under a MD regime, considering the temporal relationship from current primary balances to future liabilities, current innovations to primary balances should be negatively related to future government liabilities since increases in the primary balances would be used to pay down the debt. However, under an FD regime, there would be no relationship between shocks to current primary balances and future government liabilities.

From the above, it is possible to discriminate between a MD and FD regime by performing Granger Causality tests that evaluates whether lagged values of public sector liabilities help to explain current movements in primary balances and vice versa. Also, to account for possible lags in the variable responses, impulse responses functions can help in determining the effect of the relationship between the variables over-time. The benefits of this approach are that it allows for the estimation of a relatively small number of parameters and does not impose any structure on the economy. From equation (4.1), the model in estimated form is stated as:

$$\Delta RPB_t = \delta_0 + \sum_{j=1} \delta_j \Delta RPB_{t-j} + \sum_{j=1} \beta_j \Delta LIAB_{t-j} + \varepsilon_t \quad (4.2)$$

$$\Delta LIAB_t = \theta_0 + \sum_{j=1} \vartheta_j \Delta RPB_{t-j} + \sum_{j=1} \gamma_j \Delta LIAB_{t-j} + \eta_t \quad (4.3)$$

where ΔRPB = change in real primary balance
 $\Delta LIAB$ = change in real public sector liabilities

6 - The primary balance excludes payment from the fiscal balance to reflect current fiscal stance. It measures how the current fiscal stance affects the net indebtedness of the public sector. Because interest payments are the result of past deficits, excluding them from the fiscal balance provides a transparent measure of current behavior. The measure is useful in determining the long-term sustainability of fiscal policy. "If an economy is to sustain high long-run growth above the real rate of interest, the primary balance must at some point become positive to allow repayment of interest on current government debt" (Oshikoya et al, 2010, p.91)

(Zoli, 2005) performed equations (4.2) and (4.3) on six emerging markets (Argentina, Brazil, Colombia, Mexico, Poland and Thailand) for the periods 1990s and 2000s. The results did not distinguish unambiguously between periods of fiscal dominance (FD) and monetary dominance (MD). FD were found in Argentina, Brazil during the 1990s and early 2000s; but for Thailand, Poland, Colombia and Mexico the results were ambiguous. Based on data availability, equations (4.2) and (4.3) are applied to Ghana for the period 2000Q1 – 2014Q2. Data was mainly sourced from the Bank of Ghana, Ministry of Finance and the Ghana Statistical Service.

As shown from the specification in equation (4.4), fiscal policy is dominant when the fiscal authorities autonomously fix the path of spending, taxation and debt; leaving the monetary authorities to decide the path of money creation revenues to satisfy the intertemporal budget constraint. Hence, in the presence of fiscal dominance, the theoretical relationship is between deficits and the present value of the revenue from seigniorage. This follows that the hypothesis of fiscal dominance requires the existence of a dynamic causal link from deficits to money creation. We therefore augment the VAR with a monetary variable.

4.2 Assessing the Effect of Fiscal Policy on Monetary Policy

The VAR approach examines the dynamic relationship between public sector liabilities and primary deficits to determine whether deficits are exogenously set, independent of public sector liabilities – prerequisite for fiscal dominance. However, the test says nothing about the behaviour of the monetary authority and how fiscal policy affects monetary policy. It is necessary to ascertain the coordination between monetary and fiscal policy. Theoretically, the interaction could be explained by analyzing the reaction function of the central bank.

$$r_t = f(r_{t-1}, INF_{t-1}, Y_{pg}, \Delta PB) \quad (4.4)$$

$$r_t = b_0 + b_1 r_{t-1} + b_2 INF_{t-1} + b_3 Ygap_{t-1} + b_4 PB_{t-1} + V_t \quad (4.5)$$

where:

r_t = monetary policy rate

INF = annual inflation rate

Y_{pg} = Output gap is the difference between actual output and potential output

ΔPB = change in real primary balance

V_t = error term

Since Ghana's monetary policy is based on inflation targeting, the estimated equation is:

$$r_t = b_0 + b_1 r_{t-1} + b_2 (INF^e - INF^x) + b_3 Ygap_{t-1} + b_4 PB_{t-1} + V_t \quad (4.6)$$

where

INF^e = expected inflation at time t.

INF^x = inflation target

Equations (4.4) and (4.5) can assist in the evaluation of the direct impact of fiscal policy on monetary policy, over and above the indirect effect through aggregate demand pressures and inflation. A significant and positive relation between primary balances and the monetary policy rate would support the notion that the Central Bank loosens in response to increases in budget deficits supporting the contention that fiscal expansion could eventually trigger a monetary relaxation. No significant relation between the two variables would suggest that fiscal policy does not affect the conduct of monetary policy directly. But a significant and negative relation between primary balances and the policy rate could suggest that monetary and fiscal policy move in opposite directions, affecting each other.

5. Empirical Results

5.1 Unit Root Tests

We examined the time series properties of the variables in the model by performing both Augmented Dickey-Fuller (ADF) and Philip-Perron (PP) unit root tests. Both tests included a constant, a constant and linear time trend, or neither of the two in the test regressions, assuming a null hypothesis of non-stationarity against the alternative of stationarity. Table 3 shows the results of both ADF and PP unit root tests. The results from both ADF and PP tests showed primary balance to GDP ratio (PRIMBG) and output gap (YGAP)⁷ to be stationary, $I(0)$, at levels, while log of nominal cedi-dollar exchange rate (LXRATE), log of public debt (LLPUD) and Monetary Policy rate (MPR) exhibited non-stationary properties, $I(1)$ at levels.

TABLE 2: Unit Root Test Results

| | ADF Tests | | | | PP Tests | | | |
|--------|-----------|-----------|---------------------|------------------|----------|-----------|---------------------|------------------|
| | None | Intercept | Intercept and Trend | First Difference | None | Intercept | Intercept and Trend | First Difference |
| MPR | 0.27 | 0.34 | 0.89 | 0.00* | 0.22 | 0.42 | 0.95 | 0.00* |
| INF | 0.35 | 0.33 | 0.19 | 0.00* | 0.30 | 0.17 | 0.05*** | 0.00* |
| PRIMBG | 0.00* | 0.00* | 0.00* | 0.00* | 0.00* | 0.00* | 0.00* | 0.00* |
| LLPUD | 1.00 | 0.99 | 0.98 | 0.00* | 1.00 | 0.99 | 0.98 | 0.00* |
| YGAP | 0.00* | 0.00* | 0.00* | 0.00* | 0.00* | 0.00* | 0.00* | 0.00* |
| LXRATE | 0.99 | 1.00 | 0.94 | 0.00* | 0.66 | 0.89 | 0.40 | 0.00* |
| PUBDG | 0.03** | 0.18 | 0.98 | 0.02** | 0.11 | 0.72 | 0.70 | 0.00* |

Note: *, ** & *** denotes 1%, 5% and 10% significant levels resp.

the other hand, while ADF test showed (CPI inflation (INF) to be non-stationary at level, the PP test however established a trend stationary for CPI inflation at levels. In addition, public debt to GDP ratio (PUBDG) however exhibited stationary properties without trend or

7 - YGAP was computed using Hodrick-Prescott (HP) filter.

intercept from the ADF but this was contradicted by the PP test which indicated a stationary property for PUBDG only at first difference.

5.2 Granger Causality Test

In testing for fiscal dominance, we investigated the direction of causality between primary balance and public liability (debt), all scaled by GDP. The result from Pairwise Granger Causality test is displayed in table 3. There is evidence that public sector liabilities Granger cause primary balances as the lagged orders of the former showed significant impacts on the latter. Indeed, a graphical illustration (chart 10) using a plot of net claims on government and the central bank's balance sheet also gave some indication of the presence of fiscal dominance.

TABLE 3: Pairwise Granger-Causality Test Result

| Null Hypothesis: | lag 1 | lag 2 |
|-------------------------------------|---------|-----------|
| PUBDG does not Granger Cause PRIMBG | [0.00]* | [0.06]*** |
| PRIMBG does not Granger Cause PUBDG | [0.35] | [0.55] |

Note: *, ** & *** denote 1%, 5% & 10% significant levels respectively

As exhibited in Table 3, the test established a one-way causality, running from public liability to primary balance. This implies that the response of fiscal authority to rising public liability is inadequate to obviate debt build-up, and suggests that monetary policy is largely subjugated by the fiscal policy.

5.3 Evidence from the VAR model: Impulse Response and Variance Decomposition

We further discriminated between fiscal dominance (FD) and monetary dominance (MD) using a bivariate impulse-response and variance decomposition functions from VAR framework that comprised primary balance and public liability, all scaled by GDP. Consistent with the preceding results, a significant positive response of primary balance to innovations in public liability was only noticed during the 3rd quarter (see, Figure 11). However, no significant negative response of public liability to innovations in primary balance was established for the entire 16 quarters.

Figure 11: Response of Primary Balance to Innovations in Public Debt

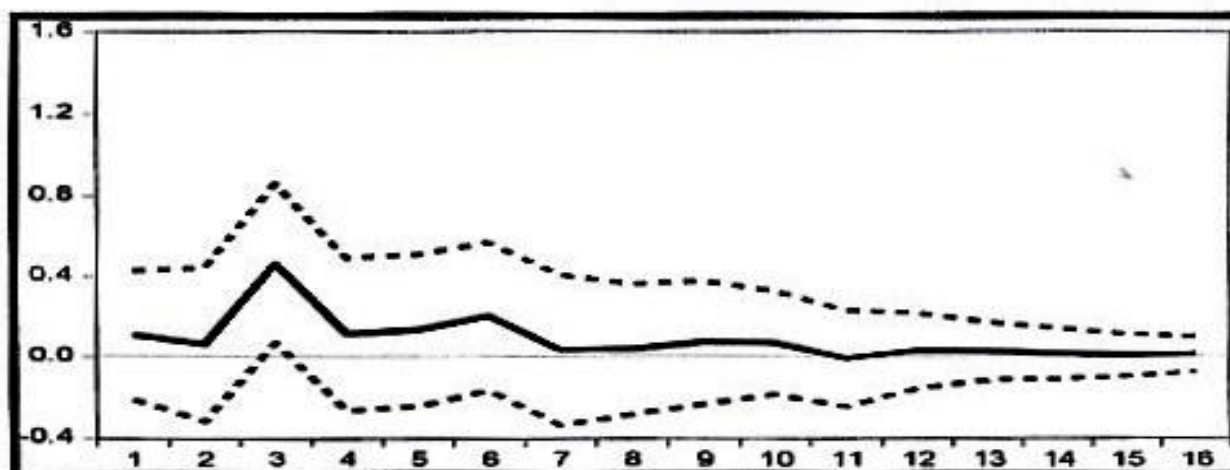
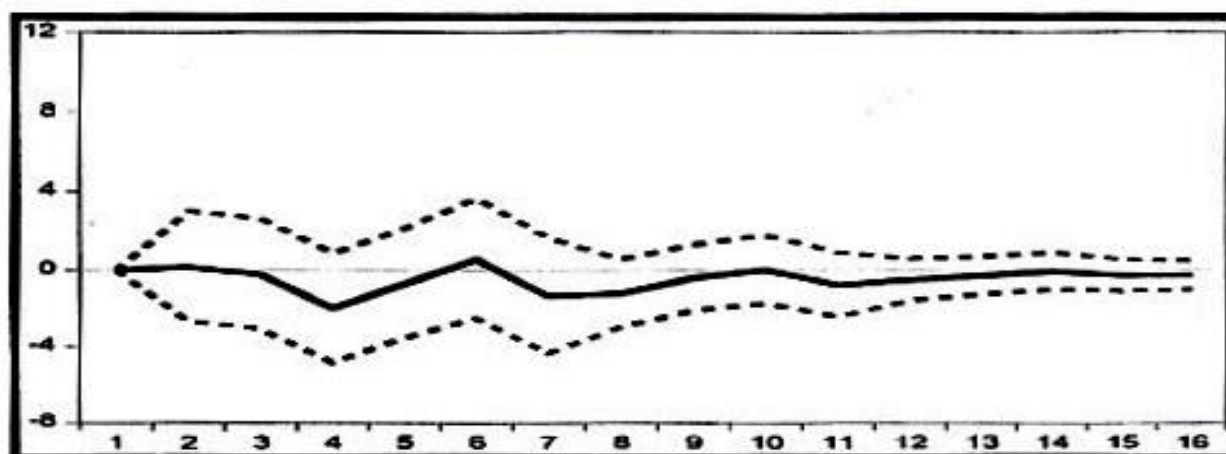


Figure 12: Response of Public Debt to Innovations in Primary Balance



Similarly, the results from the variance decomposition in table 3 also indicate a much greater or increasing explanation of public debt to the variations in primary balance, than the reverse explanation of the latter to changes in the former.

TABLE 3: Variance Decomposition Results

| Period | Variance decomposition of PRIMBG: | | Variance Decomposition of Δ PUBDG: | |
|--------|-----------------------------------|--------|-------------------------------------------|--------|
| | Δ PUBDG | PRIMBG | Δ PUBDG | PRIMBG |
| 1 | 0.9 | 99.1 | 100.0 | 0.0 |
| 2 | 1.1 | 98.9 | 100.0 | 0.0 |
| 3 | 13.8 | 86.2 | 99.9 | 0.1 |
| 4 | 13.2 | 86.8 | 95.5 | 4.5 |
| 5 | 13.7 | 86.3 | 95.8 | 4.2 |
| 6 | 15.4 | 84.6 | 95.6 | 4.4 |
| 7 | 15.1 | 84.9 | 94.1 | 5.9 |
| 8 | 15.0 | 85.0 | 93.0 | 7.0 |
| 9 | 15.2 | 84.8 | 93.0 | 7.0 |
| 10 | 15.4 | 84.6 | 93.0 | 7.0 |

While public liability explained approximately 13% of the variations in primary balance at the end of the 4th quarter, primary balance only explains less than 5% of the variation in public liabilities during the same period. This reinforces the dominant role of fiscal policy in the Ghanaian economy.

5.4 Effect of Fiscal Policy on Monetary Policy

We further evaluated the effect of fiscal policy on monetary policy by estimating monetary policy reaction function based on equations 4.5 and 4.6 above. We augmented the models by controlling for two key factors including election cycle effects which often associated with large fiscal overruns and nominal exchange rate depreciation which among others results in rising stock of public (external) debt. Besides the primary balance indicator, we examined the direct and the indirect effect of public liability on monetary policy rate decision by including log of total public liability and an interaction term for lagged public debt and inflation, respectively. The interaction term between public debt and inflation helps to evaluate how monetary policy reacts to inflationary pressures induced by fiscal vulnerabilities. In addition, since election cycles in Ghana are often characterized by fiscal excesses, we also introduced an interaction term for election dummy and previous levels of primary balance in order to capture monetary policy reaction to changes in primary balance during election years. Table 4 shows the linearly specified parametric estimates of the monetary policy reaction function in the case of Ghana. As exhibited in Panels A to E, all the coefficients had the expected signs and the models generally satisfied the diagnostic tests with the exception of Panel A which violated the tests for normal distribution (Panel B also) and model stability (both Ramsey Reset and Cusum of squares tests).

TABLE 4: Linearly Specified Estimation Results for Monetary Policy Reaction Function (MPRF)

| <i>Dependent Variable: ΔMPR</i> | | | | | |
|----------------------------------------------------|-----------------------|-----------------------|-----------------------|-----------------------|-----------------------|
| | <i>Panel A</i> | <i>Panel B</i> | <i>Panel C</i> | <i>Panel D</i> | <i>Panel E</i> |
| <i>Variable</i> | <i>Coeff[P-Value]</i> | <i>Coeff[P-Value]</i> | <i>Coeff[P-Value]</i> | <i>Coeff[P-Value]</i> | <i>Coeff[P-Value]</i> |
| <i>C</i> | -0.11[0.51] | -0.49[0.00]* | -0.49[0.00]* | -0.46[0.00]* | -0.49[0.00]* |
| ΔINF_{t-1} | 0.07[0.02]** | 0.11[0.00]* | 0.06[0.07]*** | 0.06[0.06]*** | 0.06[0.07]** |
| $PRIMBG_{t-1}$ | -0.19[0.09]** | -0.32[0.02]** | -0.27[0.00]* | 0.28[0.00]* | -0.27[0.00]* |
| $YGAP_{t-1}$ | 0.02[0.45] | | | | 0.01[0.49] |
| $\Delta LPUD_{t-1}$ | | | 2.03[0.00] | 2.08[0.00]* | 2.01[0.00]* |
| $\Delta LPUD_{t-1} * DINF$ | | 0.02[0.00]* | 2.076[0.00]* | 2.061[0.00]* | 2.75[0.00]* |
| $ELECDUM_t$ | | 0.70[0.03]** | 0.080[0.00]* | 0.080[0.00]* | 0.79[0.00]* |
| $ELECDUM * PRIMBG_{t-1}$ | | 0.53[0.02]** | 0.44[0.00]* | 0.47[0.00]* | 0.44[0.00]* |
| $\Delta LXRATE_{t-1}$ | | 9.41[0.00]* | 6.44[0.01]** | 5.71[0.06]*** | 6.60[0.01]** |
| ΔMPR_{t-1} | 0.27[0.00]* | | | 0.06[0.38] | |
| <i>Adjusted R-squared</i> | 0.16 | 0.48 | 0.65 | 0.64 | 0.64 |
| <i>Sum squared resid</i> | 58.47 | 34.43 | 11.47 | 11.36 | 11.42 |
| <i>Log likelihood</i> | -75.85 | -61.62 | -32.35 | -32.13 | -32.24 |
| <i>F-statistic</i> | 3.45 | 8.65 | 11.81 | 10.10 | 10.09 |
| <i>Prob(S-statistic)</i> | [0.01]* | [0.00]* | [0.00]* | [0.00]* | [0.00]* |
| <i>Schwarz criterion</i> | 3.36 | 3.01 | 2.25 | 2.33 | 2.33 |
| <i>Durbin-Watson stat</i> | 1.92 | 1.92 | 2.21 | 2.27 | 2.22 |
| <i>Observations</i> | 51 | 50 | 42 | 42 | 42 |
| <i>Normality Test</i> | [0.00]* | [0.00]* | [0.73] | [0.63] | [0.81] |
| <i>Serial Correlation LM Test:</i> | [0.82] | [0.34] | [0.38] | [0.34] | [0.16] |
| <i>Heteroskedasticity Test</i> | [0.35] | [0.18] | [0.98] | [0.99] | [0.97] |
| <i>Ramsey RESET Test</i> | [0.05]** | [0.95] | [0.27] | [0.19] | [0.90] |
| <i>Cusum Test</i> | Within | Within | Within | Within | Within |
| <i>Cusum of Squares Test</i> | Not Within | Within | Within | Within | Within |

Note: *, ** & *** denote 1%, 5% & 10% significant levels respectively

Importantly, the monetary policy rate (MPR) has significant negative response to changes in primary balance, implying that rising primary deficits are countered by monetary policy tightening (hike in monetary policy rate) and the opposite is also true. The magnitude of the coefficient also suggests that a 1% increase in primary deficit to GDP ratio leads to an approximately 27 basis points (bps) increase in MPR. The positive response of MPR to changes in primary deficit reaffirms the dominance of fiscal policy over monetary policy as the direction of the latter is largely dictated by the behaviour of the former.

In addition, MPR has positive and significant response to lagged changes in inflation, growth in public liability and previous nominal exchange rate depreciations. A percentage increase in lagged inflation, public debt and nominal exchange rate depreciation reflects increases in MPR by approximately 6 bps, 204 bps and 704 bps respectively for the sample period. Although output gap had the expected positive sign, it was generally insignificant.

On the other hand, monetary authority tends to tighten monetary policy during election cycles. This is indicated by a positive and highly significant coefficient of election dummy which suggests an average shift in the intercept of MPR by 80 bps during election years. In the same vein, the interaction term for election dummy and lagged primary balance assumes a positive and significant coefficient, also indicating an upward shift in the slope of MPR during election years. Similarly, monetary policy responds positively to inflationary episodes precipitated by public debt as the interaction term for lagged public liability and changes in inflation has a positive and significant coefficient.

Notwithstanding the lucid preponderance of fiscal policy over monetary policy, we verified the robustness of the linear estimates by carrying out BDS test on the residuals to assess model mis-specification and possibly an omitted non-linear structure as well as investigating for potential structural breaks using Quandt-Andrews Unknown Breakpoint and Chow Breakpoint tests. The rationale for the unknown test was to allow the model to identify the break and verified with the subsequent test. The BDS independent test developed by Brock, Dechert and Scheinkman (1987) is designed for the null hypothesis of independent and identical distribution (iid) of the residual for the purpose of detecting non-random "chaotic" dynamic (that is the series follows a non-linear deterministic process but looks random). In this case, if the null hypothesis cannot be rejected, then the original model cannot be rejected. However, if the null hypothesis is rejected, then the fitted linear model is mis-specified and hence, warranting the use of nonlinear models.

Table 5 displays the results of the BDS independent tests on the residuals generated from Panel E. The BDS tests on the residuals generated from models in Panel C to E reject the null hypotheses of the respective models at least 5% significant levels after the 4th correlation dimensions. This connotes that the models in Table 4 were mis-specified and possibly omitted a nonlinear structure.

TABLE 5: BDS test of Independent and identical distribution (iid) of residuals

| Dimension | Residuals from Panel C | | | Residuals from Panel E | | | Residuals from Panel D | | |
|-----------|------------------------|-------------|-------|------------------------|-------------|-------|------------------------|-------------|-------|
| | BDS Statistic | z-Statistic | Prob. | BDS Statistic | z-Statistic | Prob. | BDS Statistic | z-Statistic | Prob. |
| 2 | 0.002 | 0.180 | 0.857 | -0.004 | -0.317 | 0.751 | 0.000 | -0.46 | 0.964 |
| 3 | -0.027 | -1.532 | 0.126 | -0.026 | -1.405 | 0.160 | -0.030 | -1.700 | 0.089 |
| 4 | -0.051 | -2.392 | 0.017 | -0.051 | -2.226 | 0.026 | -0.050 | -2.358 | 0.018 |
| 5 | -0.045 | -1.990 | 0.047 | -0.043 | -1.801 | 0.072 | -0.039 | -1.740 | 0.082 |
| 6 | -0.068 | -3.043 | 0.002 | -0.079 | -3.340 | 0.001 | -0.061 | -2.766 | 0.006 |
| 7 | -0.063 | -2.992 | 0.003 | -0.078 | -3.535 | 0.000 | -0.053 | -2.567 | 0.010 |
| 8 | -0.044 | -2.321 | 0.020 | -0.056 | -2.820 | 0.005 | -0.036 | -1.901 | 0.057 |

Table 6 presents the results of the tests for possible structural breaks in the data from Quandt-Andrews unknown breakpoints test and Chow Breakpoint tests. The upper panel (UP) of Table 6 displays the result of Quandt-Andrew unknown breakpoint test while the lower panel (LP) exhibits the result of the Chows test. Both tests identified a structural break at the period 2006Q2 as the respective null hypothesis of no breakpoint is rejected at 10% significant level or better. The identified breakpoint was not surprising as it was associated with two major events, namely the period with the multilateral debt relief under the HIPC/MDRI which led to significant external (also overall government) debt reduction as well as the rebasing of the Ghanaian economy.

TABLE 6: Test for Structural Breaks

| A: Quandt-Andrews unknown breakpoint test | | | |
|--------------------------------------------------------------------|--------|---------------------|-------|
| <i>Null Hypothesis: No breakpoint within 15% trimmed data</i> | | | |
| Statistic | Value | | Prob. |
| Maximum LR F-statistic (2006Q2) | 3.821 | | 0.071 |
| Maximum Wald F-statistic (2006Q2) | 15.285 | | 0.071 |
| Exp LR F-statistic | 1.198 | | 0.068 |
| Exp Wald F-statistic | 5.526 | | 0.035 |
| Average LR F-statistic | 2.264 | | 0.011 |
| Average Wald F-statistic | 9.055 | | 0.011 |
| <i>Note: probabilities calculated using Hansen's (1997) method</i> | | | |
| B: Chow Breakpoint Test 2006Q2 | | | |
| <i>Null Hypothesis: No breaks at specified breakpoints</i> | | | |
| F-statistic | 2.234 | Prob. F(5,46) | 0.067 |
| Log likelihood ratio | 12.174 | Prob. chi-Square(5) | 0.031 |
| Wald statistic | 11.170 | Prob. chi-Square(5) | 0.041 |

In view of the rejection of null hypothesis of linearity and the evidence of structural break, our decision to use a non-linear regime switching model in this study is justified. We therefore proceeded to capture the structural break and any possible non-linear dynamics in the time series by fitting a non-parametric monetary policy reaction function to ascertain how the central bank reacts to fiscal developments. In this approach, the monetary policy reaction function was estimated using non-linear two-state Markov Regime Switching Model (MRSM) in equation (4.7) below:

$$MPR_t = \alpha(S_t) + \beta(S_t)primbg_{t-1} + \theta(S_t)ygap_{t-1} + \theta(S_t)\Delta inf_{t-1} + \theta(S_t)C_t + \sigma(S_t)\mu_t, \dots \dots \dots (4.7)$$

where *primbg_t* represents primary balance to GDP ratio, *inf_{t-1}* is previous debt to GDP ratio, *ygap_{t-1}* is lagged output gap, *C_t* is vector of other macroeconomic variables such nominal exchange rate depreciation (LXRATE), lagged public liabilities (LPUD_{t-1}), election cycle dummy (ELECDUM), dummy for 2006Q2 structural breakpoint (BREAK2006), interaction terms and lagged dependent variable; and *S_t* represents the policy regime that follows a two-state Markov chain with transition probability matrix:

$$\begin{pmatrix} \lambda_{11} & 1 - \lambda_{22} \\ 1 - \lambda_{11} & \lambda_{22} \end{pmatrix},$$

whose (*i,j*) element indicates the probability that the policy regime move to Regime *i* from Regime *j*. The usual interpretation of "regimes" would be different monetary policy stance by different administration. The structural break dummy also entered the model either as a common parameter for both regimes or as a regime specific parameter to ascertain its relative importance.

Table 7 presents the results of the MRSM with the upper panel (UP) showing the outcomes of regime 1, while the middle panel (MP) displays the results for regime 2. This is followed by the results for the common parameter variables, then the transitory probability and lastly the model diagnostics. Also Panel F presents results of a simple-regime switching model (SRSM), while Panels G to J contain the results of MRSM. The SRSM estimation was essentially used to verify the MRSM results, and these were consistent. The coefficient of the structural break dummy (BREAK2006) was significant both as a common parameter (positive) and regime specific parameter (negative and significant in regime 2). In addition, the coefficient of log (sigma) was negative and significant, lending support to the use of non-linear model.

In general, the results in Table 7 were consistent with the earlier linearly estimated results in Table 4 as the explanatory variables largely maintained their respective sign. The results confirm a significant and positive response of MPR to rising primary deficit, rising inflation, high nominal exchange rate depreciation, rapid public debt accumulation and its pass-through to inflation (interaction) as well as political election cycle effect. In addition, the coefficient of lagged MPR was generally positive and statistically significant for both regimes, averaging 21 bps in regime 1 compared to 144 bps in regime 2. This suggests that not only do monetary authorities consider the evolution of MPR within the policy process, but also the magnitude of lagged MPR, especially in regime 2, indicates a considerable inertia in the decision process

of the Monetary Policy Committee (MPC). However, the response of MPR to previous developments in output gap appears to be generally mixed and insubstantial.

In terms of relative responses, MPR reacts substantially to rapid nominal exchange rate depreciation, followed by fiscal developments that expose the economy to elevated current and economic risks such as rising public debt accumulation and its pass through to inflation as well as rising primary deficits triggered by election cycles. In synthesis, we established that monetary authorities in Ghana have higher tendency to react almost instantaneously and aggressively to fiscal policy developments in the quest to mollify the pass through of the latter to inflation and nominal exchange rate depreciation.

TABLE 7: Non-Linear Simple and Markov Switching Results

| | Panel F | Panel G | Panel H | Panel I | Panel J |
|---------------------------|----------------|----------------|----------------|----------------|----------------|
| <i>Regime 1</i> | | | | | |
| Variable | Coeff[P-Value] | Coeff[P-Value] | Coeff[P-Value] | Coeff[P-Value] | Coeff[P-Value] |
| C | -018[0.16] | 010[0.51] | -0.22[0.09]*** | -0.06[0.52] | -015[0.21] |
| ΔINF_{t-1} | 0.03[0.18] | 0.03[0.29] | 0.001[0.95] | -0.02[0.37] | 0.01[0.43] |
| $PRIMBG_{t-1}$ | -0.18[0.07]*** | -0.11[0.28] | -0.23[0.00]* | -0.10[0.06]*** | -0.16[0.02]* |
| $YGAP_{t-1}$ | 0.02[0.59] | 0.00[0.97] | 0.03[0.39] | 0.001[0.98] | 0.01[0.73] |
| ΔMPR_{t-1} | 0.21[0.05]*** | 0.23[0.03]** | 0.22[0.00]* | 0.20[0.00]* | 0.17[0.01]* |
| $\Delta LPUD_{t-1}$ | | | -1.81[0.17] | -1.46[0.15] | -3.06[0.00] |
| $\Delta LXRATE_{t-1}$ | | | 10.56[0.00]* | 7.73[0.00]* | 8.66[0.00] |
| $\Delta LUPD_{t-1}$ *DINF | | | | 0.01[0.94] | -0.03[0.85] |
| BREAK2006 | | -0.06[0.92] | | | |
| ELECDUM | | -0.07[0.81] | | | |
| <i>Regime 2</i> | | | | | |
| C | 0.40[0.41] | 0.46[0.35] | 0.28[0.41] | 0.02[0.92] | -1.83[0.00] |
| ΔINF_{t-1} | 1.13[0.00]* | 0.01[0.91] | 0.57[0.00]* | 0.07[0.05]*** | 0.22[0.01]* |
| $PRIMBG_{t-1}$ | 0.14[0.79] | -2.54[0.00]* | 0.94[0.00] | -2.32[0.00]* | -0.44[0.03] |
| $YGAP_{t-1}$ | 0.01[0.97] | -0.10[0.52] | 0.01[0.93] | -0.11[0.25] | -0.61[0.00] |
| ΔMPR_{t-1} | 0.80[0.04]** | 1.55[0.00]* | 2.78[0.00]* | 1.01[0.00]* | 1.05[0.02]* |
| $\Delta LPUD_{t-1}$ | | | 1.56[0.18] | 11.71[0.00]* | 5.22[0.00] |
| $\Delta LXRATE_{t-1}$ | | | 4.55[0.51] | -6.49[0.08]*** | 18.20[0.07] |
| $\Delta LUPD_{t-1}$ *DINF | | | | 3.43[0.00]*** | 3.15[0.00] |
| BREAK2006 | | -6.46[0.00]* | | | |
| ELECDUM | | 2.41[0.00]* | | | |
| <i>Common Parameters</i> | | | | | |
| BREAK2006 | | | | | 0.30[0.09]* |
| LOG(SIGMA) | -0.31[0.01]** | -0.42[0.00]* | -0.71[0.00]* | -1.03[0.03]** | 1.33[0.00] |

| <i>Transition Matrix Parameters</i> | | | | | |
|-------------------------------------|-------------|--------------|--------------|--------------|--------------|
| P1-C | 2.01[0.00]* | | | | |
| P11-C | | 1.49[0.01]** | 1.37[0.02]** | 1.03[0.03]** | 1.33[0.00]* |
| P21-C | | 1.03[0.49] | 22.66[0.97] | 2.16[0.15] | 2.28[0.09]** |
| log likelihood | -72.57 | -72.70 | -56.21 | -48.10 | -47.30 |
| Sum squared resid | 71.96 | 80.97 | 64.93 | 86.33 | 71.04 |
| Durbin-Watson stat | 1.89 | 1.90 | 1.83 | 1.82 | 1.86 |
| Schar criterion | 3.45 | 3.82 | 3.23 | 3.08 | 3.13 |
| Prob [Normality Test] | [0.10] | [0.58] | [0.23] | [0.37] | [0.92] |
| No. of Observations | 56 | 56 | 56 | 56 | 56 |

Note: *, ** & *** denote 1%, 5% & 10% significant levels respectively; Dependent Variable is ΔMPR_t

6. Conclusion and Policy Recommendations

This paper uses alternative quantitative approaches to examine the presence of fiscal dominance in Ghana during the period 2000Q1 to 2014Q2, and explores how fiscal policy influences monetary policy. Fiscal dominance occurs when the fiscal position of the economy effectively sets a target that monetary policy has to follow; such that monetary policy plays a subordinate role, keeps interest rates low and allows inflation to erode the real value of government debt. By contrast, monetary dominance implies that fiscal policy plays a passive role while monetary policy goes about keeping inflation under control without a concern about the adverse effect of higher interest rates on the ability of governments to sustain the debt burden. More recently, the fiscal theory of the price level also introduced the argument that monetary policy needs to accommodate fiscal dominance by providing lower real interest rates as inflation rises.

From the empirical analysis of the subject matter and also trends in net claims on government on the balance sheet of the central bank, there is evidence of fiscal dominance in Ghana over the period of the study. The evidence of fiscal dominance suggests: (i) a problem of coordination between monetary authorities and government; (ii) a need for the central bank to adhere to legal limits on central bank financing of government deficits (iii) a need to intensify efforts at expanding the domestic resource base to deal with deficits, and (iv) a need to deepen the market for private bonds as an alternative source of financing.

Other suggestions include the need for the conduct of monetary policy to be coordinated well with the fiscal stance of government if monetary policy is to be effective. Furthermore, the literature suggests that the link between fiscal and monetary variables change with different levels of financial development and inflation. Hence, the need to promote financial development as a way to strengthen the conduct of monetary policy. Finally, the role of fiscal consolidation cannot be overemphasised. Going by the experience of emerging markets, a successful fiscal consolidation wipes out the constraint of fiscal dominance and restores the potentials of traditional monetary policy and inflation targeting for example.

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