How does fiscal policy affect monetary policy in the Southern African Community (SADC)?

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How Does Fiscal Policy Affect Monetary Policy in Southern African Development Community (SADC)?

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Abstract

Fiscal policy can affect monetary policy either through debt monetisation or through a direct effect on price dynamics. The former is the conventional classical view rooted in the quantity theory of money while the latter is the modern view of the Fiscal Theory of Price Determination. Based on the dynamic response of inflation to different shocks, we test the relationship between fiscal balances and monetary stability in 10 SADC countries. Results show that five out of 10 countries considered here were characterised throughout the period 1980-2006 by fiscally dominant regimes, with weak or no response of primary surpluses to public liabilities. The remaining five countries exhibit a monetary dominant regime. The study also finds that changes in primary surpluses affect price variability via aggregate demand, suggesting that fiscal outcomes could be a direct source of inflation variability, hence, the need for policy coordination in the region.

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I. INTRODUCTION

Understanding the nature of the relationship between monetary and fiscal policy is central in the process of designing institution for macroeconomic stability and growth. In the debate about the process of African integration the issue of the correct policy framework that each country should follow is an important part of the policy discussion.

The main preoccupation of policy makers is that undisciplined fiscal policies could jeopardize monetary stability for the whole Southern Africa. In a "fiscal dominant" regime, where the fiscal authority sets the budget independently of public sector liabilities; a fiscal expansion may eventually require monetization, and result in higher inflation. However money creation may not be the only channel through which fiscal policy becomes dominant. Fiscal dominant regime may also arise when fiscal policy is not sustainable and government bonds are considered net wealth.[3] The implication is that fiscal policy can be the main determinant of inflation.

This paper tests the nature of fiscal and monetary policy interdependence in SADC. The main objective is to investigate whether fiscal policy is dominating monetary policy and whether fiscal instability contributes directly to the price dynamics.

The paper is organised as follows. In the next section we review some of the debate about fiscal and monetary policy interdependence, with a particular attention paid to the so called Fiscal Theory of Price Determination (FTPD). In the second part, using data for the period 1980-2006 for 10 Southern African countries, we investigate whether some of the implications of the FTPD are indeed a feature of the SADC region. The last section concludes.

II. THE INTERTEMPORAL APPROACH TO FISCAL AND MONETARY POLICY INTERDEPENDENCE

Modern analysis of interdependence between monetary and fiscal policy has a central point of reference in the seminal paper by Sargent and Wallace (1981) "Unpleasant Monetarist Arithmetic". The main objective of the paper was to show that, even in a pure monetarist framework, unbounded fiscal policy produces negative spillover effects on monetary policy, and ultimately it can undermine the ability of monetary policy to control inflation.

This conclusion largely based on the "assumption" that permanent budget deficits must be eventually monetized. Not surprisingly, with an exogenous stream of budget deficits, there is only one integral of money creation that is consistent with long run equilibrium (in term of

[3] See Woodford (1998).

satisfaction of agents trasversality conditions), and the only choice in the hand of the monetary authority is the time profile of money creation.

In the words of Sargent and Wallace: "Without help from the fiscal authorities, fighting current inflation with tight monetary policy must eventually lead to higher future inflation".

On the other hand, the introduction of rational expectations has the effect of anticipating the inflationary pressure at time zero. This eliminates even the possibility of choosing the desired time profile of inflation consistent with the long run solvency of the public sector.

But the most influential result of the Sargent and Wallace contribution has probably been the fact that the policy conflict between fiscal and monetary policy could be resolved simply by assigning policy leadership to the Central Bank. If it was possible to give the "first move" to the monetary authority, then the fiscal authority would be constrained in its policy choice by the amount of seignorage provided by the Central Bank.

In fact, in the Sargent and Wallace model, the monetary authority is the loser of the policy game simply because is not able to influence the spending decision of the fiscal authority. Sargent and Wallace themselves recognise that the conflict could be resolved with appropriate institutional arrangements. As they say "One can imagine a monetary authority sufficiently powerful vis-à-vis the fiscal authority that by the imposition of a slower rates of growth of base money, both now and into indefinite future, it can successfully constrain fiscal policy by telling the fiscal authority how much seignorage it can expect now and in the future".

A recent stream of research (Woodford 1995,1996 Sims,1993,1995, and Bergin, 1997a, 1997b), building on previous works of Calvo (1990) and Leeper (1991) among others, has renovated the interest in the analysis of the interrelation between monetary and fiscal policy, partly questioning the conclusions derived from the Sargent and Wallace approach. The main innovation introduced by these contributions is that the interrelation between fiscal policy on one side, and monetary policy and the private sector on the other, manifests itself through changes in the level of prices that moves to achieve public sector solvency, independently of the institutional arrangements between fiscal and monetary authority.

Variables like net government liabilities and expectations regarding the stream of future surpluses are given an immediate role in the determination of the equilibrium price level. If the government's solvency condition were not satisfied at a particular point in time, (i.e. the stream of current and expected future surpluses would not pay the existing debt) price will move to ensure that it does hold.

The first goal of this approach to monetary and fiscal policy interdependence is to derive conditions under which the level of price is determined even in a regime of nominal short run interest rate targeting. In the quantity theory tradition, when the monetary authority targets the nominal interest rate, it supplies any amount of money demanded by the private sector. Given that the demand of money is a demand for real money balances, a given quantity of real money can be determined by an infinite number of combinations of nominal money supply and prices, producing indeterminate levels of prices and money stocks (Patinkin, 1961, Sargent and Wallace, 1975). On the contrary, the fiscal theory of price determination (FTPD) finds an anchor for the price level in the dynamics of expected future fiscal surpluses.

The basic mechanism behind the theory can be illustrated using an infinite horizon model with money in the utility function similar to the one used by Bergin(1997).In this model, a representative agent solves a standard optimisation problem,

$$\max_{B,M} U(C) = E_{t-1}\left[\sum_{t=0}^{\infty}\beta^{t}\left(\log C_t + \mu \log\frac{M_t}{P_t}\right)\right] \tag{1}$$

subject to

$$C_t + \frac{B_t}{P_t} + \frac{M_t}{P_t} = (1+i_{t-1})\frac{B_{t-1}}{P_t} + \frac{M_{t-1}}{P_t} + Y_t - \tau_t \tag{2}$$

and

$$B_t \geq 0 \qquad M_t \geq 0 \qquad C_t \geq 0$$

where all the variables have the standard meaning, i_t is the nominal interest rate, the income Y_t is an independent and normally distributed positive random variables and τ is a lump sum tax imposed by the government. The government budget constraint, expressed in nominal term, is:

$$B_t + P_t\tau_t = (1+i_{t-1})B_{t-1} - (M_t - M_{t-1}) \tag{3}$$

The government must fix two of the five variables in (3), or define a function for each of them, in order for the model to be complete. The other three variables will then be determined by the private agent first order conditions. The F.O.C are given by:

$$\frac{\delta U}{\delta C}: \qquad \frac{1}{C_t} = \lambda_t \tag{4}$$

$$\frac{\delta U}{\delta B}: \qquad \frac{1}{P_t C_t} = \beta(1+i_{t-1})E\frac{1}{P_{t+1}C_{t+1}} \tag{5}$$

$$\frac{\delta U}{\delta M}: \qquad \frac{M_t}{P_t} = \mu \frac{1+i_t}{i_t} C_t \tag{6}$$

Suppose that the government follows a policy of nominal interest rate targeting and fixes *i* and the level of taxes. Then the government budget constraint divided by P_tC_t is given by:

$$\frac{B_t}{P_t C_t} = \frac{P_{t-1}C_{t-1}}{P_t C_t}\left(\left(1+\bar{i}\right)\frac{B_{t-1}}{P_{t-1}C_{t-1}} + \frac{M_{t-1}}{P_{t-1}C_{t-1}}\right) - \frac{M_t}{P_t C_t} - \frac{\tau}{C_t} \tag{7}$$

Taking the expectations of (7) and using the private sector FOCs and the fact that in equilibrium is C=Y, we have (using condition 5 and 6):

$$E_{t-1}\left(\frac{B_t}{P_t Y_t}\right) = \beta^{-1}\frac{B_{t-1}}{P_{t-1}Y_{t-1}} - \tau E_{t-1}\left(Y_{-1t}^{-1}\right) - \mu\left[\frac{1-\beta-\beta\bar{i}}{\beta\bar{i}}\right] \tag{8}$$

Equation (8) is an unstable difference equation (β<1), with the last term representing the expected constant seignorage revenues, given the policy pegging nominal interest rate. Condition (8) has a single stable solution, as:

$$\frac{B}{PY} = \frac{\beta}{1-\beta}\left[\tau E_{t-1}\left(Y_t^{-1}\right) + \mu\xi\right] \tag{9}$$

where ξ is the constant term in equation (8). Given the level of taxes and the nominal interest rate, (9) is the only value of real debt compatible with the solvency of the public sector. Implicitly (9) represents the net present value of expected future surpluses, therefore any movement in the present income, or taxes or interest rate will produce a movement in prices such that the intertemporal budget constraint of the public sector is satisfied. Substituting this equilibrium value of future surpluses, called Φ, in (7) it is possible to express the movement in prices respect the other real variable in the model:

$$\frac{P_t}{P_{t-1}} = \frac{\left(1+i_t\right)Y_{t-1}\Phi}{\Phi Y_t + \tau + \left(\mu\xi\right)} \tag{10}$$

Equation (10) shows the relation between income and price dynamics when the government follows an exogenous fiscal policy as the one studied by Sargent and Wallace.

This negative correlation between movements in prices and movement in real income is determined only by the particular fiscal policy followed by the Government. A level of income greater then its trend value eases the pressure on the level of prices coming from the fiscal side, therefore reducing the level of prices itself. On the other hand the fiscal authorities can

influence the level of prices via changes in the tax rate with a result that is observationally equivalent to the traditional demand effects of fiscal policy of the Keynesian tradition. A reduction in taxes increases the wealth effect of the debt outstanding, thus increasing private demand and prices until the real value of debt has not came back at its sustainable value.

The mechanism behind this relation totally depends on the wealth effect of public debt. In what is this approach differ from the traditional way to describe the determination of fiscal policy effects in a General Equilibrium Model? In building up a general equilibrium model similar to the one described above, it is usual practice to close the model with two trasversality conditions, one for each agent. On one hand a rational private agent is required to plan is consumption-leisure choice in such a way that in the limit he will use all his available resources:

$$E_t\left\{\sum_{s=t}^{\infty}\left(\frac{1}{1+r}\right)^{s-t}C_s\right\}=(1+r)\frac{B_t}{P_t}+\frac{M_t}{P_t}+E_t\left\{\sum_{s=t}^{\infty}\left(\frac{1}{1+r}\right)^{s-t}[(Y_s-\tau_s)]\right\}$$

On the other hand the same condition is also imposed on the behaviour of the government derived by integrating forward with a condition like (3), and imposing the final condition

$$\lim_{i\to\infty}\left(\frac{1}{1+r}\right)^{t+i}\frac{B_{t+i}}{P_{t+i}}=0 \text{ or}$$

$$D_t=\sum_{i=0}^{\infty}\left(\frac{1}{1+r}\right)^{t+i-1}(\tau_{t+i}) \qquad (11)$$

where D is the real value of debt issued by the government. As argued by Buiter (1998) "These decision rules determine, jointly with the market clearing conditions, initial conditions and other system wide constraints, the equilibrium sequences of prices. The Budget constraints must be satisfied, however, both for equilibrium and for out of equilibrium sequences of endogenous variables in order for these budget constraints to co-determine these equilibrium sequences" (pp17-18). But in doing so, the equilibrium is imposed "ex ante", as a condition for the formulation of the model itself, and it is not the result, ex post, of possible disequilibrium dynamics.

In the FTPD instead, because the actual fiscal policy is expressed in nominal terms but the trasversality condition (11) is expressed in real terms, it is possible that a disequilibrium behaviour of the government produces a movement in prices that generates a new equilibrium in which (11) is satisfied at an higher nominal debt and an higher level of prices. Only a policy

that explicitly follows a Ricardian rule, as defined by (11), produces total independence of prices from fiscal dynamics.

For example, consider the case of a government following a tax policy that adjusts the level of taxes to the level of real debt, as:

$$\tau_t = -\theta_0 + \theta_1 \frac{B_t}{P_t} \tag{12}$$

Substituting this policy rule in the budget constraint (8) we obtain:

$$E_{t-1}\left(\frac{B_t}{P_t Y_t}\right) = \beta^{-1}\frac{B_{t-1}}{P_{t-1}Y_{t-1}} + \theta_0 E_{t-1}\left(Y_{-1t}^{-1}\right) - \theta_1 E_{t-1}\left(\frac{B_t}{P_t Y_t}\right) - \mu\left[E_{t-1}(Y_t) - \beta^{-1}Y_{t-1}\right]$$

or, simplifying:

$$E_{t-1}\left(\frac{B_t}{P_t Y_t}\right) = \frac{1}{\left[(1+\theta_1)\beta\right]}\frac{B_{t-1}}{P_{t-1}Y_{t-1}} + \frac{1}{(1+\theta_1)}\left\{\theta_0 E_{t-1}\left(Y_{-1t}^{-1}\right) - \mu\left[E_{t-1}(Y_t) - \beta^{-1}Y_{t-1}\right]\right\} \tag{13}$$

that is a stable difference equation as long as $(1+\theta_1)\beta$ is greater than 1. The meaning of equation (13) is pretty obvious: if taxes react to the increase in debt strongly enough, equation (13) is stable and a policy of pegging the level of prices does not conflict with the equilibrium of the public sector[4].

It is clear that the above approach greatly reduces the role of the monetary authorities in determining the price level and, at the same time, casts serious doubt that the independence of the central bank should be the sole instrument for price stability. As argued by Posen (1993), Central Bank independence is not the instrument for achieving price stability by itself, but is the way in which the fiscal authorities have signalled to the market their willingness to stabilise the fiscal position, therefore achieving price stability through a change in fiscal stance. On the other hand monetary policy independence cannot achieve price stability without a fiscal policy coherent with that objective.

This possible characteristic of monetary and fiscal policy interaction matters when thinking at process of economic integration and monetary cooperation. The possibility to delegate monetary policy to an independent and supranational institution is not going to provide real

[4] - Leeper (1991), Sims (1994) and Canzoneri and Diba (1997) separately analyse the all possible rules that provide the same stability condition than (13), demonstrating that even less stringent rules than the one illustrated can provide the same "Ricardian" result (as defined by Woodford, 1995). Bergin (1998) analyses the same rules in a monetary union and concludes that the Maastricht rules are sufficient but not necessary to achieve Ricardian fiscal policies.

and nominal stability if fiscal policy does not operate in a stabilizing manner. Ultimately the issue is an empirical one. Do countries in Southern Africa have a fiscal dominant or a monetary dominant regime, or, in other words, is inflation in Southern Africa a monetary or a fiscal phenomenon? These are the questions that we will try to answer in the following section.

III EMPIRICAL STRATEGY

To provide robust evidence on the nature of relationship that exists between fiscal and monetary policy, this section develops the following empirical approaches using nonstructural VAR.[5]

- based on the dynamic relationship between government liabilities and primary surpluses; we test how fiscal authorities respond to ensure the solvency of the public sector;
- given the role of nominal income in the FD regime, the second approach tests whether the positive response of future surpluses to current surpluses is due to lower nominal income or not
- based on the interaction between fiscal and monetary variables, we estimate the relative importance of primary surpluses and money growth on inflation;

A. Fist Approach

The first approach follows the methodology used by Canzoneri et al (2001). This allows us to identify Monetary Dominant (or Ricardian) regime or Fiscal Dominant (or non Ricardian) regime by estimating how primary surpluses respond to a temporary shock in government liabilities, and vice versa.

Table 2 summarizes the criteria for identifying FD and MD regimes using this approach. Consider how a positive innovation in current surpluses passes to the future liabilities. In a MD regime, the surpluses pay off some of the debt and future liabilities fall. While in a FD regime, future liabilities rise. Again, consider next the case in which an innovation in the current surpluses is not correlated with the future surpluses. In a FD regime, future liabilities should not be affected by the innovations in current surpluses. However, there is also another case to consider. Suppose innovations in current surpluses are negatively correlated with

[5] For a discussion of different approaches to test the FTPD empirically, see among others, Sala (2004), Tanner and Ramos (2002), Canzoneri, Cumby and Diba (2001), and Christiano and Fitzgerald (2000).

future surpluses. In this case, future liabilities would fall in either a MD or FD regime, and we have an identification problem.

The test is based on impulse-responses analysis of future total government liabilities to a shock in current surpluses. Say for example, there is a shock in the Surplus/GDP, how do both variables react. Identifying these shocks in FD regime is straight forward because the Surplus/GDP series is assumed to be exogenous. The first equation of the VAR, which describes the evolution of Surplus/GDP, is simply a forecasting equation in which Liabilities/GDP enters because of its value in forecasting future surpluses. In MD regime instead, Liabilities/GDP influence the setting of future surpluses.[6]

B. Second Approach

In extension and for robustness check, the second approach analyses the role of nominal income in the FD regime. It tests if the positive response of future surpluses to current surpluses is due to lower nominal income or not. Since the theory of FTPD implies that nominal income moves to help balance the present-value budget constraint equation, then, a positive innovation in Surplus/GDP would lower nominal income in the same period and raise the real value of current government liabilities. To test for this presumption, we split the numerator and denominator of Liabilities/GDP, and run a VAR on log of nominal liabilities→ log of nominal income→ Surplus/GDP. This is the only ordering that makes sense in a FD regime, since log liabilities is predetermined and log nominal GDP is predicted to respond to the surplus innovation. Table 3 summarizes the identifying criteria based on this approach.

C. Third Approach

Finally, the third approach analyses how inflation variability is directly affected by fiscal and monetary aggregates. The FTPD predicts that, under FD (or NR) regime the main source of changes in the price level could be explained primary by the associated wealth effects upon private consumption.[7] This is because, with a non Ricardian regime, if fiscal authorities are

[6] As Christiano et al (2000) and Canzoneri et al (2001) demonstrate, the dynamic response of a variable to a shock in surplus/GDP can be estimated by computing the impulse responses in a VAR's ordering

[7] See Woodford (1998).

unable to adjust primary surpluses to guarantee solvency of the public sector, the increase in nominal public debt to finance persistent budget deficits is perceived by private agents as an increase in nominal wealth, leading to higher demand for goods, which raises domestic prices. Here, we identify which of the two policy variables ─ money growth or real primary surpluses, best explains inflation variability in SADC, after controlling for the aggregate demand channel (that is, output gap).[8]

In so doing, a VAR is run with the following causal ordering: nominal domestic debt growth→ growth rate of money→ real output gap→ inflation rate. This ensures that the inflation rate is the only variable responding contemporaneously to fiscal and monetary policy shocks. The real output gap is included to control for the effect of aggregate demand onto inflation. Subsequently, variance error decompositions for inflation in each VAR are computed.

1V. ECONOMETRIC RESULTS

A. Data

Primary surplus corresponds to government revenue less its expenditure (including net federal interest payment) and divided by nominal GDP for the fiscal year. Total liabilities is calculated by adding the net federal debt to the money base both measured at the beginning of the fiscal year and dividing by nominal GDP for the fiscal year.

Data limitation problems meant that Angola, DRC, Mozambique and Namibia had to be dropped. And we concentrate on the remaining ten countries within the region whose data are at least available annually for the period, 1980-2006.[9]

Most of the data are extracted from the International Financial Statistics, IFS of the IMF and SADC website. For some countries where data on government primary surplus are missing, the World Table of the World Bank 1994 and The Europa World Year Book 2004 serve as supplement. In addition, African Development Report 2002 and Earthtrends Data Tables are used to supplement data on debt, especially, for Seychelles.

[8] Output gap is estimated using Hedrick Prescott. The parameter lambda is set to a value of 100 as it is customary for annual data

[9] Three countries are from CMA and seven from non-CMA.

B. Unit-Root Test

We investigate the integrating properties of the variables by conducting unit-root tests using the augmented Dickey-Fuller (ADF) tests. This test includes a constant and a deterministic time trend (when necessary) with four lags assumed as a starting point. The lag length in the ADF regression is selected using the Akaike and Schwarz information criterion. The results are presented in table 1.

The rejection of non stationarity for some variables means that shock to these variables will be necessarily temporary, over time, the effects of shocks will dissipate in those countries and the series will revert to its long run level. As such, long-term forecast of those variables will converge to the unconditional mean of the series. However, this is not the case for non stationary variables. These variables instead have permanent components, and their mean and/or variance are rather time dependent.

Still, it does not matter whether a variable is stationary or not in the Vector Autoregressive VAR.[10] Sims and others recommend against differencing even if the variables contain a unit root. They argue that the goal of a VAR analysis is to determine the interrelationships among the variables, not the parameter estimates. So we should not expect any bias in our analysis because of non stationary variables. .

C. Analysis

This section presents the results of the three econometric approaches to identify Fiscal Dominant and Monetary Dominant regimes in SADC region. Table 4, 5 and 6, and figure 1 summarize, respectively, the various approaches described above. The second and third columns of table 4, shows the sign of the responses of future real liabilities to a shock in current real surpluses in both the first and second ordering of the VAR. The fourth column shows the response of future surpluses to current surpluses, the fifth column shows autocorrelation sign of the surpluses, and the sixth column identifies the type of regime, FD or MD, based on the criteria summarized in table 2.[11]

[10] See Enders, 1996.

[11] The use of different data sources when extracting total debt for many countries undoubtedly reduces the statistical power of these results. However the use of different econometric tests and approaches to underpin the relative importance of monetary and fiscal determinants of inflation should improve the reliability of the results.

Of a sample of 10 SADC countries, five are estimated to have followed a FD regime (Lesotho, Botswana, Malawi, Zambia and Zimbabwe). The remaining 5 countries exhibit a MD regime (South Africa, Swaziland, Mauritius, Seychelles and Tanzania).

The response of Liabilities/GDP in period 1 to an innovation in Surplus/GDP in period 0 is negative regardless of the ordering used for South Africa, Swaziland, Mauritius, Seychelles and Tanzania. This negative response would arise naturally in a MD regime. As already shown in table 2 however, this negative response could also arise in a FD regime if a positive Surplus/GDP innovation lowers expected future surpluses sufficiently to reduce the present value. This is not the case here. The response of future surpluses is positive and significant for these countries (Surplus/GDP in period 0 produce a surplus in period 1) so that even more of the debt is paid off in period t+1 and future liabilities falls.

Evidence is much weaker in Lesotho, Botswana, Malawi, Zambia and Zimbabwe. The response of Liabilities/GDP to surplus shock is positive. As already pointed out, this positive response would arise naturally in a FD regime.

Table 5 summarizes the nominal income analysis results of the second approach. The second and third column of the table shows the sign of the responses of future log of nominal income to a shock in current real surpluses in both the first and second ordering of the VAR. The fourth column shows the response of future surpluses to current surpluses, and the fifth column identifies the type of regime, FD or MD, based on the criteria summarized in table 3.

All countries, except Lesotho, Botswana and Malawi, exhibit a positive response of future log of nominal income to current real surpluses. This interpretation is consistent with the one given in table 4. This suggests that the response that our "natural presumption" associates with a FD regime is not supported by the data for South Africa, Swaziland, Mauritius, Seychelles and Tanzania. Meanwhile, a FD regime in Zambia and Zimbabwe is more chronic as real surpluses generated in both countries are not used for the purpose of reducing their debt.

Table 6 summarizes the variance error decomposition results, suggesting that inflation variability could be mostly explained by real primary surpluses (Mauritius and Tanzania), money growth (Swaziland, Lesotho, Seychelles, Zambia and Zimbabwe) and by both determinants (Malawi).

In table 6, second column, reports the regime identified by the previous approaches, while the third and fourth columns show the average percentage of inflation variability for eight periods due to, real primary surpluses and money growth respectively. Zimbabwe, for example, is a case previously identified as a FD regime. Under this test, the inflation variability is more likely to be associated with changes in money growth (26.0%) than changes in real surpluses

(13.9%), suggesting that the type of FD regime in Zimbabwe could be explained by the QTM of debt monetisation. For Malawi, however, which is also a FD regime, the largest variability in inflation is associated with both changes in real surpluses (23.5%) and money growth (37.6%), indicating that the type of FD regime in Malawi could be best explained by both the FTPD and QTM mechanisms. These results are also presented in figure 1.

Overall, these results seem to indicate that inflation variability could also be associated with changes in real surpluses in countries under a MD regime, implying that real primary surpluses matter to price volatility.

However, until now, we assume that there were no regime switches in our analysis. But eyeballing rolling regression in government expenditure and revenue in figure 2, enables us see if there is any significant changes taking place, particularly in the recent period. Notice the difference between 1980-1994 and 1995-2005, for South Africa, Lesotho and Swaziland. There is evidence of stabilisation policy in the later period than in the former. Movement in government expenditure and revenue is more consistent and positive from 1995.

Similarly, for years, Botswana and Mauritius exhibit more positive and stable movement in both variables. But, although insignificant, notice the recent negative change taking place in Botswana, and a very strong and significant stability that is just occurring in Tanzania.

There is evidence of destabilisation policy in Malawi, Zambia and Zimbabwe.[12] While that of Seychelles shows a very high random movement in government expenditure and revenue. But we did not attempt to formally identify statistical breaks in the data in order to confirm this, which means that one may still need a more concrete evidence to support these changes.

V. CONCLUSION

This paper analyses the fiscal and monetary determinant of inflation in the SADC region. It offers a theoretical model in understanding the implication of the FTPD in a small open economy facing borrowing constraints. It provides quantitative evidence that traces out the dynamic response of inflation to different shocks. In particular, the study finds, as predicted by the FTPD, that changes in primary surplus pass through to prices by increasing inflation variability. Therefore, fiscal policy matter for achieving and maintaining price stability in the SADC region.

[12] Again, although insignificant, notice the recent sign of a change towards stability in Malawi.

The paper also provides evidence that FD regimes may arise regardless of how independent monetary policy is (like in the case of Lesotho and Botswana). This highlights the importance of coordinating fiscal and monetary policy in the region.

In general, South Africa, Swaziland, Mauritius, Tanzania and Seychelles seem to have been characterised by a MD regime in SADC throughout the period 1980-2006; while Botswana, Lesotho, Malawi, Zambia and Zimbabwe seem to have been characterised by a FD regime. Finally, countries within the SADC region still need to intensify and redouble their effort towards the realisation of a more sustainable fiscal policy.

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Table 1: Augmented Dickey-Fuller (ADF) Test for Unit Root

Country	Stationary	non Stationary
CMA		
South Africa	Psurp and Liab	
Lesotho	Psurp and Liab	
Swaziland	Psurp	Liab
Other SADC		
Botswana	Psurp	Liab
Mauritius	Psurp	Liab
Tanzania	Psurp	Liab
Malawi	Psurp	Liab
Seychelles		Psurp and Liab
Zambia	Psurp	Liab
Zimbabwe	Psurp	Liab

Note
All monetary variables used in the analysis are stationary.

Table 2: Identification Criteria for Fiscal Dominance (FD) and Monetary Dominance (MD) Regimes

Criteria	Response of future Liab to current Psurp		Response of future Psurp to current Psurp	Auto Psurp	Regime
	1st Order	2nd Order			
C1	negative (–)	negative (–)	positive (+)	+	MD
C2	non negative (0, +)	non negative (0, +)	non negative (0, +)	+	FD
C3	negative (–)	negative (–)	negative (–)	–	Unidentified

Note
Psurb is government revenue less its expenditure (including net federal interest payment) and divided by nominal GDP. Liab is calculated by adding the net federal debt to the money base both divided by nominal GDP.
1st VAR ordering is Psurp→ Liab, which is consistent with a non Ricardian or FD regime characterized by an active fiscal policy.
2nd VAR ordering is Liab→ Psurp, which is consistent with a Ricardian or MD regime characterized by a passive fiscal policy and active monetary policy. Results are however, consistent under both orderings.

Table 3: Identification Criteria for FD and MD based on Nominal Income

Criteria	Response of future income to current Psurp	Response of future Psurp to current Psurp	Regime
C1	negative (–)	positive (+)	FD
C2	positive (+)	positive (+)	MD

Note
This is based on the sign of the impulse response function of the following VAR model; output gap→ money growth→ inflation

Table 4: VAR on Psurp and Liab

	Response of future Liab to current Psurp		Response of future Psurp to current Psurp	Auto Psurp	Regime
	1st Order	2nd Order			
CMA					
South Africa	–	+	+	+	MD
Lesotho	+	+	+	+	FD
Swaziland	–	–	+	+	MD
Other SADC					
Botswana	+	+	+	+	FD
Mauritius	–	–	+	+	MD
Tanzania	–	–	+	+	MD
Malawi	+	+	+	+	FD
Seychelles	–	–	+	+	MD
Zambia	+	+	+	+	FD
Zimbabwe	+	+	+	+	FD

Table 5: VAR on Log of Liab, Psurp and Log of Nominal GDP

	Response of future nominal income to current Psurp		Response of future Psurp to current Psurp	Regime
	1st Order	2nd Order		
CMA				
South Africa	0/+	0/+	+	MD
Lesotho	–	–	+	FD
Swaziland	0/+	0/+	+	MD
Other SADC				
Botswana	–	–	+	FD
Mauritius	0/+	0/+	+	MD
Tanzania	0/+	0/+	+	MD
Malawi	–	–	+	FD
Seychelles	0/+	0/+	+	MD
Zambia	0/+	0/+	+	FD
Zimbabwe	0/+	0/+	+	FD

Note
VAR Ordering is log of nominal liabilities→ Psurp→ log of nominal income

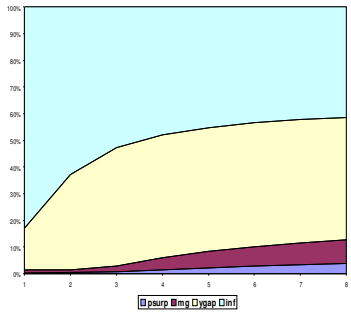
Table 6: Variance Decomposition on Inflation Variability

	Regime	Inflation variability due to Psurp	Inflation variability due to money growth
CMA			
South Africa	MD	1.9%	4.9%
Lesotho	FD	5.0%	28.9%
Swaziland	MD	3.8%	19.0%
Other SADC			
Botswana	FD	11.9%	15.5%
Mauritius	MD	7.3%	6.3%
Tanzania	MD	19.6%	11.8%
Malawi	FD	23.5%	37.6%
Seychelles	MD	2.6%	17.0%
Zambia	FD	3.9%	55.6%
Zimbabwe	FD	13.9%	26.0%

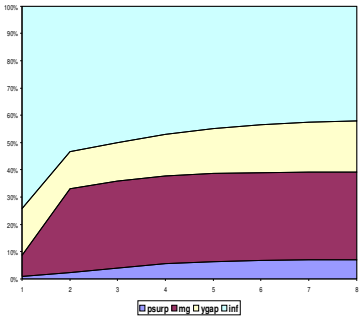
Note
VAR Ordering is Psurp→ Nominal money growth→ Real output gap→ Inflation
The values displayed are average value of the variance decomposition for eight periods

Figure 1: Variance Decomposition on Inflation Variability

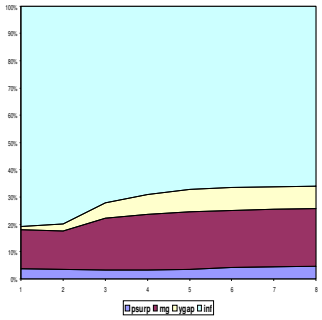
South Africa



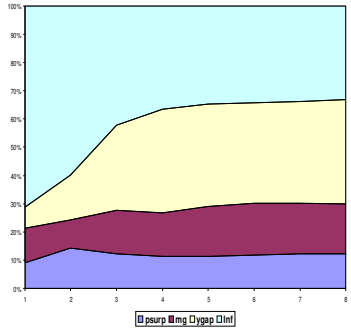
Lesotho



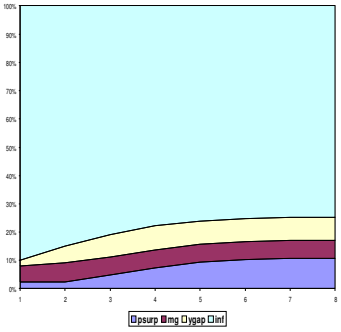
Swaziland



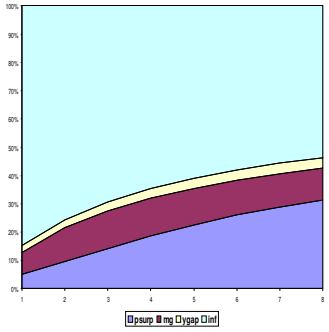
Botswana



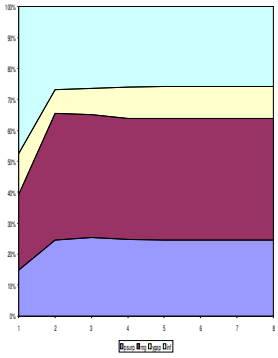
Mauritius



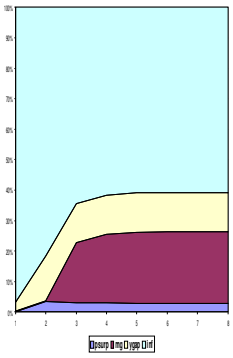
Tanzania



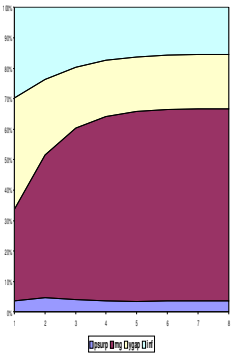
Malawi



Seychelles



Zambia



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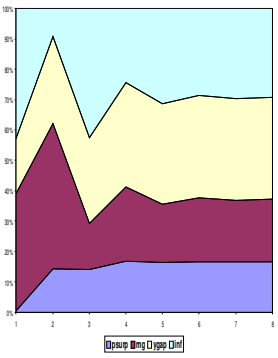
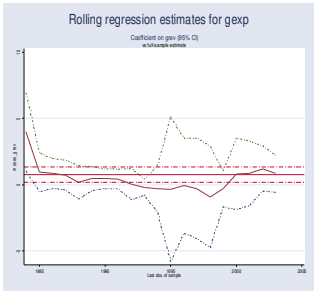
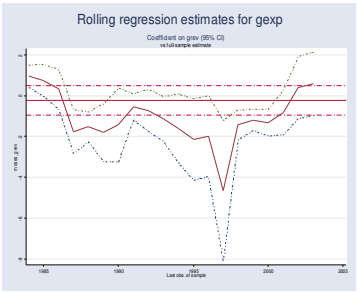


Figure 2: *Rolling Regression in Government Expenditure and Revenue (% of GDP) 1980-2005*

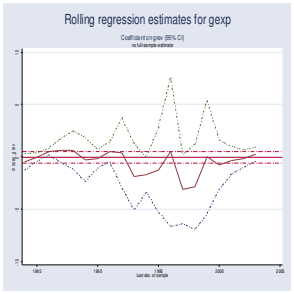
South Africa



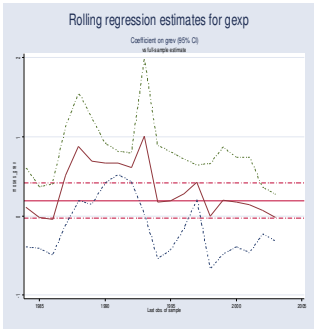
Lesotho



Swaziland

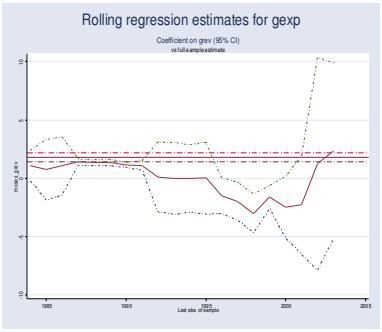


Botswana

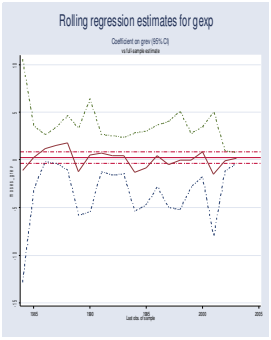


Mauritius

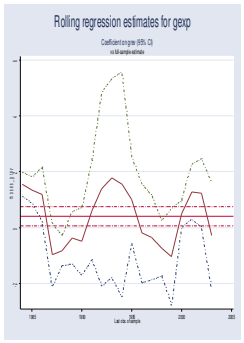
Tanzania



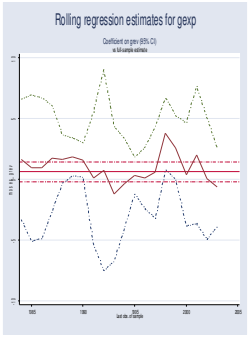
Malawi



Seychelles



Zambia



Zimbabwe