

# Fiscal and Monetary Policy Interdependence in Southern African Development Community

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## Abstract

Monetary integration in Africa is often promoted as a way to enhance and enforce fiscal discipline on national authorities (see for example, Masson and Pattillo, 2004; and Yehoue, 2005). The basis for this idea is an interpretation of the relationship between fiscal and monetary policy that puts the latter as the dominant policy instrument. But this interpretation is questioned by the modern Fiscal Theory of Price Determination (FT), which suggests that if primary surpluses evolve independently of government debt, the equilibrium price level ‘jumps’ to assure fiscal solvency. In this Non-Ricardian regime, fiscal policy dominates monetary policy. Monetary policy has little relevance for inflation, with interest rate and money supply becoming endogenous to fiscal policy. And the goal of price stability may remain elusive regardless of how tough and independent the central bank is. This paper tests the relevance of the theory for Southern African Development Communities (SADC) as a means of assessing the desirability and feasibility of Monetary Union for the region. Based on VAR on Surplus/GDP and Liabilities/GDP, the emerging pattern seems to suggest six countries out of ten considered in this study. However, this does not necessarily preclude the adoption of the remaining four countries if they could fasten up in adjusting before the scheduled period. I then address the issue of desirability. I find — based on a simple rolling regression in government expenditure and revenue — that more member countries still need to intensify and redouble their effort towards the realization of a more sustainable fiscal discipline.

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## I INTRODUCTION

Monetary integration in Africa is often promoted as a means to enhance and enforce fiscal discipline on national authorities.<sup>2</sup> The basis for this idea is an interpretation of the relationship between fiscal and monetary policy that puts the later as a dominant policy instrument — otherwise known as an Ricardian (R) regime. But what if the existing regime in the bloc of countries is of a Non Ricardian (NR) type, so that one could not be assured of fiscal solvency without a price jump?

For this reason, this paper discusses the fiscal and monetary policy interdependence in one of the regions in Africa, the Southern African Development Community (SADC). The objective is to assess the desirability and feasibility of monetary union for the region by investigating whether the existing relationship between fiscal and monetary policy in the region justifies for the adoption of a common monetary union.

This, we believe might be what is required now that projects for regional monetary union in Africa is high in the agenda of continental policy makers. African fiscal problems are much more severe. Monetary policy often begins in the Treasury. Central banks that are forced to finance growing budget deficits may have to implement neutralising monetary policies that will drive interest rates up. This will crowd out private investment at the cost of real economic convergence in economies with poorly developed financial markets, like Africa, central banks may also find themselves without the means to implement the required anti-inflationary measures.<sup>3</sup> Therefore, the need for a sound and credible fiscal policy, which is evident in any R regime, is fundamental for adopting a common monetary union.

In this study, we approach the issue in both theoretical and empirical ways. In the former, we reconsider theoretically, fiscal and monetary policy interdependence in the light of the peculiar fiscal institutions present in Africa. The literature ranges from the traditional theory of Unpleasant Monetarist Arithmetic by Sargent and Wallace (1981) to

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<sup>2</sup> See for example, Masson and Patillo, 2004, Yehoue, 2005, and others.

<sup>3</sup> As noted also in Mishkin (1999); in emerging market countries with their very different institutional structure, a foreign exchange crisis can trigger a full-scale financial crisis

the modern theory of price determination by Michael Woodford, John Cochrane, Christopher A. Sims and others.

The traditional literature recognizes that both fiscal and monetary policy must be selected in the appropriate way if price stability is to be achieved. Nonetheless, they still retained the viewpoint that price determination is mainly a matter of monetary policy, that if the central bank is independent, automatically, the fiscal authorities will be compelled to adopt an appropriate fiscal policy. In this conventional wisdom, prices are determined by money supply and demand – fiscal policy is implicit. Following Woodford (1995), one can call this an R regime.

However, evidence from several emerging countries seems to question this simple Sargent-Wallace mechanism of fiscal-monetary policy interdependence. Sokoler (2003) shows that it is not enough to have an institutional framework, which guarantees the central bank's independence in Israel, what is required in addition is a framework that guarantees fiscal prudence in the medium-term. The failure of the government to maintain its commitment towards ending fiscal dominance by 2002 led to an upward shift in the term structure of inflation expectations and increased exchange rate volatility in that country. Loyo (2000) and Favero et al (2004) show how a failure in fiscal backup for monetary policy leaves interest rate increases powerless to restrain inflation in Brazil. In Czech-Republic, Matalkk and Slavik (2003) show that the widening deficit of the general government budget from 1998 to date has placed risk to achievement of economic and monetary policy objectives.<sup>4</sup> The common characteristics of these experiences are that fiscal policy regime must be such that it does not allow changes in the price level to become the mechanism through which the condition for government solvency is satisfied (Moreno, 2003). In other words, the effectiveness and credibility of monetary policy should not be jeopardized by the size of fiscal imbalances.

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<sup>4</sup> Further evidence are Mexico (Sidaoui, 2003), Columbia (Uribe et al, 2003), Chile (Marshall, 2003), Peru, Poland, Indonesia, Venezuela, Thailand (Mohanty, 2003) and Nigeria (Obinyeluaku, 2004).

This is the modern theory of price determination. It says that when the actual policy setting is dominated by fiscal policy, monetary policy will have little relevance for inflation, with the interest rate and money supply becoming endogenous to fiscal policy. So unless special steps are taken to ensure that appropriate fiscal policies are taken, the goal of price stability may remain elusive regardless of how tough and independent the central bank is. In this unconventional view, monetary policy has to work through seigniorage and the government's budget constraint, and in such case, it is probably not reasonable to hold a central bank responsible for price stability (Canzoneri et al, 2001). Again following Woodford (1995), one can call this a NR regime.

Amid the foregoing debate, this paper focuses more attention on the Non-R regime since they tend to yield unconventional results for monetary policy and price determination. And as such might be the one that is relevant for SADC. The implication of this is that countries forming monetary union should ensure that the nature of the existing relationship between their fiscal and monetary policy assures fiscal solvency without a price jump (or that the existing regime is R).

Having established the theoretical framework, we proceed to evaluate empirically, the nature of fiscal and monetary policy interdependence in SADC using macroeconomic time series, now available also for the region. Different VAR models – Impulse Response function and SVAR are employed in this regard.

Based on the empirical results, we find at least some statistical evidence to back the SADC Monetary Union aspiration. The emerging pattern seems to suggest six countries out of ten considered in this study: South Africa, Lesotho, Swaziland (the Common Monetary Area members), Botswana Mauritius and Tanzania.

A little caveat should be highlighted. Although this paper finds no evidence to support the remaining four countries, this does not necessarily precludes their adoption if they could fastened up and meet up with others before the scheduled period (2016). So the outcome of this study should be seen as indicative and not binding.

Also notice that the analysis puts aside the trade pattern and the comovements of prices and outputs that have received substantial attention in the current studies. Instead, the paper focuses on the standard convergence criteria that depend on the fiscal and monetary policy interdependence.

The rest of the paper is organized as follows: Section II presents the theoretical approach underpinning the empirical analysis. Section III presents data and methodology. Section IV analyzes the nature of relationship between fiscal and monetary policy among ten countries in SADC whose data are at least, available. Section V concludes the paper.

## II THEORETICAL APPROACH

The literature from the conventional theory of Sargent and Wallace to the modern Fiscal Theory of Price Level by Leeper, Sims, Woodford and Cochrane among many others, has discussed how an unsustainable fiscal policy may hinder the effectiveness of monetary policy.<sup>5</sup> Their work demonstrates that the way in which the government's present-value budget constraint is satisfied affects how prices are determined.

If government is committed to maintaining fiscal solvency, an independent monetary policy that responds to a rise in the deficit by raising interest rates can force the government to adjust. In such an R regime, monetary policy could dominate fiscal policy. And primary surpluses move automatically to assure fiscal solvency for any path the price level might take. If on the other hand the primary budget balance evolves through the political process, and fiscal policy is not anchored by a medium-term rule, the government's liabilities would simply grow out of control, raising expectations that government debts would not be paid by raising future taxes. This creates the temptation to reduce the real value of government debt by inflation. In such a NR regime, the equilibrium price level "jumps" to guarantee fiscal solvency. As already noted in section I, the former is the conventional view, summarized in a Sargent and Wallace's Unpleasant Monetarist Arithmetic while the later is the modern Fiscal Theory of Price

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<sup>5</sup> See Sargent and Wallace (1981), Leeper (1991), Sims (1994), Woodford (1995) and Cochrane (1998).

Level. In this section, more attention is paid to the latter, since they tend to yield unconventional results to monetary policy and price determination.

Basically, it is perhaps useful to begin by recalling how quantity-theory analyses argue that the path of the price level can be determined in such a case without any reference to the time path of government deficit or of the outstanding government debt.

In rational-expectations versions of the model of Cagan (1956), it is assumed that desired real money balances are a decreasing function of the expected rate of inflation, so that the money demand function is

$$M_t - P_t = -\gamma(P_{t+1} - P_t) \quad (1)$$

Where  $M_t$  is the log of quantity of money of time  $t$ ,  $p_t$  is the log of price level at time  $t$ , and  $\gamma$  is the parameter that governs the sensitivity of money demand to the rate of inflation.<sup>6</sup> Under the assumption of perfect foresight; equation (1) becomes:

$$P_t = \left(\frac{1}{1+\gamma}\right)M_t + \left(\frac{\gamma}{1+\gamma}\right)P_{t+1} \quad (2)$$

After some algebra, the equilibrium price level sequence becomes

$$P_t = \sum_{s=0}^{\infty} \left(\frac{1}{1+\gamma}\right)^{s-t} M_{t+s} \quad (3)$$

This simply means that the current price level is a weighted average of the current and all future money supplies.<sup>7</sup> Moreover, by relaxing the assumption of perfect foresight – the future is not known with certainty, then, equation (3) becomes

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<sup>6</sup> By the property of logarithms,  $M_t - p_t$  is the log of real money balances, and  $p_{t+1} - p_t$  is the inflation rate between period  $t$  and  $t+1$ .

<sup>7</sup> Note the importance of  $\gamma$ . The weights on the future money supplies decline geometrically at rate  $\gamma/1+\gamma$ . If  $\gamma$  is small, then  $\gamma/1+\gamma$  are small, and the weights decline quickly. In this case, the current money supply

$$P_t = \left( \frac{1}{1+\gamma} \right) M_t + E \sum_{s=0}^{\infty} \left( \frac{1}{1+\gamma} \right)^{s-t+1} M_{t+s+1} \quad (4)$$

This means that the price level or the rate of inflation depends on the current money supply and expected future money supplies. However, while it is admitted that various real factors affect the form of the function  $\gamma$ , the time variation in the real factors is regarded as negligible in this model. Thus, the specification of the time path of the government budget deficit, among other things is irrelevant for determination of the price level.

Yet, if price level is independent of fiscal policy, it is not independent of debt unless debt is zero, money growth must finance the interest obligations of the government. Fiscal policy implies deficits which require a future inflation (and implies price level) sequence to validate the debt. So, while the current money supply is set to fix current prices, that of future or expected money supply must reflect fiscal requirements. And unless there is credibility on the part of fiscal authorities – that is achieved by removing the need for seigniorage (the underlying cause of high money supply in future) – monetary policy cannot be credible (as discussed later). This is the conventional view of Sargent and Wallace Unpleasant Monetarist Arithmetic. Nevertheless, they retained the viewpoint that price determination is still a matter of monetary policy, that an independent monetary policy decreases the need for seigniorage in the present, and allows the monetary authorities to resist government demands for seigniorage in the future.

But, what if the fiscal authorities fail to take actions to ensure that their intertemporal budget constraint is satisfied? The fact that fiscal policy implies deficits, and an inflation path is set via future money supply growth; to validate the debt, a current price level rise is required implying a current money supply jump. So, both current and future money supply must reflect fiscal requirements. This then means that even if money growth

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is the primary determinant of the price level. Indeed if  $\gamma$  is zero, then, we can obtain the quantity theory of money: the price level is proportional to the current money supply, and the future money supplies do not matter at all. If  $\gamma$  is large, then,  $\gamma/1+\gamma$  are close to 1 and the weights decline slowly. In this case, future money supplies play a key role in determining today's price level (see Mankiw, 1999).

remains unchanged, fiscal policy independently affects the price level and inflation rate. This is the modern fiscal theory of price level. They pursued this implication of fiscal and monetary policy interactions more radically.<sup>8</sup> They give fiscal policy at least a co-equal role with monetary policy in determining prices. Their works develop a way of looking at the most comprehensive approach towards the interaction of fiscal and monetary policy.

The theory of Fiscal-Monetary policy Interdependence then revolves around the way in which both the conventional and modern view differ.<sup>9</sup> .In other words, how both concepts view a particular equation; the government present-value budget constraint

The equation says that the value of the government debt is equal to the present discounted value of future government surpluses (or tax revenues net of expenditures) plus seigniorage, where both the debt and surpluses are denominated in units of goods. This is expressed as follows:

$$B^1 + P(S^f + S^g) = B \quad (5)$$

Where  $B^1$  is what government receives from any household who purchase new debt,  $S^f$  is the present value of future surpluses,  $S^g$  is seigniorage and  $P$  is the price level. Optimising households will obviously never choose  $B^1 > 0$  and they are constrained from setting  $B^1 < 0$  by assumption. So household optimization implies that  $B^1 = 0$ . Imposing this, equation (5) now becomes:

$$B = P(S^f + S^g) \quad (6)$$

Or

$$\frac{B}{P} = (S^f + S^g) \quad (6a)$$

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<sup>8</sup> As Woodford (1995) observed, the expected path of the money supply does not matter for price level determination except through its consequences for the government budget.

<sup>9</sup> See Cochrane, 1998; Christiano et al, 2000, and Canzoneri et al, 2001

The main conclusions of the Sargent and Wallace analysis may be understood from equation (6a). Suppose an expansionary fiscal policy is adopted so that future surpluses is reduced. Then, simple arithmetic dictates that the monetary authority must increase seignorage (or prints money). Consequently, inflation increases. So to avoid this problem, the same arithmetic suggests a solution: tough and independent monetary policy so that they can credibly commit to not falling into an irresponsible fiscal authority that sets future surpluses low. The notion is that with monetary authority completely committed to a fixed value for seignorage, the arithmetic forces the fiscal authority to adopt the fiscal policy consistent with it. Thus the conventional view of fiscal theory holds that equation (6a) is constraint on the government taxes and expenditure policy. And to achieve a stable price level, it suffices to have a tough and independent central bank, which is focused on price

But, there is no institution that imposes such a budget constraint on the government in an economy that is expected to continue into an indefinite future.<sup>10</sup> So there is nothing inherent to government or to society that requires governments to treat equation (6a) as a constraint on policy, instead, an equilibrium condition that must be satisfied. If anything happens to disturb (6a), then the market clearing mechanism moves the price level,  $P$ , to restore equity. Afterall, if dual dominance exists for fiscal and monetary policy, then, movements in fiscal policy must independently affect the price level. For example, for a fixed money stock (or independent monetary policy) an increase in the deficit (through fiscal expansion) might cause prices to rise, deflating the real value of government debt outstanding, thus maintaining budgetary solvency. Put differently, if fiscal authorities fail to ensure that their intertemporal budget constraint is satisfied, equilibria are possible where fiscal — rather than monetary — policy determines the price level. Thus, the goal of price stability may remain elusive regardless of how tough and independent the central bank is. This is the advocate of the modern theory.

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<sup>10</sup> We do not have lump-sum taxes available, some prices are not perfectly flexible, people do not live forever and many people have no children or parents willing or able to provide them with financial support (Sims, 1995).

Moreover, to facilitate policy discussions and the empirical applications that follows; let's redo equation (6a). Following Canzoneri et al (2001) this becomes.

$$B_j = (T_j - G_j) + (M_{j+1} - M_j) + B_{j+1}/(1+i_j) \quad (7)$$

Where  $M_j$  and  $B_j$  are the stocks of base money and government debt at the beginning of period  $j$ ,  $T_j - G_j$  is the primary surplus during period  $j$  and  $i_j$  is the interest rate for period  $j$ . Equation (7) says that the existing debt has to be paid off, monetized or refinanced. By expressing (7) in terms of total government liabilities,  $M + B$ , and scale the fiscal variables on GDP. After some algebra (7) becomes

$$\frac{M_j + B_j}{P_j y_j} = \left[ \frac{T_j - G_j}{P_j y_j} + \left( \frac{M_{j+1}}{P_j y_j} \right) \left( \frac{i_j}{1+i_j} \right) \right] + \left( \frac{y_{j+1}/y_j}{(1+i_j)(P_j/P_{j+1})} \right) \left( \frac{M_{j+1} + B_{j+1}}{P_{j+1} y_{j+1}} \right) \quad (8)$$

Equation (8) says that the ratio of total government liabilities to GDP has to be equal to the primary surplus (including seigniorage or central bank transfers) to GDP ratio plus the discounted value of next period liabilities to GDP ratio. The discount factor is the ratio of the real growth in GDP to the real interest rate. By simplification, (8) becomes

$$w_j = s_j + \alpha_j w_{j+1} \quad (9)$$

$w_j$  is the liabilities to GDP ratio,  $s_j$  is the surplus to GDP ratio and  $\alpha_j$  is the discount factor. It should be noted that  $s_j$  include seigniorage. Iterating equation (9) forward from the current period,  $t$ , and taking expectations conditional on information available in period  $t$ , we obtain the present value constraint

$$w_t = s_t + E_t \sum_{j=t+1}^{+\infty} \left( \prod_{k=t}^{j-1} \alpha_k \right) s_j \Leftrightarrow \lim E_t \left( \prod_{k=t}^{T+t-1} \alpha_k \right) w_{t+T} = 0 \quad (10)$$

Fiscal Theory of Price Level treats equation (10) as an equilibrium condition that must be satisfied. If primary surplus to GDP ratios are determined by an arbitrary process (unrelated to the level of the debt), then, nominal income and/or discount factors must jump in equilibrium to satisfy (10). As already noted, this is a NR regime. If on the other hand, primary surpluses are determined in such a way that (10) is satisfied no matter what nominal income and discount factors are, then, nominal income and the discount factors can be determined elsewhere in the model. And this is an R regime.

With these insights, we are ready to develop some implications of the theory that will help us to determine the nature of fiscal and monetary policy interrelationship in the subsequent section. Consider how a positive innovation in  $s_t$  passes to  $w_{t+1}$ . In an R regime, the surplus pays off some of the debt and  $w_{t+1}$  falls. While in a Non-R regime,  $w_{t+1}$  should rise. Again, consider next the case in which an innovation in  $s_t$  is not correlated with the surpluses on the RHS of (10). In a Non-R regime,  $w_{t+1}$  should not be affected by the innovation in  $s_t$ . However, there is also another case to consider. Suppose innovations in  $s_t$  are negatively correlated with future surpluses. In this case,  $w_{t+1}$  would fall in either an R or a Non-R regime. But even at that, one may still conclude in favour of Non-R regime if a positive Surplus/GDP innovation lowers expected future surpluses sufficiently to reduce the present value.

We might also like to add a distinct flavour according to EMU, as the concern is now shifting from long-term stability — or long-term solvency of government debt — to short-term stabilisation policy.

Following this, it should in principle be possible to determine the nature of fiscal and monetary policy interdependence in the SADC region. The Impulse response function and SVAR in Surplus/GDP and Liabilities/GDP would tell us whether the existing relationship in the region justifies for the adoption of a common monetary union or not.

### III DATA AND METHODOLOGY

Here, we present the four key variables that we analyse. GEXP and GREV, which correspond to government expenditure and its revenue all divided by nominal GDP for the fiscal year. PSURP, which corresponds to  $s_t$  in section 2 is government revenue less its expenditure (including net federal interest payment) and divided by nominal GDP for the fiscal year. LIAB, which corresponds to  $w_t$  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, 1980-2003.<sup>11</sup> Yet, we do not expect this to constitute any bias to our conclusion, ten countries out of fourteen are sufficiently enough to pass judgement. Data on these four variables are taken from the International Financial Statistics, IFS of the IMF and SADC website. For some countries where data on PSURP are missing (for some years), 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.

Table 1 shows test of unit root between the CMA and other countries. Test based on augmented Dicky-Fuller (ADF) reveals that we cannot reject the null hypothesis of unit root on all the variables, for South Africa (the t-values for the variables are inside the confidence intervals, -3.750, -3.000 and -2.630). But, for the remaining nine countries, except for Malawi and Zambia, GREV is stationary for the rest. And GEXP is stationary as well, except for Lesotho, Mauritius and Zambia. Similarly, LIAB is stationary for four countries and PSURP for three countries.<sup>12</sup> Meanwhile, for expository purposes, the

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<sup>11</sup> Three countries are from CMA and six from non-CMA.

<sup>12</sup> There is no time trend in the model for all countries (the p-value for trend variable is insignificant at all conventional levels) except for Botswana (on GEXP and LIAB), Malawi (on LIAB) and Mauritius (on LIAB)

series for these variables are presented in figure 1. This too, compliment with the result 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 South Africa, and other countries in which these variables are non stationary. The 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.<sup>13</sup> 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 Impulse Response and SVAR analysis because of non stationary variables. .

#### IV THE NATURE OF FISCAL AND MONETARY POLICY INTERRELATIONSHIP IN SADC

In this section, we examine the nature of relationship that exists between fiscal and monetary policy among ten countries within the SADC region. We begin with VAR on Surplus/GDP and Liabilities/GDP. Say for example, there is a shock in the Surplus/GDP, how do both variables react. Identifying these shocks in NR 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 R regime instead, Liabilities/GDP influence the setting of future surpluses.<sup>14</sup>

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<sup>13</sup> See Enders, 1996.

<sup>14</sup> As Christiano et al (1999) 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

Figure 2 contains plots of the impulse response functions of the VAR computed for orderings of the variables. In the first ordering, Surplus/GDP comes first. This allows for a contemporaneous effect on Liabilities/GDP, as it is consistent with an NR regime (where nominal GDP has to jump to make the value of the existing debt equal to the expected present value of surpluses). In the second ordering, Liabilities/GDP comes first. This ordering may make more sense in an R regime (where nominal GDP can be determined elsewhere in the model), because it does not allow for a contemporaneous effect on Liabilities/GDP, and allows us to identify shocks to Surplus/GDP in an R regime. Except for Malawi, Seychelles and Zambia (with 2 lags), the VAR of 1 lag and a constant is selected for all the countries.

There is no significant response of Liabilities/GDP in period 1 to an innovation in Surplus/GDP in period 0 regardless of the ordering used for South Africa, Lesotho and Zimbabwe. As discussed in section II, this no response will arise in a NR regime if an innovation in  $S_t$  is not correlated with  $S_{t+1}$ . This is the case for Zimbabwe, Surplus/GDP in period 0 does not respond to surplus in period 1 and this is significant. For South Africa and Lesotho instead, the response is positive and significant. This implies that while we may conclude in favour of a NR regime for Zimbabwe that of South Africa and Lesotho may be taken as an R regime.

For Swaziland, Botswana and Tanzania, the response of Liabilities/GDP to Surplus shock is insignificantly negative regardless of the ordering used, but partly significant for three periods in the case of Mauritius (except in the second ordering). This negative response would arise naturally in an R regime. As already pointed out in the last two sections, however, this negative response could also arise in a NR 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  $S_{t+1}$  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  $W_{t+2}$  falls. This means that the four countries may be taken as an R regime.

Evidence is much weaker in Malawi and Zambia. The response of Liabilities/GDP to surplus shock is positive and partly significant. As the theory presented in section II emphasizes, this positive response would arise naturally in a NR regime. More so, Surplus/GDP in period 0 does not produce surplus in period 1 for both countries so that even more of the debt is not paid off in the period  $t+1$  and  $W_{t+2}$  rises.<sup>15</sup>

There is an identification problem in Seychelles. The result appears in favour of an R regime in the first two periods beyond which a NR regime becomes more evident. An innovation in Surplus/GDP is positively correlated with future surpluses in the first two periods and becomes negative afterwards.

Still on impulse response function; since the theory of a NR regime implies that nominal income moves to help balance the present-value budget constraint equation 10 in section II, 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 estimate VAR in the log of nominal liabilities, the log of nominal income and Surplus/GDP. Once again, except for Malawi, Seychelles and Zambia (with 2 lags), the VAR of 1 lag and a constant is selected for all the countries.

Responses to an innovation in Surplus/GDP are presented in figure 3. The ordering of variables in the Choleski decomposition is: log liabilities ( $l_{liab}$ ), Surplus/GDP and log of nominal GDP ( $l_{nom}$ ). This is the only ordering that makes sense in NR regime, since log liabilities is predetermined and log nominal GDP is predicted to respond to the surplus innovation. We can see that the  $l_{nom}$  rises insignificantly in response to the positive innovation in Surplus/GDP for South Africa, Swaziland and Zimbabwe, but falls for Lesotho. This implies that except for Zimbabwe, the response that our “natural presumption” associates with a NR regime is not supported by the data for these countries. As we have already seen with figure 2 and even 3, the innovation in

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<sup>15</sup> The same is applicable even with 1 lag.

Surplus/GDP is positively correlated with future surpluses for South Africa, Lesotho and Swaziland, but not for Zimbabwe.

For Botswana, Tanzania and Mauritius, the interpretation is consistent with the one given in figure 2. The solvency condition is not assured by a rise in  $lnom$  since an innovation in Surplus/GDP in period 0 produces surplus in period 1, and this too is significant.

However, a partly significant increase in the  $lnom$  in response to positive innovation in Surplus/GDP for Malawi and Zambia will cause the RHS of equation 10 in section II to fall. And since an innovation in Surplus/GDP is negatively correlated with future surpluses in both countries, then, the solvency condition can only be assured by this increase in the  $lnom$ . This too is consistent with the interpretation in figure 2. Once again, evidence still appears convoluted for Seychelles.

Moreover, the Choleski Decomposition used in the preceding analysis can also be interpreted in a structural form (that is SVAR). The aim is to use economic (rather than the Choleski decomposition) to recover the structural innovations from the residuals  $e_{1t}$  and  $e_{2t}$ .<sup>16</sup> Unless, the underlying structural model can be identified from the reduced form VAR model, the innovations in Choleski decomposition have no direct economic interpretation.

We impose the Choleski restrictions of the system by applying equality constraint using the constraint matrices:

$$A = \begin{bmatrix} 1 & 0 \\ \cdot & 1 \end{bmatrix} \quad \text{And} \quad B = \begin{bmatrix} \cdot & 0 \\ 0 & \cdot \end{bmatrix}$$

With these structural restrictions, we assume that the change in Surplus/GDP is not contemporaneously affected by change in Liabilities/GDP. We also assume that the change in Liabilities/GDP is affected by contemporaneously change in Surplus/GDP.

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<sup>16</sup> As in Enders (1995), if we want to obtain an impulse response function to trace out the effects of an innovation in  $y_t$  or  $z_t$ , it is necessary to use the structural shocks ( $\epsilon_{yt}$  and  $\epsilon_{zt}$ ) not the forecast errors.

Again except for Malawi, Seychelles and Zambia (with 2 lags), the VAR of 1 lag and a constant is selected for all the countries.

Still, evidence shows that responses in figure 4 are consistent with that of figure 2. So, except for Malawi, Seychelles (for some periods), Zambia and Zimbabwe, there is at least some statistical evidence to support short-term stability in the remaining six countries.

Figure 5 shows results on rolling regression in government expenditure and revenue. This is important for two reasons. First, it can serve as a robustness checks on our previous results. Second, it enables us to see if there is any significant change taking place in the recent period. Notice the difference between 1980-1994 and 1995-2003, 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, which is evident of an R regime.<sup>17</sup>

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.

As expected, there is evidence of destabilisation policy in Malawi, Zambia and Zimbabwe.<sup>18</sup> 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. Nonetheless, there is at least some statistical evidence to support an R regime for South Africa, Lesotho and Swaziland (all in a CMA), Botswana, Mauritius and Tanzania, but a NR regime for Malawi, Seychelles (for some periods), Zambia and Zimbabwe., from our study.

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<sup>17</sup> As we know, 1980-1994 was the period of a harsh and destabilisation policy implementation by apartheid regime in South Africa, which affected the region's economic and political destiny as well. Note also that Lesotho had its first internationally accepted democratic government from the military rule in 1993.

<sup>18</sup> Again, although insignificant, notice the recent sign of a change towards stability in Malawi.

## V CONCLUSION

Is the SADC's strategy of adopting a common monetary union feasible and desirable? Based on the fiscal and monetary policy interdependence criteria, we find at least some statistical evidence to back the region's monetary union aspiration. The emerging pattern seems to suggest six countries out of ten considered in this paper: South Africa, Swaziland, Lesotho (all in the CMA), Botswana, Mauritius and Tanzania. However, this does not necessarily precludes the remaining other four countries from qualifying if they could fastened up and meet up before the scheduled period, 2016, which might be even what is needed.. Because the recent experiences of the EU demonstrated that it would be better, if possible, to have more countries adjusting before the scheduled period, otherwise, one might experience more instability due to uncertain fiscal dynamics.

For example, if Malawi could be able to maintain this recent sign of a switch to an R-type of movement in government expenditure and revenue, and Seychelles corrects the random movement in both variables, both countries might as well be good candidates in near future. Moreover, a more sustainable movement in government expenditure and revenue is desirable for Zambia and Zimbabwe to assume a more responsible fiscal policy. Meanwhile, lack of reliable and consistent data especially for Angola, DRC, Mozambique and Namibia (except for the latter period), which are not considered in this study, is a more reflection of the traditional lack of accountability and transparency in the fiscal accounts.

Generally, while the issue of feasibility of monetary union in SADC is acceptable, its desirability is still uncertain. Until we begin to see more member countries intensifying and redoubling their efforts towards the realization of a more responsible fiscal policy, we may not be assured of a successful implementation of a SADC monetary union within the agreed timeframe.

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

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| <b>Country</b> | <b>Stationary</b>  | <b>Non Stationary</b> |
|----------------|--------------------|-----------------------|
| CMA            |                    |                       |
| South Africa   |                    | All                   |
| Lesotho        | GREV & LIAB        | GEXP & PSURP          |
| Swaziland      | GREV, PSURP & GEXP | LIAB                  |
| OTHERS         |                    |                       |
| Botswana       | GEXP, GREV & LIAB  | PSURP                 |
| Mauritius      | GREV               | GEXP, LIAB & PSURP    |
| Malawi         | GEXP, PSURP & LIAB | GREV                  |
| Seychelles     | GEXP & GREV        | LIAB & PSURP          |
| Tanzania       | GREV               | GEXP, LIAB & PSURP    |
| Zambia         | LIAB               | GEXP, GREV & PSURP    |
| Zimbabwe       | GEXP, GREV & PSURP | LIAB                  |

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**Figure 1**

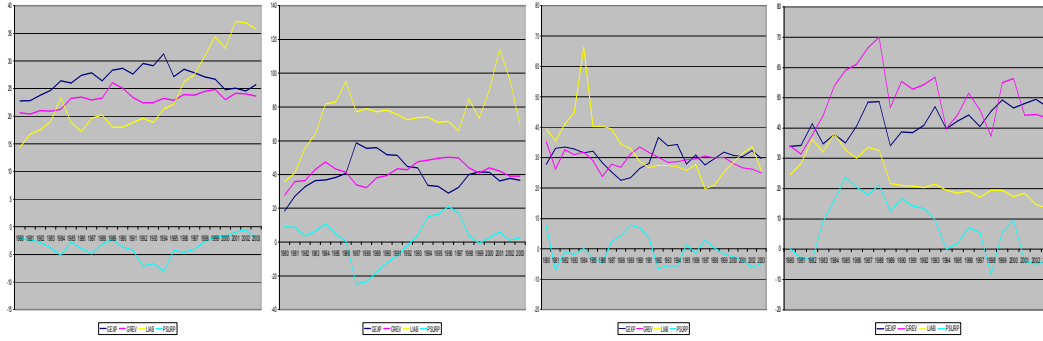
*Government Expenditure, Revenue, Liabilities and Surplus (% of GDP) 1980-2003*

South Africa

Lesotho

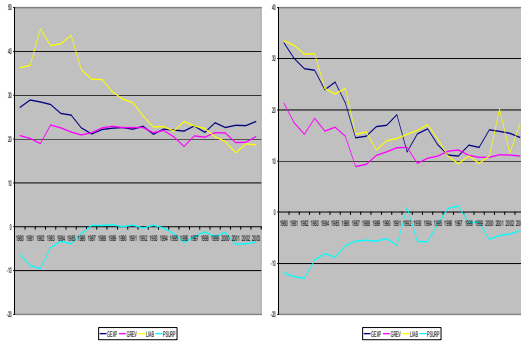
Swaziland

Botswana



Mauritius

Tanzania

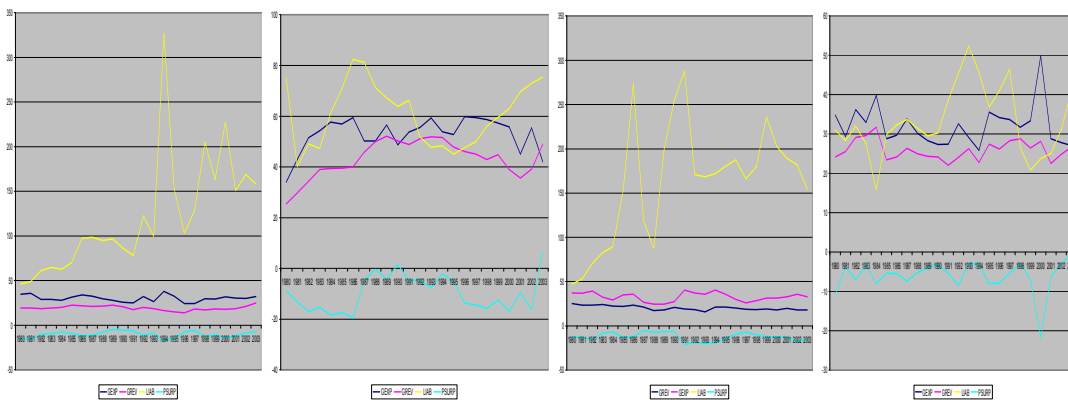


Malawi

Seychelles

Zambia

Zimbabwe



## Figure 2

### VAR in Surplus/GDP and Liabilities/GDP

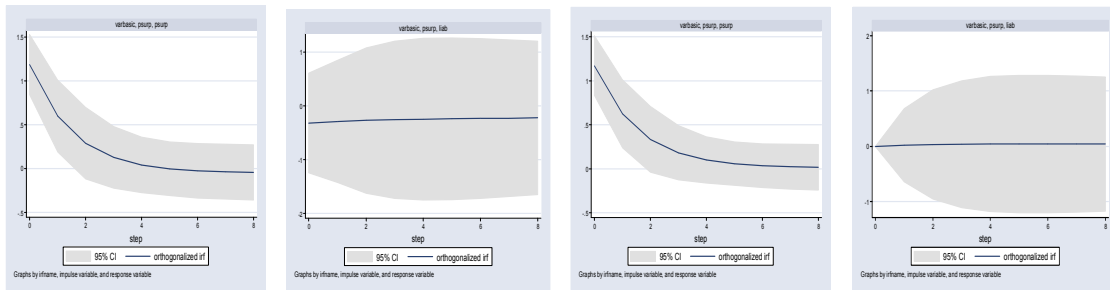
Notes: First Ordering, Surplus/GDP and Liabilities/GDP

Second Ordering, Liabilities/GDP and Surplus/GDP

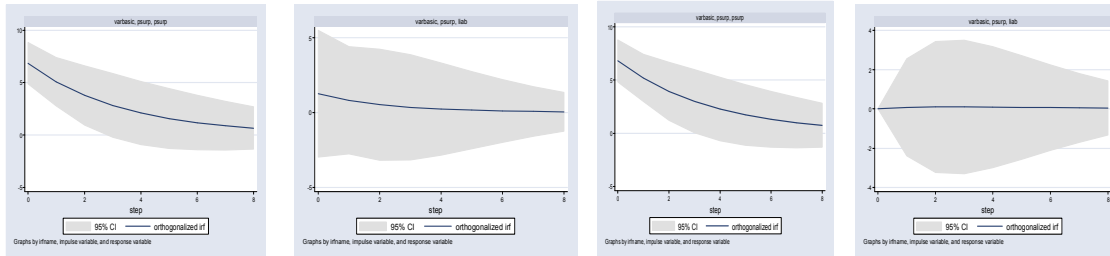
#### South Africa

First ordering

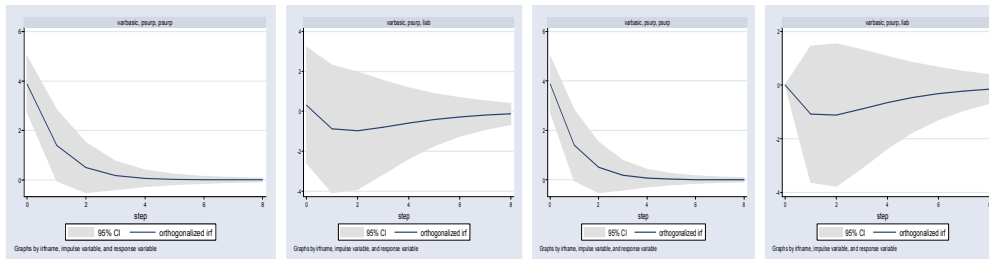
Second Ordering



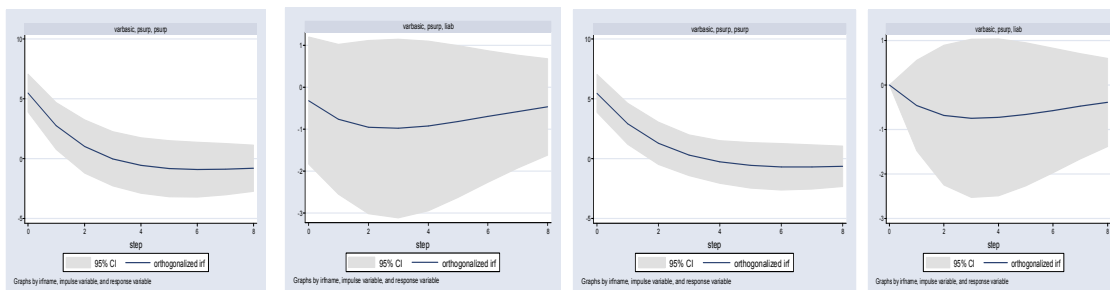
#### Lesotho



#### Swaziland



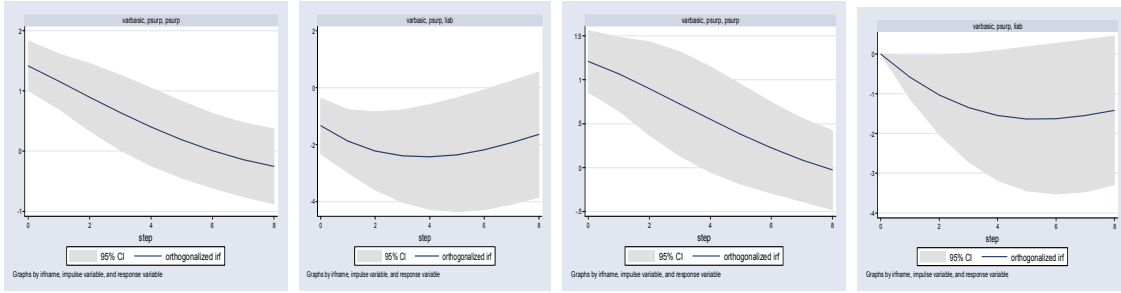
#### Botswana



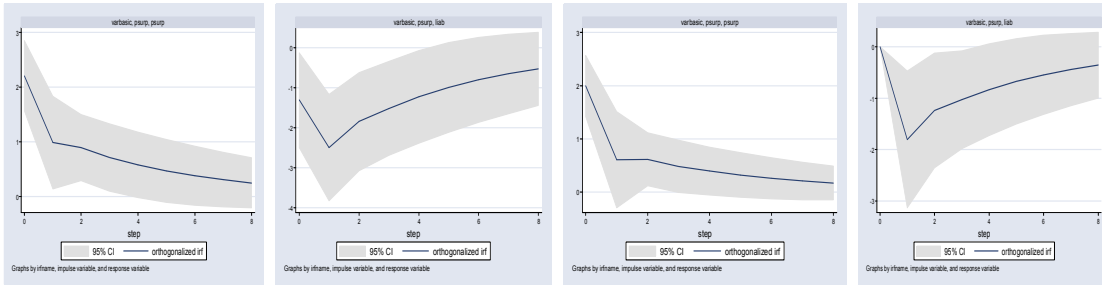
# Mauritius

## First Ordering

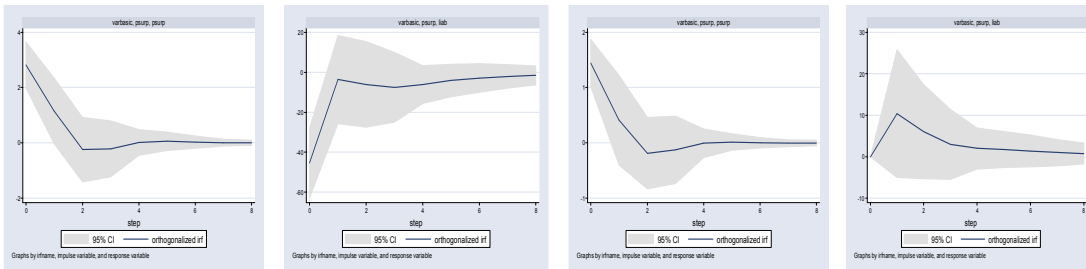
## Second Ordering



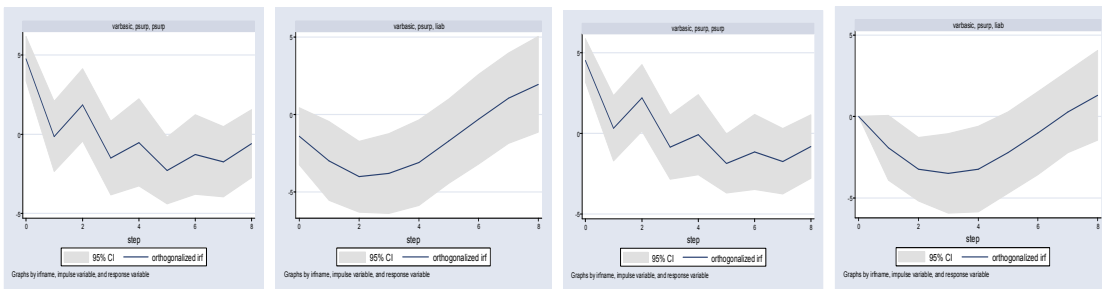
# Tanzania



# Malawi



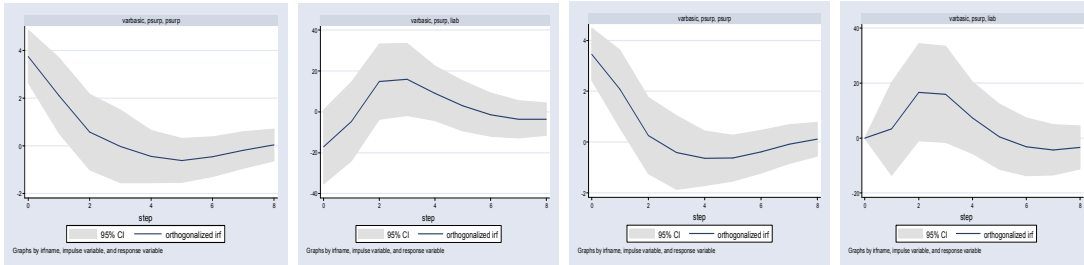
# Seychelles



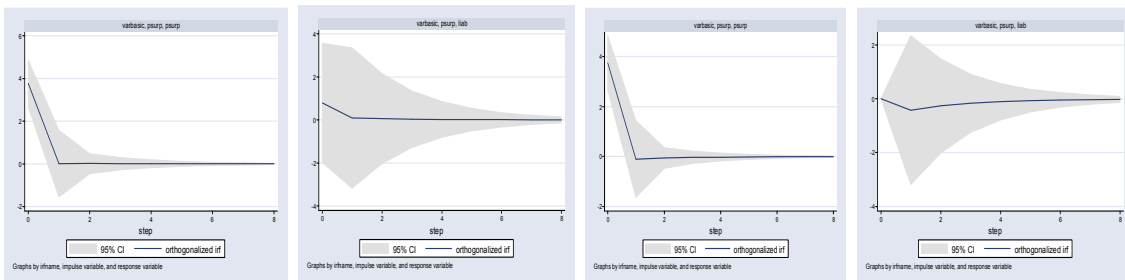
# Zambia

## First Ordering

## Second Ordering



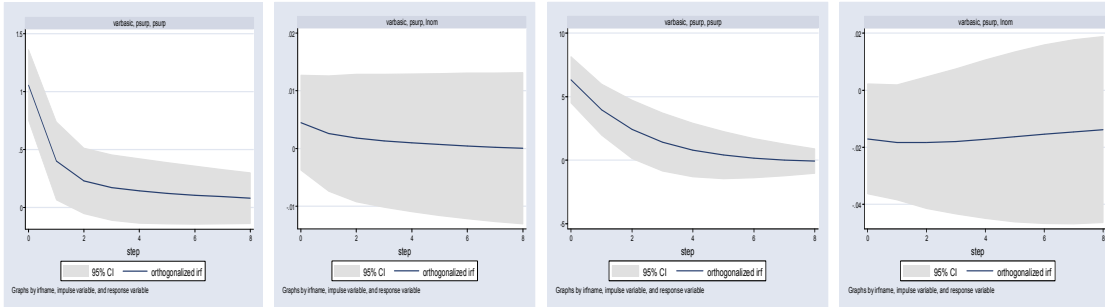
# Zimbabwe



**Figure 3**  
*VAR in lliab, Surplus/GDP and Inom*  
 Note: Ordering, lliab, Surplus/GDP and Inom

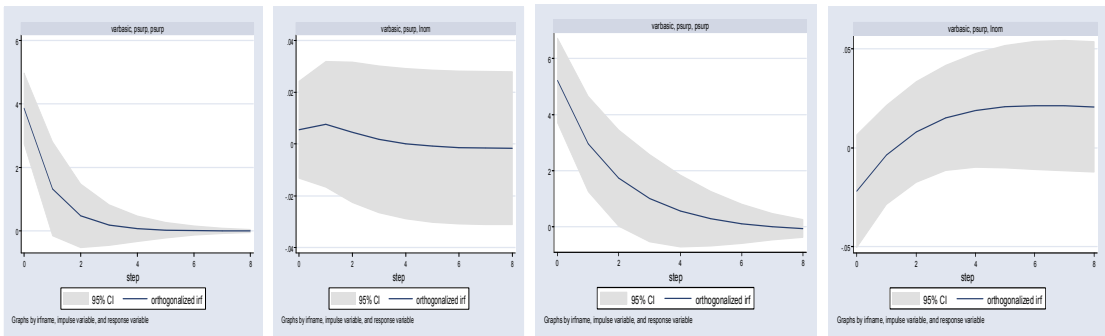
South Africa

Lesotho



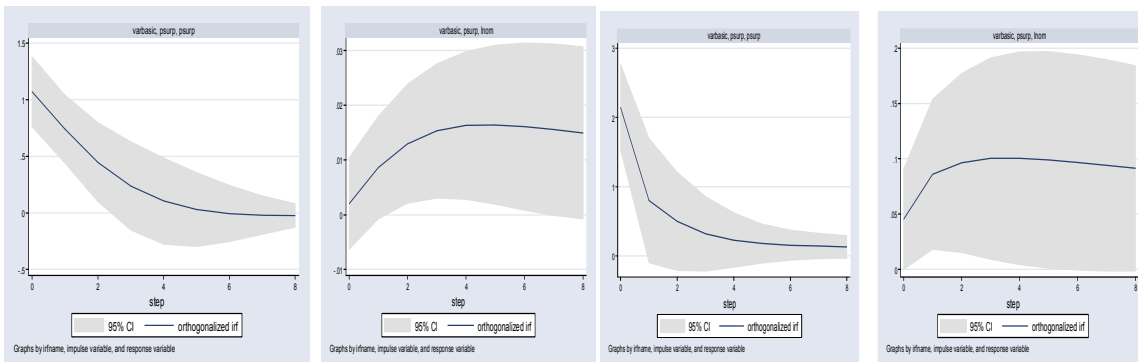
Swaziland

Botswana

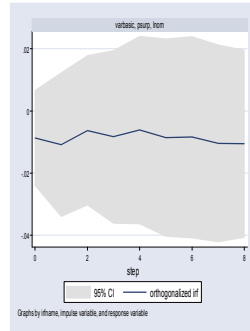
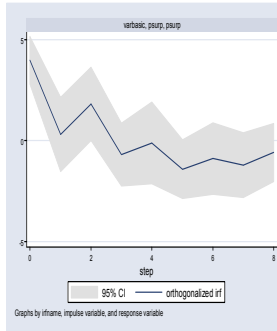
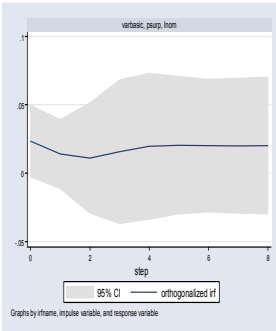
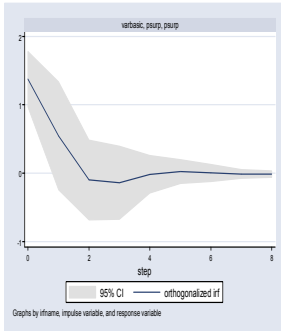


Mauritius

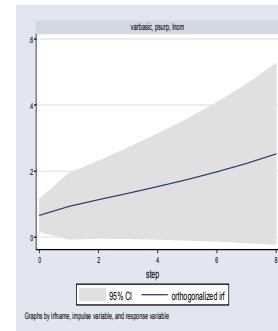
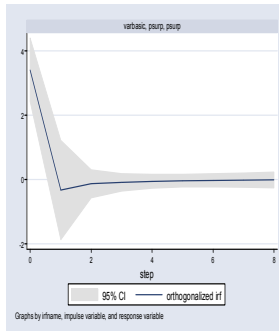
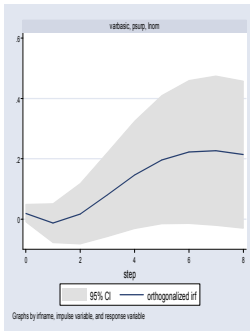
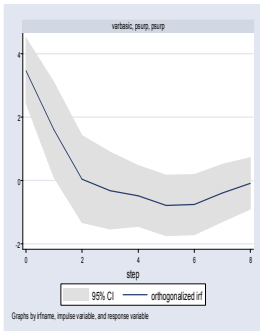
Tanzania



## Malawi



## Zambia



## Seychelles

## Zimbabwe

## Figure 4

### SVAR in Surplus/GDP and Liabilities/GDP

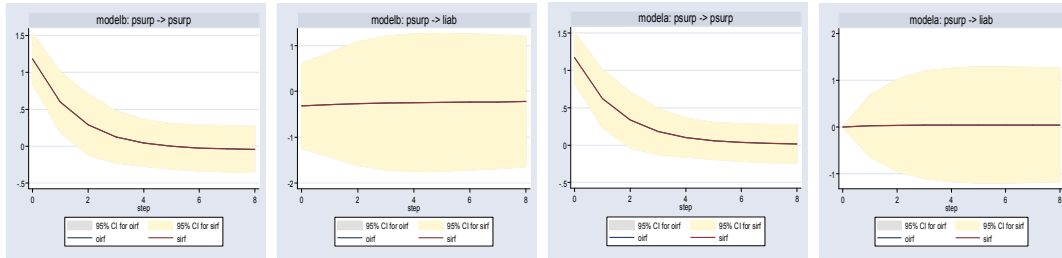
Notes: First Ordering, Surplus/GDP and Liabilities/GDP

Second Ordering, Liabilities/GDP and Surplus/GDP

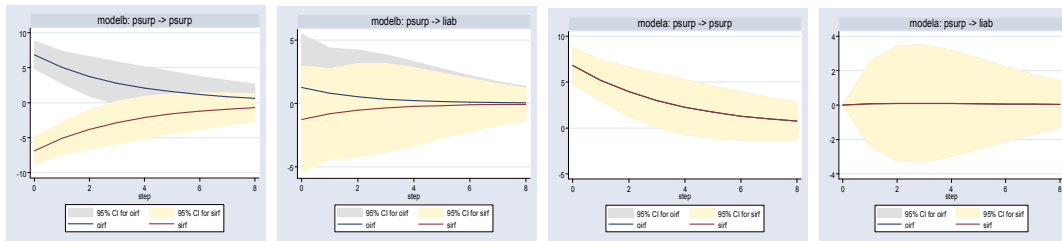
#### South Africa

##### First Ordering

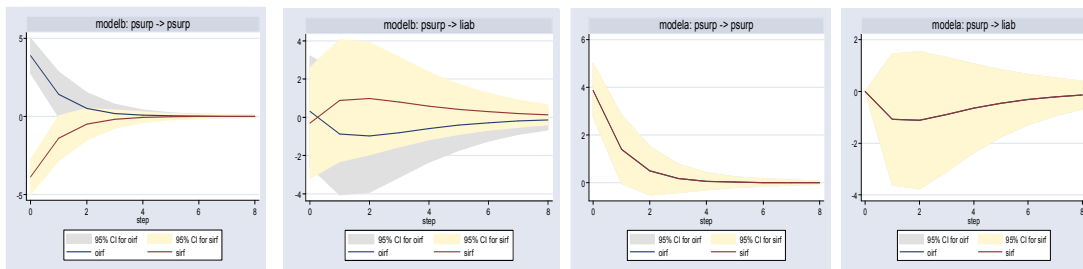
##### Second Ordering



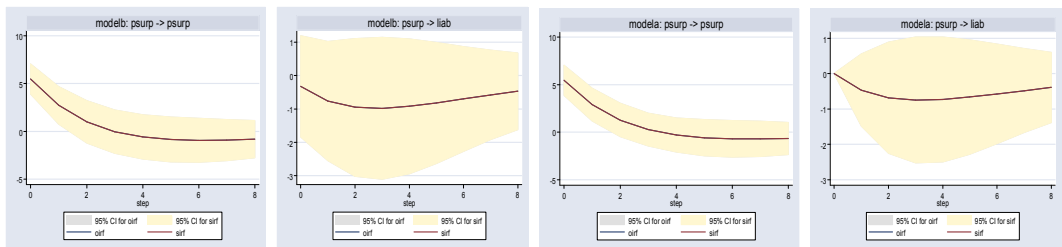
#### Lesotho



#### Swaziland



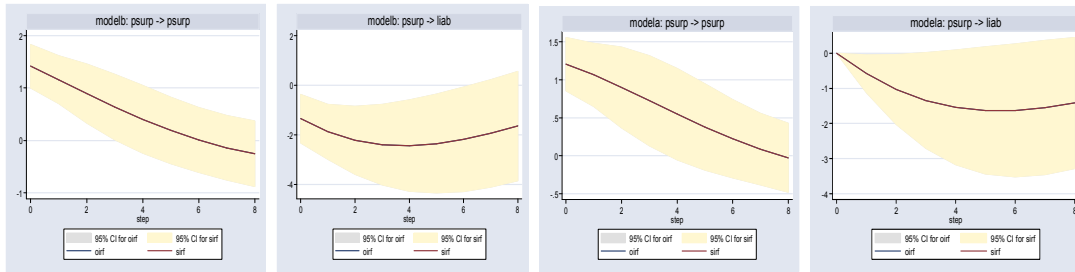
#### Botswana



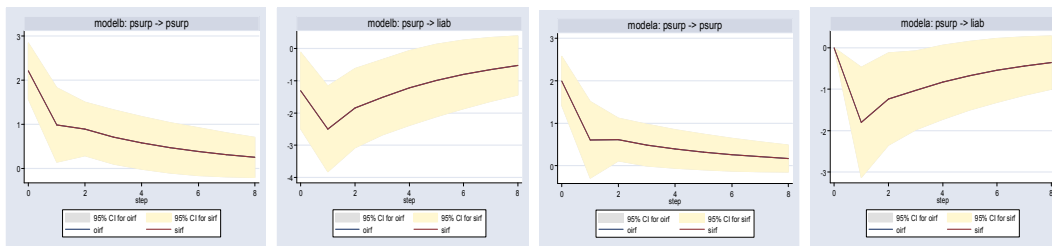
# Mauritius

## First Ordering

## Second Ordering



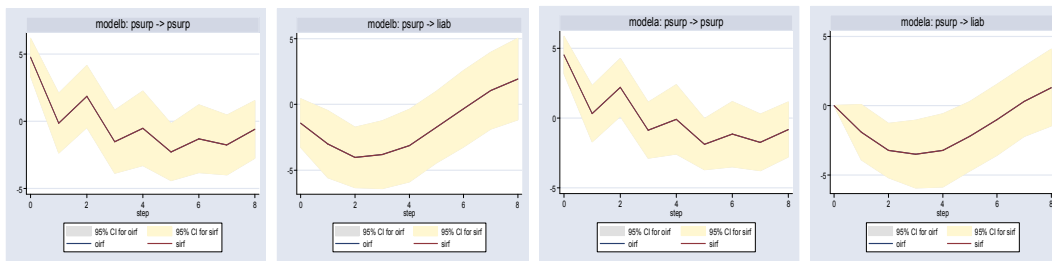
# Tanzania



# Malawi



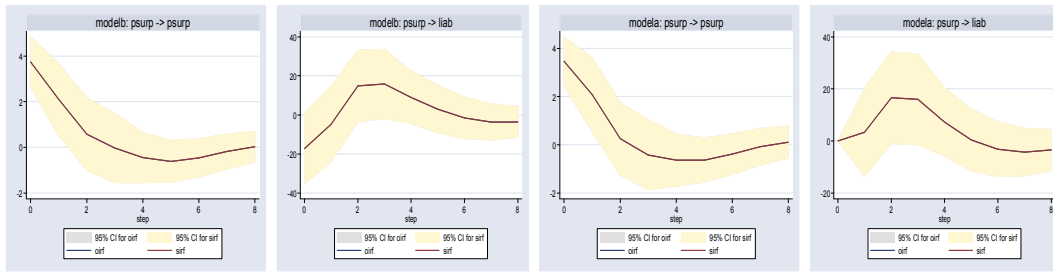
# Seychelles



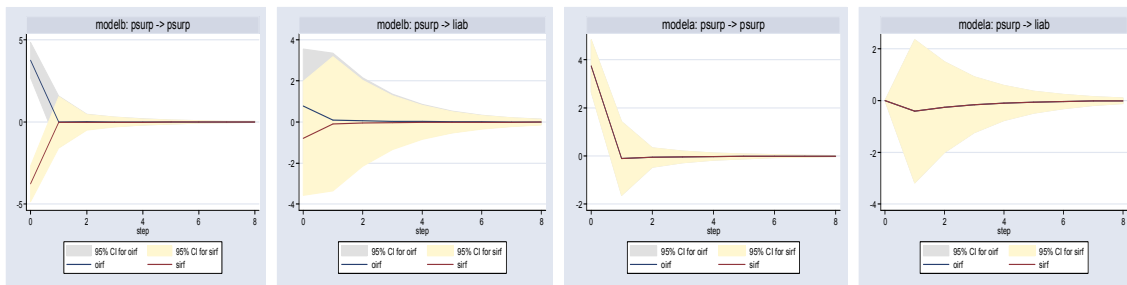
# Zambia

## First Ordering

## Second Ordering

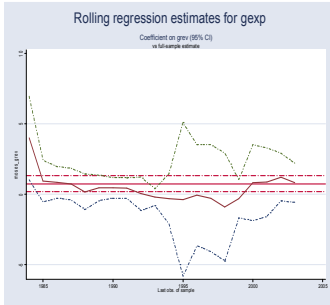


# Zimbabwe



**Figure 5**  
*Rolling Regression in Government Expenditure and Revenue (% of GDP) 1980-2003*

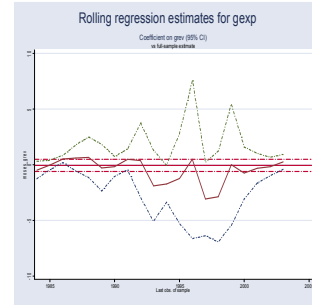
South Africa



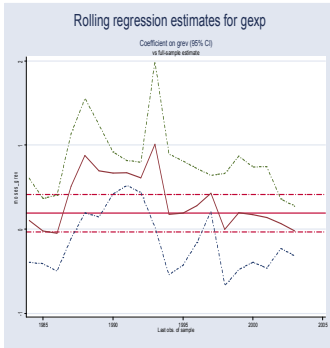
Lesotho



Swaziland



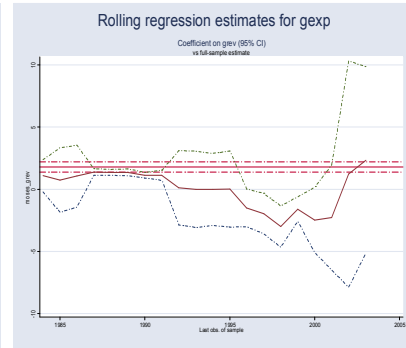
Botswana



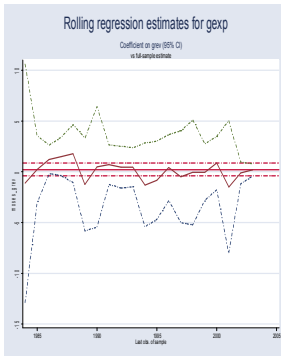
Mauritius



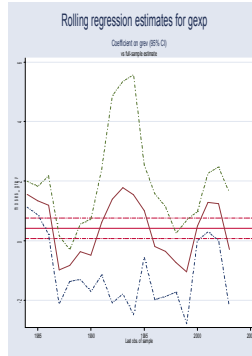
Tanzania



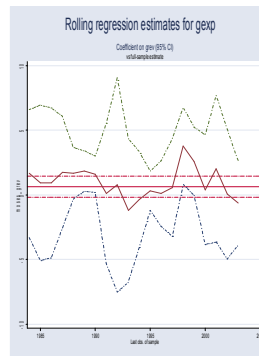
Malawi



Seychelles



Zambia



Zimbabwe

