



FISCAL SHOCKS – A STABILIZATION TOOL

by

Kester Guy

and

Tracy Maynard

Research Department
Central Bank of Barbados
P.O. Box 1016, Bridgetown, Barbados
Email: tomaynard@centralbank.org.bb
Tel.: 1 (246) 436-6870
Fax: 1 (246) 427-1431

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ABSTRACT

The role of fiscal policy in offsetting idiosyncratic shocks has been widely debated among academics and policy-makers. Notwithstanding this, many economies around the world have adopted expansionary fiscal policies to help jolt economic activity during this time of global downturn. This study investigates whether fiscal policy in Barbados can be used as a counter-cyclical tool and the overall impact of expansionary policies on other macroeconomic variables. The structural vector autoregressive (SVAR) methodology was adopted and applied to quarterly data over the period 1980:1 to 2008:4. The empirical results suggested that fiscal policy can be counter-cyclical, at least in the short-term.

* Corresponding Author: Tracy Maynard, Research Department, Central Bank of Barbados, Tom Adams Financial Centre, P.O. Box 1016, Bridgetown, Barbados; Tel: 1 (246) 436870; Fax: 1 (246) 4271431; Email tomaynard@centralbank.org.bb

1.0. Introduction

There is still a lack of consensus in the economic literature on the role of fiscal policy in influencing economic activity. A renewed emphasis on this issue has arose as many countries have implemented fiscal stimuli to boost economic activity and buffer against the recessionary impact that followed the financial collapse n the US submarket. Since Keynes, many analysts have accepted that fiscal policy is the only instrument on the demand side that countries can implement to offset idiosyncratic shocks. Critics on the other hand, argue that economic agents will offset the impact of fiscal policy through behavioural adjustments, while the mid-way view posits that fiscal policy can be effective as long as macroeconomic fundamentals are strong.

This study analyzes the effectiveness of fiscal policy in stimulating economic activity in Barbados. The empirical approach is base on the structural vector autoregressive (SVAR) framework, and our finding suggest that there is a scope for fiscal policy in stimulating economic activity in Barbados.

The paper is organized as follows: Section 2 provides the conceptual and empirical review of the literature; Section 3 outlines the methodological approach used; in Section 4 we present our findings and conclude with Section 5.

2.0 Literature Review

The effectiveness of fiscal policy is ultimately determined through empirical analysis. To date, there is no consensus from the literature concerning the impact of fiscal expansion on real growth, as idiosyncrasies within countries tend to alter the outcome. Notwithstanding, several theoretical and empirical constructs have been explored to provide some reasonable arguments on the nexus between fiscal shocks and output.

2.1. Demand-side Effects

The Keynesian approach suggests that output is determined by aggregate demand. Thus, the multiplier effect of a fiscal expansion would increase aggregate demand and ultimately output.

This simplistic view assumes that price rigidities and excess capacity exist. By extending these assumptions to include crowding out effects through induced changes in interest rates and the exchange rate, the size of the fiscal multipliers would be significantly affected.¹ In the standard IS-LM model, private investment depends negatively on interest rates, and therefore a fiscal expansion resulting from increased borrowing that leads to higher interest rates would reduce investment. Higher interest rates may attract capital inflows and result in an appreciation in the exchange rate, which may then lead to deterioration in the external current account. The degree of openness and the exchange rate regime are therefore important factors that determine the size of the fiscal multiplier.

From a rational expectations view point, the distinction between temporary and permanent policy changes is important as this would significantly alter adaptive expectations. For example, while a temporary fiscal expansion that has no long-term effects will not influence expectations, a permanent fiscal expansion can add to crowding out – possibly to an extent that fiscal multipliers turn negative – because household and firms will expect that an initial increase in interest rates and appreciation of the exchange rate will persist and could become larger (Hemming et al., 2002). In the Ricardian perspective, the outcome of a fiscal expansion is dependent on how consumers perceive the increased spending would be paid for in the future. Consumers are forward-looking and are fully aware of government’s intertemporal budget constraints. Therefore, an increase in government spending may have no effect on aggregate demand (or possibly negative fiscal multipliers), as consumers tend offset fiscal injections through higher private savings – so that aggregate demand is not affected.

Under uncertain economic conditions, confidence effects are very important, as firms and households tend to be extremely cautious. A fiscal expansion may result in very low and possibly negative fiscal multipliers, as household may accumulate precautionary savings while firms may delay irreversible investments. While the theoretical underpinning of confidence effects that are not related to expectations or credibility is unclear, the general idea is that consumption or investment may depend on households’ or firms’ attitudes to the general

¹ The extent of crowding out affects the size of fiscal multipliers but does not change their sign. (Hemming et al., 2002)

economic environment, and their confidence in this regard is influenced by government policies (Hemming et al., 2002).

2.2. *Supply-side Effects*

Although supply-side effects are seen as more important than demand side over the long term, the distinction between short-term demand-side concerns and longer-term supply-side issues are not so clear. Supply-side effects of fiscal policy can have short-term demand-side consequences because of expectations that over the longer-term growth will be higher. A fiscal expansion in an economy that is operating at full capacity is likely to result in the crowding out, since the productive capacity cannot be increased in the short-term. Therefore, policies that promote supply-side responses can address capacity constraints, and their impact is primarily in the longer term. Thus, a fiscal expansion imparted through tax cuts and spending increases that are good for the supply-side, will tend to increase fiscal multipliers.

From a new classical perspective, prices clear markets and the fluctuations in output are the result of supply-side shocks and not of changes in aggregate demand. One implication of new classical models, first highlighted by Lucas (1975) and Sargent and Wallace (1975), is that fully anticipated policies affecting aggregate demand (but not aggregate supply) have no effect on growth either in the short term or the longer term. Only unanticipated policies – which reflect either surprises by the government or imperfect information – have an effect, which emerges entirely through the supply side. This does not mean that these models are silent on fiscal policy. However, they focus on the design of optimal fiscal policy, as distinct from the impact of fiscal policy on economic activity (Hemming et al., 2002).

2.3. *Institutional Considerations*

Institutional factors also play a significant role when assessing the impact of fiscal policy on economic activity. All fiscal measures could be subject to long inside lags because their design, approval, and implementation may be protracted – this type of lag is referred to as “inside lags” which is a function of the political process and the effectiveness of fiscal management. Generally speaking, automatic stabilizers – usually in the form of progressive income taxes and unemployment compensation – that provide countercyclical impulses to the economy without the

need for discretionary measures have shorter inside lags. The greater the reliance on discretionary measures, the longer inside lags are likely to be. “Outside lags” on the other hand, reflect the time it takes for fiscal measures to feed through to aggregate demand and these tend to be shorter for transfers and income tax cuts (Hemming et al., 2002).

Large and persistent deficits may point to the existence of a deficit bias explained by several political economy factors. Where a deficit bias exists, the positive impact of a fiscal expansion must be weighed against the negative impact of persistently higher deficits that result in the expansion is not fully reversed. If households and firms are completely myopic or liquidity constrained, this may not affect fiscal multipliers. But if households and firms (or financial markets) are at least partially forward-looking, a fiscal expansion that is announced to be temporary may still lead to an increase in the risk premium, or higher private saving, which will reduce fiscal multipliers (Hemming et al., 2002).

Another significant influence on the effectiveness of fiscal policy relates to the level of development within the economy. Although most of the literature on the effectiveness of fiscal policy has been written in the context of an advanced economy context, some authors argue that in principle, the same arguments could be used in a developing country setting. However, there are institutional features specific to developing countries that will affect the size of fiscal multipliers. Firstly, the availability and cost of domestic and external financing is often a major constraint on fiscal policy. In highly indebted developing countries that do not have access to international capital markets (or do so only on unfavorable terms), access to financing often determines the size of the fiscal deficit. It then follows that an increase in the fiscal deficit beyond a level that can be financed on acceptable terms will lead to strong crowding out effects.² On the other hand, the relatively high marginal propensity to consume in many developing countries would tend to increase the size of the multiplier. Finally, fiscal policy is likely to be to be harder to implement in developing countries, for several reasons: poor tax administration and expenditure management; governance problems; volatile revenue bases, for example due to

² This argument was made in the case of Asian crisis countries. The main argument for fiscal tightening in the early stage of the crisis was the presence of financing constraints, and it was argued that fiscal policy begins to have a significant stimulative effect only as external financing constraints are relaxed, or additional financing becomes available (Hemming et al., 2002).

heavy reliance on trade taxes; long lags affecting fiscal policy³, and reflecting some of these and other factors (e.g., the need to subsidize loss-making public enterprises), a greater deficit bias⁴ (Hemming et al., 2002).

2.4. Empirical Literature

According to Eskesen (2009), the question on the effectiveness of fiscal policy is ultimately an empirical one. The paper outlined that the vast literature on this topic generally support the role for counter-cyclical measures, but the evidence on the size of fiscal multipliers varied with the analytical approach. The results from several studies were also presented: The 2001 income tax rebates in the United States are generally considered to have been effective in boosting domestic demand, although the impact on output was relatively small with multipliers well below 1. The 1995 stimulus package in Japan is estimated to have been successful, but it did not have a lasting impact on economic activity. Findland's response to the 1991 outputs shock, by letting automatic stabilizers operate fully, is considered to have been largely ineffective because it raised concerns about fiscal sustainability. IMF, World Economic Outlook (October 2008) provided evidence that the size of public debt and composition of fiscal stimulus could be important determinants of the effect of fiscal policy (Eskesen 2009).

In other papers, Giordano et al., (2008) used a structural VAR methodology on data in Italy and found that public expenditures positively impact output and that the cumulative multiplier, a indicator which gauges the effects of economic activity per unit of expenditure, was relatively high when compared to the findings in the United States. Tagkalakis (2007) concluded that among OECD countries, fiscal policy is highly effective in stimulating private consumption and pushing the economy out of a recession, when liquidity constraints bind for a larger fraction of the population. The study also found that spending shocks have a positive effect while tax shocks have a negative effect on private consumption and that the changes in "bad times" are more than in "good times." De Castrk and Hernandez de Cos (2008) found that in Spain output multipliers of government expenditure to be slightly above one in the short-term and negative in the longer

³ Since automatic stabilizers tend to be weaker in developing countries, inside lags in particular are likely to be longer (Tanzi, 1986)

⁴ there may therefore be a particularly strong argument in favour of fiscal rule or institutional arrangements (such as stabilization funds) to reduce the deficit bias in developing countries.

term, government expenditure shocks yielded significant and positive effects on prices, both government expenditure and net-tax increases generate public deficits in the medium term due to their endogenous response, and that the responses of GDP or prices may differ significantly depending on the spending or tax component considered. Some of the studies in Barbados that had a similar focus found: certain compositions of public expenditure positively impact growth (Belgrave and Craigwell, 1995); the size of the public sector plays a dominant role in the relationship between deficits and growth in government spending (Craigwell and Rock, 1991); the response of real output to exogenous changes in government spending is positive but weak (Bynoe and Maynard, 2008).

3.0. Methodology

3.1. Specification of SVAR Model

The reduced-form VAR can be represented as:⁵

$$z_t = \Gamma(L)z_{t-1} + u_t \quad (1)$$

where z_t is a vector of endogenous variables, $\Gamma(L)$ is an autoregressive lag polynomial in the lag operator L , and u_t is a vector of reduced-form innovations, which are independent and identically distributed. The relation between the reduced-form innovations, u_t , and the objects of ultimate interest, the structural shocks, v_t , can be represented as:

$$Au_t = Bv_t \quad (2)$$

where A and B are square matrices that respectively describe (i) the instantaneous relation between the variables and (ii) the linear relationship between the reduced-form innovations. The structural shocks are assumed to be independently and identically distributed with covariance matrix equal to the identity. The structural form of the VAR can be obtained by multiplying equation (1) by A and then applying the relational defined of equation (2):

$$Az_t = A\Gamma(L)z_{t-1} + Au_t = A\Gamma(L)z_{t-1} + Bv_t \quad (3)$$

Solving equation (3) for z_t yields the structural specification:

⁵ The SVAR specifications followed the methodology adopted in Eskesen 2008, Giordano et al., 2008 and de Castro and Hernandez de Cos 2007.

$$z_t = [I - \Gamma(L)L]^{-1} A^{-1} B v_t \quad (4)$$

3.2. Identification of fiscal Policy Shocks

De Castro and Hernandez de Cos (2008) suggest that the reduced-form residuals of the g_t and T_t equations, u_t^g and u_t^T , can be thought of as linear combinations of three types of shocks: (a) The automatic responses of spending and net taxes to GDP, price and interest rate innovations, (b) systematic discretionary responses of fiscal policy to the macro variables in the system, and (c) random discretionary fiscal policy shocks, taken as the truly uncorrelated structural fiscal policy shocks.⁶ Thus, the reduced-form residuals of the variables of interest, g_t and T_t can be decomposed as:

$$u_t^g = \alpha_{g,y} u_t^y + \alpha_{g,p} u_t^p + \alpha_{g,u} u_t^u + \alpha_{g,c} u_t^c + \alpha_{g,i} u_t^i + \beta_{g,t} v_t^T + v_t^g \quad (5)$$

$$u_t^T = \alpha_{T,y} u_t^y + \alpha_{T,p} u_t^p + \alpha_{T,u} u_t^u + \alpha_{T,c} u_t^c + \alpha_{T,i} u_t^i + \beta_{T,g} v_t^g + v_t^T \quad (6)$$

where v_t^g and v_t^T are the structural orthogonal shocks of government expenditure and tax revenue respectively⁷; the coefficients α_{ij} reflect the automatic response of the fiscal variables, i , to innovations in the other variables, j , of the VAR system, while the β_i coefficients measure the contemporaneous shock of one fiscal variable on the other.

One frequent criticism to the identification of quarterly fiscal policy shocks is that fiscal decisions are mainly taken on an annual basis and embedded in the budget. However, while acknowledging that the yearly budget incorporates important policy measures, supplements to it and other decisions affecting fiscal policy during the year usually occur. Therefore the identification of quarterly fiscal shocks may offer a more precise view of their effects. One caveat though, is that the estimates of the quarterly data might be biased since policy measures contained in the annual budget help configure agent's expectations (de Castro and Hernandez de Cos, 2008)

⁶De Castro and Hernandez de Cos followed Blanchard and Perotti (2002) and Perotti (2004). Giordano et al., (2008) and Eskesen (2008) also adopted a similar construct.

⁷ Similarly, $v_t^y, v_t^p, v_t^u, v_t^c$ and v_t^i would be the structural orthogonal shocks in the output, prices, unemployment, private consumption, private investment and interest payments respectively.

3. Data and Stylized Facts

3.1. Data

Two sets of data were compiled and analyzed in this study. The first set presents annual stylized facts about the expenditure and revenue trends over the period 1990 to 2008 in relation to overall economic performance and other macroeconomic variables which include: real GDP growth output gap⁸, unemployment, prices, debt/GDP ratio among others.

The second set of data in this study was applied to the SVAR framework as outlined in Section 2, and was consisted of seasonally adjusted quarterly data over the period 1980 to 2008 for seven variables.⁹ The variables included: total government expenditure less interest payments (g_t); tax revenue (T_t); real GDP (y_t), GDP deflator (p_t); unemployment rate (u_t); private consumption (c_t); and private investment (i_t).

3.2. Stylized Facts on the Barbadian Economy

Over the 19 years, three distinct periods of economic downturn, 1981 – 1982, 1991 – 1992 and 2001 – 2003, was observed. From the initial observations, it is not clear whether government policies are pro-cyclical or counter-cyclical. During the early 1980s and 1990s when the economy contracted, the fiscal stance also appeared to be contracting, however in 2001, when the economy activity declined the fiscal stance expanded and the counter-cyclical policies employed help stabilize the economy. This section presents an analysis of the trends in fiscal policy and output, particularly during the periods of economic downturn. Figure 1, 2 and 3 trace out the time path of government's cyclical behaviors and provides an overall snapshot of the economic performance in relation to output gap.

⁸ The output gap is defined as: $\frac{Y - Y^*}{Y^*} \times 100$, where Y is actual real output and Y^* is the potential output. The

latter was obtained by applying the Fixed length symmetric (Christiano-Fitzgerald) Band-Pass Filter.

⁹ Interest rate and debt variables were also included originally but fell out because the integrating order of these was not the same as the other variables. Where quarterly data was not available, the Lisman and J. Sandee (1964) was adopted to convert annual data into a quarterly series.

Figure 1: Simulation of Barbados' Output Gap and Cyclical Expenditures 1990 – 2008

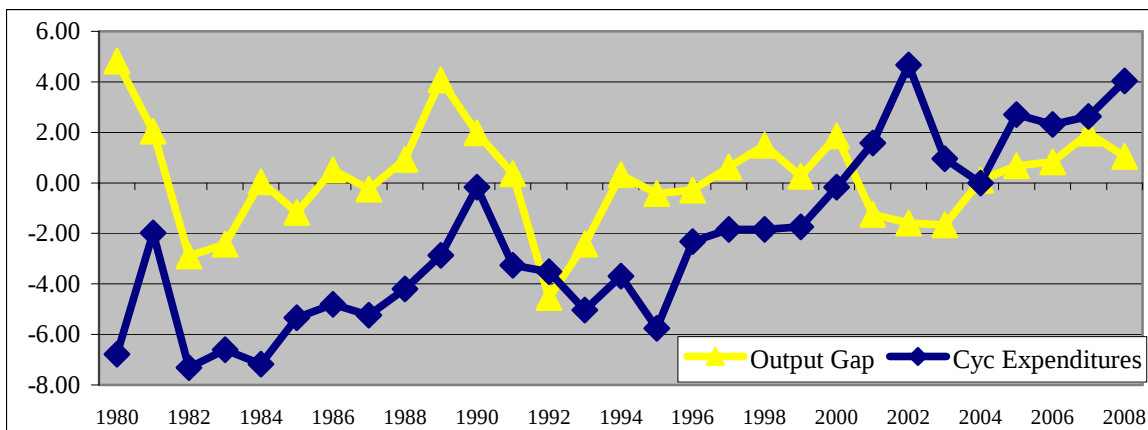


Figure 2: Simulation of Barbados' Output Gap and Cyclical Revenues 1990 – 2008

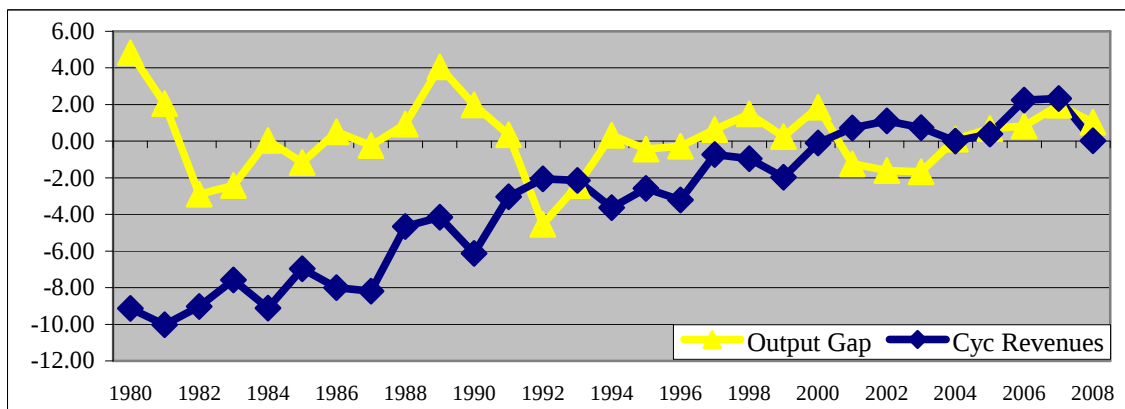
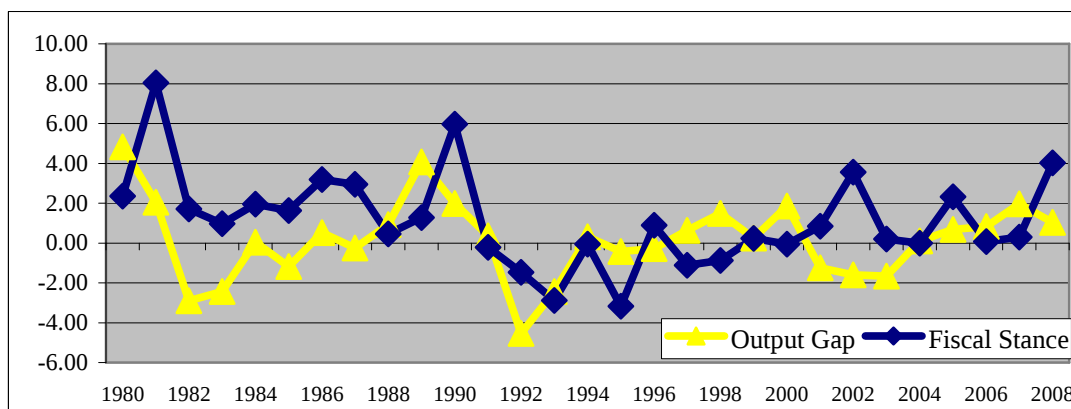


Figure 3: Simulation of Barbados' Output Gap and Fiscal Stance Revenues 1990 – 2008



Period 1 (1981 – 1982)

Real GDP declined in 1981 and 1982 and brought to end the five-year streak of positive economic growth. Recessionary conditions in the US and Europe led to a sharp fall in tourist arrivals and weaker demand for domestic exports. Large government outlays in 1981 were reflected in higher wages and in the expansions of government's extensive capital works programme, but slower revenue growth resulted in a significant build-up of the fiscal deficit. During the year, foreign payments imbalance and the fiscal deficit became more critical and government and the central bank took measures to restrict spending. Although the central bank drew heavily on its international credit line and the government obtained a Eurodollar loan the overall outcome on the balance of payments was still in deficit.

Substantial credit demands by both the government and the private sector severely strained the domestic banking system in 1981. Reduced foreign exchange earnings and heavy payments on both traded and non-traded transactions prevented any significant build-up in deposits. Consequently, liquidity in the financial system registered a sharp fall during the year. These tight conditions persisted into 1982. Policies to contain domestic expenditure were introduced early in the year, and liquidity requirements for commercial banks were raised to a historic high, while selective credit controls were tightened even further. The central bank also raised the discount rate for short-term borrowing by commercial banks as well as the minimum rate received on savings deposits. The reduced level of economic activity that slowed the growth of revenues hampered public sector operations. Controls on current expenditures and a drastic cut in the capital budget reduced the overall fiscal deficit, by approximately half compared to the previous year, but difficulties in financing the deficit still persisted.

The annual average level of unemployment for 1982 stood at 13.6% compared with 10.9% at the end of 1981 and was primarily concentrated in the tourism and government sectors. Prices moderated during the period because of domestic inflationary influences, as well as the decline in imported inflation. Even though the balance of payments was under intense pressure during the period, there was a small overall surplus at the end of 1982. Although the manufacturing exports grew and imports fell, the weak external demand for tourism and other services pushed the external current account further into deficit. However, the substantial inflows of investment

and short-term funds mostly absorbed by the private sector helped offset the external current account deficit. Again in 1982, the central bank drew from its credit line at the IMF mainly to ensure adequate foreign exchange reserves.

Period 2 (1991 – 1992)

Following seven years of consecutive growth, the Barbadian economy was constrained by significant declines in the Net International Reserves (NIR). The worsening of the external sector was largely attributable to a fall in sugar export earnings, sizeable debt service payments and a considerable increase in retained imports. To restrain the rapid credit expansion and reduce the strain on the foreign reserves, the central bank raised both the rate at which it provides short-term financing to commercial banks as well as the minimum deposit rate on savings during the latter half of 1989.¹⁰ Selective credit controls were also reintroduced and ceilings were imposed on the levels of personal, consumer and distribution credit outstanding at financial institutions.

In the early 1990s the Barbadian economy experienced three consecutive years of decline. The worsening external balance, coupled with the build-up in debt service payments prompted the government to implement an IMF stabilization programme, which sought to reduce spending on imports in the short-term through reductions in the fiscal deficit and private sector credit. The fiscal measures included a decrease in public sector wages, a reduction in spending on capital projects, lower transfers to statutory corporations and increased taxation. As the fiscal measures tightened, the monetary authority also reined in, thus, the central bank's discount rate was raised, commercial banks were required to hold a higher portion of deposits in government securities, credit limits were placed on commercial banks and the ceiling on the average lending rate was removed. This period was marked with significant increases in the unemployment rate, interest rates and the debt to GDP ratio, but by the end of 1993 there was an incipient recovery the economy and the NIR had started to improve.¹¹ The overall fiscal deficit by the end of 1993 had declined to 0.5% due to stronger revenue growth and restrictive fiscal spending. The

¹⁰ The Central Bank raised the bank rate from 8% to 13.5% in two adjustments, while the minimum savings rate on deposits was raised from 4% to 6%.

¹¹ See Appendix 1 for details.

unemployment rate continued to grow but prices remained relatively subdued.

Period 3 (2001 – 2003)

The negative growth in 2001 resulted in a three-year drop in the output gap. However, the economic conditions were very different and the resulting fiscal stance during this period was the opposite of that in the two previous periods. The contraction in the economy during this period stemmed from trade liberalization adjustments as well as the negative spillover effects of a depressed world economy, and was exacerbated by the September 11, 2001 attacks on the US economy. To help better manage the challenges posed by this deteriorating economic climate, government issued a US\$ 150 million international bond in the last quarter of 2001. The proceeds from this bond issue, together with a strong first-quarter private sector inflows resulted in a significant increase in the NIR. The deficit on the external current account balance improved mainly because of a sharp fall in retained imports, which directly reflected weaker consumer and business demand. Private sector credit was the weakest since 1993, and with the continued build-up in deposits excess liquidity in the banking system grew. The central bank cut its official interest rates on four occasions in an attempt to stimulate economic activity. The government also adopted expansionary policies by increasing both current and capital outlays, which resulted in an increase in the fiscal deficit. Government tax revenue was however boosted by increases in personal taxes and property taxes, while indirect taxes and corporation taxed declined in line with economic activity. Prices during this period grew faster than in the early 1990s but the unemployment rate, though increasing was significantly lower than that recorded during 1991-1994 period. By the second half of 2002, a slight pick-up in the tourism sector contributed to a marginal growth in overall economic activity.

4.0. Empirical Results

The unit root test showed that all variables in the system contained one unit root and after estimation of the system the impulse responses for government expenditure shocks and tax revenue shocks were analyzed.¹²

¹² See appendix for unit root test (table 2) and the lag selection criteria for the system (table 3).

4.1. *Government Expenditure Shocks*

Figure 4 displays the response of the endogenous variables to a positive expenditure shock. The results suggest that a government expenditure shock is short-lived and tends to become insignificant after approximately five quarters. This result is consistent with the finding in Singapore (Eskenen, 2009), but contrary to those found for OECD countries.¹³

In relation to GDP, the result shows that government expenditure shocks positively impacts real output. The cumulative output multiplier after four quarters is approximately 10% and reaches its maximum of about 12% after 8 quarters.¹⁴ The GDP response to fiscal stimulus vanishes after the 8 quarters, thus, the cumulative multiplier would tend to lessen thereafter.

Given the fiscal shock, tax revenue has been shown to rise and remained positive and significant over the 10-quarter horizon. This persistence may largely be reflective of the automatic stabilization process associated with the increase in GDP. Hernandez et al., suggest that that the positive net-tax collections are able to offset the increase of public expenditure in the quarters following the shock.

Higher prices, measured by the GDP deflator, are also associated with the expansion in government spending according to our model. However, this result was not significant over the period. This result is not entirely surprising as many studies on inflation in Barbados suggest that domestic inflation is largely driven by import prices (See...). The evidence from the literature on the effects of government spending shocks on prices is rather mixed (Hernandez et al., 2008).¹⁵

¹³ Hernandez de Cos et al., (2008) found government expenditure shocks for Spain to be very persistent, and only becoming insignificant after five years. He referenced Perotti, 2004 and Gali et al., 2003 who found similar results for other OECD countries.

¹⁴ The cumulative dynamic multiplier at a given quarter is obtained as the ratio of the cumulative response of GDP and the cumulative response of government expenditure (Hernandez de Cos et al., 2008).

¹⁵ For the US, Fatas and Mihov (2001) and Mountford and Uhlig (2002) show negative effects on prices after a positive government spending shock, while Perotti (2004) finds an initial positive impact and negative effects thereafter on the CPI over the period 1961 – 2000; for the sub-period starting in 1980, the effects (albeit not significant) are instead positive after one, 12 and 20 quarters. Endelberg et al. (1998) find a negative effect after an initial positive effect, Neri (2001) reports no significant effects and Canzoneri et al. (2002) find a temporary rise in inflation after a brief decline. For other OECD countries, Perotti (2004) finds positive effects of government spending on prices in Germany, the UK and Australia, and negative, albeit small, in Canada. Marcellino (2002) reports minor and not statically significant effects on inflation in Germany, Italy and Spain and a positive and significant effect in France in the short term. By contrast, Giuliadori and Beetsma (2005) get non-significant

Unemployment appears to be positively affected by government expenditure shocks. The result is quite counter-intuitive and may be related to the time-lags between fiscal expansion and the actual change in unemployment.

The interest rate after three quarters shows began to show upward movement. Notwithstanding its insignificance during the first six quarters, the interest rate is positively and significantly impacted by the increase in fiscal spending over the medium term.¹⁶

As for the GDP components, the augmented VAR yields patterns of response for private consumption and investment quite similar to that of GDP, going up in the quarters following the shock and declining in the longer term. Private consumption reaches its peak in the fourth quarter die out after 8 quarters, while private investment peaked a bit earlier but remained significant over the 10-quarter horizon (See Appendix, figure 1). The evidence for private investment is however more mixed, with some papers showing negative responses of this variable to an exogenous increase in government spending. The short-run upswings of private consumption and investment arise as a consequence of the demand multiplier effect of public expenditure (de Castro et al., 2008).

4.2. Tax Revenue Shocks

The results from tax expenditure shocks (see figure 5) show that higher revenues encourage government spending, which increased significantly after 2 quarters and remained significant over the review horizon period. The significant responses of either fiscal variables after shocks to the other one suggest that a bi-directional causality between public revenues and expenditure may exist.

The GDP response to the tax shock, although positive due to the parallel increase of government expenditure and becomes insignificant in the medium term. Interest rate, private consumption

inflation responses in Germany and France and positive in the two quarters after the shock in Italy (de Castro et al., 2008).

¹⁶ The interest rate was found to be significant at the 10% level in the long-run cointegrating relationship (See table. Perotti (2004) found no clear-cut evidence in either direction on this issue.

and private investments responses to the tax shock are similar to that in the expenditure shock, while unemployment and prices remain insignificant over the 10 quarter horizon.

4.3. *Alternative Approach*

Due to the endogeneity between the two fiscal variables the responses of some variables may not intuitive. For this reason, a similar analysis was done using the fiscal stance variable to determine the impact of macroeconomic variable to shocks in the fiscal stance (see table 4 in appendix). The fiscal stance variable is useful because it combines the fiscal expenditure and tax revenue shocks and provides an overall fiscal position.

The overall findings indicate that an expansionary fiscal stance after 2 quarters can positively impact the output gap and real GDP growth. The output gap response remains significant over the remainder of the horizon, but the real GDP growth is short-lived. The change in debt levels responds positively to a shock in the fiscal stance and this response is sustained over two years. Prices measured by the CPI showed a general increase through out the period and the real interest rate showed positive significance only in the medium-term (after 6 quarters).

Figure 4 – Baseline Variables Response to Government Expenditure

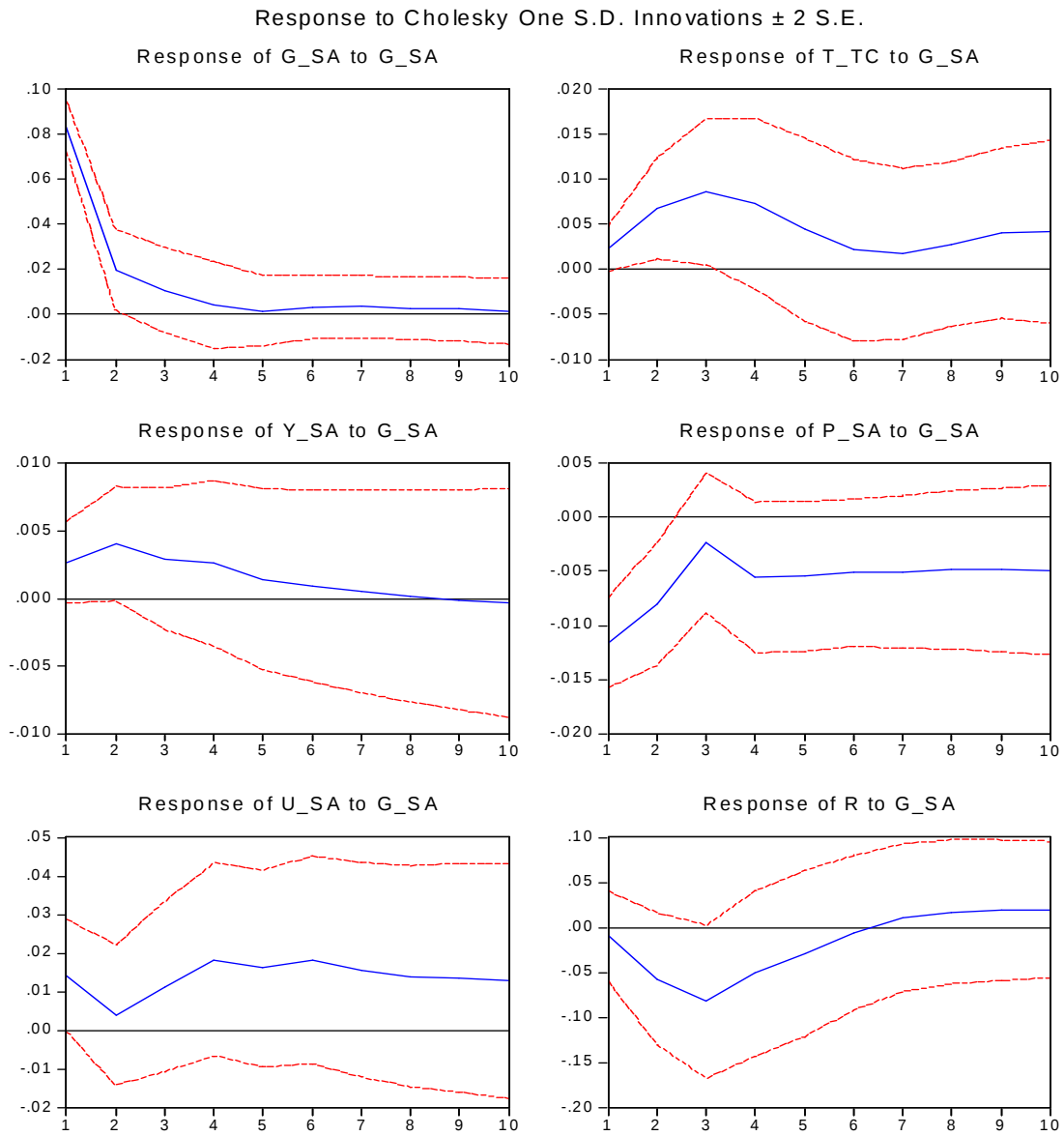
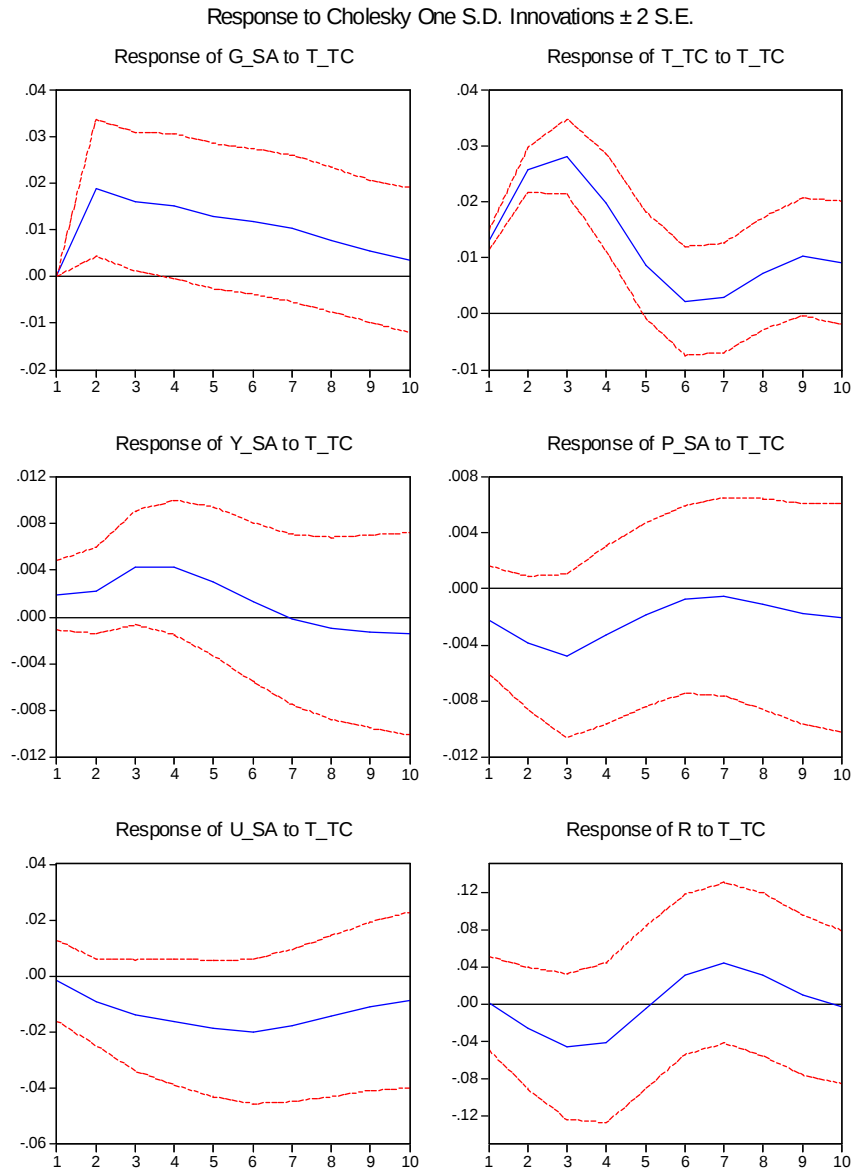


Figure 5 – Baseline Variables Response to Tax Shocks



5.0. Conclusion

This study examined the economic effects of fiscal policy shocks in Barbados by using a SVAR methodology. Our primary result suggests that positive fiscal expenditure shocks can contribute

to short term increases in real GDP as the expenditure multipliers were estimated at 10% and 12% after four and eight quarters respectively. Another significant result is that fiscal expenditure shocks tend to positively impact medium term nominal and real interest rates. However, there was no indication that higher interest rates would lead to private sector crowding out. A significant bi-directional short-run relationship was found between the two fiscal variables.

From a policy perspective, fiscal expansion is able to stimulate economic activity at the cost of higher debt, increase in domestic prices and medium-term increases in both the nominal and real interest rates. An attempt to achieve fiscal consolidation by increasing the tax burden may not yield the desirable results and may involve higher deficits in the future. A worsening external current account, a build-up of public debt and increases in the domestic interest rate would tend to constrain the fiscal capacity to stimulate.

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APPENDIX

Table 1: Stylized Facts

	GDP (%)	Fiscal	Inflation	Unemployment	Debt/	Discount	NIR (IMF)	Revenue	Expenditure
	Growth	Balance/ GDP (%)	Rate (%)	Rate (%)	GDP (%)	Rate (%)	(Changes)	Change (%)	Change (%)
1980	4.4	-2.9	14.4	12.6	28.5	6.2			
1981	-1.9	-9.6	14.7	10.8	36.0	13.8	11.6	5.7	32.5
1982	-4.9	-5.0	10.3	13.7	38.3	11.3	3.5	8.9	-14.1
1983	0.5	-4.1	5.3	15	40.9	6.8	-13.2	11.5	7.3
1984	3.6	-4.2	4.6	17.1	41.6	7.2	32.6	2.3	8.2
1985	1.1	-4.3	3.9	18.7	45.5	4.6	-43.9	19.7	14.2
1986	5.1	-5.2	1.3	17.8	48.6	4.3	-41.0	3.2	9.9
1987	2.6	-5.3	3.4	17.9	51.2	5.0	-0.4	4.5	5.2
1988	3.5	-2.4	4.8	17.5	52.9	4.7	-75.2	21.3	4.9
1989	3.6	-2.1	6.2	15.6	50.5	5.8	85.0	20.3	13.5
1990	-3.3	-7.5	3.1	16.1	54.6	8.1	77.5	-6.4	11.2
1991	-3.9	-1.9	6	17.3	57.4	11.3	80.4	9.8	-8.5
1992	-7	-2.5	6.1	23	62.7	6.6	-58.5	-3.4	-1.9
1993	1.2	-0.2	1.1	24.3	70.2	7.2	-42	3.9	-3
1994	3.8	-2.1	0.7	21.8	71.5	7.8	-118.2	0.3	6.4
1995	2	0.8	1.9	19.6	66.4	8.3	-83	11.2	1.3
1996	4	-3.2	2.4	15.8	68.2	5.6	-173.2	4.6	18.8
1997	4.7	-0.9	7.7	14.5	63	4.9	-36.1	18.9	10.4
1998	3.7	-0.8	-1.2	12.3	60.2	5.7	11.2	7.2	7
1999	0.4	-2.4	1.6	10.4	59.6	6.1	-73.8	1.3	6.2
2000	2.3	-1.5	2.4	9.4	63.7	3.9	-356	9.4	6.4
2001	-2.6	-3.5	2.8	9.9	72.6	2.0	-445.1	2.3	7.9
2002	0.7	-6.4	0.2	10.3	80.1	1.5	47.4	-2	5.2
2003	2	-3	1.6	11	76.1	0.6	-136.9	7.7	-1.0
2004	4.8	-2.2	1.4	9.8	75.2	2.8	312.9	2.8	0.6
2005	3.9	-4.3	6.1	9.1	82.7	6.3	-46.1	6.6	12.8
2006	3.2	-2	7.3	8.7	78.9	6.6	42.5	12.7	5.6
2007	3.4	-1.8	4	7.4	83.1	4.8	-354	7.1	6.6
2008	0.2	-5.9	8.1	8.1	87.6	4.8	191.7	0.9	12.8

Table 2: Unit Root Tests

Variable	ADF		PP		KPSS	
	Level	1 st Difference	Level	1 st Difference	Level	1 st Difference
GDP	-1.857	-11.135***	-1.94	-11.125***	0.149+++	0.061
Unemployment	-1.665	-13.115***	-1.703	-13.055***	0.236+++	0.069
Government Exp	-3.035	-10.021***	-4.256***	-39.592***	0.220+++	0.192++
Tax Revenue	-2.113	-3.73**	-2.229	-4.808***	0.146++	0.062
Investment	-2.422	-9.31578***	-2.5948*	-9.2388***	0.0630++	0.0402
Inflation	-1.707	-6.661***	-1.188	-6.611***	0.231+++	0.048
Consumption	-3.166*	-7.581***	-2.722	-7.147***	0.090	0.050
Prices	-2.384	-13.106***	-2.165	-13.175***	0.164++	0.070

Notes: *, **, *** are the MacKinnon critical values for the rejection of the null hypothesis of a unit root at the 10%, 5% and 1% levels respectively, for both the ADF and PP tests, while +, ++, +++ are the critical values for the LM statistic of the KPSS test and denote rejection of the null hypothesis of stationarity at the 10%, 5% and 1%, respectively (based upon the asymptotic results presented in KPSS(1992) -Table 1, pp.166.

Table 3: Lag Selection Criteria for the Baseline Model

VAR Lag Order Selection Criteria						
Endogenous variables: G T Y P U R						
Exogenous variables: C						
Lag	LogL	LR	FPE	AIC	SC	HQ
0	367.3648	NA	5.65e-11	-6.570270	-6.422971	-6.510524
1	1070.618	1317.001	3.04e-16	-18.70214	-17.67105*	-18.28393
2	1143.793	129.0539	1.56e-16	-19.37805	-17.46316	-18.60136*
3	1198.662	90.78407*	1.12e-16*	-19.72113*	-16.92245	-18.58597
4	1227.844	45.09854	1.30e-16	-19.59716	-15.91468	-18.10353
5	1251.238	33.60245	1.72e-16	-19.36796	-14.80169	-17.51586
6	1282.317	41.25045	2.01e-16	-19.27849	-13.82843	-17.06791
* indicates lag order selected by the criterion						
LR: sequential modified LR test statistic (each test at 5% level)						
FPE: Final prediction error						
AIC: Akaike information criterion						
SC: Schwarz information criterion						
HQ: Hannan-Quinn information criterion						

Table 3 – Cointegration Results

Vector Error Correction Estimates						
Cointegrating Eq:	CointEq1					
G_SA(-1)	1					
T_TC(-1)	-0.50408 -0.19036 [-2.6480]					
Y_SA(-1)	-1.40968 -0.26755 [-5.2688]					
P_SA(-1)	0.37366 -0.12213 [3.0596]					
U_SA(-1)	0.008427 -0.04008 [0.2102]					
R(-1)	0.020937 -0.01448 [1.4558]					
C	3.200698 -1.21465 [2.6351]					
Error Correction:	D(G_SA)	D(T_TC)	D(Y_SA)	D(P_SA)	D(U_SA)	D(R)
CointEq1	-0.86672 -0.17251 [-5.0243]	-0.0621 -0.0290 [-2.14]	-0.00327 -0.0363 [-0.0902]	0.1056 -0.05245 [2.0132]	0.444094 -0.17216 [2.5795]	-0.8675 -0.5982 [-1.450]

Figure 1 – Augmented Variables Response to Government Expenditure

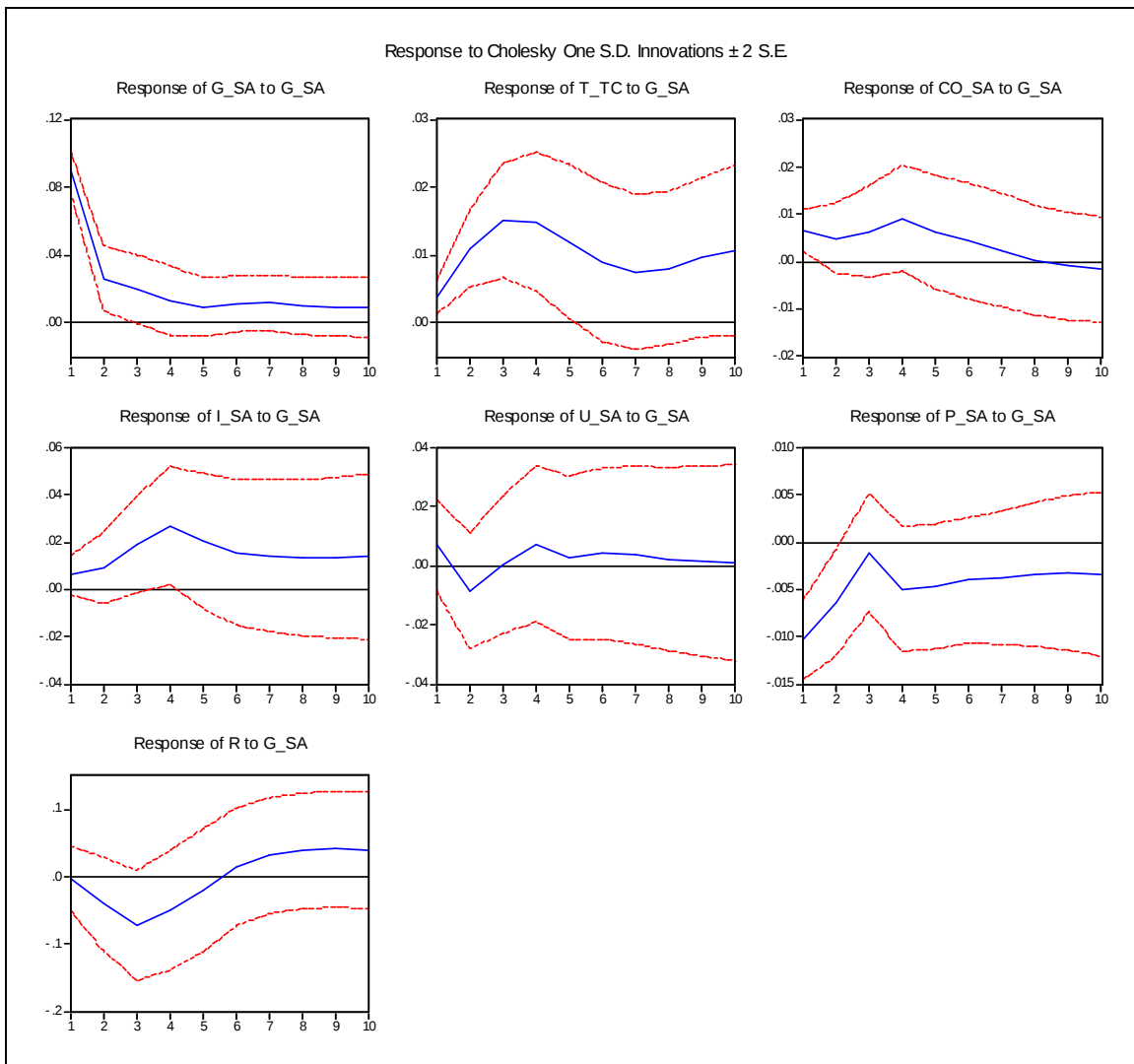


Table 4 – Fiscal Stance Shocks

