The Quality of Fiscal Adjustment and the Long-Run Growth Impact of Fiscal Policy in Brazil[1]

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Throughout the 1990s, Brazil initiated a process of economic reform including liberalizing trade, relaxing price controls, and privatizing public enterprises. Although initially some problems remained, such as higher public sector deficits and limited exchange rate flexibility, the country corrected most of these and steered a course towards stability by the end of the millennium. However, the positive outlook deteriorated in 2001 –2002 because of several shocks: (i) the domestic energy shock in 2001 that lead to the rationing of electricity consumption; (ii) the worldwide uncertainty and risk aversion arising from the corporate corruption scandals in developed markets and the September 11 terrorist attacks; (iii) the collapse of the Argentina economy that represented 11 percent of the exports of goods and the country's debt default that rocked emerging economies' sovereign bond spreads and currencies; (iv) the oil price shock resulting from the international political situation; (v) the economic slowdown in the United States and Europe; and (vi) the uncertainty surrounding the 2002 presidential election. As a result, domestic growth slowed down from 4.4 percent in 2000 to 1.5 percent in 2002, sovereign spreads rose from about 700 to 2,400 basis points, the currency depreciated from 2.4 to 4 Reais per dollar, and the debt to GDP ratio worsened from 49.3 percent in 2000 to 57 percent at the end of 2002.

This paper analyzes why these shocks derailed the economy despite the significant progress in economic policymaking in the previous years. In particular, with the primary fiscal surplus of over 3 percent per year in the years prior to the crisis, a floating exchange rate regime and a successful inflation targeting regime, it is legitimate to ask how the policymaking framework could be enhanced. This paper argues that the quality of fiscal policy can be improved by both making policy more responsive to shocks and considering the impact of fiscal variables on long run growth.

The paper is organized in five chapters following this introduction. The first one describes the main elements of fiscal policy in the decade prior to the crisis, focusing mostly on the period 1998-2001. This section categorizes fiscal policy as flexible but achieving and adjustment of mixed quality. On one hand, policy was flexible enough to shift the primary balance from a deficit to a surplus in the face of the 1998 external shocks. This chapter documents Brazil's successful use of fiscal policy as a signaling device during the 1998-1999 , in contrast with Argentina's experience. On the other hand,

[1] The authors wish to thank Gaobo Pang for helpful research assistance. The paper is a draft of work in progress that carries the name of the author and should be cited accordingly. The findings, interpretations and conclusions are the author's responsibility and do not necessarily represent the view of the World Bank or its Executive Directors. Corresponding author: sherrera@worldbank.org

the quality of the adjustment was mixed because it was achieved at the expense of cutting capital expenditures and increasing tax revenues both of which are difficult to deepen or sustain through time.

The second section focuses on the 2002 debt crisis and interprets it mostly as a result of policy rigidity. In contrast with the 1998-1999 adjustment, Brazil's fiscal policy in 2002 was unresponsive to the shocks, raising concerns on public finance sustainability. The volatility was magnified by a particular composition of public debt and compounded by uncertainty from the political process. In the end, the economy was stabilized as the primary balance rose and uncertainty about the future stance of fiscal policy was resolved.

The third section focuses on a particular mechanism that allows fiscal policy to be more responsive to shocks, namely by permitting automatic stabilizers to operate throughout the business cycle to mitigate the procyclical nature of Brazilian fiscal accounts. Procyclical fiscal policy induces volatility and may make a bad situation even worse. This section computes the long run effects of different variables on the primary balance and estimates the cyclical component of the primary surplus.

The fourth section examines the long-term effects of public finance and growth in Brazil, using a modified production function approach in which private and public capital are considered inputs, as well as different types of public expenditure. The paper uses two different but related econometric approaches: first, a single equation method, the Autoregressive Distributed Lag (ARDL) approach to cointegration proposed by Pesaran, Shin and Smith (1999); second, a multiple equation method, the cointegratng VAR approach, that is useful to analyze the interaction between several of the variables involved. Both approaches contemplate the effect of taxes to capture the government's budget constraint and the potential negative effect of this variable on aggregate production. We report the elasticities of output with respect to public and private capital as well as the long term impacts of different types of public expenditure on growth. Both methods produce similar results: large values of elasticities, small impact of public expenditure in the long run, and a significant negative impact of taxation on long-run GDP.

The fifth chapter summarizes the results and concludes.

I. Background: Brazilian Fiscal Policy during 1990-2003

This chapter is divided into four sections . The first one describes fiscal stylized facts during the last decade, focusing more closely on the fiscal adjustment of the three last years, and measures the contribution of the different levels of government to this adjustment. The second section highlights the flexibility of fiscal policy during the 1998-1999 volatile period, and examines in particular the role of the primary surplus as a signaling device in a world of imperfect information , contrasting the Brazilian experience with Argentina's. The third section identifies the type of adjustment implemented--revenue increasing or expenditure cutting--at the federal and state levels. The fourth section examines the impact of the adjustment on social expenditures.

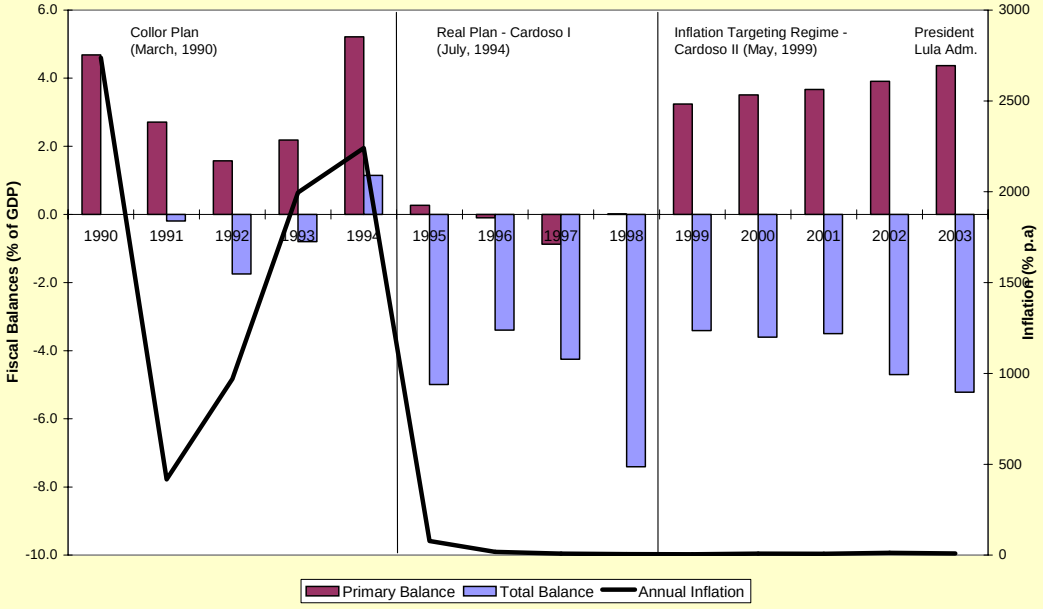
A. Fiscal Policy Trends in Brazil

During the last years of the military regime, the Brazilian public sector showed signs of financial fragility. The end of high-growth rates, combined with the external shocks suffered by the Brazilian economy, led to a reduction in public sector savings. The re-democratization process deepened the fiscal disequilibria, since the new democratic government set out to satisfy repressed social demands for redistribution. In particular, the 1988 Constitution expanded the social responsibilities of the state, guaranteed free access to social services, established higher social security benefits, and defined a generous regime for public sector employees, including employment tenure and higher compensations. (Bevilaqua and Werneck, 1998) The 1988 Constitution also modified the federal fiscal system, creating an imbalance between resources and responsibilities among levels of governments. Finally, the 1988 Constitution increased the rigidity of public expenditures through the earmarking of an important portion of fiscal revenues.

These measures could have led to an unsustainable path, but inflation postponed the collapse of this fiscal regime and masked the fiscal disequilibria during the early nineties. During this high-inflation period, the asymmetric indexation to inflation between revenues and expenditures, that is, higher indexation for revenues than for expenditures, the negative real interest rates and the inflation tax generated soft budget constraints and positive fiscal outcomes, despite the mismatch between limited fiscal resources and increasing obligations.

The evolution of fiscal accounts during 1990-2003 can be divided into three sub-periods, as shown in Figure 1. The first one, 1990-1994, is characterized by positive primary outcomes and operational equilibriums; the second, from 1995 to 1998, reflects a continuous deterioration of fiscal accounts, reflected in the vanishing of primary surpluses and growing operational deficits. The last period, 1999-2003, corresponds to the fiscal adjustment years and shows a permanent improvement of the primary surplus from –0.2% of GDP in 1998, to 4.4% in 2003 that was not matched by reductions in total balances.

Figure 1
Brazil: Fiscal Results and Inflation 1990-2003



In 1994, Brazil adopted the Real Plan, which brought down high inflation and stabilized it at international levels. The end of the inflationary process coincided with the deterioration of fiscal outcomes in 1995-98. Inflation was not only a revenue source but was also a useful mechanism to control government expenditures in real terms during the high inflation era (Cardoso, 1998). This loss of flexibility, combined with a lack of decisive fiscal reform, implied rising public sector deficits. The excess spending relative to national income was financed in liquid international capital markets. As a result, both public and private debt increased. interest payments, leading to larger negative operational balances and to an increase in the public debt from 29% in 1994 to almost 42% in 1998.

The central bank sterilized these capital inflows through open market operations to avoid monetary expansion and maintain a pegged exchange rate. This response complicated the situation even more because it entailed rising central bank (domestic) indebtedness and climbing interest rates that increased the cost of servicing public debt. High interest rates combined with the pegged exchange rate attracted even more capital, worsening the state of affairs. The increased indebtedness, jointly with the rigid fiscal, monetary, and exchange rate policies, left the economy vulnerable and with no capacity to absorb shocks. When the Asian and Russian financial crises occurred in 1997-1998, Brazil was severely affected due to its sizeable external financing requirements. In January 1999, the central bank abandoned its crawling peg exchange rate regime in favor of a flexible rate and adopted an inflation-targeting framework for managing monetary policy.

Simultaneously, the country began to tackle its fiscal imbalance by launching the Fiscal Stability Program, which consisted not only in raising taxes to obtain primary

surpluses, but also in designing a legal framework for fiscal policy management. The government set and met stringent targets for the primary fiscal surplus; the public sector primary surplus reached 3.3 percent of GDP in 1999, 3.5 percent in 2000, 3.7 percent in 2001, 4.1 percent in 2002, and 4.3 percent in 2003. However, the high interest rates and the exchange rate devaluations of 1999, 2001 and 2002 prevented a further reduction of operational deficits. Consequently, the primary surpluses were not sufficient to truncate the increasing path of public debt.

Table 1 compares the three periods. During 1995-98, the operational balance deteriorated by almost 5% of GDP in comparison with the 1990-94 period. This reduction consists of a 1.5% increase in interest payments and a primary surplus of 3.5% of GDP. The Federal government was responsible for 60% of the reduction of the operational balance due to the stronger effect of interest payment increases on the federal debt, and for more than 40% in the decrease of the primary surplus. States and local governments and public enterprises were responsible for 30% each for the deterioration of primary results.

Table 1: Fiscal Balances*, 1990-2003

	Annual Averages (% of GDP)			
	1990-1994 *(A)*	1995-1998 *(B)*	1999-2002 *(C)*	2003 *(D)*
I Operational Balance (III - II)	-0.05	-5.01	-1.52	-0.91
Federal Government	0.52	-2.48	-1.55	-1.00
States and Municipalities	-0.25	-1.98	-0.37	-0.60
Public Enterprises	-0.31	-0.55	0.41	0.69
II Real Interest Payments	3.33	4.84	5.09	5.28
Federal Government	1.26	2.78	3.67	3.56
States and Municipalities	0.86	1.64	0.98	1.51
Public Enterprises	1.20	0.42	0.44	0.21
III Primary Balance	3.27	-0.17	3.58	4.37
Federal Government	1.78	0.30	2.11	2.56
States and Municipalities	0.61	-0.34	0.61	0.91
Public Enterprises	0.89	-0.13	0.85	0.90

* (+) Surplus (-) Deficit

Due to the tight monetary policy and to the 2002 debt crisis, interest payments rose from 4.8% of GDP in the 1995-98 period to 5.1 percent of GDP in 1999-2002 and 5.3% of GDP in 2003. The operational balance improved by 4% of GDP, from –5% to -1%, as a consequence of the significant improvement of 4.5% of GDP in the primary balance. The Federal government contributed half of the primary result increase, while states and municipalities and public enterprises contributed 25% each[2].

Finally, at least for primary figures, it is evident that the three levels of government had a similar fiscal stance in each period and that the federal government was the most important contributor to both fiscal expansions and contractions.

B. The Flexible Primary Surplus as a Device to Signal Fiscal Sustainability

Despite quite similar public indebtedness indicators (Table 2), Argentina suffered a major crisis in 2001, while Brazil avoided one. How can the different outcomes be accounted for? The major difference in fiscal variables seems to lie in the primary balance. Does this variable explain the different fortunes?. In this section, we present evidence of the importance of the primary balance as a signaling device for regime sustainability and compare results for Brazil with those for other countries. 3

Table 2
Summary of Public Debt Indicators in Argentina and Brazil 2000-2001

	Argentina		**Brazil**	
	2000	2001	2000	2001
Public Debt (% of GDP)	50.0	62.0	49.6	53.3
Interest payments (% of GDP)	4.1	5.4	7.2	7.3
Interest/ tax revenue (%)	22.7	30.9	30.9	29.8
Interest/current revenue (%)	16.6	22.9	18.0	16.5
Overall fiscal balance (% of GDP)	-3.6	-6.8	-3.6	-3.6
Primary fiscal balance (% of GDP)	0.4	-1.4	3.6	3.8

Source: Source: World Bank staff calculations based on official data for Brazil, Bacen and for Argentina, Minsterio de Economia.

How do governments that are not fully credible signal regime sustainability? The recent contrasting experiences of Argentina and Brazil, as well as that of European economies that faced credibility problems in the late eighties, can provide a valuable

[2] Regarding the operational balance, the federal contribution was low (only 16%) due to the impact of the greater effect of interest rates on federal accounts. On the other hand, the interest payments for state and municipalities have been reduced because of the bail-out operation of 1997-98. This operation has substituted state bonds for federal bonds and re-scheduled state debt, producing a subsidy from the federal government to the states. This means higher interest payments for the federal government and lower ones for state governments.

[3] It is possible to argue that exchange rate flexibility played a major role. Though that may be true, that line of reasoning is moderated by the fact that external sustainability indicators (debt service to exports) were similar for both countries. Additionally, given the flexible exchange rate and the dollar-indexing of domestic debt in Brazil, the governments cash flow (debt service) was subject to exchange rate risk in Brazil.

lesson. Based on the Drudi-Prati (2000)4 model that rationalizes debt accumulation and delayed stabilization, we analyze the Brazilian case. The main testable implication of the Drudi-Prati (DP) model is the existence of a positive relationship between the spreads and the debt level and a negative association between spreads and primary balances. This last relationship is conditioned on the debt level: Given uncertainty about the likelihood of default, the government will use the primary balance as a signaling tool to reveal to investors its true type. As the debt level increases, the dependable government (though not fully credible) will use more actively its primary balance as a signaling tool.

Spreads on sovereign debt are crucial determinants of the nominal exchange rate in Brazil (Bacen, 2001)5 and, in turn, on domestic interest rates. What is the relationship between these rates and the fiscal variables? For Brazil, primary balances and spreads show a non-stable relationship (Figure 2). From 1994 to 1998, when fiscal balances deteriorated, spreads declined. After 1999, when fiscal balances improved, spreads declined further. Drudi and Prati verified this non-monotonic relationship in their study of several European countries. The relationship between public debt and spreads is also non-monotonic. From 1994 –1997, when the debt ratio was low and slightly rising, spreads fell. Since 1999, however, Brazilian spreads, as well as debt ratios, appear to have settled at a higher level (Figure 3). Drudi and Prati (DP) described a similar phenomenon for the European countries

Figure 2
Primary Fiscal Balances and Sovereign Spreads in Brazil 1994-2003

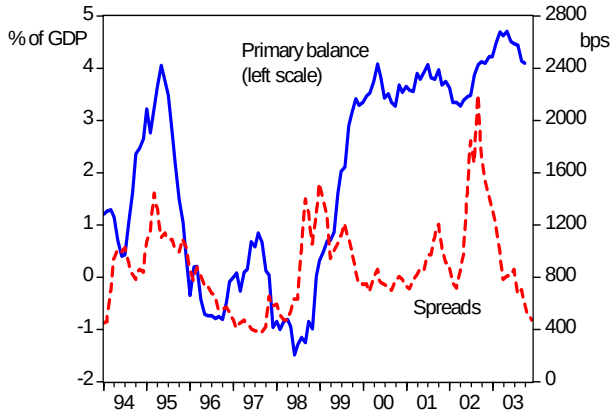
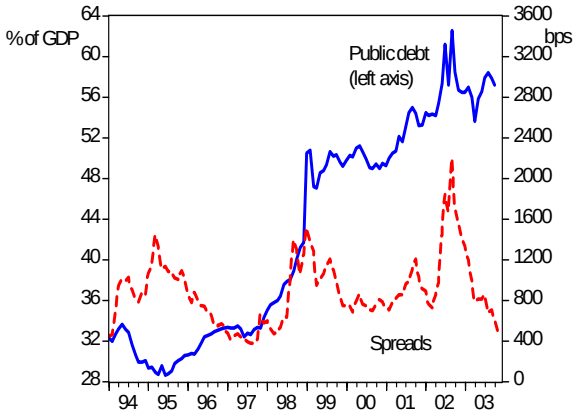


Figure 3
Public Debt Ratio and Sovereign Spreads in Brazil 1994 - 2003



The DP model predicts that both primary fiscal balances and public debt ratios enter into the rating (spreads) function, and that the primary balance has a more significant role when debt ratios are high. In the DP model, for a given distribution of

[4] Drudi, F. and A. Prati (2000), "Signaling fiscal regime sustainability," *European Economic Review*, Vol. 44 pp. 1897-1930.
[5] Bacen, "Modeling Exchange Rate and Risk Premium," Inflation Report, December 2001.

shocks, the likelihood of default increases with the debt ratio and the primary deficit. This section verifies econometrically the following three testable implications of the DP model: 1) Debt ratios and primary balances are complementary in the spreads function; 2) The signaling role of the primary balance increases with the debt ratio; and, 3) If the government is dependable, then the primary balance will increase when the debt ratio increases.

To verify the first implication, namely the complementary nature of fiscal balances and debt ratios in the spreads function, we regressed[6] the sovereign spreads on the first two variables (lagged). Table 3 shows that, effectively, both enter significantly in the spreads function[7] with the expected signs.

Table 3
Complementary Roles of Debt Ratios and Primary Balances as Spreads' Determinants
Dependent Variable: EMBORLAT
Method: Least Squares
Sample(adjusted): 1995:02 2002:01
Included observations: 84 after adjusting endpoints
Newey-West HAC Standard Errors & Covariance (lag truncation=3)

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	-0.26	0.06	-4.45	0.00
DEBTY(-1)	0.01	0.00	4.48	0.00
PRIMBAL(-1)	-0.02	0.01	-2.40	0.02

R-squared	0.454	Mean dependent var	-0.011
Adjusted R-squared	0.441	S.D. dependent var	0.083
S.E. of regression	0.062	Akaike info criterion	-2.698
Sum squared resid	0.309	Schwarz criterion	-2.611
Log likelihood	116.295	F-statistic	33.723
Durbin-Watson stat	0.362	Prob(F-statistic)	0.000

EMBORLAT= Brazil EMBI spreads orthogonalized from Latin aggregate
DEBTY= Debt to GDP ratio
PRIMBAL= Primary fiscal balance

[6] We used monthly data for the primary balance and debt ratios as calculated by Bacen, and used the JPMorgan sovereign spreads for Brazil. To isolate the credit risk exclusively associated with Brazil, we orthogonalized the Brazil risk from the rest of the Latin American countries by regressing the Latin American aggregate spreads onto the Brazil spreads and taking the residuals. The sampleperiod is 1995-2002 to facilitate comparisons with Argentina for which only data since 1995 was available.

[7] All the variables were I(1) and we were unable to reject the cointegration hypothesis. The cointegrating vector coefficients estimated by the Johansen method were slightly different than the OLS coefficients reported in the tables, but we maintain these to facilitate comparison with Drudi-Prati's results. The regressions included lagged values of the independent variables to minimize endogeneity bias. As previously mentioned, the Cointegration analysis eliminates this problem, and results are similar to those reported in the text.

The second implication of the DP model, namely the changing nature of the signaling ability of primary balances is captured by two alternative approaches. First, we define a dummy variable for a specific signaling period and interact the dummy with the primary balances. The original regression is augmented with this new variable, and the sum of both coefficients has to be larger than the primary balance coefficient by itself. For the second approach, we examine the significance of an auxiliary variable constructed from the interaction of the primary balances with the debt ratio. If this variable is significant, then we cannot reject the difference in the signaling role.

For the first approach, the signaling period ranges from June 1999, when the inflation-targeting approach was adopted and primary balances were on the rise, to the present. Since this auxiliary variable is significant (Table 4), we conclude that the primary balances affected spreads in a more significant way during this signaling period. The alternative approach (Table 5) shows that the primary balance coefficient increases with the debt ratio, implying that signaling takes time and is not a once-and-for-all event. Drudi and Prati obtained the same result for Italy and Belgium.

Table 4
The Changing Role of Primary Balances–Test 1
Dependent Variable: EMBORLAT
Method: Least Squares
Sample(adjusted): 1995:02 2002:01
Included observations: 84 after adjusting endpoints
Newey-West HAC Standard Errors & Covariance (lag truncation=3)

Variable	Coefficient	Std. Error	t-Statistic	Prob.
DEBTY(-1)	0.013764	0.002046	6.726813	0.0000
PRIMBAL(-1)	5.95E-05	0.005334	0.011153	0.9911
DSIG*PRIMBAL(-1)	-0.054382	0.012458	-4.365126	0.0000
C	-0.500954	0.075216	-6.660195	0.0000

R-squared	0.641035	Mean dependent var	-0.011316
Adjusted R-squared	0.627574	S.D. dependent var	0.082535
S.E. of regression	0.050368	Akaike info criterion	-3.092458
Sum squared resid	0.202958	Schwarz criterion	-2.976705
Log likelihood	133.8832	F-statistic	47.62098
Durbin-Watson stat	0.611709	Prob(F-statistic)	0.000000

All variables defined in previous table
DSIG= 1 for t> January 1999; 0 otherwise

Table 5
The changing role of primary balances- Test 2
Dependent Variable: EMBORLAT
Method: Least Squares
Sample(adjusted): 1995:02 2002:01
Included observations: 84 after adjusting endpoints
Newey-West HAC Standard Errors & Covariance (lag truncation=3)

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	-0.530713	0.071481	-7.424499	0.0000
DEBTY(-1)	0.014446	0.001826	7.912960	0.0000
PRIMBAL(-1)	-0.024688	0.003926	-6.288602	0.0000
PRIMBAL(-1)*(DEBTDEV)	-0.002630	0.000572	-4.593340	0.0000

R-squared	0.632718	Mean dependent var	-0.011316
Adjusted R-squared	0.618945	S.D. dependent var	0.082535
S.E. of regression	0.050949	Akaike info criterion	-3.069552
Sum squared resid	0.207661	Schwarz criterion	-2.953799
Log likelihood	132.9212	F-statistic	45.93872
Durbin-Watson stat	0.632039	Prob(F-statistic)	0.000000

DEBTDEV=Deviation of the debt ratio from the sample mean

The third and final implication of the DP model, namely the positive association between the primary balance and the debt ratio if the government is dependable,. Is summarized in Table 6 . The value of the coefficient for Brazil, 0.11, is lower than any of those reported by Drudi-Prati for their group of European countries, ranging from 0.14 to 0.24. Not surprisingly, the countries with the lowest coefficients were Italy and Belgium.

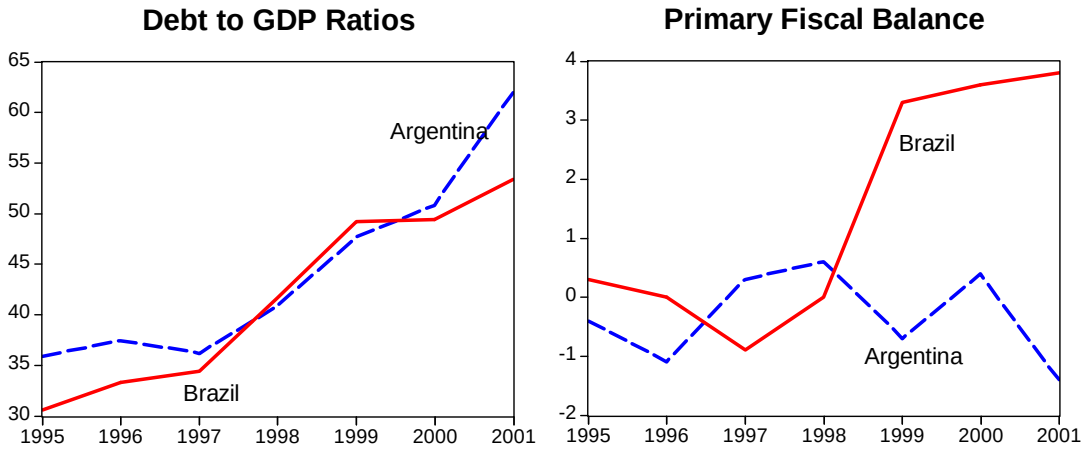
Table 6
Primary Balances and Debt Ratios
Dependent Variable: PRIMBAL
Method: Least Squares
Sample(adjusted): 1995:01 2002:01
Included observations: 85 after adjusting endpoints
White Heteroskedasticity-Consistent Standard Errors & Covariance

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	-2.921112	1.048574	-2.785795	0.0066
DEBTY(-1)	0.112549	0.022527	4.996247	0.0000

R-squared	0.247189	Mean dependent var	1.631294
Adjusted R-squared	0.238119	S.D. dependent var	2.060787
S.E. of regression	1.798774	Akaike info criterion	4.035336
Sum squared resid	268.5538	Schwarz criterion	4.092810
Log likelihood	-169.5018	F-statistic	27.25346
Durbin-Watson stat	0.049271	Prob(F-statistic)	0.000001

Comparing the Argentine and Brazilian experiences during the nineties, we identify a striking difference. For both countries, the primary balance was relatively similar until 1999 (Figure 4). In that year, debt ratios rose in both countries. Primary balances turned into significant surpluses only in Brazil.

Figure 4
Primary Balances and Debt Ratios in Argentina and Brazil 1995 – 2001
(% of GDP)



Using quarterly data beginning with the fourth quarter of 1994 and ending with the fourth quarter of 2001, we repeat the signaling exercise for Argentina (Tables A1-A4 in the appendix), highlighting three key results:. First, both the debt ratios and primary balances enter into the spreads function with the correct signs (i.e. spreads increase with the debt ratio and decrease with primary balances), but the significance level of the latter is very low. Second, primary balances in Argentina did not play a changing role as the debt ratio increased (Tables A2 and A3)8. And, third, higher debt ratios are associated with a higher primary balance (Table A4) though at a low significance level and the value of the coefficient is extremely low when compared with Brazil and the OECD countries. We also pooled the data for both countries and estimated by Seemingly Unrelated Regression (SUR) methods the four models that we previously estimated for each individual country. The appendix shows that none of the conclusions for the individual country exercise change. 9

[8] The signaling period we chose began in 1998 and ended in April of 2001.

[9] Tables A5- A8 in the Appendix show that none of the conclusions change[9]. Pooling the data we obtain that both spreads and debt ratios affect the sovereign spreads (Table A5), though the Argentinean coefficient for the primary balance is not as significant as the Brazilian. Tables A6 and A7 show that as the debt ratio increased the primary balance gained weight during the signaling period in Brazil, while in Argentina that did not happen. Finally, Table A8 shows that even though the coefficient of the debt ratio is positive and significant in Argentina it is practically zero, the same as in the individual country regression.

Finally, based on the equilibrium relationship between spreads, debt ratios and primary balances10 in Brazil, the long-run primary balance consistent with a target level of spreads and a given debt ratio may be calculated. Alternatively, we can compute the debt ratio consistent with a given primary balance and a spread level. Table 7 reports the first option: According to our results, if Brazil's wishes to attain spread levels of about 500 bps, with current debt levels oscillating between 50 and 60 percent of GDP, the long run primary balance surplus consistent with those levels is of the order of 5 to 6 percent of GDP. Recall that Brazil had sovereign spreads below 500 bps in 1993-1994 and in 1996-1997, and the primary balance oscillated around 2% of GDP or even lower. However, debt levels were around 32% of GDP. Now, the larger primary balance required to attain similar spread levels can be interpreted as the combined cost of delayed stabilization, of the several shocks that affected the Brazilian economy and the debt indexation that led to debt ratios to increase.

Table 7
Long Run Primary Balance Consistent with a Target Sovereign Spread Level for Different Debt-to-GDP Ratios
(in % of GDP)

	Sovereign Spreads (bps)				
Debt ratio (% of GDP)	500	600	700	800	900
45	4.5	3.9	3.4	2.9	2.3
50	5.2	4.7	4.2	3.6	3.1
55	6.0	5.5	5.0	4.4	3.9
60	6.8	6.3	5.8	5.2	4.7

The second point to bear in mind is that these are long-run estimates, and therefore, for policy purposes, must be compared with cyclically adjusted figures to abstract from the transitory changes in output , exchange rates, terms of trade or other variables that affect the primary surplus. That is, for policy purposes these estimations should be compared to the structural primary balance.

C. The Type of Brazilian Fiscal Adjustment, 1999-2003

During the last decade, imbalance in fiscal accounts occurred during the first four years of the Real Plan (1995-98), due mostly to the loss of inflation as an adjustment

[10] As discussed in a previous footnote , the variables are I(1) and we found the existence of a single cointegrating vector. The cointegrationg vector estimation analogous to Table 3 is the following:-Embispr +190.8*Primary-29.73* Debty-1.98*(Dsig*Primary). Note that in this estimation we did not use the Brazilian spreads orthogonal of the Latin American average (Emborlat) to facilitate number estimations presented in the table reported in the text. The period of estimation is 1991-2001. Future refinements of this exercise could include a non-linear estimation of the cointegrating relationship. Aditionally, the reported coefficients have a standard error that has to be incorporated into the estimates of the required long run primary balances reported in Table 7.

mechanism and to the lack of decisive fiscal reform. As Table 8 shows, the fiscal deterioration of the 1995-98 period is explained by the higher increase of expenditures vis à vis revenues. Total expenditures grew by 16%, i.e., .6% of GDP while the increase of revenues was just 8% or 1.4% of GDP. During this period, personnel and social contributions and social security benefits expanded the most. On the revenue side, table 8 shows that the growth was concentrated in tax increases while the revenues of the Social Security System remained stable. *In sum, the fiscal expansion of the 1995-98 period was due to expenditure increases and not to revenue reductions.*

Table 8: Federal Government Primary Balances, 1990 - 2003

Categories	Annual Averages (% of GDP)			
	1990-1994 *(A)*	1995-1998 *(B)*	1999-2002 *(C)*	2003 *(D)*
I Total Revenue	17.3	18.6	22.6	23.6
Treasury Revenue	11.9	13.6	17.6	18.3
Tax Revenue	11.0	12.0	15.2	15.5
Other Treasury Revenues	1.2	1.6	2.4	2.8
Social Security Revenue	5.0	5.1	5.2	5.3
II Total Expenditure	15.8	18.4	20.6	21.0
Personnel and Social Contributions	4.4	5.2	5.2	5.2
Social Security Benefits	4.2	5.4	6.4	7.1
Other Current and Capital Expenditures	4.3	4.8	5.0	4.8
Subsidies	0.1	0.2	0.3	0.3
FAT	0.2	0.6	0.6	0.6
Other- Goods and Services and Investment	4.0	4.0	4.2	3.8
Intergovernmental Transfers	2.9	3.0	3.9	4.0
Primary Balance (I - II)	1.6	0.3	2.2	2.6

The adjustment of the federal fiscal accounts during the last five years was based on further revenue increases. During 1999-2002, tax revenue increased by 3.2 % of GDP and in 2003 total revenue rose by an additional 1 percent of GDP despite the growth

slowdown. Expenditures also grew, but much less than revenues. They rose by 2.3 percentage points of GDP during 1999-2002, while in 2003 they remained constant. As in the 1995-98 period, current expenditures accounted for most of the increase, while capital expenditures remained stable. In this case, personnel expenditures remained stable while social security benefits and intergovernmental transfers experienced more dramatic increases. Thus, the expenditure composition continued losing quality in the sense that the weight of capital expenditure was reduced while current transfers showed a permanent increase.

The revenue-increasing feature of the 1999-2003 fiscal adjustment raises some concerns about its sustainability over the next few years. International experiences indicate that adjustments based on revenue increases tend to be short-lived. As expenditures begin to follow the revenue increases, the fiscal adjustment efforts are weakened and the unique effect of this type of adjustment is an increase in government size. On the other hand, the already high Brazilian tax burden acts as an additional constraint on revenue increases. Consequently, if the upward trend of expenditures is not truncated, fiscal disequilibria will return.

To gauge better the quality of the 1999-2003 fiscal adjustment, we investigate the revenue increase in more detail. Table 9 shows the evolution of federal revenue and its composition, with a continuous increase of federal revenue during the 1990-2003 period, from 19% in 1995-1998 to 25% of GDP in 2003.

During the last decade, and especially in the last five years, the significant rise of indirect social contributions accounts for revenue growth, representing more than 80% of the increase. Given the cumulative nature and excess burden that this type of contribution imposes on the formal productive sector of the economy, we conclude that the fiscal adjustment negatively affected the efficiency of the Brazilian economy. This fact is verified econometrically in the last section of the paper.

Table 9: Federal Government Revenue, 1990 - 2003

	1990 - 1994		1995 - 1998		1999 - 2002		2003	
	(% of GDP)	(% of Total)	(% of GDP)	(% of Total)	(% of GDP)	(% of Total)	(% of GDP)	(% of Total)
Direct Taxes	4.1	22.1	4.9	24.5	6.8	28.2	7.3	29.1
Indirect Taxes	3.6	19.4	3.0	15.1	2.7	11.3	2.1	8.5
Indirect Social Contributions	3.8	20.2	4.5	22.7	6.6	27.5	6.6	26.4
Social Security Revenues	5.0	26.6	5.1	25.7	5.7	23.8	5.9	23.6
Other Economic Contributions*	2.2	11.7	2.4	12.1	2.2	9.2	3.1	12.4
Total Federal Revenue	18.8	100.0	19.9	100.0	24.0	100.0	25.0	100.0

* Includes FGTS, CPSSS, Salario Educação and "S" System

Table 9 shows that indirect taxation was reduced from 3.6% of GDP to 2.8%, losing weight in the federal revenue structure. These two developments—the increase in indirect contributions and the reduction of indirect taxes—reveals the federal government's preference for obtaining resources through contributions that are not shared with states and municipalities, instead of promoting taxes that have to be distributed to lower levels of government. This preference has clear implications for the quality of the tax burden. The reduction in revenue from the federal VAT (IPI) and the intensive use of cumulative contributions causes serious distortions in the economy.

It is necessary to highlight, however, the steep rise in federal direct taxes of more than 40%. The progressive nature of the income tax and its greater weight in the structure of federal revenue implies that the poor have not financed the adjustment. At the same time, if it is accepted that direct taxes lead to lesser distortions than indirect ones, the greater importance of direct taxes should be considered a positive development.

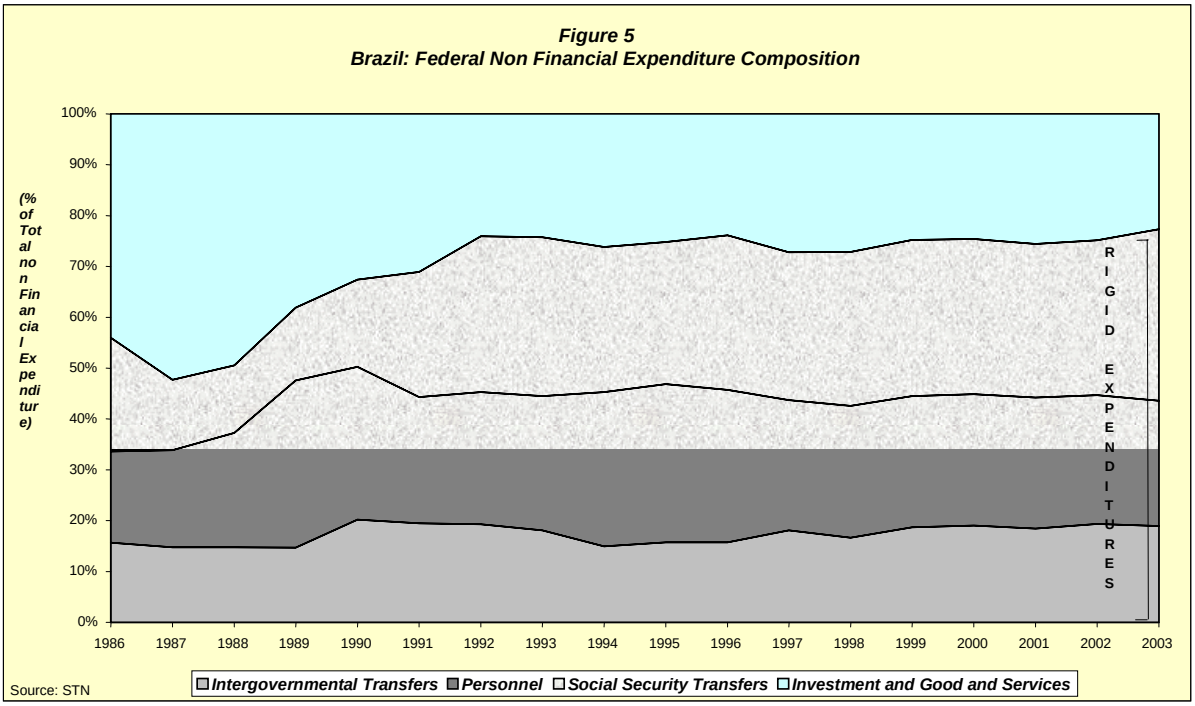
Finally, as table 9 shows, during the last decade, the social security revenues have stagnated. Increasing unemployment combined mainly with a progressive expansion of the informal sector of the economy accounts for this stagnation. And, while revenues have stagnated, social security expenditures have increased permanently, resulting in an explosive path of huge deficits within the social security system.

C. The rigidity of expenditures as the main explanation of the type of adjustment implemented.

The main cause for the implementation of the revenue-sided adjustment was the rigidity of public expenditures. At the federal level, three factors determine the high degree of expenditure rigidity: i) the rise of the share of the social security and social assistance benefits in the non financial expenditure of the federal government, ii) the job tenure stability rules for public servants which determines the impossibility of reductions in the payroll of the public sector and iii) the constitutional earmarking of an important part of federal tax revenues.

The 1988 Constitution reinforced the three factors of expenditure rigidity through the concession of higher social security benefits and soften the eligibility criteria, defining a generous regime for official public employees which included job tenure and higher compensations and pension benefits equal to 100% of exit salaries, extending these benefits to all public sector employees and strengthening the intergovernmental transfers system. The 1988 Constitution favored the expansion of social responsibilities of the state, guaranteeing the free access to social services, particularly health services, creating the unemployment insurance, establishing a minimum level of social security benefits (1 minimum wage) and universalizing it with the extension of the social security benefits to rural workers.

Figure 5 shows the rising trend of the share of mandatory expenditures within the federal non financial expenditures between 1986 and 2003. The increasing expenditure rigidity is due to the rise in the share of the personnel, social security and assistance transfers and the intergovernmental constitutional transfers to states and municipalities that increased from 55% in 1986 to almost 80% in 2001.



Another result of the growing expenditure rigidity in Brazilian fiscal accounts is the decreasing share of investment and other current expenditures would be around 51% of total non-financial expenditures in the federal budget, in contrast with today's less than 20% (2001).

The high rigidity of this type of expenditures comes from five basic factors: (1) for most social programs, unit values equal one minimum wage; (2) minimum wages and social security payments under the INSS scheme are adjusted annually at least by the rate of inflation (actually, minimum wage adjustments have exceeded inflation itself); (3) retirement benefits and pensions in the public sector must be adjusted, as a general, constitutional rule, at the same rates as those for workers in activity in the same working category; (4) once a person is enrolled in any one of those schemes, the probability of his/her being excluded is virtually zero, except for death and (5) the minimum wage became the floor value for any social security or welfare benefit from then on.

Cleary that social security transfers constitute the category of expenditure that had experienced the higher increase. At the same time the social security system generates huge deficit that has to be covered by the treasury. Table 10 shows the evolution of the revenues, expenditures and deficit of the social security system during the period 1995-2001. It is possible to observe an increasing trend of the social security system. In 1995 the deficit was 3% of GDP and in 2001 it achieved 5.2%. Even more important, table 10 shows that the public servants social security Regime (RJU) accounts for almost 80% of

this deficit. However, the social security system for private workers (INSS) exhibits a rising trend.[11].

Table10

Contributions, Benefits and Deficit of the General Social Security System and Public Sector of the Public Servants, 1995-200

% of GDP

	1995	1996	1997	1998	1999	2000	2001	2002	2003*
I - GENERAL REGIME - INSS	**(0.1)**	**(0.0)**	**(0.4)**	**(0.8)**	**(1.0)**	**(0.9)**	**(1.1)**	**(1.5)**	**(1.8)**
Contributions (Net Revenue)	5.0	5.2	5.1	5.1	5.1	5.1	5.3	6.3	5.5
Benefits	5.0	5.2	5.4	5.9	6.1	6.0	6.3	7.8	7.2
II - PUBLIC SECTOR SERVANTS SYSTEM	**(3.0)**	**(3.5)**	**(3.5)**	**(3.8)**	**(3.7)**	**(4.1)**	**(4.1)**	**(3.8)**	**(3.9)**
Contributions	1.0	0.8	0.8	0.7	0.8	0.6	0.7		
Inactives and pensionists benefits	3.9	4.3	4.3	4.6	4.6	4.8	4.7		
FEDERAL GOVERNMENT	**(2.0)**	**(1.8)**	**(1.8)**	**(2.0)**	**(2.1)**	**(2.0)**	**(2.1)**		
Contributions	0.3	0.3	0.3	0.3	0.3	0.3	0.3		
Inactives and pensionists benefits	2.4	2.1	2.1	2.3	2.4	2.3	2.4		
STATES	**(0.8)**	**(1.4)**	**(1.4)**	**(1.5)**	**(1.4)**	**(1.8)**	**(1.8)**		
Contributions	0.6	0.4	0.4	0.4	0.5	0.3	0.3		
Inactives and pensionists benefits	1.3	1.9	1.8	2.0	1.9	2.2	2.1		
MUNICIPALITIES*	**(0.2)**	**(0.3)**	**(0.3)**	**(0.3)**	**(0.3)**	**(0.3)**	**(0.3)**		
Contributions	0.1	0.0	0.0	0.0	0.0	0.0	0.0		
Inactives and pensionists benefits	0.2	0.3	0.3	0.3	0.3	0.3	0.3		
TOTAL	**(3.0)**	**(3.5)**	**(3.9)**	**(4.6)**	**(4.7)**	**(5.1)**	**(5.2)**	**(5.3)**	**(5.7)**
Contributions	5.9	6.0	5.8	5.9	6.0	5.7	5.9		
Benefits	9.0	9.5	9.7	10.5	10.7	10.8	11.1		

Source: MPAS, MF/SRF, MF/STN, MOG/Boletim Estatístico de Pessoal e INSS.
*Public Sector Sevants System Estimates

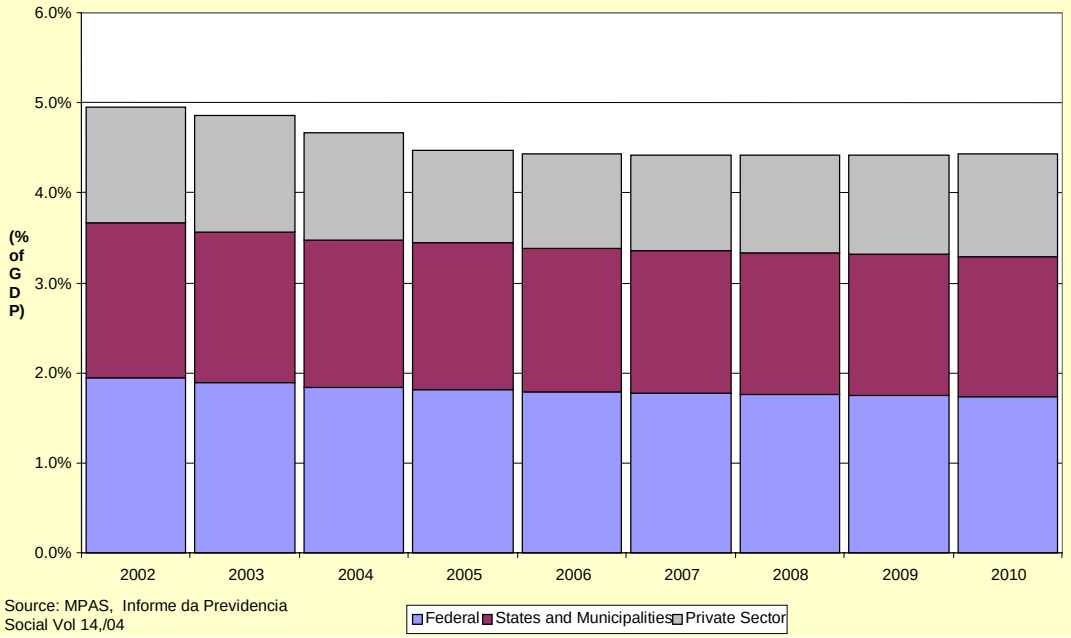
A high portion of INSS benefits (private workers system) is not in the nature of a social security benefit proper (in the sense that their recipients had contributed with something in the past), but simply corresponds to welfare (or pure transfer) payments. That is the case with respect to most one minimum-wage recipients (one minimum wage) under INSS management. Had that portion of INSS expenditure been classified elsewhere in a welfare-only specific budget, the social security current deficit itself might have decreased substantially, or even disappeared.

Given its magnitude, the problem of the huge financial imbalance of the social security system resides on the public servants system constitutes the most important threat for fiscal stability. During the last years, the government had implemented a first round of reforms to the system with little impact in the short run social security accounts.

Projections of the social security accounts show that without further reforms the deficit of social security system will experience a little decrease stabilizing in 4.5% of GDP until 2010 with a constant composition between private and public workers systems as shown in Figure 6.

[11] . It is worthy to mention that public sector beneficiaries represent only 10% of the universe of beneficiaries and pensioned of the overall system.

Figure 6
Brazil: Deficit of the Social Security System, 2002-2010 (%of GDP)

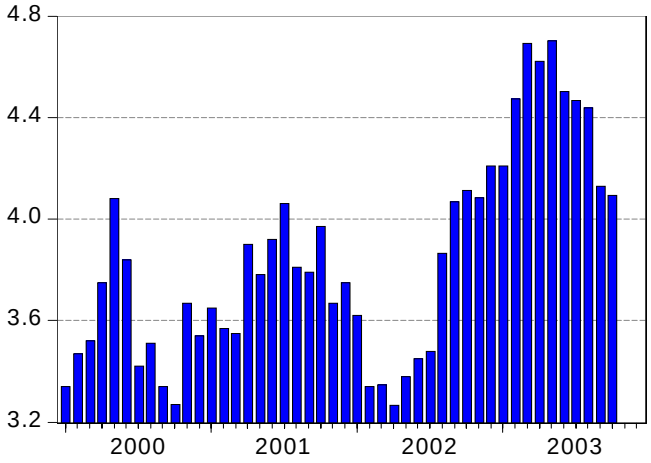


Source: MPAS, Informe da Previdencia Social Vol 14,/04

II. Policy rigidity and the 2002 Crisis

In sharp contrast with the 1998-1999 adjustment, Brazil's fiscal policy did not react to the shocks in early 2002. This policy rigidity compounded uncertainty arising from other sources and led to asset price changes that complicated the situation even more. The government's commitment to maintain a constant primary surplus seemed to falter as the primary balance declined during the first semester (Figure 7) amidst a heated political debate on the stance of future fiscal policy.

Figure 7
Primary Fiscal Balance of the Public Sector 2000-2003
(as a percentage of GDP)



Source: Bacen, Boletin Estadistico, several issues

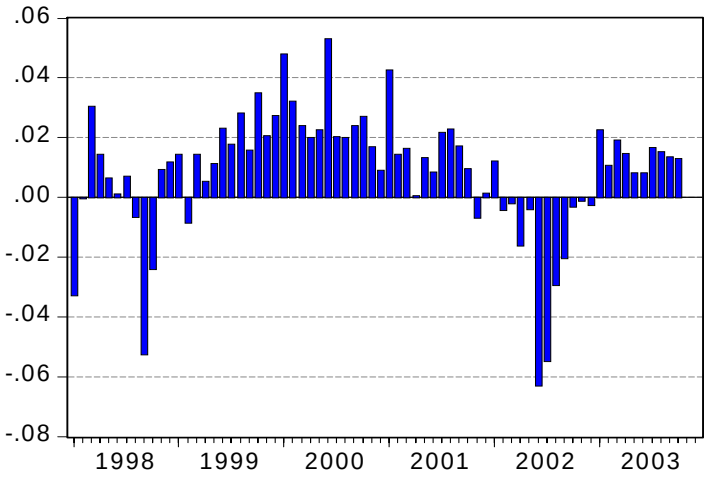
The rigidity of fiscal policy may have been at the root of the 2002 crisis. Inflexibility was the result of both structural factors and transitory circumstances. The structural inflexibility of the budget exists in both expenditures and revenues: on the expenditure side, rigidity arises from constitutional mandates and entitlements, while on the income side, it emanates from revenue sharing with the states and earmarking. More than 70 percent of primary expenditure is composed of social security benefits and wages (Velloso, 2002), while more than 80 percent of federal government revenues are earmarked or subject to revenue sharing (Ministerio de Planejamiento, 2003).

This legacy severely limited the options of fiscal adjustment to cutting capital expenditures or raising revenues, both of which have limits. International experience shows that successful fiscal adjustments, that is, those that are permanent, rely more on current expenditure cuts than on revenue hikes or capital spending reduction (Alesina and Peroti, 1996). Given that, by 2001, the primary surplus had already reached 3.8 percent of GDP, with capital expenditures dropping to historically low levels and public sector revenues reaching extraordinarily high echelons, it was difficult to increase public savings without compromising the quality of the adjustment.

Fiscal policy rigidity was also due to the short-term effect of the October presidential elections. The government's coalition had weakened because of internal disputes in anticipation of the presidential election Additionally, corruption allegations in congress led to the impeachment of its president, a strong supporter of the government's economic policy. In this context, crucial reforms with fiscal impact, namely the public servants social security and tax reforms, were left pending. Other reforms, such as the extension of the financial transactions tax, or CPMF, stalled. With the political campaign heating up in the first quarter, it was practically impossible to get support for any adjustment. Additionally, any change would have been interpreted as transitory given that a new government would take office in the near future.

Uncertainty regarding the future government's commitment to fiscal adjustment (irrespective of who won the election) generated concerns about the future value or liquidity of public debt. Given the concentration of public debt holdings in mutual funds (to be discussed in the next section), a significant resource outflow affected them in the period April-October. In its peak, the run represented more than 6 percent of the intermediaries' net worth (Figure 8).

Figure 8
Net Resource Flow to Mutual Funds
(as a fraction of net worth)



The sell-off of government securities caused a fall in their price (rising spreads), which in turn pressured the exchange rate to depreciate (Figure 9). The rising spreads and the exchange rate depreciation were also associated with capital outflows from Brazil. As Figure 10 shows, in September and October, capital outflows reached a peak of almost 20 percent of international reserves of the central bank.12 During these months the exchange rate also reached a peak of 4 Reais per dollar. Consequently, the debt level rose due to its indexing to the exchange rate. This fact aggravated concerns on debt sustainability which exerted further downward pressure on the demand for Brazilian sovereign bonds and pushed their prices even lower in a vicious circle.

[12] Capital flows exclude foreign direct investment and IMF resources.

Figure 9
Brazilian Spreads and Exchange Rate
Jan 2000 – April 2003

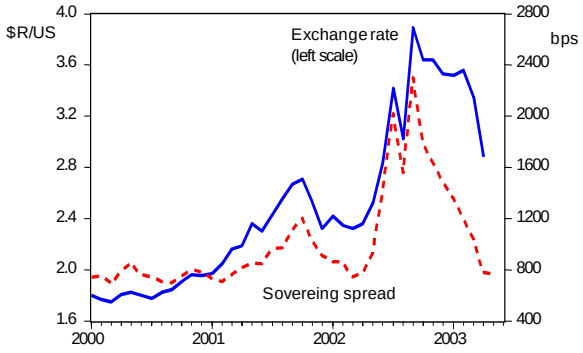
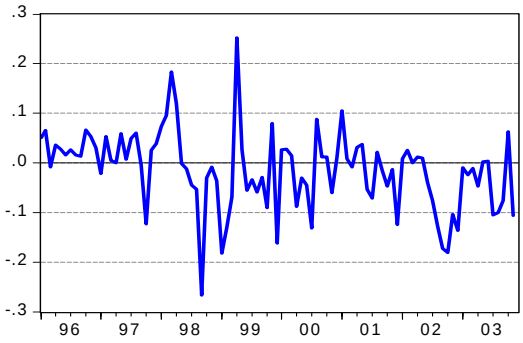


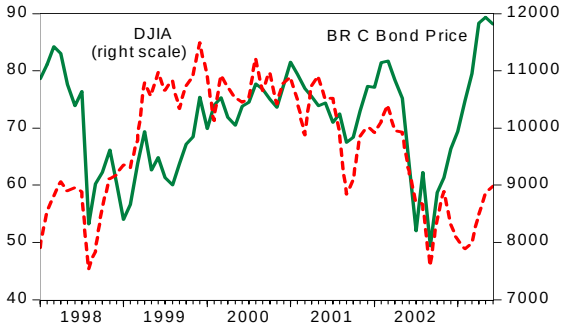
Figure 10
Capital Flows to Brazil
(ratio to international reserves



Source: Bacen and JP Morgan

The fall of Brazilian government securities' prices and capital outflows also occurred because of a global phenomenon: the rise in uncertainty and risk aversion due to the growth slowdown of the industrialized nations, the terrorist attacks in the United States, and the corporate corruption scandals of the more mature capital markets around the world. This fact exerted additional downward pressure on Brazilian government paper, and made those prices move in tandem with asset prices worldwide (Figure 11). Favero and Giavazzi (2003) show how Brazilian spreads depend both on domestic factors, in particular the stance of fiscal policy, and on global conditions. The relationship between external factors and Brazilian sovereign spreads is non-linear: when domestic fundamentals are sound, this relationship is not as clear, but when fiscal fundamentals are weak, the effect of global factors is amplified

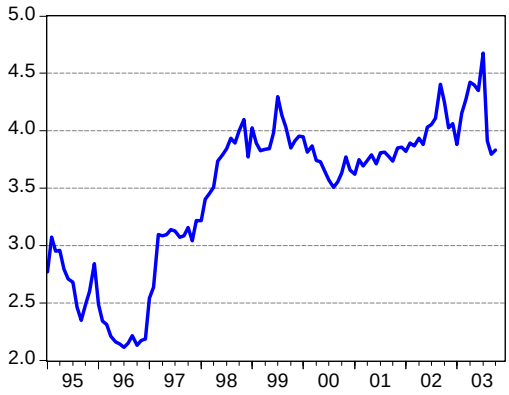
Figure 11
Co-movement of Brazil C Bond Prices and the Dow Jones Index
Evidence of Global Factors' Influence on Brazilian Asset Prices



Source: World Bank staff calculations

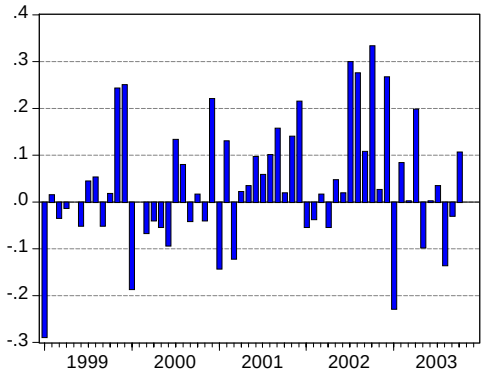
Faced with mounting difficulties in rolling over the domestic debt, the central bank redeemed a fraction of debt falling due by printing money. Consequently, the monetary base expansion exceeded nominal GDP growth (Figure 12). The monetary effect of public domestic debt redemptions during the second semester of 2002 reached the tenor of 30 percent of base money (Figure 13). It is crucial to point out, however, that the positive monetary expansion due to the treasury's operation began in the second semester of 2001 and could have been interpreted as a leading indicator of the more turbulent episodes that were to unravel in mid 2002.

Figure 12
Money Base as a Share of GDP
(seasonally adjusted data



Source: World Bank staff calculations based on Bacen data

Figure 13
Monetary Impact of Treasury's Operations 1999- 2003
(ratio to the monetary base

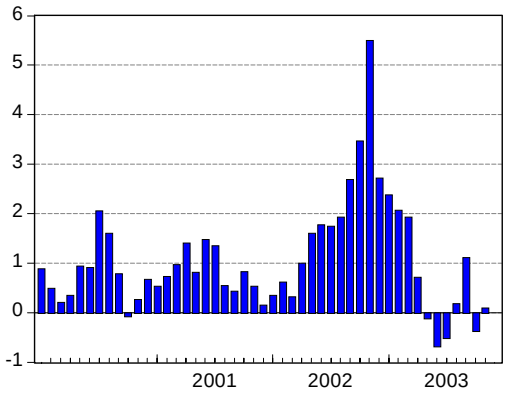


Source: World Bank calculations based on Bacen data

Moreover, base money grew in lockstep with the faster depreciation of the currency. This pressured inflation, which accelerated between June and December, reaching a peak of 5.8 percent per month in November (Figure 14). Monetary growth and rising inflation increased the government's revenue from money creation up to the equivalent of 2.0 percent of GDP.13 (Figure 15). In these circumstances, the credibility of the public on the authorities' ability to control inflation faltered. It is interesting to note that the seignorage peak occurred in the first quarter of 2003, a few months after the public debt ratio had stabilized and the exchange rate had appreciated. This implies that interest rates could not be lowered as quickly as many would have desired.

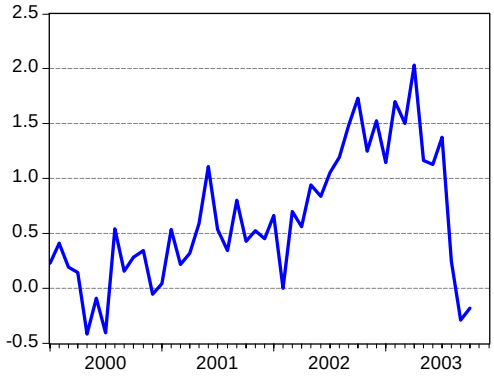
[13] The figures reported in the text and in the graph are estimated by multiplying the base money as a share of GDP times the growth rate on base money. Eliana Cardoso (1998) estimates the average inflation tax revenue in Brazil during the 50 years ending 1995 at 2 percent of GDP.

Figure 14
Monthly Inflation Rate in Brazil 2000-2003
(seasonally adjusted General Price Level
IGP-DI)



Source: FGV

Figure 15
Seignorage from Money Creation
2000-2003
(% of GDP)



Source: World Bank calculations described in text.

The monetary authorities reacted variously to the shocks during the 2001-2002 period. In the initial stage, from March 2001 to July 2001, the central bank raised the Selic rate from 15.25 percent to 19 percent.. From then on, it maintained the Selic at 19 percent, until February 2002, when it reduced it 25 bps, then lowered it again in March and July. In mid-October 2002, the central bank bumped up the Selic three percentage points to 21 percent and then raised it two more times until reaching 25 percent before the year's end (Figure 16). As the Selic rose, the exchange rate partially reversed its depreciating trend, and the debt stock (as a percent of GDP) began decreasing. Looking (ex-post) at this behavior, it is legitimate to wonder why the central bank did not raise interest rates before October. Interestingly, it also raises the question of the applicability of Blanchard's model to the Brazilian experience, since that paper presents the case for the potential destabilizing role of monetary policy when interest rates are increased, but the crisis occurred in the context of stable policy interest rates.

Several factors might explain the central bank's delayed reaction and some are related to considerations described by Blanchard's model. The first reason is that, before September-October, the fiscal conditions were inadequate. Public debt to GDP increased from 49 percent to 53 percent in 2001, and climbed further to 57 percent by mid-2002 without any policy response. With the primary balance decreasing during the first semester of 2002, it is understandable that sustainability concerns dominated investor sentiment.14 With taxes and expenditures predetermined by the electoral process and the structural rigidity of the budget, the adjustment of the government's real cash flow could come through several avenues: an increase in the price level, a higher seignorage, or a default The nature of the fiscal regime could have switched from one in which the

[14] This is what Blanchard calls the "wrong" fiscal conditions. Woodford (2001) call this a non-Ricardian environment. A Ricardian environment is one in which expected future primary surpluses adjust to compensate variations in the present value of debt, while in non-Ricardian regimes this policy adjustment certainty is non-existent.

primary surplus would de adjusted with certainty to ensure debt sustainability to one where there was uncertainty on how the adjustment would take place. A-priori it was difficult to envision how the adjustment would take place, and the composition of public debt, which we discuss in the following section, determined the final outcome.

The crucial point to bear in mind is that, under the circumstances of rising debt levels with an unresponsive fiscal policy, raising the Selic could have been inflationary.15 The higher cost of debt service (with an unresponsive primary surplus) would have led to a higher probability of default. This, in turn, would have accelerated capital outflows, increasing pressure on the currency to depreciate and hence, on inflation. Since printing money and higher prices were part of the solution to the imbalance in the government's present-value borrowing constraint, fiscal expectations were inconsistent with a stable price level. In fact, since September 2001 inflation expectations were permanently above the central bank's central target and by mid-2002 market expectations of inflation were regularly above the forecasts of the more robust models (Minella, et.al. 2003). Additionally, there is evidence of changes in the price formation mechanism in Brazil at the end of 2002 that researchers attribute to changes in the exchange rate pass-through (Belaisch, 2003). However, these changes in the observed price formation and inflation expectations generating mechanisms could have also been the result of the changes in fiscal expectations arising from a different fiscal regime during this brief period.

Empirical verification of the nature of the prevailing fiscal policy regime in a particular period poses challenges both from the conceptual and practical viewpoints. At the conceptual level, verification of the nature of the fiscal regime would require testing whether the primary surplus would have been the same if another price sequence would have been observed.16 Unfortunately, history only shows the actual (one) realization of the price level and hence it is impossible to verify whether the surplus would have been the same with a different price sequence (Woodford, 2001; Kocherlakota et al., 1999).

At the more practical level, verification of the character of the fiscal regime focuses on testing the responsiveness of the primary balance to changes in different variables (Bohn, 1998). These tests perform regressions of the primary surplus on the public debt ratio and other control variables to verify the significance of this particular coefficient. A positive (and significant) response of the primary surplus to changes in the debt ratio implies that this policy variable was the adjustment factor. In Brazil, the brevity of the period during which this regime change might have occurred limits any statistical testing. There are, however, studies that test this hypothesis using longer sample periods, with results extremely sensitive to the period of analysis. For instance,

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[15] Woodford (2001) shows how the price level may be determined by fiscal variables. The government's inability to balance its budget constraint via adjustments in the primary surplus, implies that the price level is the adjustment mechanism. Hence, the budget constraint acts as an equilibrium condition wich determines a unique price level associated with the particular fiscal policy. Previous episodes of Brazilian inflation in the 1970's and 1980s have been explained based on these grounds (Loyo, 1999). The Favero_Givazzi and Blanchard papers in this volume extend this theory to allow the price of debt (or the sovereign risk premium) to be the adjusting factor.

[16] In a controlled experiment situation, if another price (of goods or of sovereign debt) sequence could be associated with the same fiscal policy, then the hypothesis could be falsified. However, in reality we only observe the actual price sequence and, hence, cannot tell whether the fiscal policy would have been the same under a different price sequence.

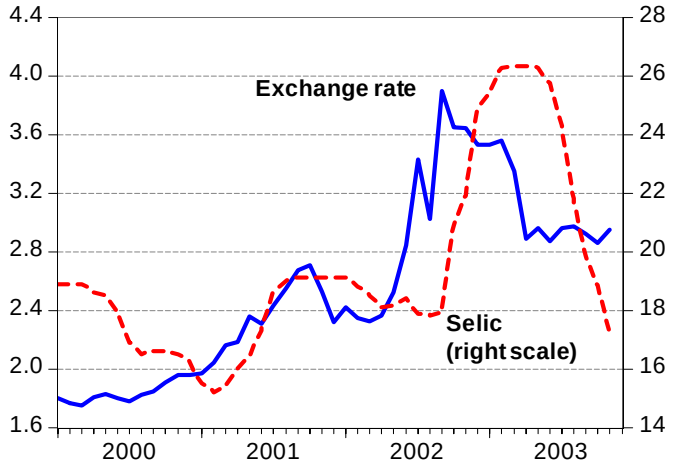
two papers in this volume report contradictory evidence: Favero and Giavazzi show that the primary surplus is highly persistent and unresponsive to any oscillation in the debt level; Wyplosz concludes that the observed surplus was similar to the one that would have resulted if the government had followed a rule that tried to stabilize the debt ratio while allowing some counter-cyclical action. It is very likely that this divergence obeys to the different sample periods: while the first study estimates the relationship after July 1999, the second one begins in 1998. Since there is a regime shift in fiscal policy in 1998-1999 described elsewhere (World Bank, 2000) and verified econometrically in the first chapter, the Favero-Giavazzi paper does not capture this change.

The second explanatory factor for the central bank's resistance to raise the policy rate was the vulnerable situation of mutual funds. Given the run on mutual fund deposits, raising the Selic would have been extremely risky because of the potential to aggravate losses to these intermediaries. As described in the next section, mutual funds were registering losses due to updating their balance sheets with new mark-to –market regulation from the central bank Raising the Selic would have increased the risk of a generalized run on the system. Additionally, in the face of a decreased demand of public bonds, to be described in the next section, the central bank was supporting the price of these assets. Under this extraordinary circumstances imposed by the public bond price support role, equivalent to an interest rate peg, liquidity was endogenous, and hence it would have been contradictory to try to control liquidity (by raising the Selic).17 Given that monetary policy was unable to respond, it would have been desirable that fiscal policy had been more responsive to the shocks.

By October 2002, the characterization of the economy had changed in several respects: (1) the run on mutual funds had been contained; (2) the presidential candidates had already agreed on sound fiscal policy principles; (3) the primary surplus reversed its decreasing trend and rose to unsurpassed levels. Clearly, the factors that originated the "wrong" expectations were not present any more. The central bank was then free to raise interest rates and quickly moved in this direction, bringing about the expected traditional results of the currency appreciating in response to tighter monetary policy as described in Figure 16. Control of the economy was gradually regained and consolidated after the first quarter of 2003.

[17] The Brazilian circumstances of a fixed primary surplus, and a central bank acting to support the price of public bonds (peging the interest rate) fit perfectly Woodford's characterization of the typical non-Ricardian regime (Woodford, 1998, 2001), with the implication of the effect of fiscal expectations on the price level.

Figure 16
Short term policy interest rate (Selic) and exchange rate in Brazil 2000 – 2003



Source: Bacen

III. Procyclical Fiscal Policy in Brazil

The vicious circle among procyclical fiscal policy, volatility and limited creditworthiness has been amply documented for Latin America (Gavin, Hausmann, Perotti and Talvi, 1996). Pro-cyclical fiscal policy is explained by the following factors: a) limited access to international credit markets during a shock means countries are unable to follow a tax-smoothing approach and have to tighten fiscal policy; b) tax structures that are heavily dependant on cyclical-sensitive income, such as indirect taxes (Gavin and Perotti, 1997); and c) weak institutional structures that do not allow generation of large enough primary surpluses in good times and lead to increased spending during expansionary phases (Talvi and Vegh, 2000). Several authors have attempted to documented the procyclical nature of Brazil's fiscal policy (IMF, WEO, 2002) but results are not highly significant.

To examine the relationship between the primary balance and economic activity in the short and in the long run, we adopted the Autoregressive Distributed Lag (ARDL) approach (Pesaran and Shin, 1999, and Pesaran, Shin and Smith, 1999) because it is robust to the order of integration and cointegration of the regressors, hence the pre-testing procedures may be avoided. This approach also has the advantage that the lags in each of the regressors are allowed to be different, and the endogeneity problem can be eliminated by appropriate selection of the lag length (Pesaran and Shin, 1999).

This section follows closely Pesaran & Pesaran (1997) and Pesaran and Shin (1999). Given that we will briefly summarize the main points, the interested reader is referred to the original sources.

Consider the simplest autoregressive distributed lag ARDL (p, q_1, q_2,,...,q_k) model,

$$\phi(L, p)y_t = \sum_{i=1}^{k} \beta_i(L, q_i)x_{it} + u_t \qquad (1)$$

where

$$\phi(L, p) = 1 - \phi_1 L - \phi_2 L^2 ... - \phi_p L^p$$

$$\beta(L, q_i) = \beta_{i0} + \beta_{i1}L + ... + \beta_{iqi}L^{q_i}, \qquad i = 1,2,...,k,$$

L = lag operator such that $Ly_t = y_{t-1}$
A vector of deterministic variables (i.e. intercept term, seasonal dummies or time trend) can be included without problem.

The long run coefficients are calculated for the x_{it}[18] :

$$\hat{\theta}_i = \frac{\hat{\beta}_i(1, \hat{q}_i)}{\hat{\phi}(1, \hat{p})} = \frac{\hat{\beta}_{i0} + \hat{\beta}_{i1} + ... + \hat{\beta}_{i\hat{q}_i}}{1 - \hat{\phi}_1 - \hat{\phi}_2 - ... - \hat{\phi}_{\hat{p}}}, \qquad i=1,2,...,k$$

where $\hat{p}$ and $\hat{q}_i$, i=1,2,...,k are the selected values of p and q

Rewriting equation 1 in terms of lagged values and the first differences of yt and xit derives the error correction model of the estimated ARDL.

$$\Delta y_t = -\phi(1, \hat{p})EC_{t-1} + \sum_{i=1}^{k} \beta_{i0}\Delta x_{it\,t} - \sum_{j=1}^{\hat{p}-1} \phi_j^* \Delta y_{t-j} - \sum_{i=1}^{k} \sum_{j=1}^{\hat{q}_i - 1} \beta_{ij}^* \Delta x_{i,t-j} + \mu_t$$

where $EC_t = y_t - \sum_{i=1}^{k} \hat{\theta}_i x_{it} - \hat{\psi}' w_t$

The asymptotic variance of the long-run estimators obtained by OLS estimation of (1) can be computed by means of the delta-method, which involves complicated computational procedures (Pesaran & Pesaran, 1997). Fortunately, a statistical package (Microfit) provides this option for single equation estimation. Alternatively, a variant of the error-correction form can be estimated by instrumental variables.

Given this number of variables (6), and that the maximum lag was chosen to be 3, a total of $(3+1)^{6+1}$= 16,384 ARDL regressions were run. Hence we ran the primary balance as the dependent variable with the following regressors: public debt, spreads, output, real exchange rate, and real interest rates. The model selection process was based

[18] The model is first estimated by OLS method for all possible values of p=0,1,2,...,m, q_i=0,,1,2,...,m, i=1,2,...,k. A total of $(m+1)^{k+1.}$ .models are estimated. The maximum lag length might be chosen using alternative criteria: The R^2 criterion, the Akaike information criterion, Schwarz criterion, or Hannan-Quinn.

on four different criteria: Akaike Information Criterion (AIC), the R-Bar Squared (RBSC), Schwarz Bayesian (SBC) criterion, and Hannan-Quinn(HQ). Tables 12 and 13 summarize both the long-run coefficients and the short-run dynamics of the primary balance.

Table 11
Estimated Long-Run Coefficients for the Primary Balance
1991:01 – 2002:01

	AIC	RBSC	SBC	HQC
Debt to GDP ratio	.14* (.05)	.15* (.05)	.14** (.07)	.12*** (.07)
Output (in logs)	18.3* (5.6)	20.8* (5.6)	21.2* (6.9)	18.0* (6.5)
REER (in logs)	-7.6* (1.9)	-7.6* (1.8)	-8.96* (2.71)	-9.8*** (2.57)
Real interest rate	-.01*** (.004)	-.01** (.003)	-.01** (.008)	-.01* (.004)
Sovereign spreads (in logs)	.30 (.65)	.44 (.65)	.37 (.89)	.01 (.84)

Standard error in parenthesis
*Significant at the .01 level
** Significant at the .05 level
*** Significant at the .10 level

Table 11 shows that, in the long run, output is positively correlated with the primary balance. However, Table 12 shows that, in the short run, the correlation is negative, implying that fiscal expansions are associated with primary balance reductions, and the primary balance increases during output contractions, verifying the pro-cyclical nature of fiscal balances. Another interesting result depicted in Table 11 is the positive and significant relationship between the primary balance and the public debt ratio. This fact may be interpreted as the result of a fiscally responsible sovereign that adjusts its primary to compensate changes in the debt ratio. Bohn (1998) postulates this as a necessary condition in his econometric testing for debt sustainability

Finally, in this section we estimate the cyclical component of the primary balance by regressing this variable on the long-run components of each of the explanatory variables used in the previous exercise. The residual of such regression is the part of the primary balance explained by the transitory or cyclical components of each of the explanatory variables. Hence, we interpret this residual as the cyclical component of the primary balance (Figure 17). In general, we observe that this component fluctuates between plus or minus 1 percent of GDP, with the most recent levels close to lower bound. That is, at the end of 2003, the economic slowdown and other transitory fluctuations of variables affecting the primary balance had a negative impact of close to one percent of GDP, compared to the positive impact of more than one percent of GDP in early 2000. Given that the observed primary balance improved by .5 percent of GDP during the period, the structural balance improved by close to 1.5 percent of GDP

Table 12
Error-correction Representation for the Selected ARDL models 1991-2002
Dependent variable: d Primary Balance

	AIC	RBSC	SBC	HQC
Error-correction term(-1)	-.20*	-.21*	-.13*	-.14*
*d*Primary(-1)	.04	.02		
*d*Primary(-2)	.17**	.16**		
*d*Primary(-3)				
*D*debty	-.014	.007	.018**	.017***
*D*debty(-1)	-.038	-.013		
*D*debty(-2)	-.027	-.018		
*D*debty(-3)	-.081***	-.085*		
*D*Output	-1.87	-1.7	-1.27	-1.5
*d*Output(-1)	-2.36***	-3.1**		
*d*Output(-2)	-3.18**	-3.6*		
*d*Output(-3)	-1.98***	-2.27**		
*D*reer	-1.49*	-.39	-1.2*	-1.4*
*D*REER(-1)				
*D*REER(-2)				
*D*REER(-3)				
Dselicr	-.0004	-.004	-.001**	.006
dSelicr(-1)	-.001	-.009		
dSelicr(-2)	.001			
dSelicr(-3)				
Dembi	.44**	.45**	0.4**	.43**
dEmbi(-1)	-.66*	-.60*	-.67**	-.63*
dEmbi(-2)		-.30		
dEmbi(-3)				
R-Bar^2	.30	.30	.21	.23
D.W.	2.15	2.06	2.09	2.05

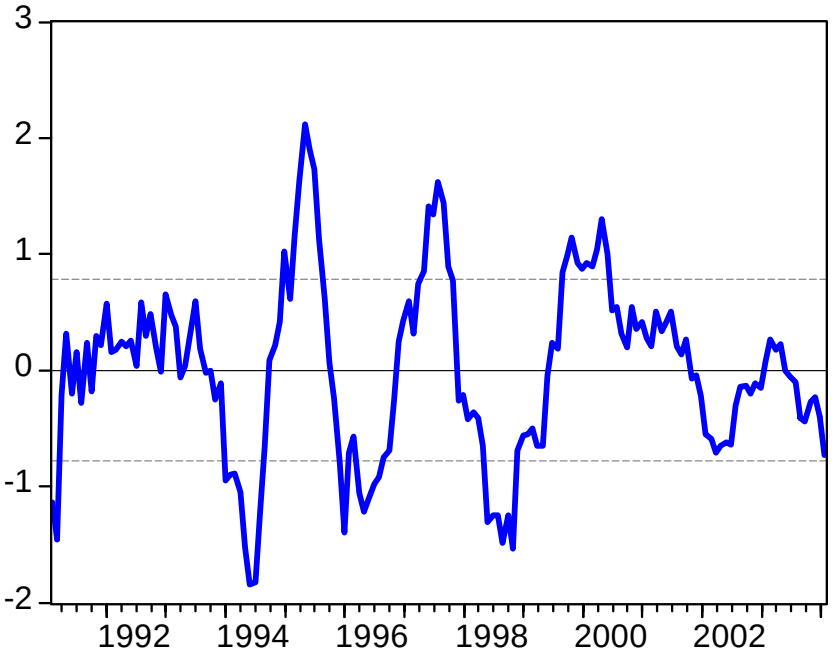
* Significant at the .01 level

** Significant at the .05 level

*** Significant at the .10 level

Figure 17: Cyclical Component of the Primary Balance

(in percent of GDP)



IV. Public Expenditure Composition and Growth

It is commonly acknowledged that the composition of government expenditures determine the net effect of government expenditures on growth (Aschauer (1989), Barro (1990) and Cashin (1995). Furthermore, one expects that investment expenditures will have a more positive effect on growth than for instance personnel expenditures or transfers. Using panel data, Muriel (1998) shows that interest payments and amortizations on public debt are negatively associated with growth in a sample of less developed countries. Based on annual data from the National Accounts System for the 1947-95 period in Brazil, Candido (2001) provides evidence that government consumption and transfer expenditures had a negative effect on Brazilian economic growth.

In this section our objective is to estimate the long run and short run impact of government expenditure on Brazilian growth using two variants with respect to previous work on the topic. First, we use the ARDL methodology described in the previous section. Next, we use capital stock data for the private and public sectors to estimate an aggregate production function. Given its robustness to the order of integration and cointegration of the regressors, we use the Autoregressive Distributed Lag (ARDL)

approach (Pesaran and Shin, 1999, and Pesaran, Shin and Smith, 1999) for the 1950-2000 period to estimate a long run relationship and an error correction representation between income per capita, private and public capital stocks per capita and three components of government current expenditure (subsidies, social security and assistance transfers and consumption)[19]. The estimation also included tax revenues and public debt as a share of GDP to control for the government's budget identity and the potential negative effects of the government financing on economic activity. The data for the stocks of private and public capital was obtained from the Reis et al (2002) and the flow data, that is income per capita and government current expenditures come from the National Accounts System - IBGE.

Tables 13 and 14 report the long-run coefficients and short-run dynamics estimated with this method.[20] Table 13 shows that, in the long run the elasticity of output with respect to the public capital stock is larger than in that of the private sector. The estimated elasticity seems high when it is compared with estimated values for the US or OECD economies (Sturn and de Haan, 1995; Hurlin, 2001), but similar to Brazilian existing Brazilian estimates for infrastructure (Cavalcanti, 2004) However, the negative impact of the tax ratio is surprisingly large: an increase of 1 percentage point in the tax ratio lowers GDP per capita by 1 percent.

Government expenditures in consumption or social security have no effect on per-capita GDP, while subsidies have a negative impact. The positive effect of public debt ratio is somewhat puzzling and could be reflecting an endogeneity problem i.e. that as GDP per capita increases there is a larger demand for financial assets and public bonds is one of those assets that domestic agents demand. To examine this hypothesis, we used Granger causality tests and the Wu-Hausman exogeneity test and both lead to the non-rejection of the exogenous public debt hypothesis.

In the short run (Table 14) private capital has a greater impact on GDP per capita than the public capital. Government expenditures have no effect on GDP, and tax rates have a negative impact on GDP Public debt has also negative impact on GDP per capita in the short-run.

[19] It also has the advantage that the lags in each of the regressors are allowed to be different, and the endogeneity problem can be eliminated by appropriate selection of the lag length (Pesaran and Shin, 1999)

[20] The tables report results for the different models: Akaika (AIC), Schwarz (SBC), R-Bar Squared (RBSQ) and Hanaan-Quinn (HQ). The production function was estimated in per capita terms, dividing all the arguments by the economically active population. There are 8 variables: GDP per capita, private capital stock per capita, public capital stock per capita, government subsidies, government consumption, government social security transfers, tax revenue ratio to GDP, and the public debt ratio to GDP. The maximum lag was 3. this produced a total of 262,144 possible combinations. THE AIC, SBC and HQC selected an ARDL (1,2,0,1,0,0,0,3) while the RBSC selected a (1,2,1,1,0,1,0,3)model.

Table 13
Estimated Long-Run Coefficients for the GDP per capita
1950 – 2002

	AIC	RBSC	SBC	HQC
Private Capital Stock per capita (in logs)	0.30* (0.10)	0.29* (0.10)	0.30* (0.10)	0.30* (0.10)
Public Capital Stock per capita (in logs)	0.71* (0.11)	0.72* (0.12)	0.71* (0.11)	0.71* (0.11)
Gov. Expenditures: subsidies per capita (in logs)	-0.04** (0.02)	-0.03*** (0.02)	-0.04** (0.02)	-0.04** (0.02)
Gov. Expenditures: consumption per capita (in logs)	0.11 (0.06)	0.10 (0.06)	0.11 (0.06)	0.11 (0.06)
Gov. Expenditures: social security and assistance transfers (in logs)	0.004 (0.061)	-0.04 (0.07)	0.004 (0.061)	0.004 (0.061)
Tax Revenue to GDP Ratio	-1.01** (0.37)	-0.82** (0.35)	-1.01** (0.37)	-1.01** (0.37)
Total Debt to GDP Ratio	0.30* (0.09)	0.32* (0.08)	0.30* (0.09)	0.30* (0.09)
Constant	-0.29 (1.00)	0.03 (1.12)	-0.29 (1.00)	-0.29 (1.00)
Trend	-0.002 (0.003)	-0.001 (0.003)	-0.002 (0.003)	-0.002 (0.003)

Standard errors in parenthesis
*Significant at the .01 level
** Significant at the .05 level
*** Significant at the .10 level

Table 14
Error-correction Representation for the Selected ARDL models 1952-2002
Dependent variable: d GDP per capita

	AIC	RBSC	SBC	HQC
Error-correction term (-1)	-0.52* (0.08)	-0.57* (0.09)	-0.52* (0.08)	-0.52* (0.08)
d(Private Capital Stock per capita)	1.66* (0.23)	1.87* (0.27)	1.66* (0.23)	1.66* (0.23)
d(Private Capital Stock per capita)-1	0.55*** (0.28)	0.63** (0.31)	0.55*** (0.28)	0.55*** (0.28)
d(Public Capital Stock per capita)	0.37* (0.05)	0.15 (0.23)	0.37* (0.05)	0.37* (0.05)
d(Gov. Expenditures: subsidies per capita)	0.004 (0.008)	0.004 (0.008)	0.004 (0.008)	0.004 (0.008)
d(Gov. Expenditures: consumption per capita)	0.06 (0.04)	0.06 (0.04)	0.06 (0.04)	0.06 (0.04)
d(Gov. Expenditures: social security and assistance transfers)	0.002 (0.032)	0.02 (0.03)	0.002 (0.032)	0.002 (0.032)
d(Tax Revenue to GDP Ratio)	-0.53* (0.17)	-0.46** (0.18)	-0.53* (0.17)	-0.53* (0.17)
d(Total Debt to GDP Ratio)	-0.17** (0.06)	-0.16** (0.06)	-0.17** (0.06)	-0.17** (0.06)
d(Total Debt to GDP Ratio)-1	0.06 (0.07)	0.04 (0.09)	0.06 (0.07)	0.06 (0.07)
d(Total Debt to GDP Ratio)-2	0.24* (0.06)	0.26* (0.06)	0.24* (0.06)	0.24* (0.06)
d(Constant)	-0.15 (0.52)	0.01 (0.64)	-0.15 (0.52)	-0.15 (0.52)
d(Trend)	-0.001 (0.002)	-0.001 (0.002)	-0.001 (0.002)	-0.001 (0.002)
R^2	0.88	0.89	0.88	0.88
D.W.	1.99	1.92	1.99	1.99

* Significant at the .01 level
** Significant at the .05 level
*** Significant at the .10 level

The long run results are somewhat puzzling for two reasons. First the high level of the public sector capital elasticity. Second, the fact that the public sector elasticity is higher than the private one. This fact is also present in several of the classic studies for the US and OECD economies, such as Aschauer(1989), Ram and Ramsey (1989), Eisner (1994),

Sturn and de Haan (1995), Balmaseda (1997) and Viverberg (1997). Hurlin (2001a, 2001b) shows that, in general, papers based on time series analysis of variables in levels, like the present one, tend to find large output elasticities of public capital. Hurlin shows that there are two potential sources of bias for this finding: one the endogeneity of the factors of production, i.e. the fact that the productivity of private capital may depend on the level of public capital; and b) the fact that in most of those studies the output and the inputs are not cointegrated and the variables are non-stationary leading to the spurious regression problem.

The first source of bias may not be a serious problem in this specific case, given the ARDL methodology produces consistent estimates of the long run coefficients (Pesraan an Shin, 1997). We tested for the correlation between both private and public capital and the residual of the regression, and were unable to reject the exogeneity of these variables. The second source of potential bias may be a problem, because based on the ARDL approach and the proposed method to test for long run relationships (Pesaran, Shin and Smith, 1999) the computed F-statistic between the upper and lower bounds that do not allow firm rejection or non-rejection of the null hypothesis of no long run relationship.

To examine further this potential problem, we adopted a multiple equation cointegrating VAR approach. This approach will also allow examination of relationships between variables that the single-equation ARDL approach did not allow. With the same set of variables, we were unable to reject the hypothesis of up to four cointegrating vectors. To reduce the dimensionality of the problem (and based on the variance decomposition) we excluded the debt variable and were able to reduce the number of cointegrating vectors to two.[21]

With the specified system of six variables we examined the response of per capita GDP to multiple shocks with the Generalized Impulse Response Function. The Appendix contains the respective tables.
A one standard deviation shock to public capital (1.7 percent of GDP) that at the end of the simulation period (10 years) implies a higher public capital stock by almost 7 percent is associated with a 5 percent higher GDP (Figure 18a); this fact implies a long run elasticity of about .7, almost identical to the long run elasticity estimated by the single-equation (ARDL) method. This approach, however, has the advantage of allowing examination of the impact of this shock on other variables. For instance, such a shock to public capital is also associated with an increase in private capital of almost 5 percent by the end of the forecasting horizon (Fig.18 b) verifying some degree of complementarity between both types of capital.

[21] See Appendix for the cointegration tests. One of the vectors, however, showed no persistence in the deviations from the equilibrium relationship to system-wide shocks. The other vector, on the opposite, showed temporary deviations from the equilibrium relationship returning after a few years. We arbitrarily eliminated the first one and remained with a single cointegrating vector.

A shock to private capital stock, representing a rise of six percent (in the long run) is associated with a higher GDP by 4 percent (Fig. 19). This would imply a long run elasticity of about .6, much higher than the one estimated by the ARDL.

Figure 18 a

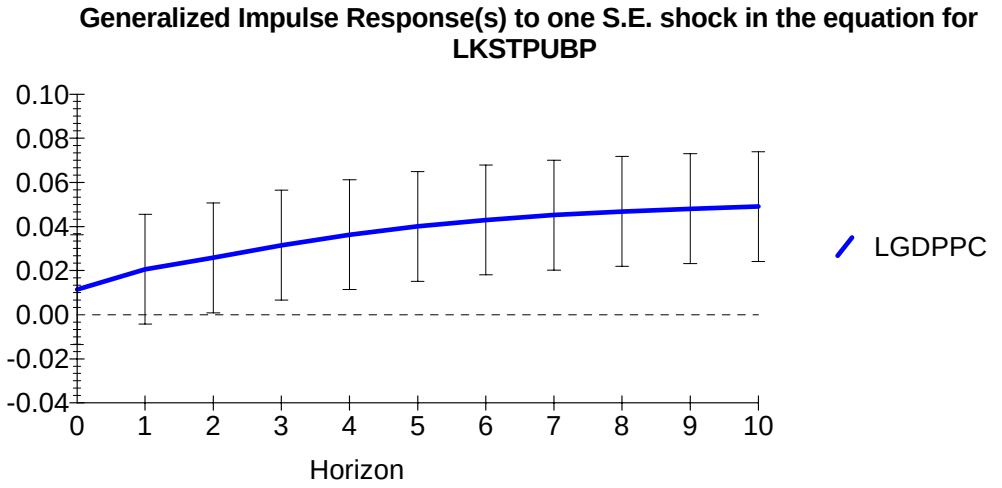


Figure 18b

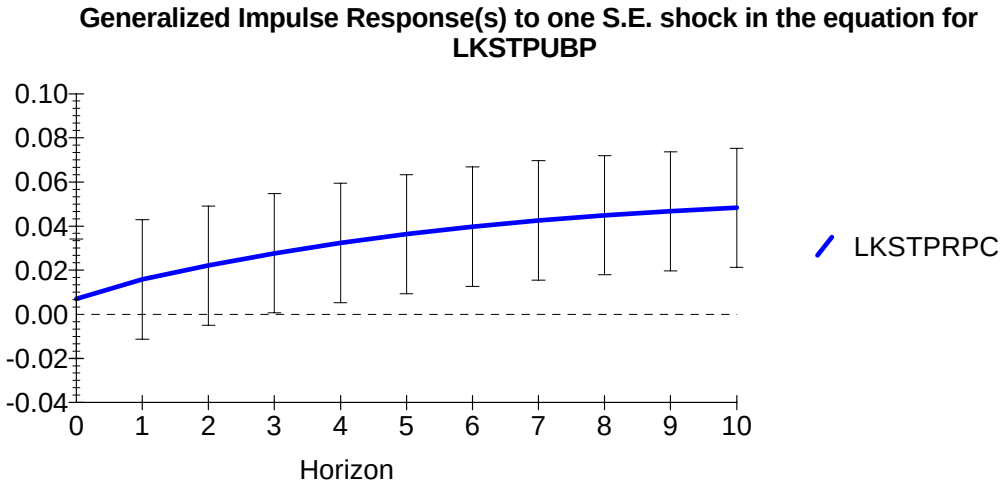
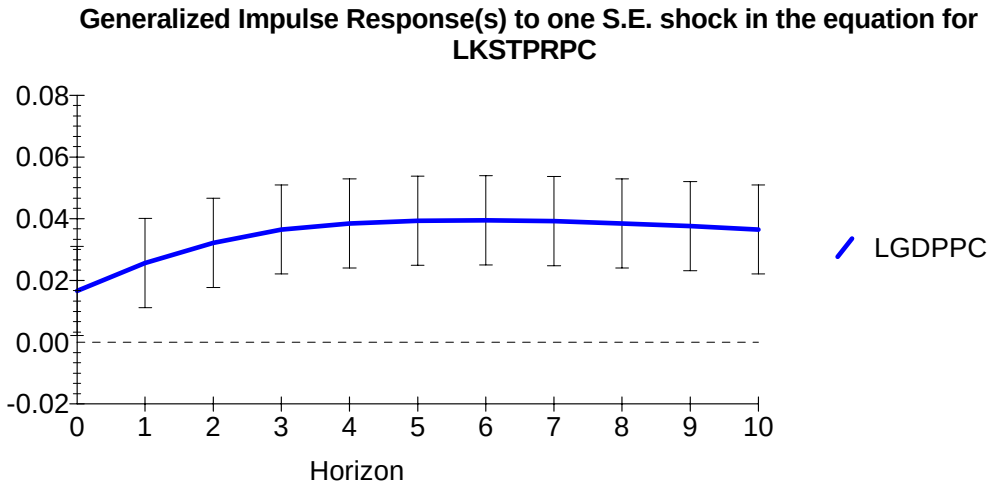


Figure 19



Another interesting result refers to the impact of a tax shock. A permanent increase of the tax ratio (of 1.5 percent of GDP) is associated with a lower GDP per capita of close to 1 percent (Figure 20a), similar to the ARDL result. The same shock is associated with a lower private capital stock (Figure 20b)

Figure 20a

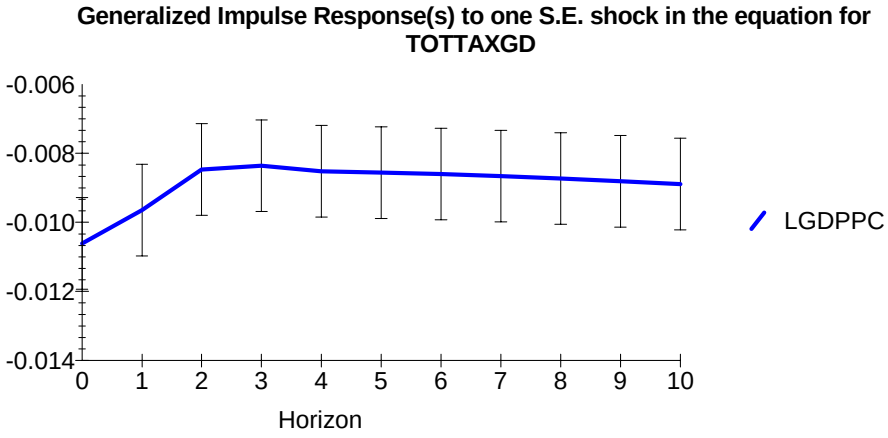
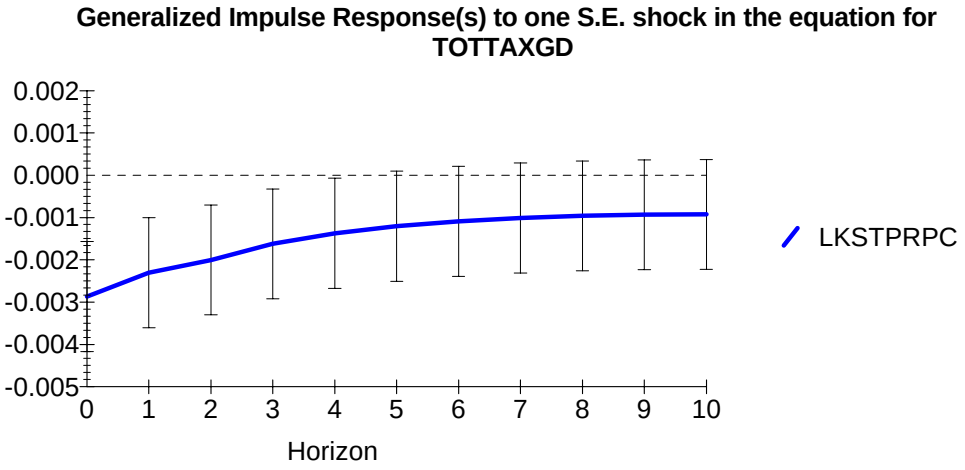


Figure 20b



A shock that leads to a permanent rise of government consumption expenditure (of 7 percent in real terms) is associated with a fall in per capita GDP (Figure 21 a). This shck is associated with a higher tax ratio (Figure 21b), lower private capital stock (Fig 21 c) and lower public capital stock as well (Figure 21d).

Figure 21 a

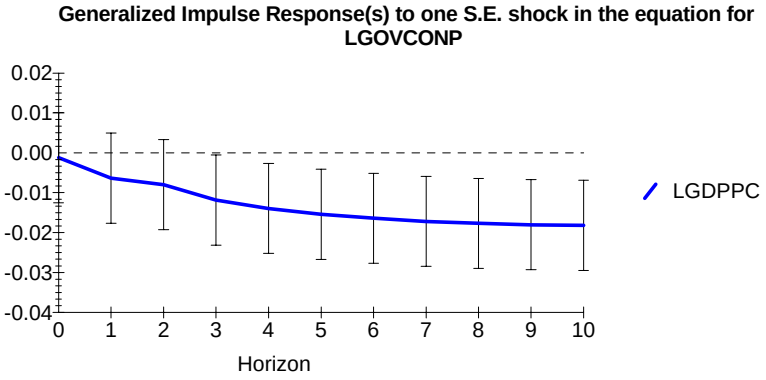


Figure 21 b

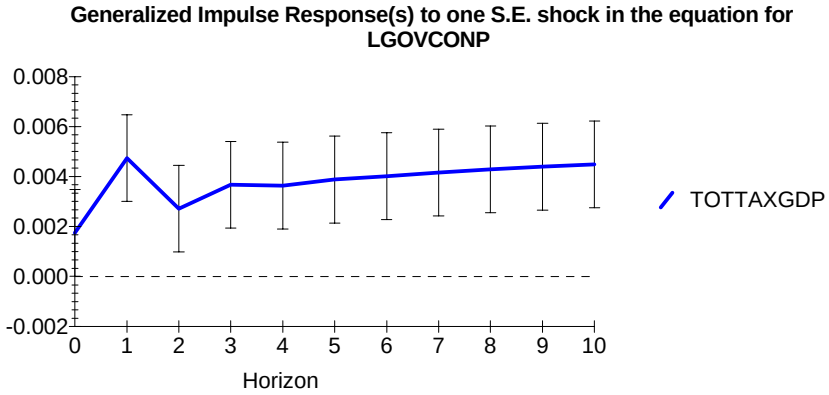


Figure 21 c

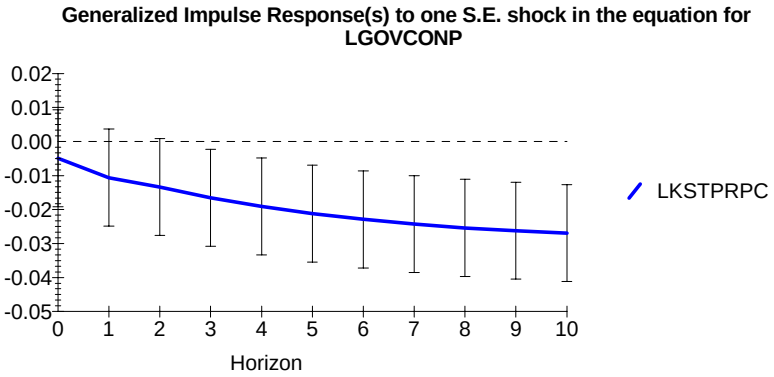
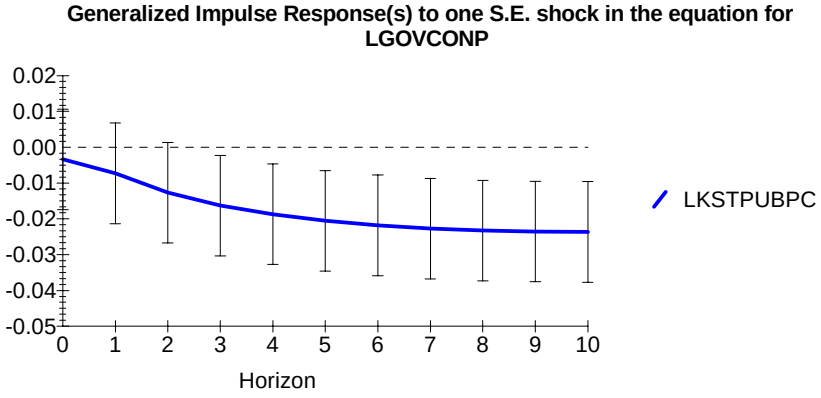


Figure 21 d



The other two types of government expenditures, namely the subsidies and social security transfers have negligible effects on GDP in the medium term and opposing effects in the long run (see Appendix) Given the small size of this type of expenditure, we will focus here on the effect of social security transfers, leaving for the appendix the subsidy case.

While subsidies have a positive effect in the long run, social security transfers have a negative effect (Figure 22a), primarily because of the associated reduction in the public sector capital (Figure 22b). A 5 percent increase in the social security payments is associated with a fall of 3 percent in the public capital stock.

Figure 22 a

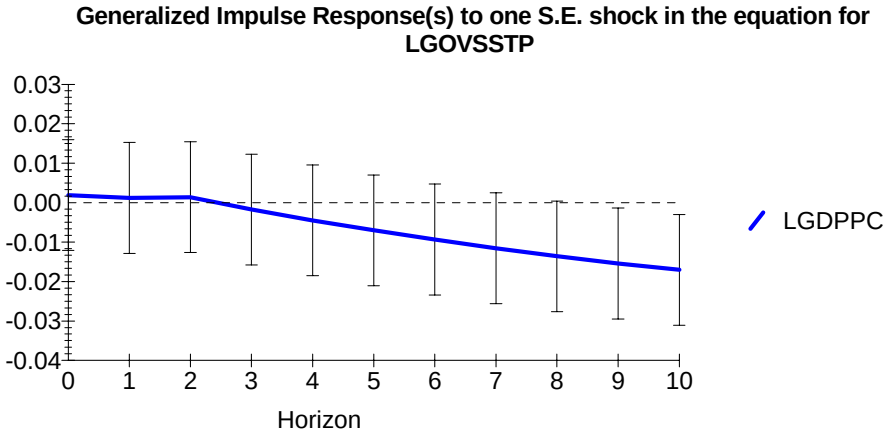
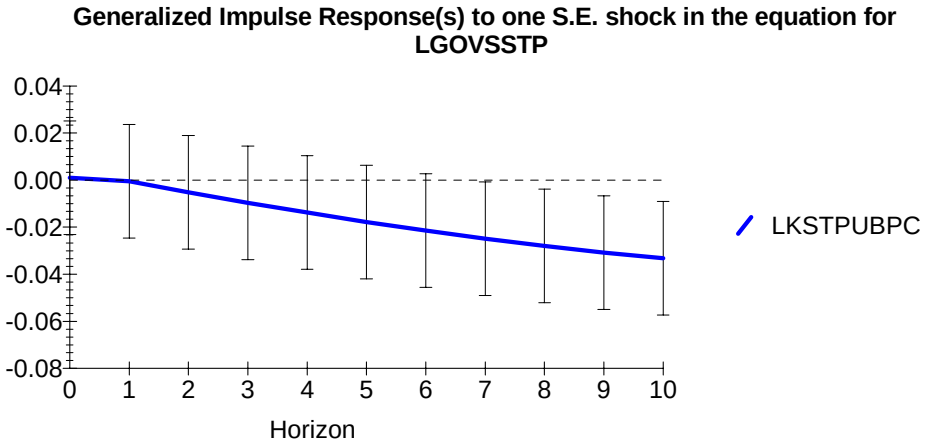


Figure 22 b



V. Conclusions and Policy Implications

During the past decade, the successful episodes of Brazilian stabilization coincide with those when fiscal policy was flexible to change the primary surpluses, while crises emerge when there is little flexibility to adjust to external shocks.. For instance, the

1998-1999 episode shows the importance of the primary balance as a signaling tool in a world of imperfect information. In contrast to the 1998-1999 stabilization, fiscal policy was unresponsive to shocks in 2002, causing concerns of fiscal policy sustainability. Compounded by electoral uncertainty, the situation ended in the 2002 debt crisis

Brazilian fiscal adjustment has been of mixed quality. On one hand, most of the adjustment has been achieved by raising revenues and cutting capital expenditures In the early nineties, the tax burden was 25% of GDP while in 2003 it reached 35%. In addition to the high level of taxation, the increasing share of indirect cumulative taxes and the over-taxation of a reduced tax base, generated distortions in economic decisions. On the other hand, on the expenditure side, the Brazilian government spends an adequate proportion of its resources in social areas and that the volume of these resources has not been reduced significantly. However, most of these social expenditures also benefit medium and high income groups through the social security system, higher education and health care expenditures. Improving the quality of the fiscal adjustment, therefore, requires reforms of the social security system and an allocation of resources directed to social areas that pays better attention to equity concerns.

Our findings also indicate that Brazilian fiscal policy is procyclical in the short run: output increases are associated with smaller primary balances, while output contractions result in higher primary balances. In the long run, however, the evidence shows that fiscal policy is countercyclical, that is a 1% increase in output is associated with a higher primary balance of 0.2% of GDP.

Using a modified production function approach we examined the contribution of public capital to GDP. We used both single-equation (ARDL) and multi-equation approaches to examine the 1950-2002 period. Both methods yield a high output elasticity of the public capital stock but also a substantial negative impact of taxation on GDP that should be incorporated in public investment project evaluation. The high elasticities are somewhat puzzling and may be reflecting the problem, identified by Hurlin (2001) common to most papers that estimate production function with time series. However, the sources of bias present in other studies do not seem to affect the present analysis.

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Appendix

Table A1
Complementary Roles of Debt Ratios and Primary Balances as Spreads' Determinants in Argentina
Dependent Variable: EMBIARORLAT
Method: Least Squares
Sample(adjusted): 1996:1 2001:4
Included observations: 24 after adjusting endpoints
Newey-West HAC Standard Errors & Covariance (lag truncation=2)

Variable	Coefficient	Std. Error	t-Statistic	Prob.
DEBTYAR(-1)	4.254237	2.097919	2.027837	0.0555
CUPRIMBALAR(-1)	-105.5507	65.65074	-1.607761	0.1228
C	-1.502347	0.717801	-2.092984	0.0487

R-squared	0.434061	Mean dependent var	0.030070
Adjusted R-squared	0.380163	S.D. dependent var	0.335798
S.E. of regression	0.264373	Akaike info criterion	0.293558
Sum squared resid	1.467755	Schwarz criterion	0.440814
Log likelihood	-0.522691	F-statistic	8.053251
Durbin-Watson stat	0.567812	Prob(F-statistic)	0.002536

EMBIARORLAT= Argentina sovereign spread (JPMORGAN) orthogonalized from Latin Aggregate

Debtyar= Debt to gdp ratio in Argentina

Cuprimbalar= Cumulative (4 quarter) primary balance as % of GDP

Table A2

Dependent Variable: EMBIARORLAT
Method: Least Squares
Sample(adjusted): 1996:1 2001:4
Included observations: 24 after adjusting endpoints
Newey-West HAC Standard Errors & Covariance (lag truncation=2)

Variable	Coefficient	Std. Error	t-Statistic	Prob.
DEBTYAR(-1)	4.783640	2.356472	2.030001	0.0559
CUPRIMBALAR(-1)	7.414377	27.31968	0.271393	0.7889
DSIG*CUPRIMBALAR(-1)	-155.2291	93.31608	-1.663477	0.1118
C	-1.669541	0.787701	-2.119510	0.0468
R-squared	0.473865	Mean dependent var		0.030070
Adjusted R-squared	0.394944	S.D. dependent var		0.335798
S.E. of regression	0.261202	Akaike info criterion		0.303964
Sum squared resid	1.364526	Schwarz criterion		0.500306
Log likelihood	0.352435	F-statistic		6.004346
Durbin-Watson stat	0.674836	Prob(F-statistic)		0.004341

Table A3

Dependent Variable: EMBIARORLAT
Method: Least Squares
Sample(adjusted): 1996:1 2001:3
Included observations: 23 after adjusting endpoints
Newey-West HAC Standard Errors & Covariance (lag truncation=2)

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	-0.121988	0.491914	-0.247985	0.8068
CUPRIMBALAR(-1)	-60.53052	49.51592	-1.222446	0.2365
DEBTYAR(-1)	0.326871	1.428264	0.228859	0.8214
CUPRIMBALAR(-1)*DEBTDEV	1420.222	798.5819	1.778430	0.0913
R-squared	0.370245	Mean dependent var		-0.024950
Adjusted R-squared	0.270810	S.D. dependent var		0.204769
S.E. of regression	0.174857	Akaike info criterion		-0.492921
Sum squared resid	0.580927	Schwarz criterion		-0.295444
Log likelihood	9.668592	F-statistic		3.723488
Durbin-Watson stat	0.673232	Prob(F-statistic)		0.029245

Table A4

Dependent Variable: CUPRIMBALAR
Method: Least Squares
Sample(adjusted): 1996:1 2001:4
Included observations: 24 after adjusting endpoints
Newey-West HAC Standard Errors & Covariance (lag truncation=2)

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	-0.001317	0.001696	-0.776918	0.4455
DEBTYAR(-1)	0.006375	0.003842	1.659478	0.1112
R-squared	0.145799	Mean dependent var		0.001164
Adjusted R-squared	0.106972	S.D. dependent var		0.000958
S.E. of regression	0.000905	Akaike info criterion		-11.09705
Sum squared resid	1.80E-05	Schwarz criterion		-10.99888
Log likelihood	135.1646	F-statistic		3.755061
Durbin-Watson stat	0.515592	Prob(F-statistic)		0.065589

Table A5

Complementary Roles of Debt and Primary Balances as Spreads
Determinants in Argentina and Brazil- Pooled Quarterly Data
1995-2001

Dependent Variable: EMBIOR?
Method: Seemingly Unrelated Regression
Sample: 1995:2 2001:4
Included observations: 27
Number of cross-sections used: 2
Total panel (unbalanced) observations: 51
One-step weighting matrix

Variable	Coefficient	Std. Error	t-Statistic	Prob.
_AR--DEBTY_AR(-1)	0.04	0.01	4.28	0.00
_BRA--DEBTY_BRA(-1)	0.01	0.00	4.41	0.00
_AR--PRIMARY_AR(-1)	-104.03	59.29	-1.75	0.09
_BRA--PRIMARY_BRA(-1)	-0.02	0.01	-3.04	0.00
Fixed Effects				
_AR--C	-1.50			
_BRA--C	-0.23			
Weighted Statistics				
Unweighted Statistics				
R-squared	0.44	Mean dependent var		0.01
Adjusted R-squared	0.38	S.D. dependent var		0.24
S.E. of regression	0.19	Sum squared resid		1.56
Durbin-Watson stat	0.59			

EMBIOR?=Embi Spread of each country orthogonalized from Latin average
DEBTY?=Debt to GDP ratio in each country
Primary?=Primary balance in each country

Table A6
The Changing Roles of Primary Balances-Test 1
Argentina and Brazil- Pooled data 1995 - 2001

Dependent Variable: EMBIOR?
Method: Seemingly Unrelated Regression
Sample: 1995:2 2001:4
Included observations: 27
Number of cross-sections used: 2
Total panel (unbalanced) observations: 51
One-step weighting matrix

Variable	Coefficient	Std. Error	t-Statistic	Prob.
_AR--DEBTY_AR(-1)	0.05	0.01	4.76	0.00
_BRA--DEBTY_BRA(-1)	0.01	0.00	4.98	0.00
_AR--PRIMARY_AR(-1)	12.88	100.09	0.13	0.90
_BRA--PRIMARY_BRA(-1)	0.00	0.01	-0.59	0.56
_AR--(DSIG_AR*PRIMARY_AR(-1))	-174.03	113.91	-1.53	0.13
_BRA--(DSIG_BRA*PRIMARY_BRA(-1))	-0.05	0.02	-2.80	0.01
Fixed Effects				
_AR--C	-1.70			
_BRA--C	-0.44			
Weighted Statistics				
Unweighted Statistics				
R-squared	0.48	Mean dependent var		0.01
Adjusted R-squared	0.40	S.D. dependent var		0.24
S.E. of regression	0.18	Sum squared resid		1.44
Durbin-Watson stat	0.74			

Table A7
The Changing Role of Primary Balances- Test 2
Argentina and Brazil-Pooled data 1995-2001

Dependent Variable: EMBIOR?
Method: Seemingly Unrelated Regression
Sample: 1995:2 2001:4
Included observations: 27
Number of cross-sections used: 2
Total panel (unbalanced) observations: 50
One-step weighting matrix

Variable	Coefficient	Std. Error	t-Statistic	Prob.
_AR--DEBTY_AR(-1)	0.00	0.01	0.44	0.67
_BRA--DEBTY_BRA(-1)	0.01	0.00	5.58	0.00
_AR--PRIMARY_AR(-1)	-63.60	38.79	-1.64	0.11
_BRA--PRIMARY_BRA(-1)	-0.03	0.01	-4.53	0.00
_AR--(DEBTDEV_AR*PRIMARY_AR(-1))	1306.73	663.40	1.97	0.06
_BRA--(DEBTDEV_BRA*PRIMARY_BRA(-1))	0.00	0.00	-3.35	0.00
Fixed Effects				
_AR--C	-0.18			
_BRA--C	-0.47			
Weighted Statistics				
Unweighted Statistics				
R-squared	0.40	Mean dependent var		-0.02
Adjusted R-squared	0.30	S.D. dependent var		0.15
S.E. of regression	0.12	Sum squared resid		0.65
Durbin-Watson stat	0.70			

Table A8
Primary Balances and Debt Ratios
Argentina and Brazil Pooled Data 1995 - 2001

Dependent Variable: PRIMARY?
Method: Seemingly Unrelated Regression
Sample: 1995:1 2001:4
Included observations: 28
Number of cross-sections used: 2
Total panel (unbalanced) observations: 52
One-step weighting matrix

Variable	Coefficient	Std. Error	t-Statistic	Prob.
_AR--DEBTY_AR(-1)	0.00	0.00	2.37	0.02
_BRA--DEBTY_BRA(-1)	0.13	0.04	3.43	0.00
Fixed Effects				
_AR--C	0.00			
_BRA--C	-3.36			
Weighted Statistics				
Unweighted Statistics				
R-squared	0.45	Mean dependent var		0.87
Adjusted R-squared	0.41	S.D. dependent var		1.71
S.E. of regression	1.31	Sum squared resid		82.20
Durbin-Watson stat	0.20			

Appendix
Cointegrating Vector Autoregression Tests and Impulse Response Function Analysis

Cointegration with unrestricted intercepts and restricted trends in the VAR
Cointegration LR Test Based on Maximal Eigenvalue of the Stochastic Matrix

****

51 observations from 1952 to 2002. Order of VAR = 2, chosen r =1.
List of variables included in the cointegrating vector:
LGDPPC LKSTPRPC LKSTPUBPC LGOVCONPC LGOVSUBPC
LGOVSSTPC TOTTAXGDP Trend
List of eigenvalues in descending order:
.63450 .53440 .42087 .31868 .26409 .21144 .12765

****

Null	Alternative	Statistic	95% Critical Value	90% Critical Value
r = 0	r = 1	51.3303	49.3200	46.5400
r<= 1	r = 2	38.9854	43.6100	40.7600
r<= 2	r = 3	27.8577	37.8600	35.0400
r<= 3	r = 4	19.5700	31.7900	29.1300
r<= 4	r = 5	15.6387	25.4200	23.1000
r<= 5	r = 6	12.1146	19.2200	17.1800
r<= 6	r = 7	6.9649	12.3900	10.5500

****

Use the above table to determine r (the number of cointegrating vectors).

Cointegration with unrestricted intercepts and restricted trends in the VAR
Cointegration LR Test Based on Trace of the Stochastic Matrix

****

51 observations from 1952 to 2002. Order of VAR = 2, chosen r =1.
List of variables included in the cointegrating vector:
LGDPPC LKSTPRPC LKSTPUBPC LGOVCONPC LGOVSUBPC
LGOVSSTPC TOTTAXGDP Trend
List of eigenvalues in descending order:
.63450 .53440 .42087 .31868 .26409 .21144 .12765

****

Null	Alternative	Statistic	95% Critical Value	90% Critical Value
r = 0	r>= 1	172.4616	147.2700	141.8200
r<= 1	r>= 2	121.1312	115.8500	110.6000
r<= 2	r>= 3	82.1459	87.1700	82.8800
r<= 3	r>= 4	54.2882	63.0000	59.1600
r<= 4	r>= 5	34.7182	42.3400	39.3400
r<= 5	r>= 6	19.0795	25.7700	23.0800
r<= 6	r = 7	6.9649	12.3900	10.5500

****

Use the above table to determine r (the number of cointegrating vectors).

Generalized Impulse Response(s) to one S.E. shock in the equation for LKSTPRPC
Cointegration with unrestricted intercepts and restricted trends in the VAR

****

51 observations from 1952 to 2002. Order of VAR = 2, chosen r =1.
List of variables included in the cointegrating vector:
LGDPPC LKSTPRPC LKSTPUBPC LGOVCONPC LGOVSUBPC
LGOVSSTPC TOTTAXGDP Trend

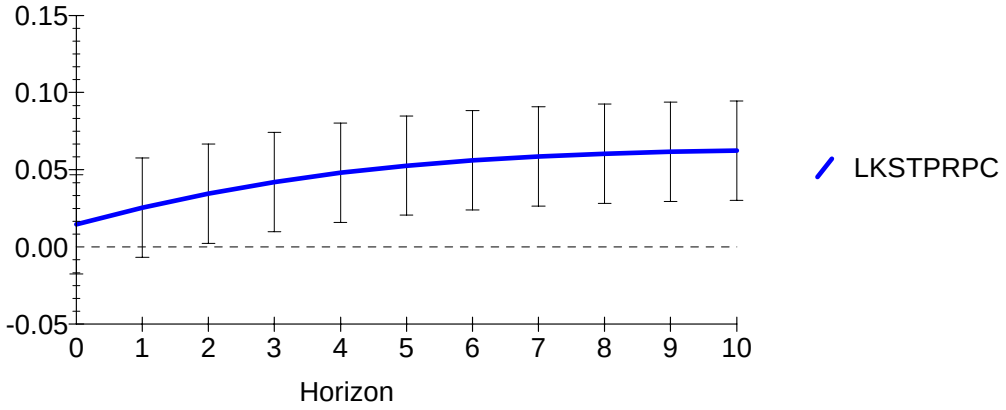
****

Horizon	LGDPPC	LKSTPRPC	LKSTPUBPC	LGOVCONPC	LGOVSUBPC	LGOVSSTPC
0	.016627	.014562	.0081256	-.027974	.065454	-.0021766
1	.025658	.025405	.017731	-.022943	.078764	.021051
2	.032214	.034483	.024337	-.019048	.12571	.019772
3	.036514	.042148	.027711	-.017208	.18766	.012425
4	.038430	.048152	.029311	-.017943	.22577	.0074402
5	.039295	.052737	.029744	-.019157	.25001	.0035185
6	.039490	.056160	.029280	-.020368	.26836	-.4930E-3
7	.039177	.058662	.028179	-.021643	.28219	-.0044187
8	.038493	.060430	.026667	-.022958	.29192	-.0080820
9	.037573	.061621	.024921	-.024256	.29833	-.011413
10	.036518	.062364	.023068	-.025493	.30221	-.014404

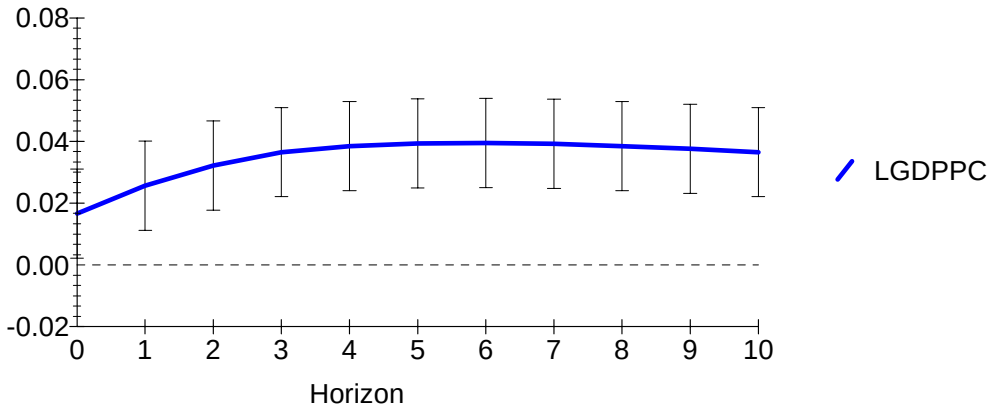
****

Horizon	TOTTAXGDP
0	-.0035154
1	-.0032477
2	-.0037751
3	-.0048950
4	-.0056279
5	-.0063279
6	-.0069067
7	-.0074023
8	-.0078145
9	-.0081562
10	-.0084361

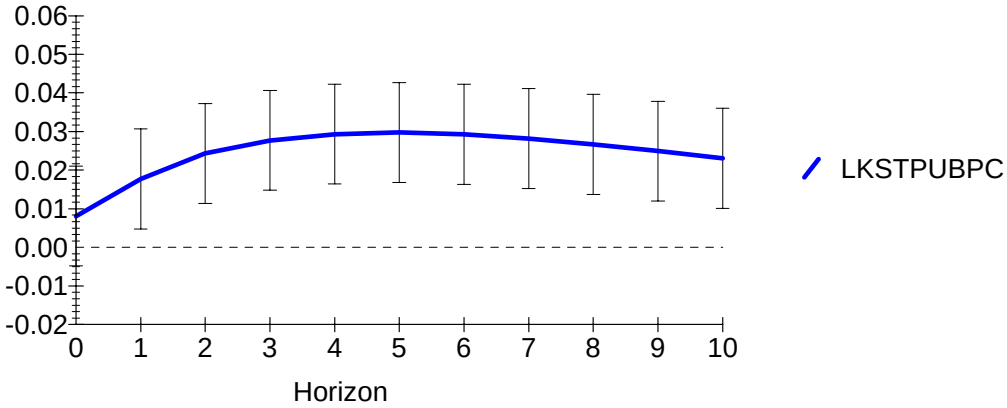
Generalized Impulse Response(s) to one S.E. shock in the equation for LKSTPRPC



Generalized Impulse Response(s) to one S.E. shock in the equation for LKSTPRPC



Generalized Impulse Response(s) to one S.E. shock in the equation for LKSTPRPC



Generalized Impulse Response(s) to one S.E. shock in the equation for LKSTPUBP
Cointegration with unrestricted intercepts and restricted trends in the VAR

****

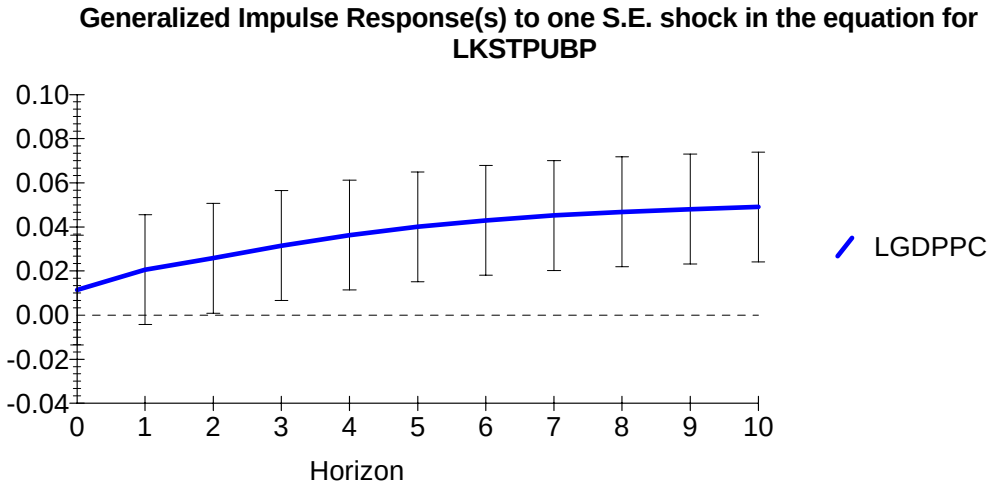
51 observations from 1952 to 2002. Order of VAR = 2, chosen r =1.
List of variables included in the cointegrating vector:
LGDPPC LKSTPRPC LKSTPUBPC LGOVCONPC LGOVSUBPC
LGOVSSTPC TOTTAXGDP Trend

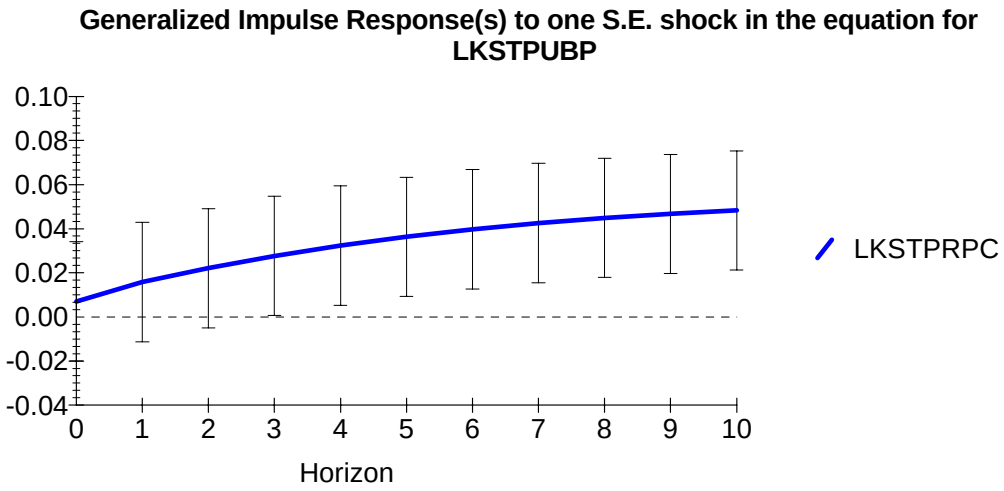
****

Horizon	LGDPPC	LKSTPRPC	LKSTPUBPC	LGOVCONPC	LGOVSUBPC	LGOVSSTPC
0	.011345	.0070947	.016677	-.016558	.13219	.0063188
1	.020634	.015807	.026809	-.0067698	.23730	-.0060201
2	.025799	.022133	.036551	-.0075954	.25341	.0045782
3	.031537	.027663	.044658	-.0048371	.27439	.010285
4	.036295	.032347	.050987	-.0022790	.30233	.012683
5	.040048	.036364	.055915	-.5244E-3	.32659	.014249
6	.042933	.039740	.059719	.6821E-3	.34608	.015279
7	.045161	.042550	.062610	.0015243	.36203	.015855
8	.046851	.044866	.064752	.0020973	.37521	.016022
9	.048101	.046757	.066294	.0024504	.38597	.015908
10	.048999	.048283	.067361	.0026355	.39464	.015602

****

Horizon	TOTTAXGDP
0	-.0010629
1	-.0029719
2	-.0023302
3	-.0027585
4	-.0028822
5	-.0031124
6	-.0033051
7	-.0034995
8	-.0036784
9	-.0038433
10	-.0039918





eneralized Impulse Response(s) to one S.E. shock in the equation for LGOVCONP
Cointegration with unrestricted intercepts and restricted trends in the VAR

****

51 observations from 1952 to 2002. Order of VAR = 2, chosen r =1.
List of variables included in the cointegrating vector:
LGDPPC LKSTPRPC LKSTPUBPC LGOVCONPC LGOVSUBPC
LGOVSSTPC TOTTAXGDP Trend

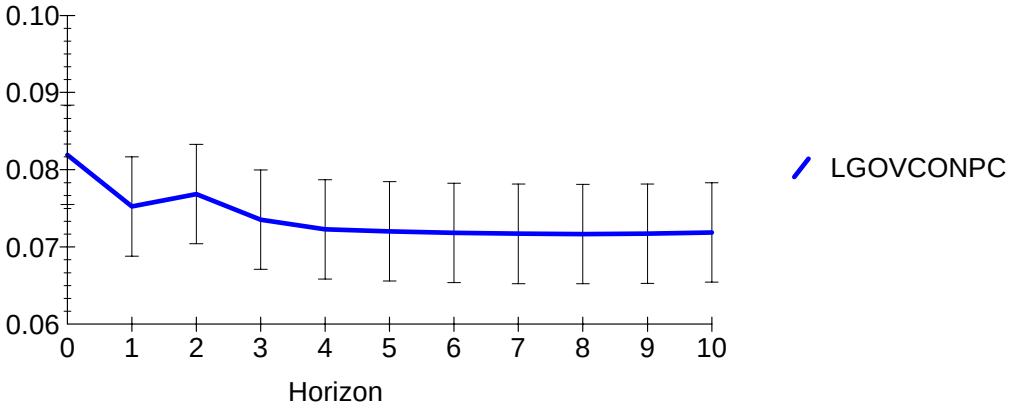
****

Horizon	LGDPPC	LKSTPRPC	LKSTPUBPC	LGOVCONPC	LGOVSUBPC	LGOVSSTPC
0	-.0012266	-.0049725	-.0033710	.081918	-.057157	.015833
1	-.0063342	-.010616	-.0073041	.075264	-.067279	.0030389
2	-.0079829	-.013413	-.012694	.076846	-.035017	-.0098600
3	-.011856	-.016518	-.016313	.073536	-.058934	-.0096376
4	-.013946	-.019063	-.018720	.072293	-.081661	-.0082162
5	-.015388	-.021208	-.020534	.072024	-.094137	-.0083018
6	-.016416	-.022924	-.021836	.071817	-.10318	-.0081722
7	-.017176	-.024302	-.022719	.071701	-.11080	-.0078422
8	-.017687	-.025394	-.023268	.071678	-.11702	-.0073495
9	-.018002	-.026250	-.023566	.071742	-.12186	-.0068164
10	-.018170	-.026908	-.023678	.071857	-.12555	-.0062669

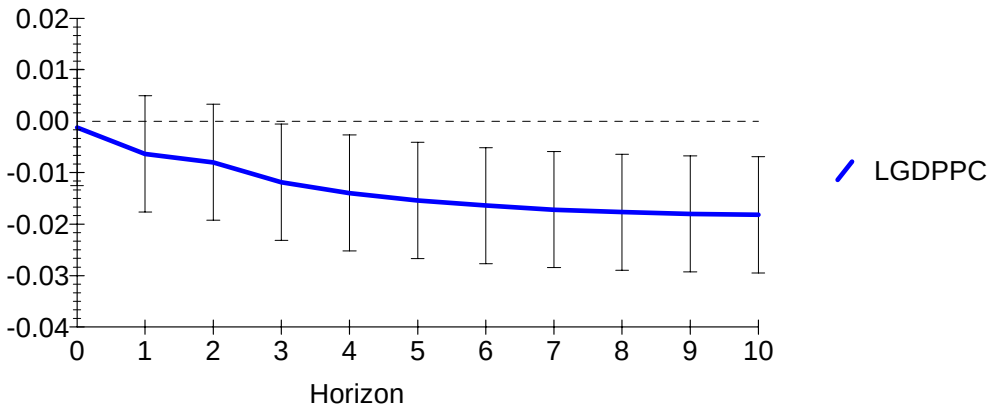
****

Horizon	TOTTAXGDP
0	.0017484
1	.0047379
2	.0027171
3	.0036730
4	.0036370
5	.0038785
6	.0040138
7	.0041622
8	.0042856
9	.0043956
10	.0044900

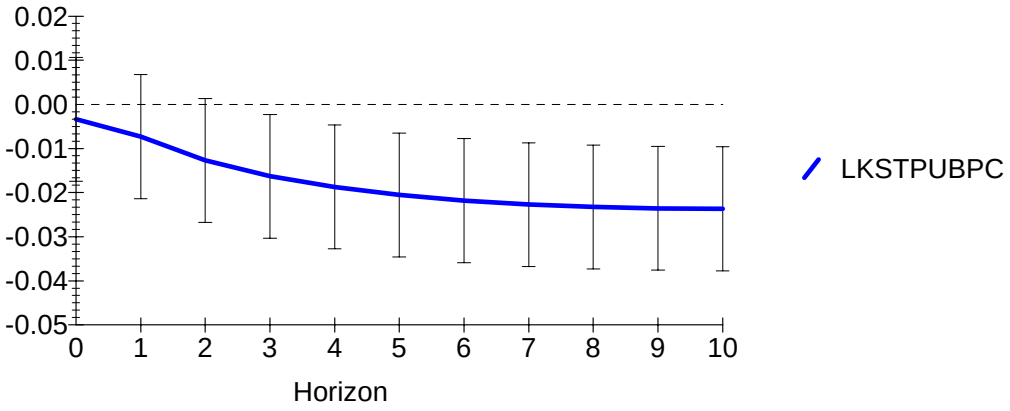
Generalized Impulse Response(s) to one S.E. shock in the equation for LGOVCONP



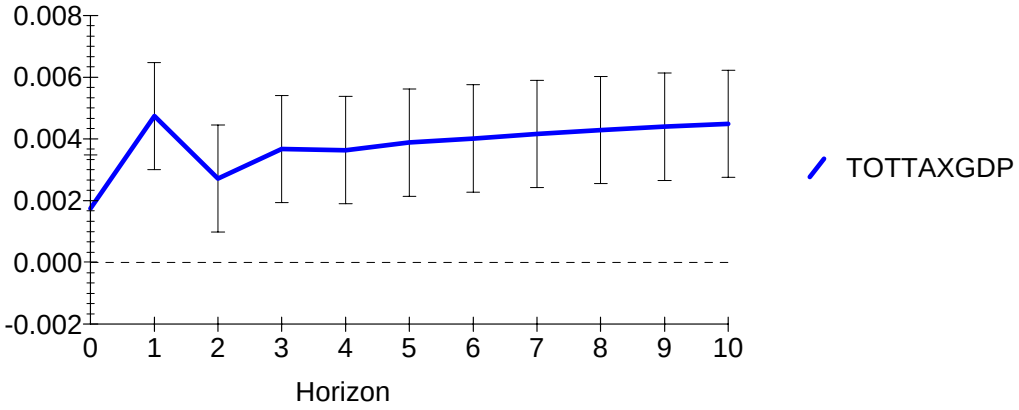
Generalized Impulse Response(s) to one S.E. shock in the equation for LGOVCONP



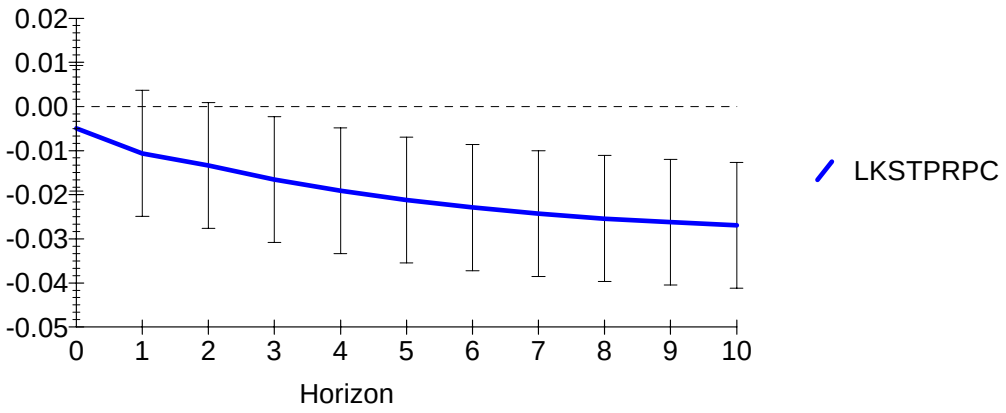
Generalized Impulse Response(s) to one S.E. shock in the equation for LGOVCONP



Generalized Impulse Response(s) to one S.E. shock in the equation for LGOVCONP



Generalized Impulse Response(s) to one S.E. shock in the equation for LGOVCONP



Generalized Impulse Response(s) to one S.E. shock in the equation for LGOVSUBP
Cointegration with unrestricted intercepts and restricted trends in the VAR

****

51 observations from 1952 to 2002. Order of VAR = 2, chosen r =1.
List of variables included in the cointegrating vector:
LGDPPC LKSTPRPC LKSTPUBPC LGOVCONPC LGOVSUBPC
LGOVSSTPC TOTTAXGDP Trend

****

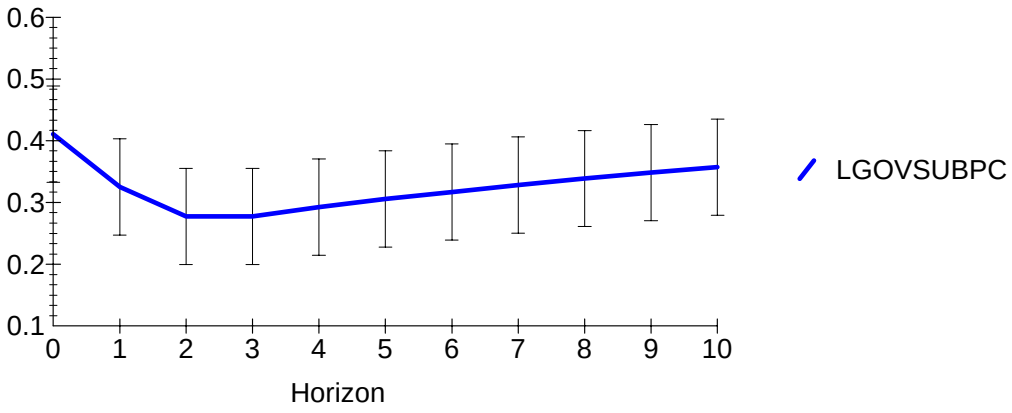
Horizon	LGDPPC	LKSTPRPC	LKSTPUBPC	LGOVCONPC	LGOVSUBPC	LGOVSSTPC
0	-.1834E-3	.0023221	.0053709	-.011407	.41045	.0034785
1	-.0047233	.0049580	.013452	-.021805	.32514	.010230
2	-.9571E-3	.0062209	.022980	-.022905	.27741	.032231
3	.0045022	.0076236	.031443	-.017983	.27732	.041459
4	.0096596	.0093974	.038792	-.013884	.29225	.047777
5	.014024	.011326	.045221	-.010722	.30559	.053166
6	.017830	.013276	.050848	-.0081610	.31705	.057953
7	.021157	.015171	.055709	-.0059682	.32808	.061845
8	.024033	.016968	.059859	-.0041309	.33866	.064958
9	.026486	.018635	.063367	-.0026175	.34846	.067429
10	.028557	.020154	.066304	-.0013854	.35734	.069374

****

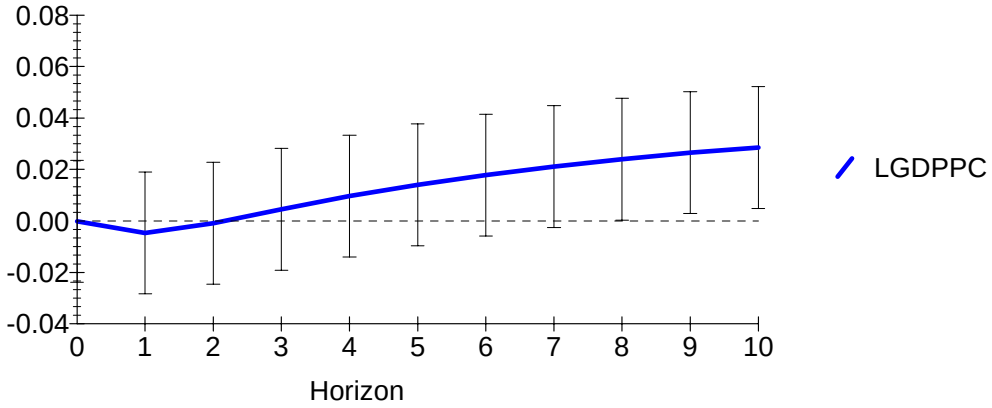
Horizon	TOTTAXGDP
0	-.7778E-3
1	.3645E-3
2	.3748E-3
3	.0010129

4	.0013059
5	.0015825
6	.0017642
7	.0018906
8	.0019685
9	.0020116
10	.0020281

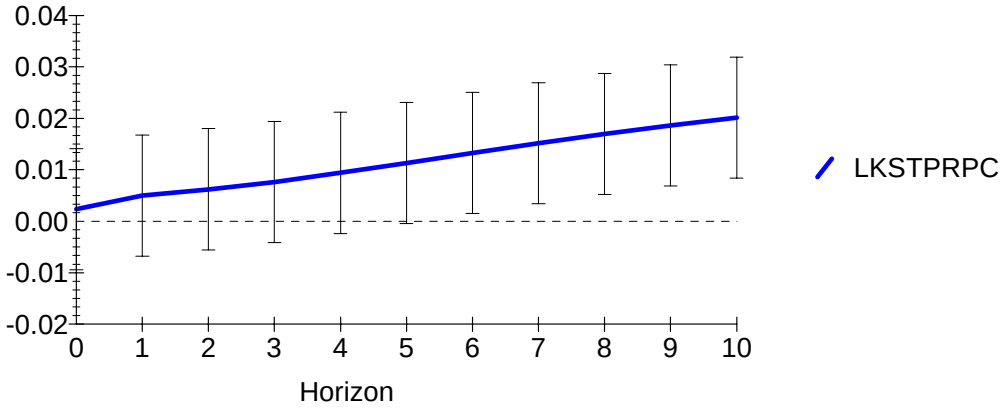
Generalized Impulse Response(s) to one S.E. shock in the equation for LGOVSUBP



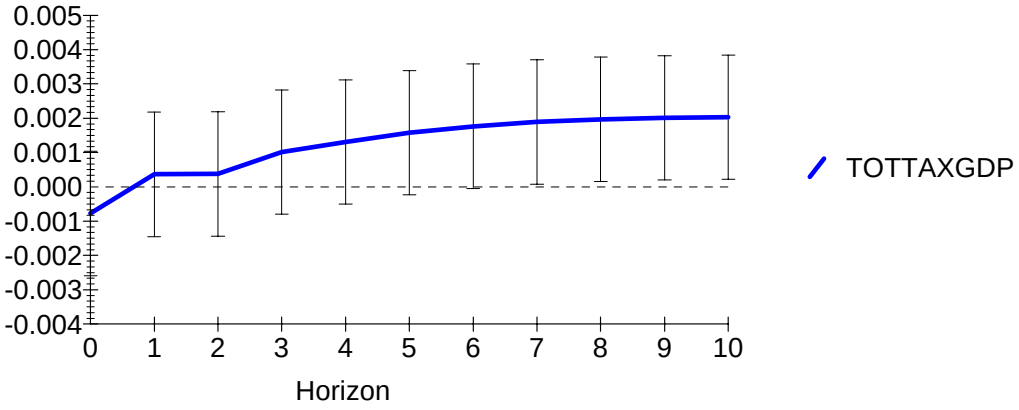
Generalized Impulse Response(s) to one S.E. shock in the equation for LGOVSUBP



Generalized Impulse Response(s) to one S.E. shock in the equation for LGOVSUBP



Generalized Impulse Response(s) to one S.E. shock in the equation for LGOVSUBP



Generalized Impulse Response(s) to one S.E. shock in the equation for LGOVSSTP
Cointegration with unrestricted intercepts and restricted trends in the VAR

****

51 observations from 1952 to 2002. Order of VAR = 2, chosen r =1.
List of variables included in the cointegrating vector:
LGDPPC LKSTPRPC LKSTPUBPC LGOVCONPC LGOVSUBPC
LGOVSSTPC TOTTAXGDP Trend

****

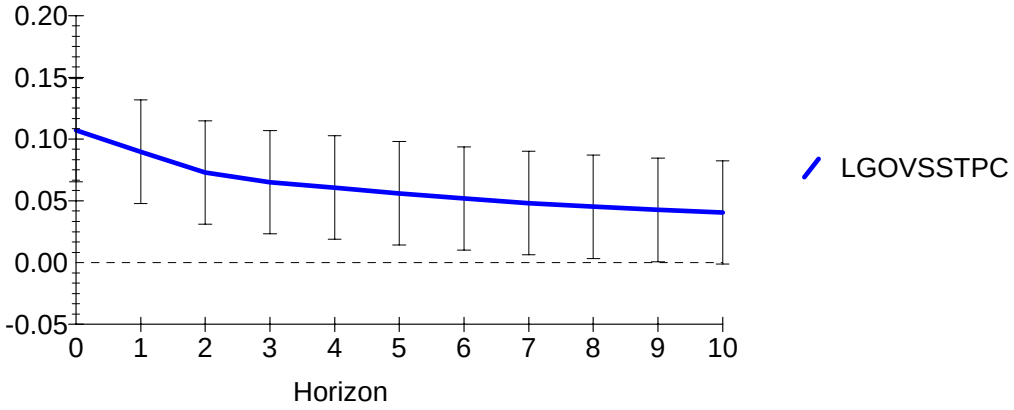
Horizon	LGDPPC	LKSTPRPC	LKSTPUBPC	LGOVCONPC	LGOVSUBPC	LGOVSSTPC
0	.0019381	-.2959E-3	.9837E-3	.012107	.013328	.10713
1	.0011795	.0019477	-.4699E-3	.016922	-.010570	.089721
2	.0013863	.0043558	-.0050918	.017783	.058960	.072903
3	-.0017314	.0056782	-.0096745	.014180	.071031	.065039
4	-.0045051	.0062943	-.013813	.010979	.067746	.060818
5	-.0070145	.0063708	-.017774	.0087731	.066225	.056110
6	-.0093581	.0061167	-.021497	.0068146	.064668	.051854
7	-.011573	.0056307	-.024917	.0050500	.061720	.048211
8	-.013606	.0049960	-.027999	.0034921	.057748	.045181
9	-.015435	.0042769	-.030739	.0021527	.053336	.042646
10	-.017060	.0035230	-.033146	.0010106	.048797	.040543

****

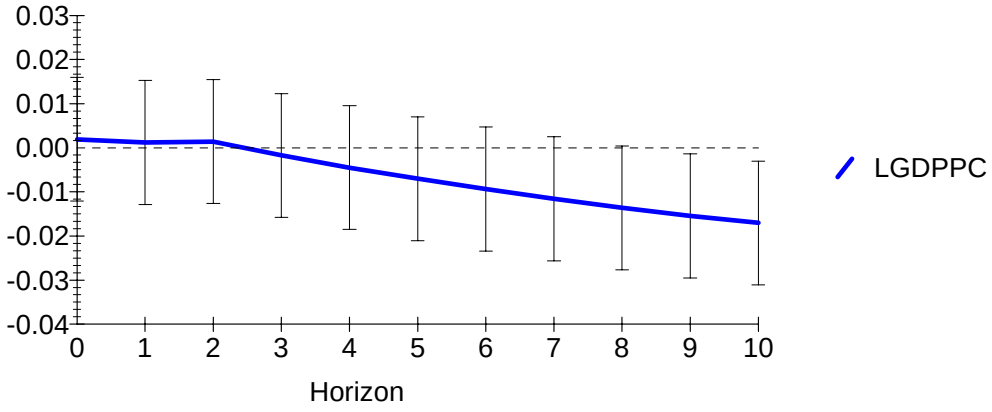
Horizon	TOTTAXGDP
0	.0054594
1	.0062042
2	.0042056
3	.0040477

4	.0034820
5	.0031519
6	.0028533
7	.0026343
8	.0024645
9	.0023388
10	.0022474

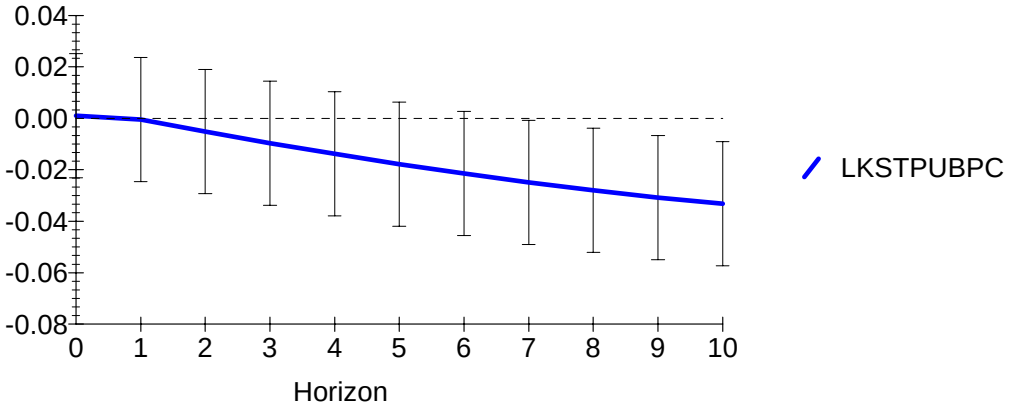
Generalized Impulse Response(s) to one S.E. shock in the equation for LGOVSSTP



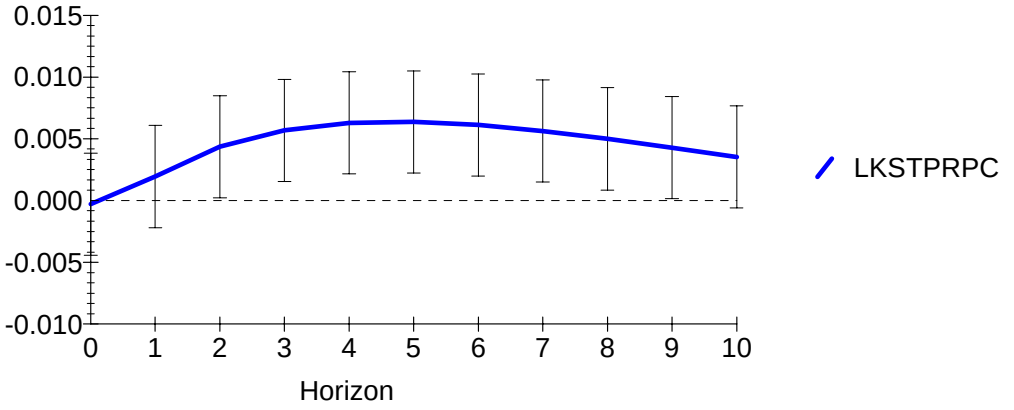
Generalized Impulse Response(s) to one S.E. shock in the equation for LGOVSSTP



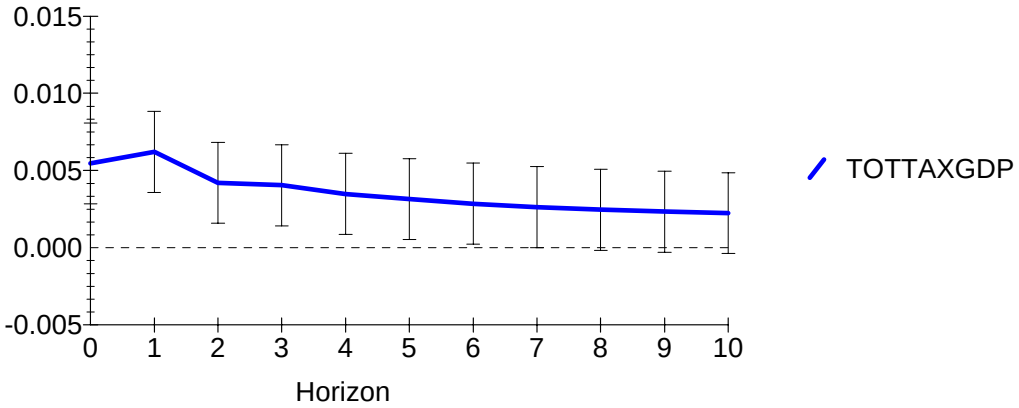
Generalized Impulse Response(s) to one S.E. shock in the equation for LGOVSSTP



Generalized Impulse Response(s) to one S.E. shock in the equation for LGOVSSTP



Generalized Impulse Response(s) to one S.E. shock in the equation for LGOVSSTP



Generalized Impulse Response(s) to one S.E. shock in the equation for TOTTAXGD
Cointegration with unrestricted intercepts and restricted trends in the VAR

****

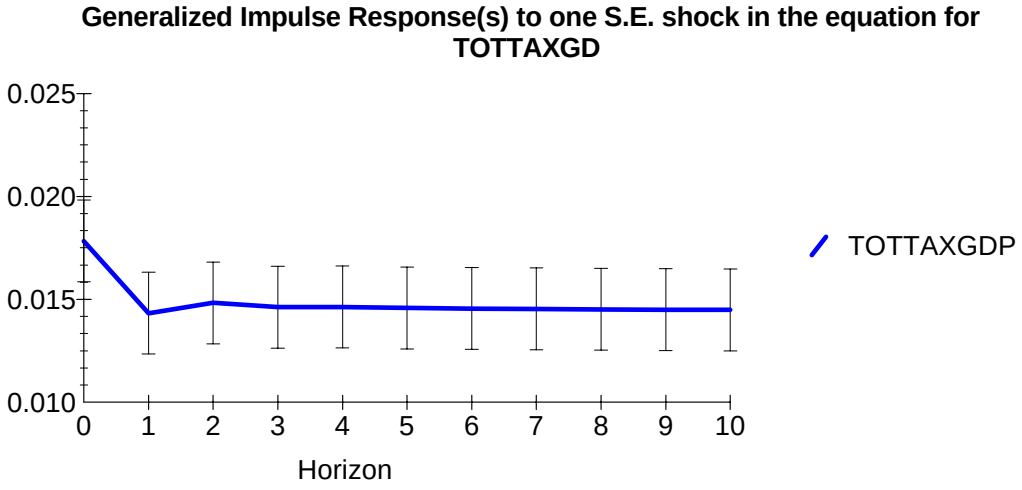
51 observations from 1952 to 2002. Order of VAR = 2, chosen r =1.
List of variables included in the cointegrating vector:
LGDPPC LKSTPRPC LKSTPUBPC LGOVCONPC LGOVSUBPC
LGOVSSTPC TOTTAXGDP Trend

****

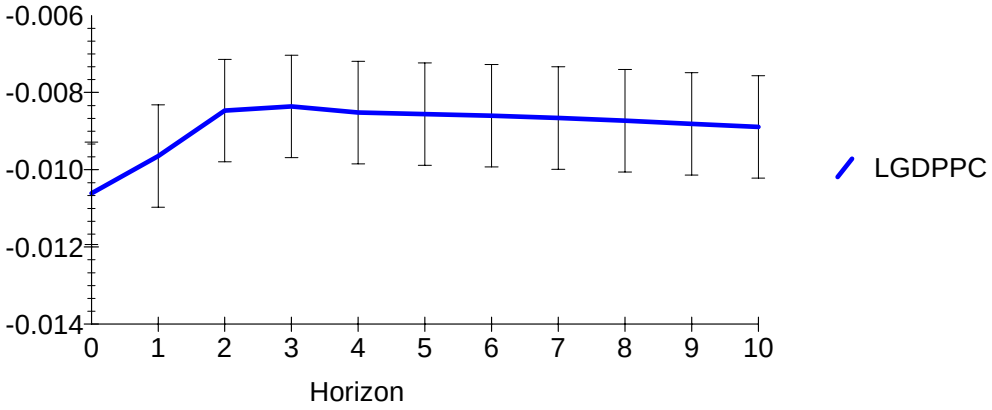
Horizon	LGDPPC	LKSTPRPC	LKSTPUBPC	LGOVCONPC	LGOVSUBPC	LGOVSSTPC
0	-.010611	-.0028704	-.9940E-3	.0080314	-.017900	.032794
1	-.0096439	-.0023036	.0015858	.0039954	-.091739	.048012
2	-.0084657	-.0020037	.0014558	.0081783	-.062058	.039635
3	-.0083608	-.0016234	.0013504	.0076156	-.053646	.038901
4	-.0085176	-.0013751	.0012866	.0073070	-.054116	.038778
5	-.0085598	-.0012086	.0012259	.0071459	-.054266	.038759
6	-.0085979	-.0010924	.0011232	.0070904	-.053591	.038484
7	-.0086577	-.0010126	.0010006	.0070081	-.053045	.038237
8	-.0087319	-.9630E-3	.8713E-3	.0069219	-.052770	.038028
9	-.0088097	-.9367E-3	.7422E-3	.0068412	-.052651	.037848
10	-.0088870	-.9276E-3	.6171E-3	.0067688	-.052621	.037689

****

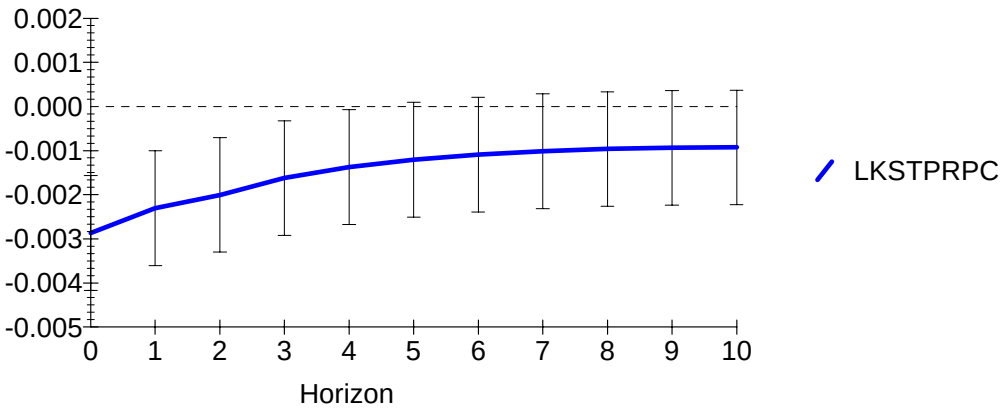
Horizon	TOTTAXGDP
0	.017834
1	.014326
2	.014827
3	.014616
4	.014628
5	.014582
6	.014557
7	.014532
8	.014514
9	.014498
10	.014486



Generalized Impulse Response(s) to one S.E. shock in the equation for TOTTAXGD



Generalized Impulse Response(s) to one S.E. shock in the equation for TOTTAXGD



Generalized Impulse Response(s) to one S.E. shock in the equation for TOTTAXGD