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Estimating a Fiscal Reaction  
Function: The Case of Debt  
Sustainability in Brazil

**Luiz de Mello**

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**ESTIMATING A FISCAL REACTION FUNCTION: THE CASE OF DEBT SUSTAINABILITY  
IN BRAZIL**

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**By Luiz de Mello**

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### **Abstract**

This paper reviews recent trends in fiscal performance in Brazil, estimates fiscal reaction functions for the consolidated public sector and different levels of government, and tests for the sustainability of the public debt dynamics. The empirical analysis, based on monthly data for the period 1995-2004, suggests that all levels of government react strongly to changes in indebtedness by adjusting their primary budget surplus targets. In addition, the central government appears to follow a spend-and-tax policy: changes in revenue are affected strongly by expenditure, with about two-thirds of changes in primary spending being offset through higher revenue over the long term. Institutions are also found to matter for fiscal sustainability. The responsiveness of sub-national fiscal stance to indebtedness, as well as that of central government revenue to changes in primary spending, appears to have strengthened after 1998, when ceilings on indebtedness were introduced.

*JEL classification numbers: E62, H62, H63*

*Keywords: Brazil, fiscal reaction function, debt sustainability, fiscal rules*

\* \* \*

### **Résumé**

Cet article examine les tendances récentes des performances budgétaires au Brésil, estime les fonctions de réaction budgétaire pour le secteur public consolidé et les différents niveaux d'administration, et teste la soutenabilité de la dynamique de la dette publique. L'analyse empirique, basée sur des données mensuelles pour la période 1995-2004, suggère que tous les niveaux d'administration réagissent fortement aux changements de l'endettement en ajustant leurs cibles d'excédent budgétaire primaire. En outre, l'administration centrale semble suivre une politique de « dépenses suivi d'impôt »: les changements de revenu sont affectés fortement par les dépenses, avec environ deux tiers des changements de la dépense primaire étant compensée par un plus haut revenu sur le long terme. Les institutions budgétaires sont également importantes en matière de soutenabilité budgétaire. La réaction des administrations locales à l'endettement, ainsi que celle du revenu de l'administration centrale aux changements de la dépense primaire, semble s'être renforcé après 1998, quand des plafonds sur l'endettement ont été introduits.

*Classification JEL: E62, H62, H63.*

*Mots-clés: le Brésil, fonction de réaction budgétaire, soutenabilité de dette, règles budgétaires.*

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## TABLE OF CONTENTS

ESTIMATING A FISCAL REACTION FUNCTION: THE CASE OF DEBT SUSTAINABILITY IN BRAZIL .....	4
1. Introduction .....	4
2. Recent trends in fiscal performance .....	5
3. Estimating a fiscal reaction function .....	9
3.1. Estimating equation, data, and baseline results.....	9
3.2. The role of institutions .....	11
4. Debt sustainability and revenue/expenditure responsiveness.....	14
4.1. Baseline results .....	14
5. Conclusions and policy recommendations .....	17
BIBLIOGRAPHY .....	19
APPENDIX 1: DEFINITIONS AND DATA SOURCES .....	21
APPENDIX 2: A SUMMARY OF FISCAL RESPONSIBILITY LEGISLATION .....	22
Revenue and expenditure .....	22
Personnel spending.....	22
Indebtedness.....	23
Escape clauses .....	23
Fiscal reporting and medium-term budgeting .....	23
Fiscal Crimes Law.....	24
Prudential regulations.....	25
An overview of sub-national debt restructuring.....	25

### Boxes

Box 1. Revenue earmarking and expenditure rigidities .....	9
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## ESTIMATING A FISCAL REACTION FUNCTION: THE CASE OF DEBT SUSTAINABILITY IN BRAZIL

by Luiz de Mello<sup>1</sup>

### 1. Introduction

1. Brazil's fiscal adjustment over the past few years has been impressive. Since the floating of the *real* in 1999, fiscal policy has responded forcefully to changes in the macroeconomic environment, with the consolidated public sector's primary surplus targets being raised over time to keep the debt-to-GDP ratio on a sustainable path. Fiscal performance has been strong even in periods of economic slowdown, making the fiscal effort all the more impressive. The consolidated primary surplus target was raised further in mid-2004 to save part of the cyclical revenue windfall while accommodating some additional spending in much-needed infrastructure investment. These developments are in contrast with the early period of macroeconomic adjustment during 1995-98, where monetary reform in mid-1994 brought inflation down and exposed budgetary imbalances that used to be financed through seignorage. It should be noted that the country's strong fiscal performance owes much to a comprehensive overhaul of institutions, including the introduction of ceilings on indebtedness and on personnel spending during 1995-98 and the enactment of the Fiscal Responsibility law in 2000.

2. However, while fiscal adjustment has been instrumental in ensuring the sustainability of the public debt dynamics, it has been achieved predominantly by hiking revenue and cutting back public investment, rather than retrenching current expenditure. These developments cast doubt over the quality of fiscal adjustment, a problem which will need to be addressed in the years to come. Against this background, this paper estimates a "fiscal reaction function" for Brazil over the period 1995-2004. In doing so, it is possible to gauge the extent to which the primary budget balance tends to be adjusted in response to changes in public indebtedness. Conventional cointegration-based tests are also used to assess whether the public debt dynamics is sustainable. The main findings of the paper are that:

- All levels of government (the consolidated public sector, as well as the central government and the regional governments, separately) respond to rising indebtedness by increasing their primary budget surpluses;
- The fiscal reaction function is affected by institutions, particularly the introduction of ceilings on indebtedness at the regional government (states and municipalities) level in 1998; and

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1. The research presented in this paper was conducted in connection with the 2005 *OECD Economic Survey of Brazil*, published under the responsibility of the Secretary General of the OECD. The author is a senior economist at the Economics Department of the OECD and is indebted to José Roberto Afonso, Andrew Dean, Sol Garson, Fabio Giambiagi, Silvana Malle, Nanno Mulder, and Marcio Ronci for helpful comments and discussions; to Anne Legendre and Thomas Chaloux, for statistical assistance; and to Muriel Duluc and Lillie Kee, for secretarial assistance.

- The public debt dynamics is sustainable but, whereas central government revenue responds strongly to changes in spending, the converse does not appear to be true, characterising a spend-and-tax policy.

3. The paper is structured as follows. The next section describes recent trends in fiscal performance. Section 3 reports the empirical findings for the estimation of a fiscal reaction function. Section 4 discusses debt sustainability. Section 5 concludes and presents policy recommendations.

## 2. Recent trends in fiscal performance

4. It has become customary to describe fiscal performance in Brazil since the early 1990s as a three-period process.<sup>2</sup> The turning points broadly coincide with monetary reform in May-July 1994, characterised by the introduction of a new currency -- the *real* -- in July 1994, and the abandonment of the exchange rate peg in January 1999.<sup>3</sup>

5. The period following the floating of the *real* in January 1999 has been marked, by and large, by fiscal conservatism (Figure 1). In an effort to stabilize the public debt-to-GDP ratio, the consolidated public sector -- including the central government, the social security system, the central bank, the regional governments (states and municipalities), and the public enterprises (all levels of government) -- has posted an average primary surplus of about 3.5 percent of GDP between 1999 and mid-2004. This is in sharp contrast with the average primary deficit of 0.4 percent of GDP during 1996-98. The deterioration of the primary balance was particularly pronounced following the monetary reform in May-July 1994, when the reduction of inflation reduced the scope for deficit financing through seignorage and the erosion of the real value of expenditure.

6. Fiscal effort after 1999 has also been shared across the different levels of government. In the early 1990s, the central government was responsible for more than one-half of the average primary surpluses of the consolidated public sector and sub-national finances were in persistent disarray. During the period 1995-98, the regional governments (states and municipalities) posted the worst primary balances of all three levels of government.

7. Consistent with higher primary surpluses, the overall budget balance has also improved in the post-1999 period. But it remains volatile, due to the preponderance in the public debt stock of securities paying floating interest rates, which makes fiscal stance overly sensitive to changes in market sentiment. Nominal deficits declined after 1994 with the reduction in inflation. But the operational deficit -- which accounts for interest payments measured in real, rather than nominal, terms -- rose at the same time, chiefly in line with the tight monetary stance pursued after monetary reform and the lower primary surpluses until 1999.

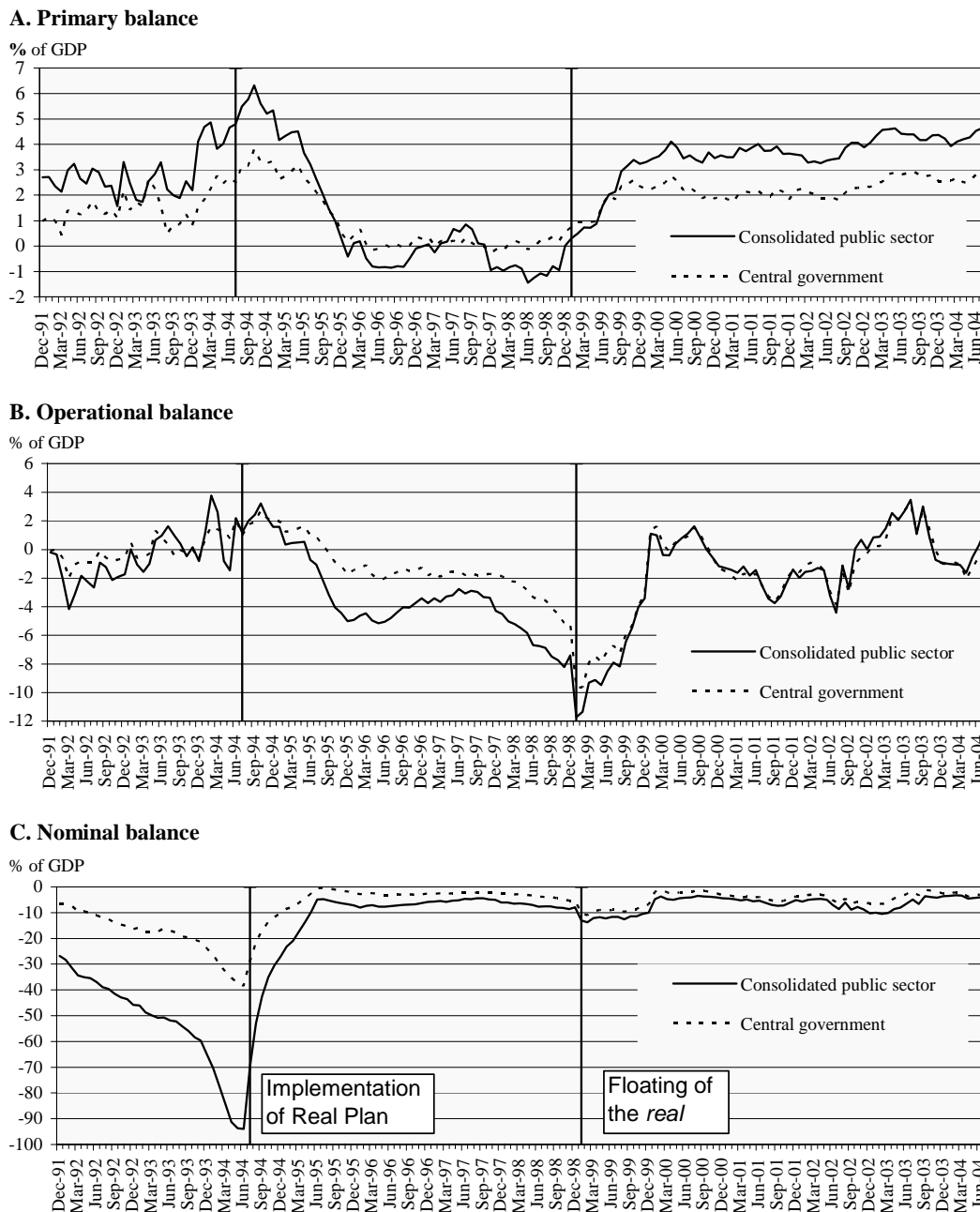
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2. See Giambiagi and Ronci (2004), for example, for more information.

3. This is confirmed by more rigorous testing. Using a Markov chain process to describe the behaviour of the primary balance, Rocha and Picchetti (2003) identify a regime change in 1995 (moving from a period of contraction to expansion) and in 1999 (moving from expansion to contraction).

**Figure 1. Budget outturn, 1991-2004**

Cumulative 12-month flows (a positive sign indicates a budget surplus)



Source: Central Bank of Brazil.

8. Two main features of post-1999 fiscal consolidation can be highlighted. *First*, fiscal stance, measured by the primary budget balance, appears to have become more sensitive to changes in public indebtedness (Figure 2). But, despite progress in fiscal consolidation and improvements in public debt management, indebtedness remains a source of vulnerability. On occasions of fiscal stress, public debt management has aimed at reducing rollover risks, through the issuance of shorter-tenor securities, and the

consequent shortening of the average maturity of the domestic debt stock. It has also responded to growing demand for foreign exchange hedge, issuing foreign exchange-indexed securities and foreign exchange swaps, thereby increasing the government's foreign exchange exposure. Acceptance of a deterioration of the public debt indicators in conditions of financial stress is often predicated on the assessment that market dislocations on those occasions have been technical and transitory. When financial conditions have been favourable, public debt management has aimed at lengthening maturities, replacing floating- by fixed-rate securities, and reducing foreign exchange exposure. Exposure to foreign exchange risk has been reduced considerably since 2003 due to the gradual retirement of foreign exchange-indexed debt.

9. *Second*, fiscal consolidation has been achieved predominantly through revenue hikes and, to a lesser extent, a compression of discretionary spending, particularly on investment programmes, rather than cuts in current outlays. To illustrate, at the consolidated public sector level, the revenue ratio increased by about 7 percentage points during 1995-2003, to nearly 35 per cent of GDP, while federal investment was reduced by 0.2 percentage points in the period, to about 0.4 per cent of GDP in 2003, having recovered somewhat in 2004. The experience of OECD countries suggests that fiscal consolidation is more likely to be successful -- at least to the extent that it leads to a sustainable reduction in indebtedness -- when based on the retrenchment of current spending rather than investment cuts and revenue hikes. In particular:

- Failure to retrench current spending is due in part to downward rigidities in the budget, deriving to a great extent from extensive earmarking of revenue (Box 1). The introduction of spending floors for several programmes, including health care and education, over the years has also exacerbated budget inflexibility. At the same time, social security pressures have mounted and the creation of new expenditure commitments, particularly in old age-related assistance, has put additional upward pressure on current spending. With limited scope for further expenditure restraint, discretionary expenditure, particularly on investment programmes, has been cut back, more drastically so since mid-2002.
- Fiscal consolidation underpinned by tax hikes has had a detrimental impact on the efficiency of the tax system. While central government tax revenue has been broadly stable in relation to GDP since end-1999, that of federal "contributions" (*i.e.*, levies whose revenue is earmarked for specific programmes, particularly in the social sectors, but not shared with the regional governments) has risen steadily over time. Originally levied on enterprise turnover and payroll, reliance on these federal contributions has had a detrimental impact on Brazil's trade competitiveness. The main federal contributions have now been converted into value added-type taxes, somewhat mitigating this problem. Regional government revenue has also trended upwards, consistent with their own fiscal consolidation efforts.<sup>4</sup> This increase in the tax take needs to be evaluated against the fact that Brazil has a high revenue-to-GDP ratio in comparison with countries of comparable income levels, being close to the OECD average and nearly twice as high as that of Latin America.<sup>5</sup>

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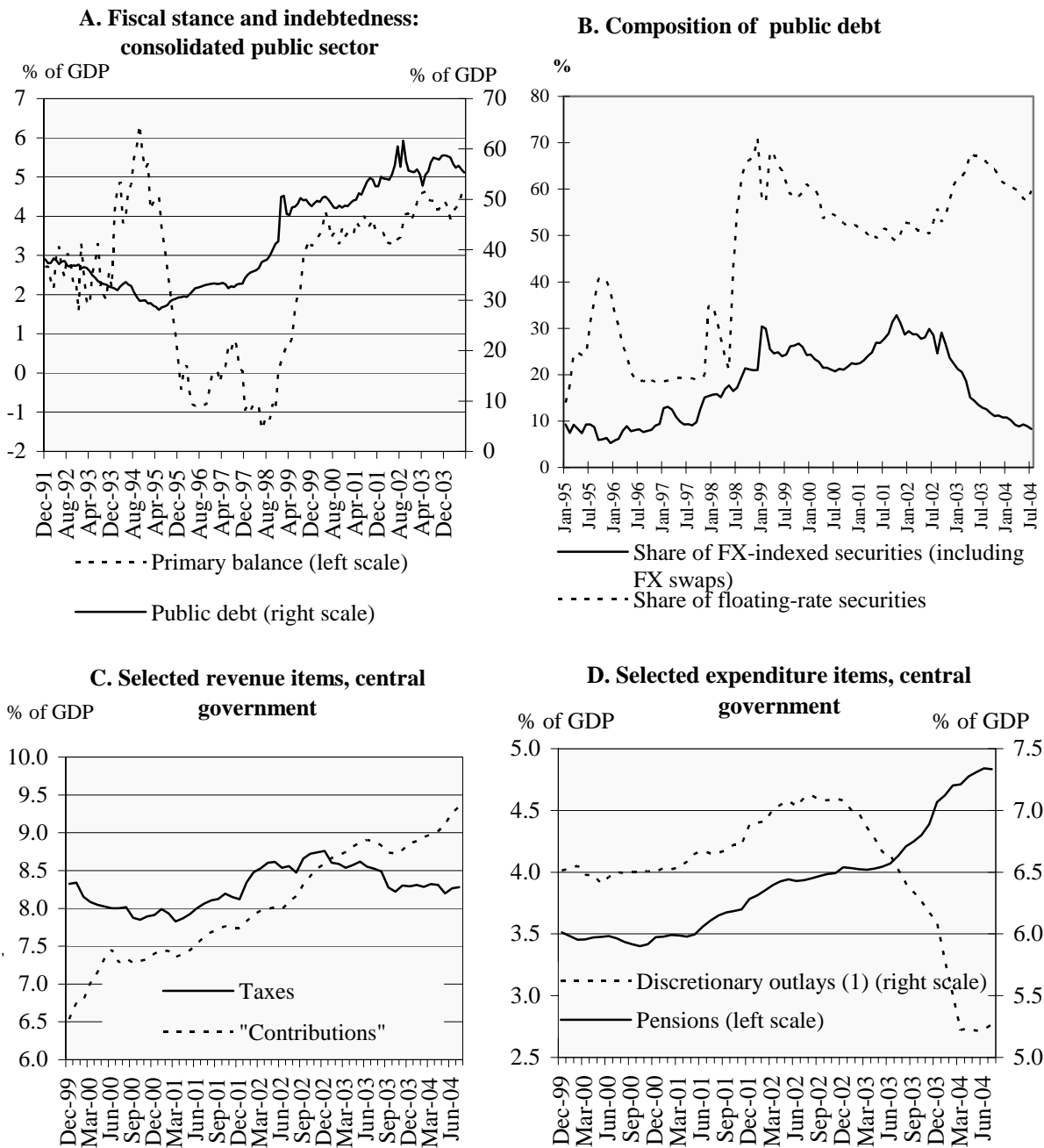
4. The increase in state-level revenue was also facilitated by the increase in the price of utilities and energy, which are taxed heavily by the states.

5. See OECD (2005), for more information.



**Figure 2. Fiscal stance and indebtedness, 1991-2004**

Cumulative 12-month flows



Source: Central Bank of Brazil and IPEA.

1. Measured as "other current and capital spending" (other OCCs).

### Box 1. Revenue earmarking and expenditure rigidities

Brazil has extensive revenue earmarking, particularly at the federal level. It is estimated that about 80 per cent of federal tax revenues are earmarked, against less than 60 per cent in 1988.<sup>1</sup> This includes mandated revenue sharing with the regional governments (state and municipalities), as well as special-purpose funds. Revenue sharing accounts for about 15 per cent of federal tax revenues and is concentrated on the income tax and IPI, the federal value added tax, which are in principle the federal government's most buoyant taxes.

Effort to increase federal revenue net of mandated transfers to the regional governments has resulted in greater reliance on "contributions"; that is, levies on enterprise turnover and payroll (*i.e.*, PIS/Pasep, Cofins) and on financial transactions (*i.e.*, CPMF) whose revenues are earmarked but not shared with the regional governments. The federal turnover taxes have now been converted into VAT-type taxes but their revenue remains earmarked to finance spending on health care and social security programmes, in the case of Cofins, and housing and labour programmes, in the case of PIS/Pasep. The revenues of *CIDE-Combustíveis*, the explicit tax on petroleum derivatives introduced in January 2002 to replace the implicit taxes in the budget's "oil account", are also earmarked for transport infrastructure and environment protection programmes.

To mitigate this problem, at least in part, an arrangement is currently in place for withholding federal earmarked revenues (*Desvinculação das Receitas da União*, DRU). Accordingly, 20 per cent of federal revenues (net of intergovernmental transfers), are withheld by the federal government, thereby reducing the extent of *de facto* revenue earmarking at the federal level. Discussions are under way to implement a comparable arrangement at the state level.

At the same time, there are significant expenditure rigidities at the federal and regional government levels. All levels of government are required by the Constitution to earmark a share of revenue (18 per cent for the federal government and 25 per cent for the state and municipal governments) to finance spending on education. In addition, the states and municipalities are required to earmark 12 per cent and 15 per cent of their revenue, respectively, to finance the provision of health care. Spending floors have also been introduced in recent years in a number of programmes. In health care, a constitutional amendment enacted in 2000 called for an increase in aggregate federal health spending in 2000 by 5 per cent in real terms relative to its 1999 level and for adjusting this spending level in line with the rate of growth of nominal GDP thereafter. In education, minimum spending levels per student enrolled in primary and lower-secondary education (1<sup>st</sup> to 8<sup>th</sup> grades) have been established, requiring the federal government to top up spending in the states that cannot afford the national spending floor. The introduction of these spending floors has, however, been associated with significant improvements in school enrolment, as discussed in de Mello (2001), OECD (2005), and de Mello and Hoppe (2005). The requirement that the minimum pension be adjusted by the same amount as the minimum wage also results in considerable downward rigidity in spending.

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1. See Ministry of Planning and Budget (2003), for more information.

## 3. Estimating a fiscal reaction function

### 3.1. Estimating equation, data, and baseline results

10. The main hypothesis to be tested when estimating a fiscal reaction function is that the government adjusts the primary budget surplus in response to changes in indebtedness so as to ensure the sustainability of the debt dynamics over time. Following the empirical literature (*e.g.*, Bohn, 1998; Gali and Perotti, 2003), the specification of fiscal reaction function is based on the government's intertemporal budget constraint:

$$b_t + (r_t - g_t)d_{t-1} = \Delta d_t + \Delta m_t + (\pi_t + g_t)m_{t-1}, \quad (1)$$

where  $b_t = \gamma_t - \tau_t$  is the ratio of primary balance to GDP (with  $\gamma_t$  denoting primary expenditure and  $\tau_t$ , revenue, both in relation to GDP),  $r_t = i_t - \pi_t$  is the real interest rate (with  $i_t$  defining the nominal interest rate and  $\pi_t$ , inflation),  $g_t$  is the real rate of GDP growth,  $d_t$  is the debt-to-GDP ratio, and  $m_t$  is monetary base-to-GDP ratio ( $t$  is a time index and  $\Delta$  is the difference operator).

11. Assuming for algebraic simplicity that  $\Delta m_t = 0$  (*i.e.*, no monetary financing of budget imbalances) and  $r_t \leq g_t$ , it then follows from Equation (1) that, for every time period, the share of the primary surplus in GDP can be calculated so as to keep the debt-to-GDP ratio constant, according to

$b_t = \frac{r_t - g_t}{1 + g_t} d_{t-1}$ . When fiscal policy is carried out over an infinite time horizon, the share in GDP of the

present value of the primary surplus can be calculated to equate the debt-to-GDP ratio, such that

$d_{t-1} = \sum_{j=0}^{\infty} \frac{B_{t+j}}{(1+r)^{j+1} Y_{t-1}}$ , which is independent of the rate of growth of GDP. Equation (1) can be solved

forward subject to a no-Ponzi-game transversality condition ( $\lim_{T \rightarrow \infty} \frac{d_{t+T+1}}{(1+r)^{t+T}} = 0$ ) on the optimal

behaviour of lenders. In other words, the current debt stock should be equal to the sum of expected future discounted primary budget surpluses. The fiscal reaction function can therefore be estimated by regressing the primary surplus on the public debt, both defined in per cent of GDP, while controlling for other determinants of fiscal stance. In particular:

$$b_i(t) = a_0 + a_1 b_i(t-1) + a_2 d_i(t-1) + a_3 C_i(t) + u_i, \quad (2)$$

where  $C$  is a set of control variables for level of government  $i$  at time  $t$ .

12. The main parameter of interest in Equation (2) is  $a_2$ , which is expected to be positively signed, indicating that an increase in the public debt ratio is associated with an increase in the primary budget surplus. Standard controls include the output gap (to capture the impact of the business cycle on the budget, depending on the size of automatic stabilizers) and inflation (to account for shocks to seigniorage revenues).

13. Monthly data are available for all variables for the period January 1995 to July 2004 from the Central Bank of Brazil (BCB). The overall budget balance (public sector borrowing requirement, PSBR) is calculated as the change in the public debt stock in the reference period (excluding stock adjustments), which is in turn calculated on the basis of the financial sector's total claims on the public sector, and the central bank's external debt register. Interest payments on the external debt and the foreign exchange-indexed/denominated domestic debt are calculated on an accrual basis. The PSBR no longer includes the valuation changes in the stock of domestic foreign exchange-indexed debt accrued, but not paid in the reference period, due to exchange rate movements. The primary balances of all levels of government are calculated by the BCB from below the line as a residual once the operational balance is subtracted from the nominal balance for each level of government. Appendix Table 1 (Appendix 1) reports the definitions and sources of the data used in the empirical analysis.

14. The relevant monthly series are defined as flows accumulated over a 12-month period to adjust for seasonality in the budget. The lagged dependent variable is included as an additional explanatory variable to deal with inertia in the smoothed series. To assess the unit root properties of the data, augmented ADF tests were performed (results available upon request), suggesting that the null hypothesis

of the presence of unit roots could not be rejected for the data defined in levels for most variables. Because ADF tests are known to be biased towards accepting the null of unit roots, and due to structural breaks in the series, such as the floating of the *real* in January 1999, Phillips-Perron tests were also performed. Because the predictive power of these unit root tests against trend stationarity is low, a conservative approach was taken and the null hypothesis of unit roots was only rejected if validated by both statistics at the 1 per cent level.

15. Estimation of the fiscal reaction function suggests that there is a positive, strong reaction of the consolidated primary surplus to changes in indebtedness (Table 1). An increase in net debt by 1 per cent of GDP is associated with an increase in the primary surplus of 0.03 per cent of GDP accumulated over a 12-month period. Sub-national fiscal stance, measured by the primary balance of the regional governments, does not seem to affect the budget balance of the central government at classical levels of significance. With regard to the control variables, the output gap is positively signed at all levels of government, suggesting that a cyclical downturn is associated with a lower primary balance, but the parameter estimate is barely significant at the 10 per cent level for the consolidated public sector. This provides preliminary evidence that fiscal stance is acyclical in Brazil. The baseline results are by and large robust to the replacement of debt by interest payments. Estimating Equation (2) by 2SLS yields comparable results (not reported).

16. To assess whether the fiscal responsiveness to indebtedness has changed over time, rolling fiscal reaction functions were also estimated for 30-month windows within the sample period, starting with the period 1995:1 to 1997:7 (Figure 3). The results suggest that fiscal stance became more responsive to indebtedness at the consolidated public sector level, particularly after the floating of the *real* in January 1999. But responsiveness seems to have weakened somewhat since late-2002, both at the consolidated public sector and central government levels, possibly reflecting the volatility in the debt series associated with the deterioration of the macroeconomic environment in the run-up to the presidential election. More importantly, responsiveness to indebtedness appears to have become more stable over time, as evidenced by the narrowing of standard errors since early 1999. This provides *prima facie* evidence of increased credibility in the maintenance of robust primary surpluses at both the central government and consolidated public sector levels.

### 3.2. *The role of institutions*

17. This is a large literature, pioneered by Eichengreen and Bayoumi (1994) and Bohn and Inman (1996), among others, on the relationship between budget institutions and fiscal outcomes, including in Latin America (Alesina *et al.*, 1999). Against this background, the government's fiscal reaction function is hypothesized to be affected by institutions, which have been strengthened over time. Appendix 2 provides a detailed review of the main provisions of Fiscal Responsibility legislation.

18. To assess the impact the enactment of the Fiscal Responsibility Law (LRF) in 2000 -- which sets a general framework for budgetary planning and execution applicable to all levels of government -- may have had on the government's fiscal reaction function, a dummy variable, taking the value of "1" for the period after May 2000, and "0" otherwise, identifying the post-LRF period, was interacted with the public debt ratio. The results, also reported in Table 1, suggest that fiscal stance became somewhat less responsive to indebtedness in the post-LRF period at the consolidated public sector and central government levels. This may be attributed to the fact that most LRF-induced stabilisation may have taken place prior to the actual enactment of legislation, including as a result of enactment of specific legislation setting ceilings on debt and personnel spending, and that the post-2000 period was characterised by considerable macroeconomic volatility.

Table 1. Fiscal reaction functions, 1995-2004<sup>a</sup>

Dep. Var.: Primary balance in per cent of GDP ("+" = surplus)

	Consolidated public sector		Central government		Regional governments				
	Baseline	1 2	Baseline	1 2	Baseline	1 2			
Primary balance (lagged)	0.90 *** (0.018)	0.92 *** (0.020)	0.90 *** (0.019)	0.89 *** (0.043)	0.85 *** (0.043)	0.88 *** (0.045)	0.85 *** (0.048)	0.85 *** (0.048)	0.82 *** (0.050)
Indebtedness (lagged)	0.03 *** (0.006)	0.03 *** (0.006)	0.01 (0.014)	0.02 *** (0.005)	0.02 *** (0.005)	0.00 (0.013)	0.00 (0.013)	0.03 *** (0.009)	0.00 (0.017)
Indebtedness (lagged) * Post-LRF period <sup>b</sup>	-0.01 ** (0.002)	-0.01 ** (0.002)		-0.01 *** (0.003)	-0.01 *** (0.003)			0.00 (0.003)	0.00 (0.003)
Indebtedness (lagged) * Post-Senate Res. period <sup>b</sup>			0.01 (0.005)			0.01 (0.006)			0.01 ** (0.004)
Output gap (lagged)	0.02 (0.010)	0.02 ** (0.010)	0.02 * (0.010)	0.01 (0.008)	0.01 (0.008)	0.01 (0.008)	0.00 (0.004)	0.00 (0.004)	0.00 (0.004)
Inflation (lagged)	0.00 (0.003)	0.00 (0.003)	0.00 (0.003)	0.00 (0.002)	0.00 (0.002)	0.00 (0.002)	0.00 (0.001)	0.00 (0.001)	0.00 (0.002)
Primary surplus (regional governments) <sup>c</sup>				0.01 (0.128)	0.11 (0.127)	0.01 (0.128)	0.06 (0.048)		
Primary surplus (public enterprises) <sup>c</sup>				0.01 (0.105)	0.12 (0.106)	0.03 (0.105)	0.001 (0.002)	0.07 (0.051)	0.09 * (0.050)
Adjusted R-squared	0.98	0.96	0.98	0.96	0.96	0.96	0.97	0.97	0.97

Source: Data available from the Central Bank of Brazil, and author's estimations.

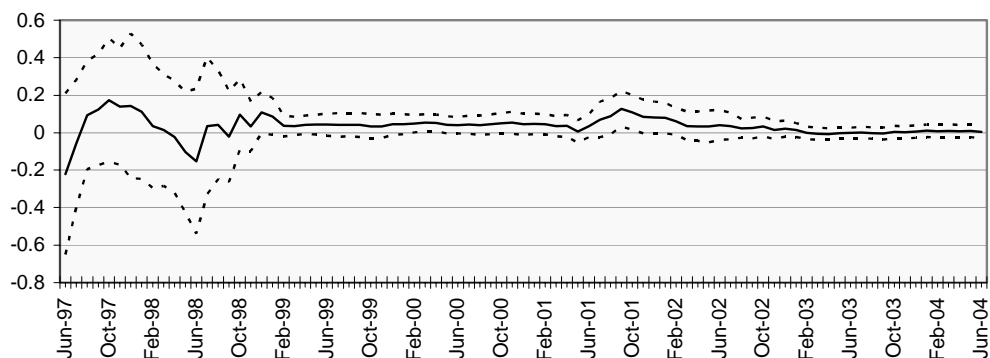
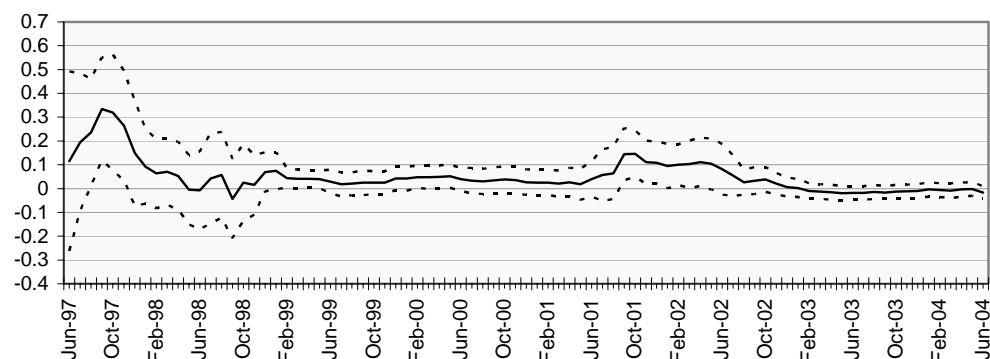
a. All equations have been estimated by OLS and contain an intercept (not reported). Standard errors are reported in parentheses. Statistical significance at the 1, 5, and 10 per cent levels is indicated by, respectively, \*\*\*, \*\*, and \*. The sample spans the period January 1995 to July 2004 (114 observations).

b. "Post-LRF period" ("Post-Senate Res. Period") is a dummy variable taking the value of "1" for the period after May 2000 (after August 1998) and "0" otherwise.

c. "Regional governments" refers to the states and municipalities, and "public enterprises" refers to all levels of government.

**Figure 3. Fiscal reaction functions: rolling equations<sup>1</sup>**

Primary surplus response to indebtedness

**A. Consolidated public sector****B. Central government**

Source: Data available from the BCB and author's estimations.

1. Based on the estimated coefficients of the lagged debt ratio reported in Table 1. The dotted lines defined a confidence interval of +/- two standard errors. The sample spans the period January 1995 to June 2004.

19. To shed further light on this hypothesis, an alternative interaction terms was experimented with, defined for a dummy variable taking the value of "1" for the period after August 1998, and "0" otherwise, when ceilings on indebtedness were introduced for the regional governments by the Senate. It is important to bear in mind that debt ceilings have also been proposed for the central government, but legislation is yet to be approved. The empirical findings suggest that, indeed, the impact of the debt ceilings appears to be stronger at the sub-national government level. Whereas in the period prior to the issuance of the Senate Resolution the reaction function of the regional governments was not responsive to indebtedness, this does not appear to be the case thereafter.

20. The empirical findings are broadly robust to the replacement of indebtedness by government outlays on personnel. This is because ceilings on government outlays on personnel have been introduced over time, starting in 1995, as an integral part of fiscal consolidation, as discussed in Appendix 2. The baseline results for the central government are also robust to the estimation of the regressions treating the fiscal stance of regional governments as endogenous.

#### 4. Debt sustainability and revenue/expenditure responsiveness

##### 4.1. Baseline results

21. The results presented above can be refined to shed further light on debt sustainability. To this end, attention is focused on the central government to estimate the responsiveness of expenditure and revenue to changes in indebtedness, and to assess whether this responsiveness has been affected by the enactment of Fiscal Responsibility legislation. Monthly above-the-line data on primary revenue and expenditure are available from the National Treasury for the central government, including the federal government, the central bank, and the social security system. Below-the-line data on interest payment are available for the central government, allowing for the calculation of total expenditure, including interest payment. Data constraints prevent the analysis for the consolidated public sector and for the regional governments, separately.

22. The empirical literature, pioneered by Hamilton and Flavin (1986), focuses on testing the debt sustainability hypothesis by assessing the stationarity properties of the budget balance and the cointegration properties of the revenue and expenditure series. In general, the empirical literature using U.S. data fails to support the sustainability hypothesis when the discount rate is time-invariant. Using U.S. data in the period 1950-88, and assuming a constant real discount rate, Hakkio and Rush (1991) cannot accept the hypothesis of cointegration between spending (including interest payment) and revenue in the post-1964 period, although both series are found to have unit roots. These findings are consistent with those reported by Trehan and Walsh (1988, 1991), who fail to accept the hypothesis that the debt is sustainable, despite the stationarity of the primary balance. On the other hand, if the real rate of interest is not constant but positive, Trehan and Walsh (1991) accept the sustainability hypothesis using U.S. data for 1960-84 on the grounds that the overall deficit (including interest payment) is stationary. Likewise, using longer data series for the United States and United Kingdom, Ahmed and Rogers (1995) decompose the primary balance into revenue and primary spending, as Hakkio and Rush (1991), and show that revenue, primary spending, and real interest payments cointegrate, thereby lending support to the sustainability hypothesis. Evidence for other countries is more limited, with the exception of Corsetti and Roubini (1991), for a sample of OECD countries

23. There is a growing literature on debt sustainability in Brazil. Issler and Lima (2000) tests the sustainability hypothesis using cointegration-based tests in the spirit of the empirical analysis reported below using annual data for 1947-92. More recent estimates reported by Bicalho (2005), based on monthly data for the period 1997:12-2004:7, also support the sustainability hypothesis. The unit root-based tests reported by Giambiagi and Ronci (2004) for the period 1995-2002 fail to support the stationarity hypothesis for the discounted, rather than undiscounted, public debt. In a different strand of literature, Garcia and Rigobon (2004) assess the stochastic properties of the Brazilian public debt dynamics and find evidence in favour of sustainability in the absence of risk. The debt dynamics is also found to be affected by the spreads on sovereign foreign exchange-denominated debt. Pires and Bugarin (2003) focus on sub-national indebtedness and report unit root tests for revenue and expenditure at the state level, suggesting that revenue is stationary, but not expenditure, which implies a deficit bias at the regional government level.

24. Conventional tests suggest that the public debt dynamics is sustainable in Brazil. On the basis of unit root tests, the overall budget balance (including interest payment), revenue, primary expenditure, and total expenditure (including nominal interest payments) follow I(1) processes, being stationary in levels. In addition, cointegration tests were performed for central government expenditure ( $G$ ) and revenue ( $T$ ), such that a system  $X = (G, T)$  can be written in error-correction form:

$$A(L)\Delta X_t = \Pi X_{t-1} + u_t, \quad (3)$$

where, as usual in its restricted form,  $\Pi = \alpha\beta'$ ,  $\beta'$  is the vector of cointegrating coefficients,  $\alpha$  is the vector of loading coefficients,  $A(L)$  is the distributed lag operator, and  $u_t$  is a multivariate white-noise process.

25. Based on the Johansen-Juselius multiple cointegrating vector (FIML) methodology, expenditure (with and without interest payments) and revenue appear to cointegrate (Table 2).<sup>6</sup> This suggests that there is a stable long-run relationship between the GDP shares of the primary balance and the lagged debt stock, satisfying the necessary condition for debt sustainability.<sup>7</sup> The point estimate of the cointegrating vector is (1, -1.06) (normalization on expenditure) when total spending is used and (1, -0.88), when only primary expenditure (excluding nominal interest payments) is considered. The restriction that the coefficients of the cointegrating vector are (1,-1) cannot be rejected at classical levels for the overall budget balance, but not for the primary balance. Because the period of analysis is characterised by low inflation, at least by Brazilian standards, the results are not sensitive to the use of real or nominal interest payments.

26. Because a stable long-run relationship can be shown to exist between the central government expenditure and revenue in the VAR defined by Equation (3), where  $0 < r < n$  and  $r$  is the rank of  $\Pi$ , exogeneity tests can be carried out in the tradition of Engle, Hendry, and Richard (1983), and Johansen (1992, 1995) by imposing a restriction on the loading parameters of the cointegrating vector. The exogeneity tests suggest that expenditure is weakly exogenous for the cointegrating vector, regardless of whether interest payments are taken into account, but revenue is not. This implies that the central government follows a spend-and-tax strategy to keep the debt dynamics sustainable. These findings are consistent with those reported by Issler and Lima (2000) using national accounts data. The authors present VECM estimations for the period 1947-92 suggesting that the budget in Brazil is balanced almost entirely through changes in revenue, regardless of how the initial imbalance was generated.

27. On the grounds that expenditure seems to be weakly exogenous, an error-correction representation of the fiscal reaction function can now be used to assess the short-term response of fiscal policy mix to indebtedness, taking other determinants of the fiscal stance into account. The main findings, reported in Table 3, suggest that changes in revenue are affected strongly by expenditure, with about two-thirds of changes in primary spending being offset by higher revenue over the long term. The long-run response of revenue to total expenditure (including interest payments) is much lower, at about 15 per cent. In comparison with the results reported in Table 1, the output gap remains insignificant at classical levels but inflation now appears to have a statistically significant, although small, effect on revenue over the long term. The fiscal stance of the regional governments now seems to affect revenue at the central government level, at least in the short run, suggesting that the central government may compensate for weaker budget outturns at the sub-national level by increasing its own fiscal effort. Moreover, the error-correction results lend further support to the hypothesis that institutions affect the government's fiscal reaction function. The

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6. The lag length was selected using a variety of information criteria including Schwarz, Hannan-Quinn, and Akaike, and the trace statistic was corrected for small sample bias. Because the cointegration tests using this technique are sensitive to the choice of the deterministic elements of the VAR, a likelihood ratio test was used to ascertain the appropriateness of including a constant and seasonal dummies in the VAR. The model without time dummies, but with a constant, usually performed better than that without a constant.

7. If the overall budget balance is stationary but expenditure and revenue do not cointegrate, sustainability is ensured but the deficit process is inconsistent with a constant expected real rate of interest. The literature also deals with the possibility of time-varying discount rates, following Bohn (1995), in a stochastic environment with uncertainty, on the grounds that the relevant discount rate for the purpose of debt sustainability is a function of the contingent probability of future debt and the intertemporal rate of substitution in consumption.



responsiveness of revenue to changes in primary spending appears to have increased, albeit by a small magnitude, after the issuance in 1998 of legislation setting ceilings on indebtedness.

28. In so far as the effect of regional government finances on the fiscal stance of the central government and the role of institutions are concerned, the findings of the error-correction estimations, while interesting, are not robust to the inclusion of interest payments in central government expenditure. This is nevertheless not surprising, given the volatility of nominal interest payments in Brazil, which reflects, as discussed above, the composition of the public debt stock and, consequently, the sensitivity of debt dynamics to changes in market conditions.

**Table 2. Debt sustainability: cointegration tests, 1998-2004<sup>a</sup>**

Dep. Vars.: Central government revenue and expenditure

	Primary expenditure		Total expenditure (includes nominal interest payments)	
	Eigenvalue	Trace	Eigenvalue	Trace
Cointegration tests				
H0: rank = p				
p == 0	0.16	14.57 **	0.15	12.12 **
p <= 1	0.03	2.14	0.07	5.24 **
Lag interval	1 to 5		1 to 6	
Deterministic component	No		No	
Cointegration vectors				
Normalized vector (on expenditure)	(1,-0.88)		(1,-1.06)	
Restriction test: Ho: (1,-1) <sup>b</sup>	8.82 [0.00]		0.40 [0.53]	
Weak exogeneity tests: <sup>c</sup>				
Expenditure is exogenous: Ho: (0,a)	0.16 [0.69]		1.42 [0.23]	
Revenue is exogenous: Ho: (a,0)	10.02 [0.00]		4.28 [0.04]	

Source: Data available from the Central Bank of Brazil, and author's estimations.

a. Refers to the Johansen-Juselius cointegration tests. (\*\*\*) and (\*\*) indicate statistical significance at the 1 percent and 5 percent levels, respectively. The sample spans the period January 1998 to July 2004 (78 observations).

b. Distributed as chi-squared, with 1 degree of freedom (p-values in brackets).

c. Based on the estimated cointegrating vector of rank equal to one and distributed as chi-squared, with 1 degree of freedom (p-values in brackets).

**Table 3. Fiscal reaction functions: error-correction models, 1997-2004<sup>a</sup>**

Dep. Var.: Central government revenue in per cent of GDP

	Primary expenditure		Total expenditure (includes nominal interest payments)	
	1	2	1	2
Change in revenue (lagged)	0.21 *	0.22 *		
	(0.118)	(0.114)		
Revenue (lagged)	-0.34 ***	-0.40 ***	-0.15 **	-0.17 **
	(0.092)	(0.093)	(0.065)	(0.066)
Expenditure (lagged)	0.20 ***	0.24 ***	0.02 **	0.02 **
	(0.069)	(0.069)	(0.012)	(0.012)
Indebtedness (lagged)	0.005	-0.02	-0.001	-0.010
	(0.011)	(0.014)	(0.013)	(0.015)
Indebtedness (lagged) * Post-Senate Resolution period		0.01 **		0.01
		(0.005)		(0.005)
Output gap (lagged)	-0.005	-0.003	0.01	0.01
	(0.009)	(0.009)	(0.009)	(0.005)
Inflation (lagged)	0.01 **	0.01 ***	0.01 **	0.01 **
	(0.003)	(0.003)	(0.003)	(0.003)
Change in primary surplus (regional governments) <sup>b</sup>	-0.42 *	-0.50 **		
	(0.243)	(0.237)		
Primary surplus (regional governments) <sup>b</sup>	0.36 **	0.41 ***	0.14	0.14
	(0.150)	(0.146)	(0.128)	(0.128)
Change in primary surplus (state-owned enterprises) <sup>b</sup>	0.35 **	0.28 *	0.19	0.13
	(0.172)	(0.168)	(0.170)	(0.173)
Adjusted R-squared	0.15	0.21	0.09	0.10
<i>Memorandum item:</i>				
Implied long-term expenditure coefficient	0.59	0.60	0.13	0.12

Source: Data available from the Central Bank of Brazil, and OECD estimations.

a. All equations have been estimated by OLS and contain an intercept (not reported). Standard errors are reported in parentheses. Statistical significance at the 1, 5, and 10 per cent levels is indicated by, respectively, \*\*\*, \*\*, and \*. The sample spans the period January 1998 to July 2004 (78 observations).

b. "Regional governments" refers to the states and municipalities, and "state-owned enterprises" refers to all levels of government.

## 5. Conclusions and policy recommendations

29. This paper reviewed trends in fiscal performance in Brazil since the early 1990s, reported empirical findings on the estimation of a fiscal reaction function for the consolidated public sector, as well as the central and regional governments separately, and assessed the sustainability of the public debt dynamics using standard unit root and cointegration tests. The empirical findings suggest that: *i*) all levels of government react strongly to changes in indebtedness by adjusting their primary surplus targets, *ii*) this reaction to indebtedness has been strengthened at the sub-national level through the introduction of debt-constraining legislation in 1998, and *iii*) the debt dynamics appears to be sustainable, with the central government following a spend-and-tax policy to ensure debt sustainability: changes in central government

revenue are affected strongly by expenditure, with about two-thirds of changes in primary spending being offset through higher revenue over the long term, but the long-term response of revenue to total expenditure (including interest payments) is lower in magnitude, at about 15 per cent.

30. On the basis of these findings, Brazil will need to continue to post sizeable primary budget surpluses in the years to come to allay concern about the sustainability of the country's public debt dynamics. Only a reduction in the public debt-to-GDP ratio over a prolonged period will mitigate this source of macroeconomic vulnerability, making the economy better equipped to withstand adverse shocks. This should include, at the same time, continued effort to strengthen public debt management, by for example continuing to improve its composition and thereby reducing government exposure to exchange and short-term interest rate risk.

31. In addition, while focusing policies on ensuring that the primary surplus targets are met, effort is needed to improve the quality and longer-term sustainability of fiscal consolidation. In particular, a sustained retrenchment in current expenditure would pave the way for reducing the tax burden over the longer-term, once fiscal consolidation has delivered an appreciable fall in indebtedness. Moreover, reducing expenditure rigidities, while avoiding disruption in service delivery in the event of revenue shortfalls, should be a key policy objective in the years to come. More importantly, the merits of continued revenue earmarking and mandated spending should be assessed against the impact these budgetary resources might have on policy outcomes, particularly in the social area.

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## APPENDIX 1: DEFINITIONS AND DATA SOURCES

Appendix Table 1. Definitions and data sources

Variable	Definition	Source
Primary budget balance	Below-the-line borrowing requirement of each level of government -- consolidated public sector, central government, <sup>a</sup> regional governments (states and municipalities), and state-owned enterprises (all levels of government) -- accumulated over a 12-month period, in per cent of GDP, multiplied by minus one.	Central Bank of Brazil
Public debt stock	End-of-period stock of net liabilities in per cent of GDP.	Central Bank of Brazil
Output gap	Deviation of real GDP from its Hodrick-Prescott (HP)-filtered trend.	Central Bank of Brazil
Inflation	Change in IPCA index.	Central Bank of Brazil
Central government primary revenue	Above-the-line flows accumulated over a 12-month period, in per cent of GDP ( <i>pagamento efetivo</i> ).	National Treasury
Central government primary expenditure	Above-the-line flows accumulated over a 12-month period, in per cent of GDP, including intergovernmental transfers ( <i>pagamento efetivo</i> ).	National Treasury
Central government nominal interest payments	Below-the-line flows accumulated over a 12-month period, in per cent of GDP (harmonized methodology).	Central Bank of Brazil

a. The central government comprises the federal government, the social security system, and the Central Bank of Brazil.

## APPENDIX 2: A SUMMARY OF FISCAL RESPONSIBILITY LEGISLATION

32. For the purpose of this summary, Fiscal Responsibility legislation comprises the Fiscal Responsibility Law (FRL), enacted in May 2000; legislation introducing ceilings on personnel spending, enacted in 1995 and 1999; Senate Resolutions introducing ceilings on indebtedness, issued in 1998; and prudential regulations on banks' exposure to sub-national debt. An overview of sub-national debt restructuring, carried out in 1997-98, is also presented.

### Revenue and expenditure

33. On revenues, the FRL mandates the withholding of discretionary federal transfers to states and municipalities that do not collect effectively their own taxes, and the publication of the impact of tax exemptions on the budget of the year when the exemptions take effect, and in two subsequent budgets.

34. On expenditure, the FRL bans the creation of *i*) permanent spending mandates without corresponding increases in permanent revenues or cuts in other permanent spending commitments, and *ii*) new spending commitments that cannot be executed before the end of the incumbent's term in office, as well as the recording of these as unspent commitments in the two quarters prior to the end of the incumbent's term in office, unless there are sufficient cash balances in reserve to cover these unspent commitments at the end of the fiscal year.

### Personnel spending

35. The FRL establishes separate ceilings for personnel spending at each level of government (including pension payments and payments to contractors) equivalent to 50 per cent of net current revenues for the central government and 60 per cent of net current revenues for the states and municipalities, as well as sub-ceilings for the executive, legislative and judicial branches of each level of government.<sup>8</sup>

36. These spending ceilings are based on previous legislation. Complementary Law No. 82 of 1995 (*Camata Law I*) sets a ceiling for personnel spending of 60 per cent of a jurisdiction's net current revenue, where personnel spending includes outlays on retired civil servants. Net current revenue is calculated by

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8. At the central government level, the sub-ceilings are 40.9 per cent of net current revenues (NCR) for the executive branch, 6 per cent of NCR for the judiciary branch, 2.5 per cent of NCR for the legislature, and 0.6 per cent of NCR for the Prosecutor's Office. At the state level, there are sub-ceilings (defined in relation to NCR) for each branch of government: 2 per cent for the Prosecutor's Office, 3 per cent for the legislature, including the Court of Accounts, 6 per cent for the Judiciary, and the remaining 49 per cent for the executive branch. At the municipal level, the sub-ceilings are as follows: 6 per cent for the legislature, including the Court of Accounts, where available, and the remaining 54 per cent for the executive branch. In the case of the municipal legislature, personnel spending, excluding on retirees, is limited to 70 per cent of total spending, and total spending is limited in relation to the sum of tax revenues and intergovernmental transfers to 8 per cent for the municipalities with population less than 100 000 inhabitants; 7 per cent for the municipalities with population between 100 001 and 300 000 inhabitants; 6 per cent for the municipalities with population between 300 001 and 500 000 inhabitants; and 5 per cent for the municipalities with population above 500 000 inhabitants. These limits were set by Constitutional Amendment No. 25. See Nascimento and Debus (2001), for more information.

excluding from total current revenues constitutionally-mandated federal transfers, social security contributions of civil servants, and the jurisdiction's net position relative to Complementary Law No. 87 of 1997 (*Kandir Law*) and FUNDEF.<sup>9</sup> Complementary Law No. 96 of 1999 (*Camata Law II*) maintains the same 60 per cent ceiling but broadens the definition of personnel spending to include several modalities of fringe benefits that had been excluded from *Camata Law I*.

### **Indebtedness**

37. Ancillary legislation complements the FRL by introducing ceilings on indebtedness. These ceilings were originally set by the Senate in 1998 (Resolutions No. 78 and 96) at 350, 200, and 120 per cent of net current revenues of the federal, state, and municipal governments, respectively.<sup>10</sup> While the debt ceilings for the regional governments were subsequently confirmed in Senate Resolution No. 40 of 2001, those for the federal government are yet to be set in law. In addition to these debt ceilings, in accordance with the FRL, the central bank has been prohibited from issuing securitized debt since May 2002. Credit or debt rescheduling operations are also prohibited among the various levels of government, including future debt restructuring arrangements such as those regulated by Law No. 9 496 of 1997 between the states, and subsequently the municipalities, and the Treasury. The LRF also contains a golden-rule provision for capital spending (*i.e.*, annual credit disbursements cannot exceed capital spending).

### **Escape clauses**

38. The time frame for reducing personnel spending or indebtedness in excess of the mandated ceilings can be lengthened if the economy contracts by 1 per cent or more during the previous 4 quarters, or a national catastrophe is declared by the legislature, as well as in the case of a state of siege. These escape clauses can only be exercised with congressional approval. A one-year "waiver" can also be decreed by initiative of the Senate, in the event of drastic changes in economic policy.

### **Fiscal reporting and medium-term budgeting**

39. The LRF also provides for more transparent fiscal reporting. Budget outturns are to be presented in bi-monthly budget execution reports, as well as more comprehensive four-month reports on compliance with the LRF, including corrective measures if the relevant provisions are breached. The municipalities are required to report to the Ministry of Finance the fiscal outturn of the previous year by end-April and the states by end-May. The Ministry of Finance is required to publish a consolidation of the public finances of the previous year by end-June. The legislative branch of each level of government, aided by their respective Courts of Accounts, is required to monitor compliance with the fiscal targets and ceilings.

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9. Complementary Law No. 87 of 1997 created a mechanism for compensating the states for the revenue losses associated with the exemption of VAT from exports of primary and semi-manufactured goods. FUNDEF is a fund created in 1998 to equalize spending capacity among the states and municipalities in the area of primary education. The federal government sets a floor for spending per student and tops up spending in the sub-national jurisdictions that cannot afford the minimum spending level. See de Mello (2001), for more information on FUNDEF.

10. These ceilings are defined in relation to the total real net revenues, as in the case of the debt restructuring arrangements regulated by Law No. 9.496 of 1997, whereas, as pointed out above, the LRF defines ceilings with respect to net current revenues. If the ceilings are exceeded, slippages are to be eliminated within one year. While the slippages persist, new financing, as well as discretionary transfers in the case of sub-national governments, is banned, including short-term revenue anticipation operations (ARO), other than those taken to refinance securitized debt. The Ministry of Finance publishes every month a list of governments that exceed their debt ceilings. ARO loans are restricted, and to be liquidated by December 10 of the year in which they are incurred. They are prohibited in the last year of an incumbent's term in office.



40. The LRF strengthens the legal framework for medium-term budgeting.<sup>11</sup> The LRF requires the inclusion of a Fiscal Policy Annex to the Multi-Year Budget Framework Law (PPA) of the federal government with multi-year fiscal targets, and the inclusion of a Fiscal Targets Annex to the Budget Guidelines Law (LDO) for all levels of government. The LDO is also required to include an annex describing fiscal risks with an assessment of contingent liabilities. By introducing more stringent requirements on fiscal targets in the preparation of the LDO, the LRF strengthens its role in budget preparation and fiscal management in general. In particular:

- The Fiscal Targets Annex contains the assessment of compliance with the fiscal targets of the previous years, and the analysis of the net worth of the public enterprises, with emphasis on the use of resources from privatizations and asset sales in general. This is to avoid the use of capital revenues to finance current spending and the inclusion of these revenues above the line to generate higher primary balances.
- The Fiscal Risks Annex contains a detailed assessment of the government's contingent liabilities, including an evaluation of the likelihood of adverse outcomes in legal disputes. In the case of the central government, the Fiscal Risks Annex provides a detailed assessment of the impact on revenues of changes in the macroeconomic framework, as well as deviations from the macroeconomic parameters based on which the annual budget law (LOA) is formulated.
- The LRF strengthens the link between the LDO and the LOA. This is achieved by requiring the LOA to abide by the LDO's fiscal targets (detailed in the LDO's Fiscal Targets Annex), the inclusion of a contingency reserve defined in per cent of net current revenues to be used for the settlement on unspent commitments (*restos a pagar*) of the previous year, as well as contingent liabilities that may materialize in the reference period, the reporting of tax expenditures, and the inclusion in the LOA of debt service obligations in the reference period.

### **Fiscal Crimes Law**

41. Complementary to the FRL is the Fiscal Crimes Law (FCL). The FCL applies to public officials of the executive, legislative and judiciary branches of the federal, state and municipal governments, as well as their decentralized agencies and public enterprises. Among other provisions, the FCL provides for detention of up to four years for public officials who: *i*) engage in credit operations without prior legislative authorization (or in breach of the credit or indebtedness ceilings); *ii*) incur expenditure commitments in the last two quarters of their term in office that cannot be paid within the current fiscal year, or without adequate cash balances; *iii*) incur unauthorized expenditure commitments; *iv*) extend loan guarantees without equal or higher-value collateral; *v*) increase personnel expenditures in the 180 days prior to the end of their term in office, and *vi*) issue unauthorized unregistered public debt.

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11. There are three integrated budget framework horizons in Brazil. *First*, a 4-year budget framework (PPA) is defined by the federal government to allocate its projected budgetary resources over the following years to different programs and activities, consistent with the medium-term macroeconomic framework, fiscal targets, and revenue forecasts. *Second*, a 3-year Budget Guidelines Law (LDO) sets targets for the main budget aggregates (expenditure, revenue, budget balance, debt) for the current year and indicative targets for the following two years. *Third*, an annual budget law (LOA) allocates budget resources to the programmes and activities defined in the PPA, consistent with the targets set in the LDO. Programmes and activities, as well as their costs, are identified in the preparation of the PPA and in the LOA. See IMF (2001), for more information.

## Prudential regulations

42. Financial institutions' exposure to the government (all levels of government, public enterprises and decentralised agencies combined) is limited to 45 per cent of their net wealth, including all credit operations and loan guarantees. These regulations are not set in the framework of the FRL, being issued by the National Monetary Council. Financial institutions also face stringent provisioning requirements, at 150 per cent of the value of loans to the public sector. More recently, it has been recognised that these constraints have restricted access to finance by some regional jurisdictions that were compliant with the debt and debt service ceilings set under the FRL. Prudential regulations were therefore introduced in 2003 setting aggregate caps on credit operations with the municipalities to finance investment in water and sanitation, subject to the observance of the debt service ceilings set under the FRL. These aggregate caps are consistent with the government's target for aggregate spending on these programmes. The option of introducing similar aggregate caps for investment in transport infrastructure is under discussion, pending an assessment of the measures introduced for water and sanitation against the expected increase in government spending on these programmes.

## An overview of sub-national debt restructuring

43. The debt restructuring arrangements between the National Treasury and the states (and the Federal District) date back to 1997.<sup>12</sup> Similar arrangements were put in place in 1998 with over 180 municipalities, including most of the larger ones, in a total of over 5,500 municipalities. Prior to these arrangements, federal credit lines could be extended to indebted states under the condition that they implement comprehensive fiscal adjustment programmes, consisting primarily of the gradual reduction of personnel spending in relation to current revenue, stricter control of public enterprises, including their privatization, and the introduction of primary surplus targets. These consolidation efforts did not always bear fruit.

44. These arrangements -- formalized in a bilateral contract between the National Treasury and the sub-national jurisdiction -- are legally binding and provided for the down-payment of 20 per cent of the jurisdiction's outstanding debt stock, as well as a fixed repayment schedule based on below-market interest rates and the jurisdiction's revenue mobilization capacity. This is measured in terms of total real net revenues, which includes own revenues and net constitutionally-mandated transfers, defined as mandated transfers from higher levels of government net of mandated transfers to lower levels of government. Non-compliance implies the replacement of below-market interest rates by the nominal interest rate paid on the federal securitized debt plus a penalty of 1 percentage point per annum.

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12. In the case of the 1997-98 arrangements, restructuring referred to outstanding liabilities incurred prior to November 30, 1995 (Credit Line I). Adjustment programmes aimed at reducing personnel spending could also be financed within the framework for debt restructuring (Credit Line II), as well as the conversion of short-term revenue anticipation operations (AROs), a de facto modality of debt financing, into debt to be restructured (Credit Line III).

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