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DELAYING PUBLIC-SECTOR REFORMS: POST-STABILIZATION FISCAL STRAINS IN BRAZIL[1]

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1. INTRODUCTION [2]

Since the mid-eighties Brazil lived through a period of great macroeconomic instability. Examining the evolution of the primary balance during these years, one identifies three markedly distinct periods: 1985 to 1989, 1990 to 1994, and 1995-96. The average primary surplus increased from 0.6 percent of GDP in 1985-89, to 3.1 percent in 1990-94, falling back to less than 0.1 percent of GDP in 1995-96. The reduction in the operational deficit between 1985-89 and 1990-94 reached almost 5.5 percent of GDP, with more than half of the improvement coming from falling interest payments. Between 1990-94 and 1995-96, the operational deficit widened by 4.5 percent of GDP. Only less than a third of that variation may be attributed to rising interest payments. All the rest came from the vanishing primary surplus.

During most of this period, the Brazilian economy was subject to very high inflation rates and to an uneven GDP growth performance. It is well known that fluctuations in these variables impact public sector's tax revenues and expenditures, having important effects on the observed changes in the fiscal deficit. In order to produce a more accurate picture of the prevailing fiscal trends in the Brazilian economy, alternative indicators of fiscal policy are constructed. One of them is a modified version of the fiscal impulse measure proposed by Blanchard (1990), in which the different components of the primary deficit are adjusted for variations both in the activity level and the inflation rate. The fiscal impulse measure shows, on average, a more expansionist fiscal policy stance than the change in the actual primary deficit during the period 1989-1996. While the estimated measure indicates more expansionist or less contractionist policies than the observed values for 1989-90 and 1994-96, it also shows that the actual change in the primary deficit significantly underestimates the contraction in fiscal policy in 1991-1992. For 1993, there is no significant difference between the two measures.

The understanding of the determinants of public-sector debt dynamics is a key step towards a fuller assessment of fiscal sustainability in the Brazilian economy. The public-sector net debt has increased from 28.5 percent of GDP in December 1994 to 34.4 per cent in December 1996. More than two thirds of that increase stemmed from the net debt of the federal government and the Central Bank. The evolution of federal net-debt figures should be seen with caution. Though the federal net debt has really increased much less dramatically than the federal gross debt since 1994, the slower increase conceals a deterioration of the quality of the net-debt that deserves some attention.

The high interest rates resulting from the combination of a lax fiscal policy and a tight monetary stance have had a severe impact on the accounts of state and municipal governments. And the combination of high interest rates and the sudden end of the high-inflation regime precipitated the already expected going under of the most fragile part of the banking system, largely constituted by banks controlled by the states. As high-interest state bonds are being swapped for lower interest

[2] The authors acknowledge the very competent research assistance of Fernando Blanco, Joana Meyer and Álvaro Motta, as well as comments from Dionísio Dias Carneiro Netto and Marina Figueira de Mello. The final version of the paper benefited from helpful suggestions from Ernesto Talvi and Carlos Végh.

federal bonds, the states' debt is being largely converted into debt to the federal government and, therefore, being subtracted from the federal gross debt in the net-debt figures. Analogously, non-performing assets of the insolvent banks transferred to the Central Bank, as well as low-interest loans extended to the institutions that absorbed those banks, are also being deducted from the federal gross debt. As the importance of those various assets has been growing very rapidly there is every reason to believe that the quality of the federal net-debt figures is being negatively affected.

Besides the macroeconomic policy mix, at least three other factors are important determinants of the public-sector debt dynamics. The first refers to the existence of contingent and hidden liabilities. When liabilities of that sort appear, as skeletons taken out of the closet, they become normal registered debt. In Brazil, the most important of those liabilities stems from the federal guarantee granted to the Mortgage Assistance Fund (*Fundo de Compensação de Variações Salariais, FCVS*). Another liability of that kind stems from the inability of the federal government to collect certain debts that are being considered as assets in its balance sheet. The still hidden costs of the bailing out of the failing banks and the restructuring of the states' debt are bound to comprise an important part of the "skeletons in the closet".

The second important determinant of the public-sector debt dynamics is the flow of privatization proceeds, which are expected to reach a peak in 1998 and as much as US$ 80 billion over the period 1997-2002. The effect of privatization on public-sector debt dynamics will depend, not so much on the flow of privatization proceeds, but on the part of that flow effectively channeled into debt redemption. Finally, a third important determinant of the public-sector debt dynamics is the extent of the financing that could stem from seigniorage. As almost three years after the launching of the stabilization program, the monetary base is still limited to about 2.8 per cent of GDP, the contribution of seigniorage to public-deficit financing is bound to be extremely limited.

Three different scenarios were initially considered in the model used to simulate debt dynamics in the paper, their differences being the assumptions about the evolution of the primary balance. In the first scenario, there is no fiscal adjustment whatsoever. The zero primary balance observed in 1996 is repeated year after year till 2002. The second scenario has the primary balance improving slowly, though steadily, over the simulation period, reaching 2 percent of GDP in 2002. Finally, in the third scenario, the primary balance jumps to 1.5 per cent of GDP in 1997 and stays at this level till the end of the period under consideration. The same set of assumptions about the evolution of public assets sales, emergence of contingent and hidden liabilities and external interest rate was adopted in all three scenarios. Also invariant were the assumptions about inflation, exchange-rate policy and growth performance during the period.

In Scenario 1, in which a no-improvement path for the primary balance is envisaged, the public-sector net debt jumps from 34.4 percent of GDP in 1996 to 50 percent in 2002. Scenario 3, that assumes an effort that leads to a primary surplus of 1.5 percent of GDP in 1997, which is maintained over the rest of the period, tells a different story. The public-sector net debt as a proportion of GDP would rise in 1997 and start to fall from 1998 on, reaching 32.2 percent of GDP in 2002, somewhat below the base-year mark. Scenario 2, represents a halfway case, in which the primary balance describes a slow, though steady, upward movement over the period,

reaching 2 percent of GDP in 2002. The net debt would be rising till 2001 but would fall back slightly to 36.2 percent of GDP in 2002. All those results proved to be very sensitive to some of the adopted assumptions, especially those concerning the GDP growth path over the period and the amount of privatization proceeds that will be effectively used to redeem public debt

The simulation exercises conducted with the debt-dynamics model were based on scenarios that assumed exogenous primary-balance paths. Though that proved to be a convenient way to concentrate the focus of the analysis on the debt-dynamics process, important questions were left unanswered. How plausible are the assumptions on the primary-balance path adopted in those scenarios? What is the likely evolution of the primary balance over the coming years after all? In order to address these fundamental questions, the simulation model was extended to allow an endogenous determination of the primary balance.

The possibilities for improvement in the public-sector primary balance in the coming years are constrained by severe rigidities and adverse structural trends. The 1988 Constitution redesigned the previous system of fiscal federalism and the central government lost a substantial part of its tax revenue to state and local governments, without being able to transfer to them any significant part of its spending programs. In addition, the new Constitution amplified the scope for the historical rent-seeking behavior of many segments of the Brazilian society, imposing on the federal budget a considerable additional burden, exactly when the Union's fiscal resources were being reduced.

The new Constitution brought a very high degree of rigidity to public sector payroll expenditures. All public employees of federal, state and local governments in official civil-servant careers were granted lifetime job tenure. At the federal level, the establishment of a single civil-service code resulted in the extension of all compensation privileges of the official civil-servant career to about 400 thousand employees, previously hired under the rules of private-sector working contracts. The impact on the cost of retirement benefits was particularly important. In contrast to private-sector employees, all public servants are now entitled to a retirement pay that is in general at least equivalent to the value of the last paycheck before retirement.

“Redemption of the social debt” was a key expression during the drafting of the 1988 Constitution. In practice it meant putting the expansion of entitlement programs in a fast track. Social insurance benefits were significantly extended, an income-maintenance program for unemployed workers was created and the right to free access to health care programs was established. The fiscal pressure coming from the present social security system in Brazil probably is the most important aspect to be considered in the assessment of structural trends.

With a gross tax burden in excess of 30 percent of GDP, Brazil is a clear outlier among countries with a similar stage of development. If there is little hope of a sizable relief from the revenue side, there are also strong reasons to believe that keeping expenditures under control will depend less and less of simple fiscal repression measures. There is ample evidence that the political costs of recurrent fiscal repression are in fact contributing to erode the already precarious political coalition that seems to support a major fiscal adjustment effort in the country.

In the simulations that involve an endogenous determination of the primary balance, three different scenarios were again considered. The differences stem from values attributed to a set of parameters identified as having a key role in the determination of the public-sector expenditures. Assumptions concerning the evolution of the revenues of all levels of government were kept invariant across the three scenarios. Attention was concentrated on the behavior of payroll expenditures, social-security benefits and health-programs expenditures.

Simulation results for Scenario A show an improving primary balance which resembles the exogenously assumed path of Scenario 2, considered in the debt dynamics model, but the improvement seems a bit less strong, the primary surplus reaching only 1.6 percent of GDP in 2002. In scenario B, the primary balance path shows a much slower upward movement. In 2002, the primary surplus is only half percent of GDP. Finally, the primary-balance path of Scenario C seems to be even worse than the one exogenously assumed in Scenario 1 of the debt dynamics model. Instead of a no-improving primary balance, one now gets a slowly worsening one, with the primary deficit reaching 0.8 percent of GDP in 2002.

The simulation results with the extended model suggest that the public sector primary-balance path over the coming years could be quite different from those assumed in the debt-dynamics simulation exercises. A natural extension, therefore, is to reexamine some debt-dynamics issues based on the endogenously-generated primary-balance paths, while keeping the same common set of assumptions of the original debt dynamics exercise.

The three endogenous primary-balance paths lead to well different consequences in terms of debt dynamics. The public-sector net debt rises very markedly even in Scenario A, which is the most favorable one. The net debt rises from 34.4 percent of GDP in 1996 to 37.9 percent of GDP in 2002. After increasing in 1997, the operational deficit falls steadily to 1.7 percent of GDP in 2002. The worst case is generated by the deteriorating primary balance of Scenario C. Fueled by soaring interest payments, the net debt jumps to 55.9 percent of GDP in 2002, and the operational deficit reaches 9.3 percent of GDP. Scenario B constitutes an intermediate case, in which the net debt rises to 45.1 percent of GDP and the operational deficit remains at a level quite similar to the base-year value. Sensitivity-analysis exercises leave no doubts about the crucial importance of the assumptions on economic growth performance.

What conclusions about fiscal sustainability in Brazil can be drawn from the paper? If a sustainable fiscal policy is defined as a policy such that the public debt to GDP ratio eventually converges back to some determined level, the answer is clear: the present fiscal stance is not sustainable. If the current tax rules and spending programs are maintained, the debt to GDP ratio will grow rapidly in the near future.

Under reasonable sets of assumptions, the simulation exercises of the paper have shown that a sharp increase in the public sector net debt, as a proportion of GDP, will be unavoidable if there is no improvement in the primary balance in coming years. But even with a significant improvement in the primary balance during the period, the net-debt to GDP ratio would still show an upward trend and public sector real interest payments would not fall, unless extremely optimistic assumptions on GDP growth are made.

Given the obstacles currently faced by fiscal-adjustment efforts, there is a widespread temptation in Brazil to believe that the country may simply grow out of its fiscal problems. If fiscal repression could produce a slowly increasing primary surplus in the near future, one could cross one's fingers and hope that economic growth will save the day and lead naturally to a significant improvement in fiscal indicators. Much as an overfed boy that dreams about getting rid of his obesity problems by simply maintaining his present weight while growing taller.

There are many reasons to believe that growing out of fiscal problems in Brazil will not be so easy. A slow improvement in the fiscal-stance will mean that for a long time interest rates will have to remain much higher than would be compatible with a growth-conducive economic environment. In addition, long-lasting fiscal repression means public investment deficiencies that will also hamper fast economic growth. Finally, the recent evolution of the Brazilian external accounts, marked by a large and rapidly widening current account deficit, suggests that a faster growth rate will probably be unfeasible. And also that the convergence of domestic interest rates to international levels may end up being much slower than assumed in the most optmistic scenarios of the paper.

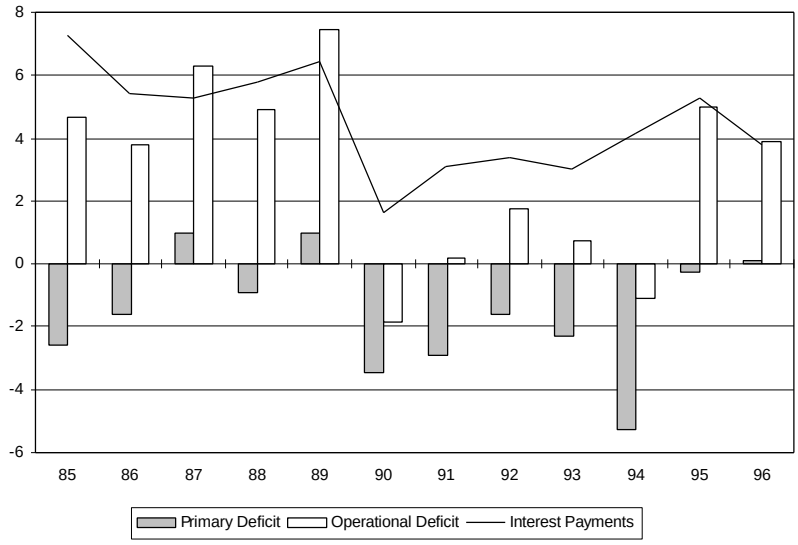
It seems, therefore, that there is no easy way out. In order to interrupt the vicious circle of bad fiscal stance, high interest rates, slow growth and even worse fiscal stance (and greater external vulnerability), there seems to be no other alternative than a decisive effort to improve the primary balance. It is highly unrealistic to expect that the already high tax burden can be further increased. Improvements in the primary balance will have to come, therefore, from expenditure reduction. Given the rigidities in the public sector payroll, the fiscal pressure coming from the social security system and the expansion in expenditures with health assistance programs, it is unlikely that the necessary expenditure cuts will be viable without a major fiscal reform. There seems to be no way to circumvent a deep change in the very nature of the fiscal regime that only constitutional amendments will make feasible.

The paper is structured as follows. Section 2 provides a brief overview of recent fiscal developments in the Brazilian economy making use of traditional fiscal policy indicators. In Section 3, alternative indicators are constructed and used to reassess past fiscal policy episodes. The next three sections examine the implications of current fiscal trends for the sustainability of fiscal policy in Brazil. Section 4 uses a model to simulate the Brazilian debt dynamics process assuming exogenous primary-balance paths. Section 5 discusses the likely evolution of the primary balance in the coming years. In Section 6, the simulation model from Section 4 is extended in order to allow an endogenous determination of the primary balance. The implications in terms of debt dynamics are examined and sensitivity-analysis exercises are used to pinpoint some important policy issues. Section 7 presents some concluding remarks.

2. TRADITIONAL FISCAL POLICY INDICATORS: HISTORICAL RETROSPECTIVE[3]

No more than a glance at Figure 2.1 is needed to grasp the extent of the variations in fiscal indicators observed since the mid-eighties in Brazil, as the country lived through a period of great macroeconomic instability. Understanding the ups and downs of those indicators, in the wake of five failed stabilization attempts and the Real Plan, is less interesting at this point than detecting the bottom line fiscal-stance changes over the period.[4]

Figure 2.1
Brazil - Fiscal Deficits and Interest Payments, 1985-1996
(In percent of GDP)



Examining the evolution of the primary balance in Figure 2.1, one identifies three markedly distinct periods.[5] The first one, from 1985 to 1989, is basically the Sarney Administration term,

[3] Throughout this paper the expression public sector refers to the nonfinancial public sector, which comprises the Federal Government (including the Central Bank and the social security system), the States and Municipalities and all Public Enterprises.

[4] Figure 3.1 in Section 3 below provides a telling picture of the long sequence of stabilization attempts during the period. For a detailed analysis of the evolution of the public sector accounts since the mid-eighties, see Carneiro and Werneck (1993), Barbosa and Giambiagi (1995), Velloso (1996a, 1996b), Furugem, Pessôa and Abe (1996) and Giambiagi (1997). For the analysis of the fiscal accounts before the mid-eighties, see Werneck (1986, 1991).

[5] Taking into consideration the deficiencies of the available information, the consolidation of the above-the-line accounts of the public sector presented in Appendix 1 should be considered an approximation. In recent years the quality of these data has improved (Piancastelli and Pereira, 1996). For a discussion of the limitations of the above-the-line data see, for example, Giambiagi (1997).

that followed the end of a two-decade long military regime. The second period, from 1990 to 1994, covers both the short-lived Collor Administration, that ended with the impeachment of the President in September 1992, and the Franco Administration that launched the Real Plan in mid-1994, six months before the end of the presidential term. The third period, 1995-96, corresponds to the first half of the present Cardoso Administration.

In order to have a clearer picture of the evolution of the fiscal indicators over the whole time span, Table 2.1 presents averages for each of those three periods, variations of the averages between periods and decomposition of the variations. The primary deficit line in the lower part of the table, shows that the average primary surplus increased from 0.6 percent of GDP in 1985-89, to 3.1 percent in 1990-94, only to fall back to less than 0.1 percent of GDP in 1995-96. The federal government was responsible for 80 percent of the improvement in the public-sector primary surplus between the first two periods, but for only 36 percent of the deterioration observed between the last two periods. The remaining deterioration stemmed, in roughly equal parts, from the accounts of states and municipalities, on one hand, and public enterprises, on the other.

The table also shows that the reduction of the operational deficit between 1985-89 and 1990-94 reached almost 5.5 percent of GDP, and that more than half of the improvement came from falling interest payments. Between 1990-94 and 1995-96, however, the operational deficit widened again by 4.5 percent of the GDP. Only less than a third of that variation may be attributed to the rising public-sector interest bill. All the rest came from the vanishing primary surplus.

A closer and more careful analysis of the evolution of the primary balance is therefore a key step towards a deeper understanding of the fiscal-policy performance in Brazil since the late eighties. The next section will concentrate precisely on this point.

Table 2. 1
Brazil: Changing Fiscal Deficits, 1985-1996

	Annual Averages (In Percent of GDP)			Variation 85/89 - 90/94			Variation 90/94 - 95/96			Variation 85/89 - 95/96		
Deficits Categories and Public Sector Segments	1985-1989 (A)	1990-1994 (B)	1995-1996 (C)	(B) - (A)	Decomp I	Decomp II	(C) - (B)	Decomp I	Decomp II	(C) - (A)	Decomp I	Decomp II
Operational Deficit	5,42	-0,05	4,45	-5,47	100,0		4,50	100,0		-0,97	100,0	
Federal Government	2,89	-0,54	1,72	-3,43	62,7		2,26	50,3		-1,17	119,9	
States and Municipalities	0,92	0,16	2,17	-0,75	13,8		2,01	44,8		1,26	-129,3	
Public Enterprises	1,62	0,33	0,62	-1,29	23,6		0,28	6,3		-1,01	103,3	
Interest Payments	6,04	3,06	4,53	-2,99	54,6	100,0	1,47	32,7	100,0	-1,52	155,8	100,0
Federal Government	2,45	1,01	2,16	-1,44	26,3	48,2	1,15	25,5	78,0	-0,29	29,9	19,2
States and Municipalities	0,96	0,79	1,80	-0,16	3,0	5,5	1,00	22,3	68,3	0,84	-86,3	-55,4
Public Enterprises	2,64	1,24	0,62	-1,40	25,7	47,0	-0,62	-13,7	-41,9	-2,02	207,5	133,2
Primary Deficit	-0,62	-3,11	-0,08	-2,49	45,4	100,0	3,02	67,2	100,0	0,54	-55,3	100,0
Federal Government	0,44	-1,55	-0,45	-1,99	36,4	80,1	1,10	24,5	36,4	-0,89	91,5	-165,5
States and Municipalities	-0,04	-0,63	0,37	-0,59	10,8	23,7	1,00	22,3	33,2	0,41	-42,5	76,9
Public Enterprises	-1,02	-0,91	-0,01	0,11	-2,1	-4,6	0,90	20,0	29,7	1,01	-104,2	188,6

3. ALTERNATIVE FISCAL POLICY INDICATORS

During most of the period under analysis, the Brazilian economy was subject to very high inflation rates and to an uneven GDP growth performance (see Figures 3.1 and 3.2). It is well known that fluctuations in these variables impact public sector's tax revenues and expenditures, having important effects on the observed changes in the fiscal deficit in any given year.[6] In order to produce a more accurate picture of the underlying fiscal trends in the Brazilian economy in the recent period, this section develops alternative indicators of fiscal policy. These indicators correct conventional measures for the effects of the economic cycle, and yield an estimate of the changes in the discretionary component of fiscal policy in each year. The section starts by deriving a measure of the "fiscal impulse" [7] for the Brazilian economy, then presents an estimate of the "underlying" (or macroeconomic adjusted) primary deficit and concludes with a reassessment of fiscal policy episodes examined in Section 2.

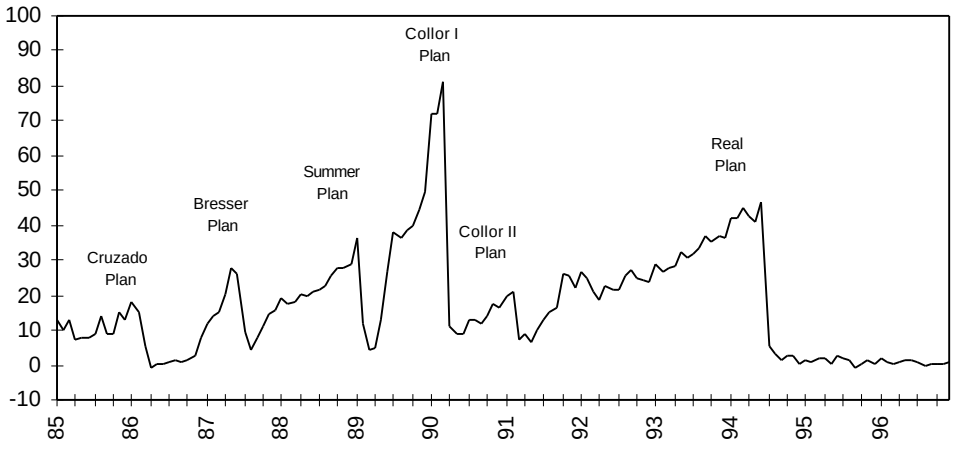
3.1 A Fiscal Impulse Measure

The change in the observed primary deficit with respect to the previous year, as a percentage of GDP, is the simplest possible measure of the discretionary change in the budgetary position of the public sector, or the "fiscal impulse". Since it excludes interest payments, it captures only the effects of contemporaneous fiscal policy actions. Its main disadvantage, however, is that part of the observed fluctuations in the primary deficit are induced by the effects of the economic cycle on tax revenues and expenditures and not by discretionary policy actions.

Blanchard (1990) suggests a measure of the fiscal impulse which addresses the main shortcoming of the changes in the primary deficit without compromising its simplicity: the value of the primary deficit in any given year if the unemployment rate had remained the same as in the previous year, minus the primary deficit in the previous year. The measure, therefore, captures the change in the primary deficit which cannot be attributed to the economic cycle, as measured by variations in the

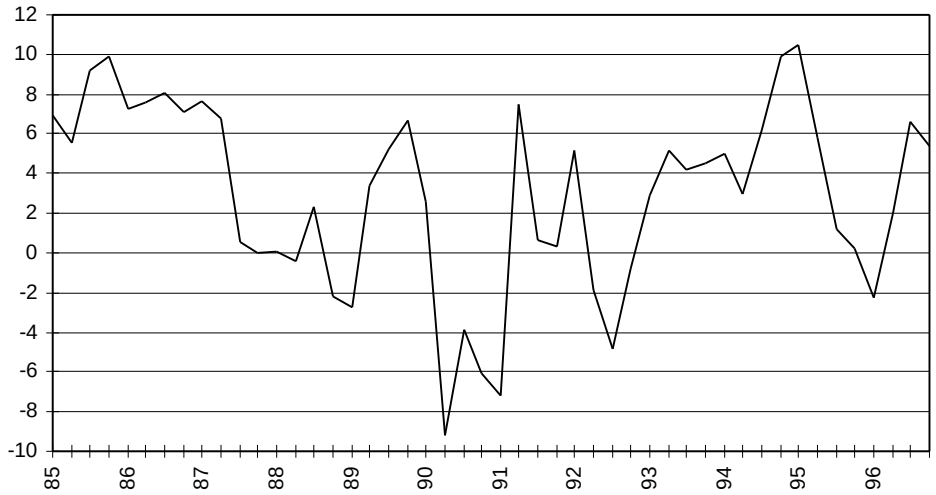
[6] See, for example, Buiter (1983).
[7] Alternative fiscal impulse measures are examined in Chand (1992).

Figure 3.1
Brazil, Monthly percentage change in the General Price Index, IGP-DI



Source: Getúlio Vargas Foundation

Figure 3.2
*Brazil, Real GDP Growth **



Source: IBGE
* 12 month growth rate in quarterly GDP

unemployment rate. Its estimation requires, in addition to the observed primary deficit, the calculation of an adjusted primary deficit series.

In this paper an alternative version of Blanchard's fiscal impulse measure is constructed in which the different components of the primary deficit are adjusted for variations both in the activity level and the inflation rate.[8] It focus on output rather than unemployment because the former captures better the short-run variations in the economic cycle in Brazil. Also, it adjusts the deficit for changes in the inflation rate because of the asymmetric indexation of revenues and expenditures throughout the period under analysis. While Brazilian tax revenues have been highly, though imperfectly, indexed to the inflation rate for many years, expenditures were never subject to a similar degree of indexation and used to have their real value significantly eroded during the high inflation period. [9]

As the 1988 Constitution introduced changes that altered substantially the fiscal regime in Brazil, the empirical work was based on data for the period of 1989 to 1996. Since this is a relatively short time interval, quarterly data was used for the econometric estimations. Because there were huge variations in the inflation rate during the period, all the data were collected on a monthly basis and deflated and then converted to quarterly figures.

Except for the state value-added tax (ICMS), only federal government data is available on a quarterly basis. Therefore, the estimated fiscal impulse measure reflects mainly the effect of adjustments in federal tax revenues and expenditures. Series of revenues from most taxes were adjusted, proving to be sensitive only to variations in the activity level. The exceptions were the import tax and the ICMS, which were also adjusted for changes in the inflation rate. On the expenditure side, the only category that had to be adjusted was the government payroll, which

[8] Despite the substantial trade liberalization of the early 1990s, the Brazilian economy remains fairly closed and most of the impact of macroeconomic variables on expenditures and tax revenues could possibly be attributed to domestic variables.

[9] Faria (1996) estimates a measure of the fiscal impulse for the Brazilian economy following a different methodology and adjusting only total revenues for fluctuations in the activity level.

proved sensitive to changes in the inflation rate.[10] The remaining expenditure series did not show any significant relationship with the two macroeconomic variables.[11]

The estimated coefficients from the regressions of tax revenues and expenditures on the activity level and the inflation rate were used to calculate the primary deficit which would have prevailed in a given year if these two variables were at the same values as in the previous year. Actual and adjusted values for the nonfinancial public sector primary deficit are presented in Table 3.1.

Table 3.1

Brazil: Actual and Adjusted Primary Deficit, 1989-1996

(In percent of GDP)

	1989	*1990*	*1991*	*1992*	*1993*	*1994*	*1995*	*1996*
Actual Deficit	*1.0*	*-4.6*	*-2.8*	*-1.6*	*-2.2*	*-5.3*	*-0.3*	*0.1*
Adjusted Deficit	*2.7*	*-2.8*	*-3.6*	*-2.1*	*-2.1*	*-4.0*	*0.5*	*0.8*

The fiscal impulse measure was then calculated by subtracting from the value of the adjusted deficit in period *t* the actual primary deficit in period *t-1*. Table 3.2 presents the actual change in the nonfinancial public sector primary deficit, along with the estimated fiscal impulse measure.

Table 3.2

Brazil: Actual Change in the Primary Deficit and Fiscal Impulse Measure, 1989-1996

(In percent of GDP)

	1989	*1990*	*1991*	*1992*	*1993*	*1994*	*1995*	*1996*
Change in Deficit	*0.9*	*-5.6*	*1.8*	*1.2*	*-0.6*	*-3.0*	*5.0*	*0.4*
Fiscal Impulse Measure	*2.6*	*-3.8*	*1.0*	*0.7*	*-0.5*	*-1.8*	*5.8*	*1.0*

[10] For an analysis of the effects of the inflation rate on government expenditures in Brazil, see Bacha (1995).

3.2 The Underlying Deficit

The fiscal impulse measure from the previous section was constructed with the use of a primary deficit series adjusted for changes in macroeconomic variables with respect to levels observed in the preceding year. An alternative way of assessing discretionary changes in fiscal policy is through the use of long-run equilibrium values for the macroeconomic variables as benchmarks to generate the adjusted deficit series. By comparing this underlying (or macroeconomic adjusted) deficit with the actual deficit, one can estimate the extent to which the observed policy stance deviates from the levels that would prevail if the main macroeconomic determinants of the deficit were at their long-run trend values.

In this paper an underlying primary deficit is constructed in which the tax revenue elasticities employed above in the estimation of the fiscal impulse measure are used to calculate the primary deficit which would have prevailed in a given year if the activity level were at its trend value.[12] Table 3.3 shows the actual nonfinancial public sector primary deficit, along with the estimated underlying primary deficit.

Table 3.3

Brazil: Actual and Underlying Primary Deficit, 1989-1996

(In percent of GDP)

	1989	*1990*	*1991*	*1992*	*1993*	*1994*	*1995*	*1996*
Actual Deficit	*1.0*	*-4.6*	*-2.8*	*-1.6*	*-2.2*	*-5.3*	*-0.3*	*0.1*
Underlying Deficit	*2.7*	*-4.3*	*-3.8*	*-1.8*	*-1.8*	*-4.7*	*0.2*	*0.6*

[11] Appendix 2 presents a detailed discussion on the construction of the fiscal impulse measure.

[12] The GDP trend was obtained with the use of the HP-filter proposed by Hodrick and Prescott (1981). The details are presented in Appendix 2.

3.3 A Reassessment of Past Fiscal Policy Episodes

To what extent would the above derived indicators affect the assessment of past fiscal policy episodes presented in Section 2? Both the adjusted and the underlying deficits show, on average, a more expansionist fiscal policy stance than the actual deficit during the period 1989-1996.[13] Average values, of course, conceal important differences within the period. While the adjusted and underlying deficit series indicate higher deficits or lower surpluses when compared to the observed values for 1989-90 and 1994-96, they also show that the actual deficit significantly underestimates the primary balances of 1991-92. For 1993, there is no significant difference between the actual and the adjusted deficits, but the underlying deficit shows a surplus lower than the value that was in fact observed. This was an year in which there was a high rate of real GDP growth and a significant increase in the inflation rate with respect to the previous year, causing the effects on revenues and expenditures to cancel out in the construction of the adjusted deficit. As for the underlying deficit, just the first effect is captured since the adjustment occurs only with respect to the activity level (see Tables 3.1 and 3.3, and Figures 3.3 and 3.4).

The same kind of conclusion emerges from the analysis of Table 3.2, which shows an average fiscal impulse of 0.6 percent of GDP for 1989-96, as opposed to the neutral fiscal policy stance suggested by the average change in the actual primary deficit during the same period.

Again, period averages conceal important differences in single years. The estimated fiscal impulse measure for 1989, for example, shows a much more expansionist stance than the actual change in the primary deficit suggests. While the actual deficit increased by about 0.9 percent of GDP with respect to the previous year, the estimated fiscal impulse measure was virtually three times bigger. That difference could probably be explained by the high rate of real GDP growth and the substantial acceleration of inflation in 1989. Similarly, for 1990 the estimated fiscal

[13] The average values of the actual, adjusted and underlying primary deficits in Tables 3.1 and 3.3 are, respectively, -2.0 , -1.3 and -1.6.

Figure 3.3
Actual and Adjusted Primary Deficit
(In percent of GDP)

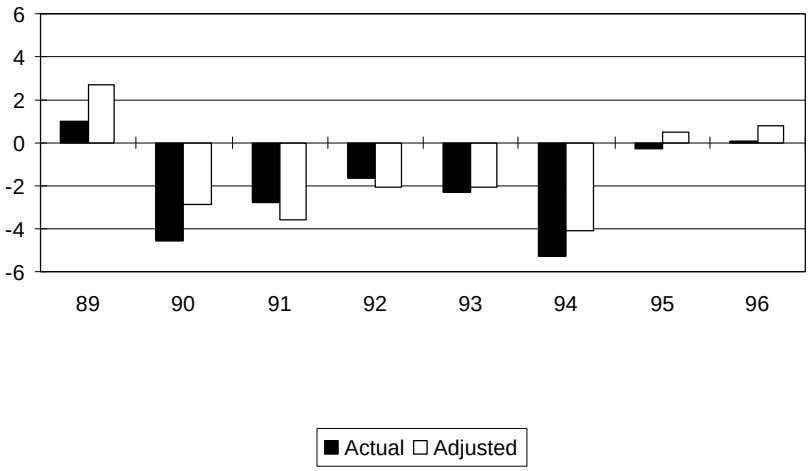
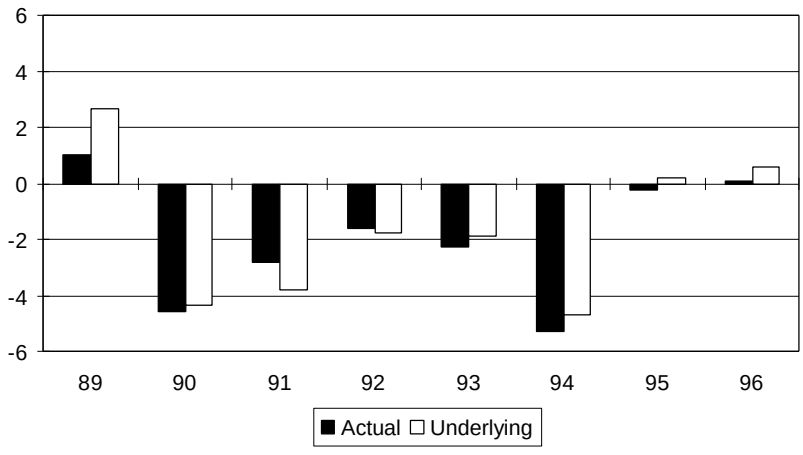


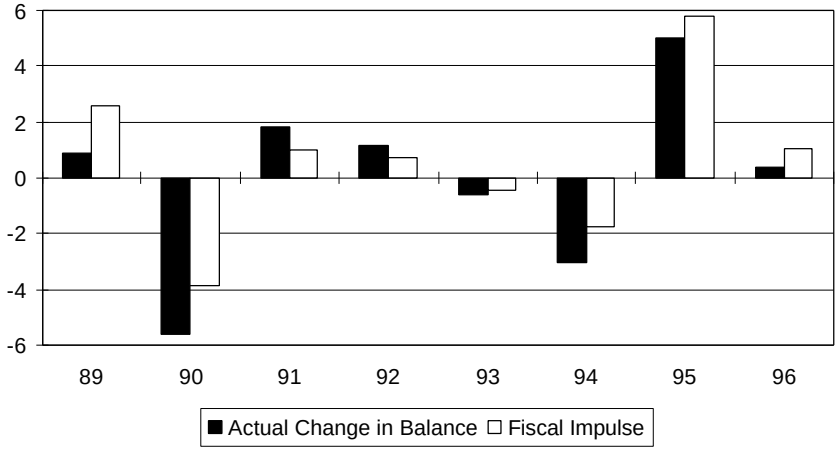
Figure 3.4
Actual and Underlying Primary Deficit
(In percent of GDP)



impulse measure shows a less contractionist fiscal policy than the actual change in the deficit does. This result, however, should possibly be attributed to the temporary increase in the tax burden in

the context of the first Collor Plan, rather than to effects of the economic cycle on tax revenues and expenditures series (see Table 3.2 and Figure 3.5).[14]

Figure 3.5
Actual Change in Primary Deficit and Fiscal Impulse Measure (In percent of GDP)



For both 1991 and 1992 the changes in the actual deficit show a more expansionist policy stance than the estimated fiscal impulse measure suggests. This is particularly the case of 1991, when the change in the observed deficit is almost twice the estimated fiscal impulse measure. The difference can be explained by the effect on tax revenues of the virtual stagnation in real GDP during these two years. This effect more than compensated the impact on expenditures of the acceleration in the inflation rate following the breakdown of the second Collor Plan in mid 1991.

The two indicators are significantly different again during the period that followed the launching of the *Real* Plan. The fiscal impulse data presented in Table 3.2 show that the change in the observed deficit overestimates the fiscal contraction of 1994, and underestimates the fiscal expansion of 1995-96. In fact, when measured by the estimated fiscal impulse the contraction in 1994 was less than two thirds of the change in the observed deficit. That can be explained by the

[14] Adjusted revenues are lower than actual revenues in 1990, despite the sharp contraction in real GDP observed in that year (See Appendix 2).

record rate of real GDP growth of 6 percent during the year, which increased tax collection by more than 2 percentage points of GDP with respect to 1993. The impact of GDP growth on adjusted revenues more than compensated the fact that adjusted expenditures were lower than actual expenditures because of the sharp drop in the inflation rate during 1994.

Finally, for 1995-96 the estimated measure shows that the fiscal stance deterioration was larger than suggested by the conventional indicator.[15] While the observed deficit showed a cumulative increase of 5.4 percent of GDP, the estimated fiscal impulse in these two years reached about 6.8 percent of GDP. In both years, the difference between the two indicators can be explained by the fact that adjusted revenues were systematically lower than actual revenues. Again, this effect more than compensated the fact that adjusted expenditures were lower than actual expenditures.

What are the implications of the above trends for the sustainability of fiscal policy in Brazil? As the next sections will show, the present fiscal stance is hardly sustainable. Unless very favorable assumptions are made, current tax rules and spending programs will cause the public debt to GDP ratio to grow very rapidly in the near future.

[15] In fact, the quarterly data presented in Figure A2.10 in Appendix 2 show that the deterioration in the fiscal policy stance started in the last quarter of 1994.

4. DEBT DYNAMICS

The understanding of the determinants of public-sector debt dynamics is a key step towards a fuller assessment of fiscal sustainability in the Brazilian economy. After a discussion of the consequences of the current macroeconomic policy mix, this section calls attention to specificities of the Brazilian debt dynamics process and resorts to a simulation model to envisage the implications of different fiscal policy scenarios.

4.1 Policy Mix and the Public-Sector Net Debt

For many years, macroeconomic policy in Brazil has been marked by a combination of lax fiscal policy and high interest rates. During the long high-inflation experience of the eighties and early nineties, extremely high interest rates were used to curb currency substitution and to keep outright hyperinflation at bay.[16] But not even the successful stabilization plan of 1994 managed to reduce the asymmetry of the macroeconomic policy mix. As shown in Figure 4.1 below, the demand boom that followed the launching of the stabilization plan in mid-1994 could only be choked by soaring interest rates, given the sharp fiscal deterioration of 1995, already analyzed in Sections 2 and 3 above. Though interest rates have been brought down steadily since the last quarter of 1995, the basic rate was still above 20% by the end of 1996. The medium- to long-run consequences of that kind of asymmetrical policy mix are very well known. For the purposes of the present section, the important ones are those related to the perverse implications for the dynamics of the public sector debt.

As shown in Table 4.1, the public-sector net debt has increased from 28.5 percent of GDP in December 1994 to 34.4 per cent in December 1996. More than two thirds of that increase stemmed from the net debt of the federal government and the Central Bank, as may be observed

[16] See Carneiro and Garcia (1994).

Figure 4.1
Brazil: Annualized Basic Real Interest Rate (Monthly Average)
August 94 - December 96

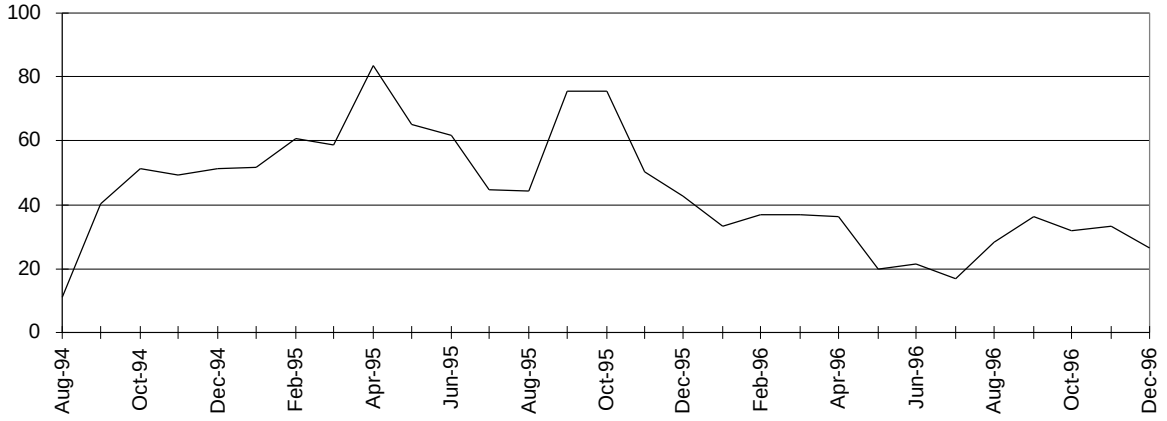


Table 4.1
Brazil, Non-Financial Public-Sector Net Debt, 1994-1996
(in percent of GDP)

	December 1994 (A)	*December 1995 (B)*	*December 1996 (C)*	*Change 94-96 (C) - (A)*
(1) Federal Government & Central Bank Net Debt	*12.3*	*13.0*	*16.4*	*4.1*
Gross Debt	*31.4*	*32.8*	*39.1*	*7.7*
Domestic Debt	*18.1*	*22.0*	*29.8*	*11.7*
Foreign Debt	*13.3*	*10.8*	*9.3*	*-4.0*
(-) Foreign Reserves	*7.2*	*7.4*	*7.7*	*0.5*
(-) Other Assets	*11.9*	*12.4*	*15.1*	*3.2*
(2) State and Municipal Governments Net Debt	*9.5*	*10.4*	*11.9*	*2.4*
Domestic Net Debt	*9.2*	*10.1*	*11.6*	*2.4*
Foreign Net Debt	*0.3*	*0.3*	*0.4*	*0.1*
(3) Public Enterprises Net Debt	*6.7*	*6.5*	*6.1*	*-0.6*
Domestic Net Debt	*4.8*	*4.8*	*4.0*	*-0.8*
Foreign Net Debt	*1.9*	*1.7*	*2.0*	*-0.1*
Public-Sector Net Debt [(1) + (2) + (3)]	*28.5*	*29.9*	*34.4*	*5.9*

Source: Banco Central do Brasil

in the last column of the table. The evolution of federal net-debt figures should be seen with a grain of salt. Though the federal net debt has really increased much less dramatically than the federal gross debt since 1994, the slower increase conceals a deterioration of the quality of the net-debt that deserves some attention.

High interest rates have had a severe impact on the accounts of state and municipal governments. And the combination of high interest rates and the sudden end of the high-inflation regime precipitated the already expected going under of the most fragile part of the banking system, largely constituted by banks controlled by the states. In order to avoid a major banking crisis, the Central Bank launched in late 1995 a program to bail out large banks which were facing problems. At least three big private institutions had been rescued by April 1997, roughly in the same way: the Central Bank assuming the bad part of the insolvent bank's balance sheet and forcing the sale of the remaining part to a sounder institution, properly persuaded to participate in the operation by the access to a low-interest credit line. Something similar is now being done with the insolvent state banks, after a long political battle with governors that insisted in keeping control over their banks after the bail out operation.

But, having lost that battle, state governors won a much more important one, as they managed to extract from the federal government a generous restructuring of the states' sizable outstanding debt. As high-interest state bonds are being swapped for lower-interest federal bonds, the states' debt is being largely converted into debt to the federal government and, therefore, being subtracted from the federal gross debt in the net-debt figures. Analogously, non-performing assets of the insolvent banks transferred to the Central Bank, as well as low-interest loans extended to the institutions that absorbed those banks, are also being deducted from the federal gross debt. As the importance of those various assets has been growing very rapidly there is every reason to believe that the quality of the federal net-debt figures is being negatively affected.

In fact, the last column of Table 4.1 shows an increment of 11.7 percent of GDP in the gross domestic debt of the federal government and the Central Bank, partly compensated by a reduction in their foreign debt equivalent to 4 per cent of GDP. The resulting gross-debt increment of 7.7

per cent of GDP, though still impressive, led to a much smaller increase in the federal net debt, largely because it was offset by an accumulation of "other assets" amounting to 3.2 per cent of GDP.

4.2 "Skeletons in the Closet", Privatization Proceeds and Seigniorage

Besides the macroeconomic policy mix, at least three other factors are bound to be important determinants of the public-sector debt dynamics. The first has to do with the existence of contingent and hidden liabilities that are either expected in some sense or simply pop up unexpectedly. When liabilities of that sort appear, as skeletons taken out of the closet, they become normal registered debt.

In Brazil, the most important of those liabilities stems from the federal guarantee granted to the Mortgage Assistance Fund (*Fundo de Compensação de Variações Salariais*, *FCVS*), administered by the Federal Savings Bank (*Caixa Econômica Federal*, *CEF*).[17] The FCVS was originally designed to stimulate the housing industry by providing insurance to the financial institutions against loss of income by borrowers. Preliminary estimates point to an accumulated deficit of US$ 40 billion for the FCVS, which eventually will have to be assumed by the federal government.[18]

Another liability of that kind stems from the inability of the federal government to collect certain debts that are being considered as assets in its balance sheet. It is highly probable that, in the future, part of the assets which are being subtracted from the federal gross public debt, as just discussed above, may prove to be partially or totally worthless. The states may not fully honor part of their debts to the federal government, or some of the assets transferred to the Central Bank when failing banks were bailed out may prove to be worthless. If and when that happens, the federal net-debt figures will have to be adjusted upwards. Therefore, the writing off of those assets in the federal government balance sheet may well be treated as equivalent to a contingent

[17] See Furuguem et alii (1996).

liability. The still hidden costs of the bailing out of the failing banks and the restructuring of the states' debt are bound to comprise an important part of the "skeletons in the closet".

Another important determinant of the public-sector debt dynamics is the flow of privatization proceeds. Though there have been many important public assets sales, particularly since 1991, only very recently cash payments have become relevant. The first wave of privatization involved auctions in which various kinds of public debt were accepted as payment. Also, most of the enterprises transferred to the private sector belonged to manufacturing industries, with a large part of the assets sales concentrated in the steel and chemical sectors. Since 1994, however, the privatization program has reached a new stage. As the divestiture in the manufacturing industries advanced, the federal government prepared public enterprises in other sectors to be privatized, and started to require cash payments. Three electricity supply companies and CVRD, the big mining concern, have already been privatized. The bulk of the state-owned electricity supply industry and the whole telecommunications industry are now in line to be privatized over the next few years. A sizable part of the privatization of the electricity industry will also involve the sale of assets that belong to the states. Privatization proceeds are expected to reach a peak in 1998 and as much as US$ 80 billion over the period 1997-2002.

The effect of privatization on public-sector debt dynamics will depend, not so much on the flow of privatization proceeds, but on the part of that flow effectively channeled into debt redemption. Though the present government appeared for quite a long time totally committed to using all funds generated by the privatization program to redeem public debt, the commitment seems to have been mollified since the assets sales operations started to involve cash payments. The President has been strongly pressed to spend the new resources in various ways. In early 1997, after some strife within the government over how the resources generated by the sale of CVRD should be used, the President "solomonically" decided that half would be used to redeem debt and the other half to fund low-interest long-term loans to the private sector. However, in July 1997, in

[18] One could also include among such liabilities those that are being accumulated in the wake of new entitlements generated by the social security system, though they could also be treated in a different way, as part of the expected future expenditure flows of the public sector, as will be done in Section 6 below.

the wake of the growing concern with the consequences of the crisis that swept across Southeast Asian economies, the Government decided that it was time to show a stronger committment to fiscal rectitude and announced that the proceeds would be "obsessively allocated" to the redemption of public debt.

Finally, a third important determinant of the public-sector debt dynamics is the extent of the financing that could stem from seigniorage. The Brazilian economy emerged from its very long high-inflation experience with an extremely low monetization ratio. As the *monthly* inflation rate was sharply brought down in mid-1994, from 50 per cent to something around one per cent, a strong remonetization movement was expected. However, the response of the demand for money has been much less intense than anticipated. Almost three years after the launching of the stabilization program, the monetary base is still limited to about 2.8 per cent of GDP. If the monetization ratio remains at such a low mark in the future, the contribution of seigniorage to public-deficit financing is bound to be extremely limited.[19]

4.3 Simulating Debt Dynamics

The analysis of the dynamics of the public sector debt may be separated into two parts. The first one involves the determinants of the evolution of the primary balance. Given the path of the primary balance over time, one may then examine how the debt stock variables are bound to evolve. The simulation analysis of this section will be confined to exercises based on exogenous scenarios for the primary balance path. In Section 6, other exercises, based on a more complete version of the simulation model, will reexamine the dynamics of public-sector debt, using endogenously generated primary balance paths.

The main features of the simulation model used in this section may be described as follows.[20] Given the rapid advancement of the privatization process and the extensive ongoing restructuring

[19] See Pastore and Pinotti (1997).
[20] A detailed description of the simulation model may be found in Appendix 3.

of state and municipal debts -- which are being transformed into obligations to the federal government, as just seen above --, the aggregate public-sector debt is actually in a state of flux. It was therefore considered unwise to break it down into the traditional three debt stocks: federal, state & municipal and public enterprises'. Instead, the aggregate public-sector net-debt was separated in the model into local-currency denominated registered net-debt (*BR*), foreign-currency denominated registered net-debt (*BRD*) and external net-debt (*D*). Interest rates on the various debt-stocks are all referred to an exogenous external rate. The highest spread (*s*) is paid on *BR*. Given the covered exchange-rate risk, a smaller spread is paid on *BRD*. A fixed spread is paid on *D*, since the current cost of the external net-debt is highly dominated by the cost of Brady bonds and the return on the stock of foreign reserves.

The base year is 1996 and the simulation period extends to 2002, the final year of the next presidential term. Given an exogenous path for the primary balance of the public sector (d_p), the model determines the volume of interest payments (*INT*) and the operational balance (d_{op}) for the first year. The debt stocks in the first year are then determined, taking into account the operational balance as well as three other factors: the expected volume of public assets sales from privatization (*AS*), the possible emergence of contingent and hidden liabilities (*HD*) and the importance of seigniorage. The resulting change in indebtedness is distributed in fixed proportions between *BR* and *BRD*. Having obtained the value of the debt stocks for the first year, the model repeats the exercise for the second year and so forth.

As the dynamics of the public-sector debt depends to a great extent upon the evolution of interest rates over time, special care was dedicated to the determination of the interest spread variable (*s*). The idea was to assure that, in each scenario, the evolution of the interest spread would be fairly consistent with the primary balance path. Though its reasonable to assume that a sounder fiscal stance, as measured by the primary balance, should allow lower interest rates, the actual extent of the response of interest rates to an improvement in the fiscal accounts is certainly open to dispute. But that is no reason to avoid a systematic treatment of the problem. So, just in order to impose consistency between the primary balance and the interest spread, the model simply determines the interest spread (*s*) as an isoelastic function of the primary balance. The sensitiveness of the

simulation results to different views on the probable response of interest rates to an improvement in fiscal stance may therefore be explored by simply changing the value of a parameter.

Three different scenarios were considered, their differences being the assumptions about the evolution of the primary balance over the simulation period. In the first scenario, there is no fiscal adjustment whatsoever. The zero primary balance observed in 1996 is repeated year after year till 2002. The second scenario has the primary balance improving slowly, though steadily, over the simulation period, reaching 2 percent of GDP in 2002. Finally, in the third scenario, the primary balance jumps to 1.5 per cent of GDP in 1997 and stays at this level till the end of the period under consideration. As shown in Table 4.2, the same set of assumptions about the evolution of public assets sales, emergence of contingent and hidden liabilities and external interest rate was adopted in all three scenarios. Also invariant were the assumptions about inflation, exchange-rate policy and growth performance during the period. Though this uniformity may certainly have made some of the scenarios less consistent than they could have been, it assured a clearer interpretation of the simulation results. Besides, these simulations can be easily complemented by other exercises to check the sensitivity of the obtained conclusions to refinements in some of the assumptions.

Simulation results are presented in a set of graphs in Figure 4.2. The first graph, on the top left, serves as a reminder of the basic differences among the three scenarios: the assumptions about the evolution of the primary balance over the period. In Scenario 1, in which a no-improvement path is envisaged, the public-sector net debt, shown on the lower right graph, jumps from 34.4 percent of GDP in 1996 to 50 percent in 2002. Scenario 3, that assumes an effort that leads to a primary surplus of 1.5 percent of GDP in 1997, which is maintained over the rest of the period, tells a totally different story. The public-sector net debt as a proportion of GDP would rise in 1997 and start to fall from 1998 on, reaching 32.2 percent of GDP in 2002, somewhat below the base year mark. Scenario 2, represents a halfway case, in which the primary balance describes a slow, though steady, upward movement over the period, reaching 2 percent of GDP in 2002. The net debt would be rising till 2001 but would fall back slightly to 36.2 percent of GDP in 2002.

Table 4.2
Main Assumptions Common to the Three Scenarios

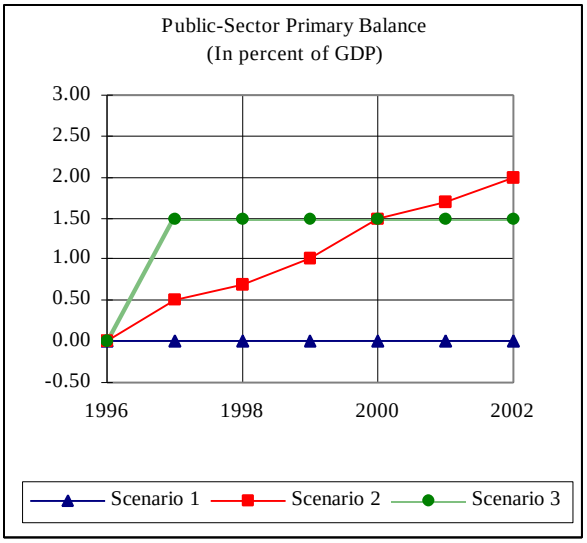
Year	*Public Assets Sales (% of GDP)*	*Emergence of Contingent and Hidden Liabilities (% of GDP)*	*GDP Growth Rate (%)*	*Inflation Rate (%)*	*Foreign-exchange Depreciation Rate (%)*	*External Interest Rate (%)*
1997	*2.0*	*1.0*	*4.0*	*6.0*	*8.0*	*5.9*
1998	*2.5*	*1.0*	*4.5*	*5.5*	*8.0*	*6.1*
1999	*1.5*	*1.0*	*4.5*	*5.0*	*7.5*	*6.1*
2000	*1.0*	*1.0*	*4.5*	*4.5*	*6.5*	*6.1*
2001	*1.0*	*1.0*	*4.5*	*4.0*	*6.0*	*6.1*
2002	*1.0*	*1.0*	*4.5*	*4.0*	*5.5*	*6.1*

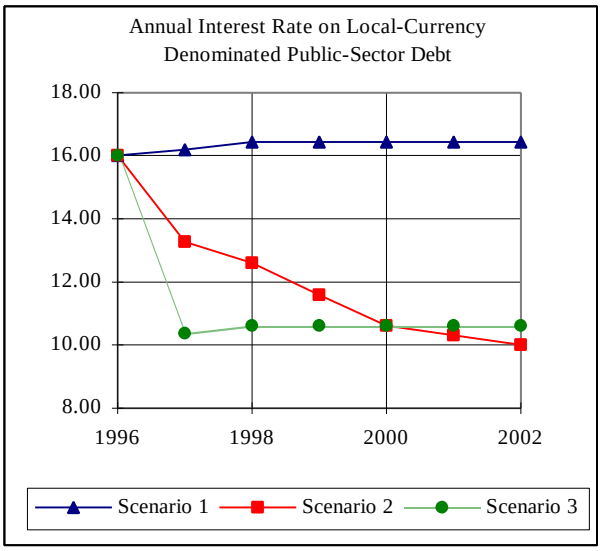
It should be noticed that the zero primary-balance path assumed in Scenario 1 leads to a such a strong increase in the net-debt as a proportion of GDP -- despite the vigorous flow of privatization proceeds --, partly because the precarious fiscal situation prevents the interest rate from falling, in contrast to what happens in the other two scenarios, as may be seen in the top right graph of Figure 4.2. The widely different consequences for the evolution of both the volume of real interest payments and the operational balance are shown in the two graphs in the mid-row of the figure. On the other hand, the debt dynamics depicted in Scenario 1, worrying as it certainly is, may actually be underestimating the rise of indebtedness that would result from a zero primary-balance path over the period. In fact, as stressed above, the invariant set of assumptions described in table 4.2 and adopted in the three scenarios, helped to provide a controlled experiment, but at the cost of compromising the consistency and plausibility of some of the scenarios. It is highly implausible that the macroeconomic policy mix of Scenario 1 could be consistent with the common assumption adopted for GDP growth over the period. More likely, such a policy mix would at best be consistent with a much lower average GDP growth rate from 1997 to 2002. And that would mean an even faster increase in the public-sector net debt as a proportion of GDP.

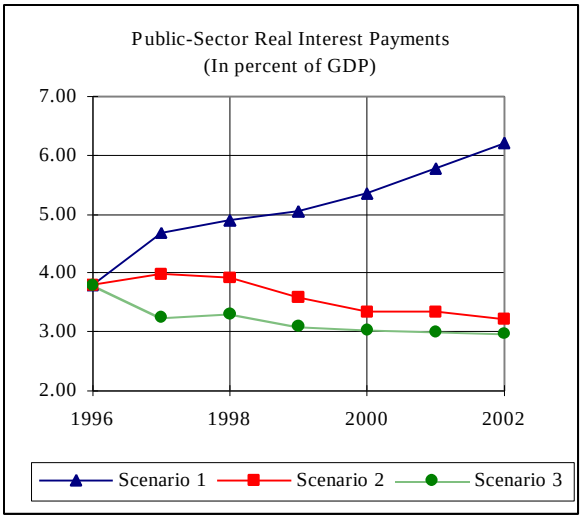
Chart 4.2

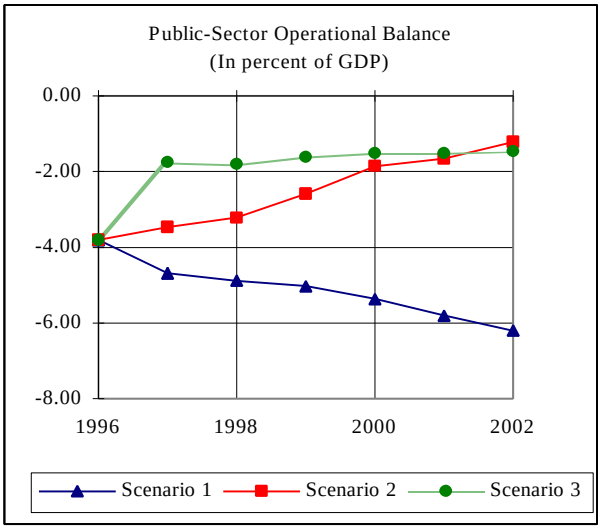
Brazil: 1997-2002

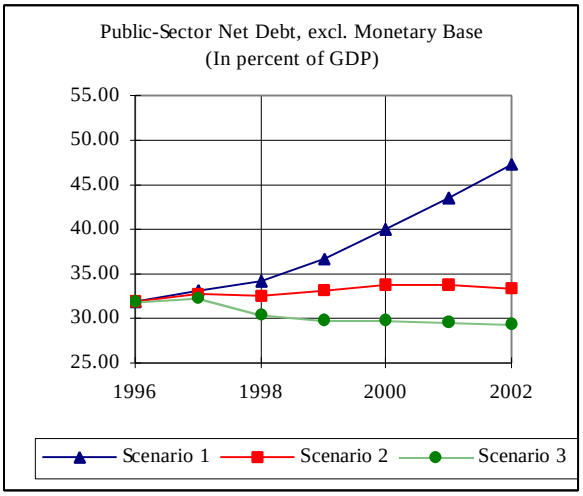
Results of the Simulation Exercises: Three Scenarios

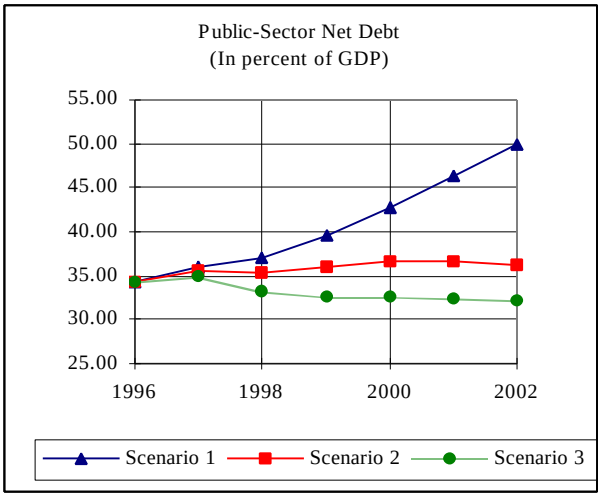












If, for example, one assumes -- optimistically, under the circumstances of Scenario 1 -- that the GDP growth rate will remains at 3 per cent per year during the whole period, the public-sector net debt in 2002 jumps, not to 50 percent of GDP, as seen above, but to 54.2 percent of GDP.

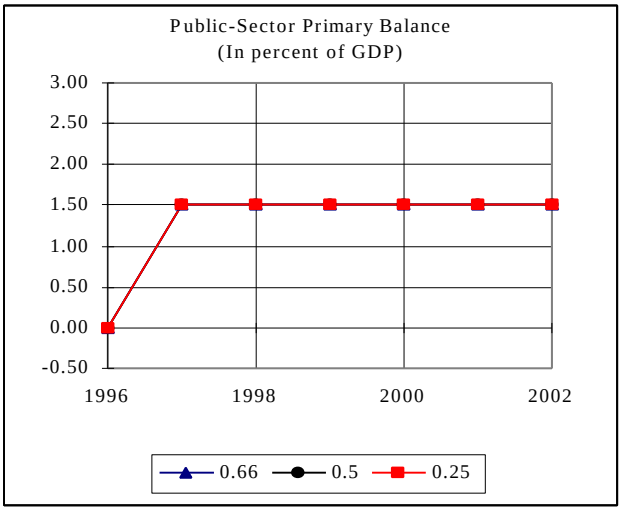
Another important point to be noticed is that the simulations assume in all three scenarios that $^3/_4$ of the total proceeds from privatization are used to redeem debt. The underlying assumptions are that federal assets-sales proceeds -- comprising 75 percent of the total expected privatization proceeds -- will be entirely set side for debt redemption, but that, in contrast, the remaining 25 percent, that should accrue to state governments, will be wholly used to fund additional expenditures. What would happen if, instead, only half of the federal proceeds could be set aside for debt redemption, in line with the policy the Government was tempted to adopt till mid-1997. That would bring down the the fraction of total privatization proceeds used to redeem debt from $^3/_4$ to $^3/_8$. In Scenario 1, for example, that change would make the public-sector net debt to reach 54.2 percent of GDP in 2002, under the GDP growth assumptions of Table 4.2, and to 58.6 percent of GDP, under the more realistic growth assumptions adopted in the last paragraph.

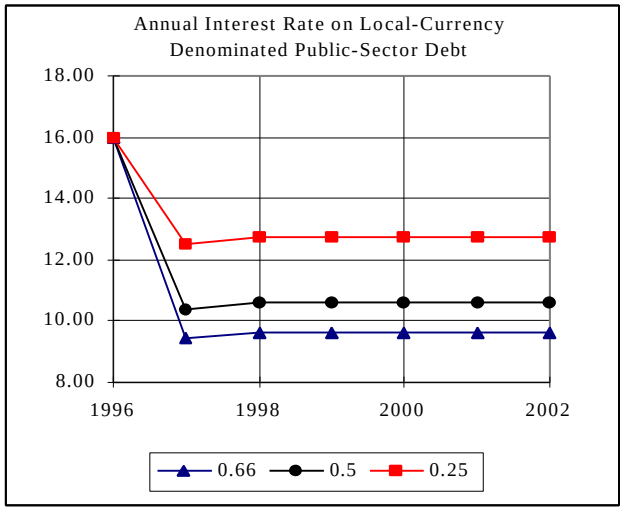
The possible evolution of the interest rate over the period deserves a closer look. As was seen above, in order to impose consistency between the primary balance and the interest rate, the simulation model assumes the interest spread (s) to be an isoelastic function of the primary balance. In all simulations considered so far the elasticity (a) of that function was presumed to be equal to $^1/_2$. What would be the sensitivity of the simulation results to changes in the value of that parameter? Figure 4.3 presents results of simulations for Scenario 3 -- which assumes the most favorable primary-balance path -- for different values of a. Besides $^1/_2$, two other values, $^1/_4$ and $^2/_3$, are also considered. The faster fall in interest rates implied by the latter value would lead to a public-sector net debt in 2002 of 30.9 percent of GDP, instead of 32.2 percent, obtained when the value attributed to a was $^1/_2$. If, on the other hand, the parameter is set equal to $^2/_3$, the end-year net debt would reach 35.3 percent of GDP.

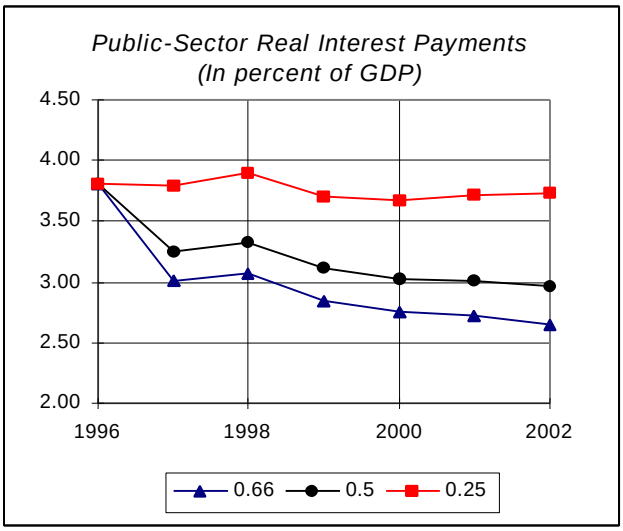
FIGURE 4.3

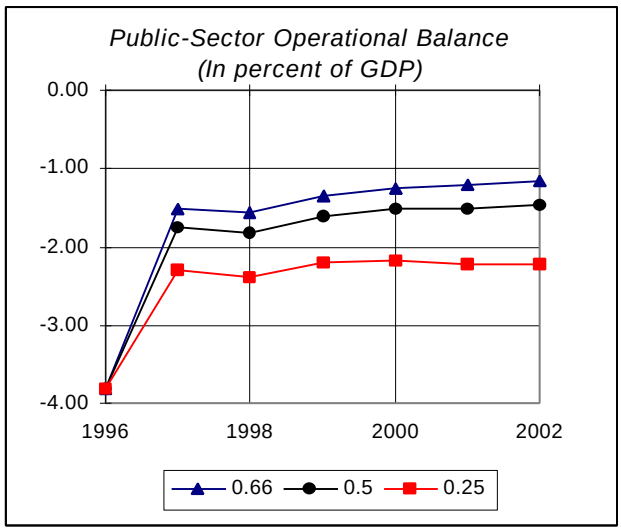
Brazil, 1997-2002

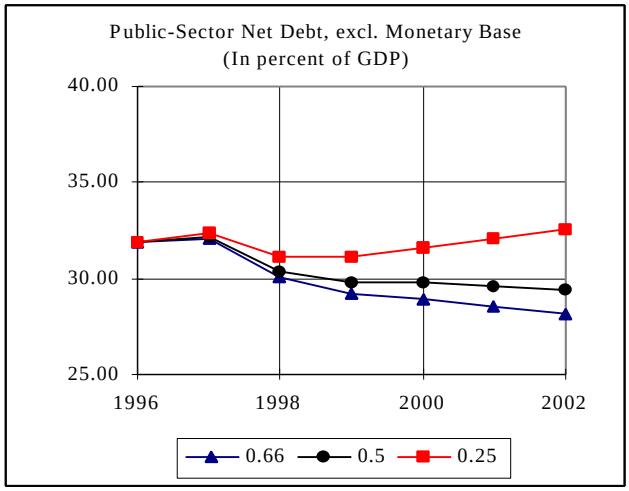
Results of the Simulation Exercises for Different Values of a (Scenic C)

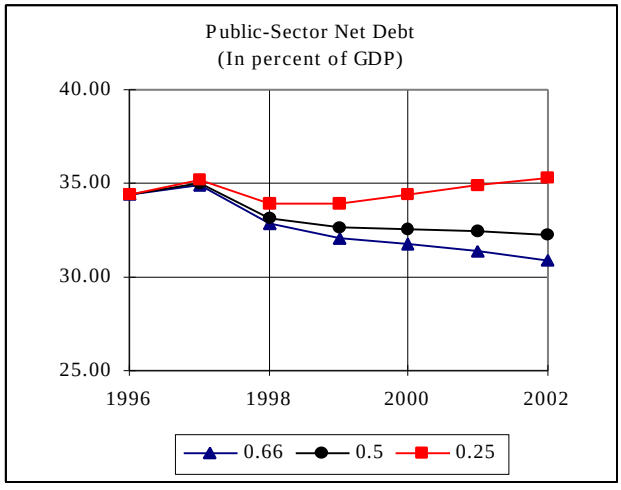












A final observation concerns the sensitivity of the results to the assumption on the evolution of the external interest rate. If the rates assumed in Table 4.2 are adjusted upward by one percentage point, the public-sector net debt of 2002 increases by 2.1 percent GDP in Scenario 1 and between 1.8 and 1.9 percent of GDP in the other two scenarios. That might serve as a rough proxy of the degree of vulnerability of the fiscal accounts to a rise in external interest rates.

4.4 Plausibility of the Assumptions on the Evolution of the Primary-balance

The simulation exercises discussed in the present section were based on scenarios that assumed exogenous primary-balance paths. Though that proved to be a convenient way to concentrate the focus of the analysis on the debt-dynamics process and to explore the relative importance of its main determinants, important questions were left unanswered. How plausible are the assumptions on the primary-balance path adopted in those scenarios? What is the likely evolution of the primary balance over the coming years after all? Those are the main questions addressed in the next two sections.

5. PRIMARY BALANCE: RIGIDITIES AND STRUCTURAL TRENDS

The possibilities for improvement in the public sector primary balance in the coming years are constrained by severe rigidities and adverse structural trends. This section traces the core of those difficulties to the constitutional reform of 1988 and analyzes the extent of the most serious constraints.

5.1 Fiscal Consequences of the 1988 Constitution

A large part of the roots of the current fiscal problems in Brazil can be found in the difficulties faced by the country during the redemocratization period, after the end of the military regime in early 1985. Tancredo Neves, an able and influential politician who had been elected the first president of the civilian regime by an impressive coalition, died before taking office, opening the way to a considerably less endowed and less influential vice-president. During the first three years of his Administration, the Congress drafted the new Constitution, which was finally promulgated in late 1988. Unfortunately, the long and delicate negotiations which brought about the new Constitution took place exactly when the federal government was notably weak, due to the shortcomings of a president accidentally inducted into office, and continuously mobilized by the quest for a higher degree of legitimacy. Therefore, the interests that should have been defended by the central government were not properly taken into consideration.

In fact, the federal government had become even weaker after the failure of two stabilization attempts, in 1986 and 1987. As the complex political alliance behind Tancredo Neves could not be maintained, a new coalition, strongly influenced by state and local governments, approved a Constitution which redesigned the previous system of fiscal federalism. The central government lost a substantial part of its tax revenue to state and local governments, without being able to transfer to them any significant part of its spending programs. And as the new fiscal system was phased in, state and local governments not only quickly adjusted their spending to their fast growing revenue. They in fact started to spend well above their enlarged means. It was not only

an inconsistent fiscal federalism arrangement that was established. As well put by Bacha and Lamounier (1992), “the abstractly desirable goal of decentralization prevailed over any consideration of timing, further weakening the central government at a moment when the Brazilian inflationary monster seemed again untamable” (p. 23).

In addition to introducing an inconsistent fiscal federalism arrangement, which amplified the Union's burden in the required fiscal adjustment effort, the new Constitution did not endow the state which emerged from the long military period with "a coherent [...] machinery against the multiple pressures of an emerging mass democracy, of a huge electorate [and] of a new generation of independent and aggressive labor leaders"[21]. In fact, it amplified the scope for the historical rent-seeking behavior of many segments of the Brazilian society, imposing on the federal budget a considerable additional burden, exactly when the Union's fiscal resources were being reduced. Some of the most important components of that burden will be analyzed below.

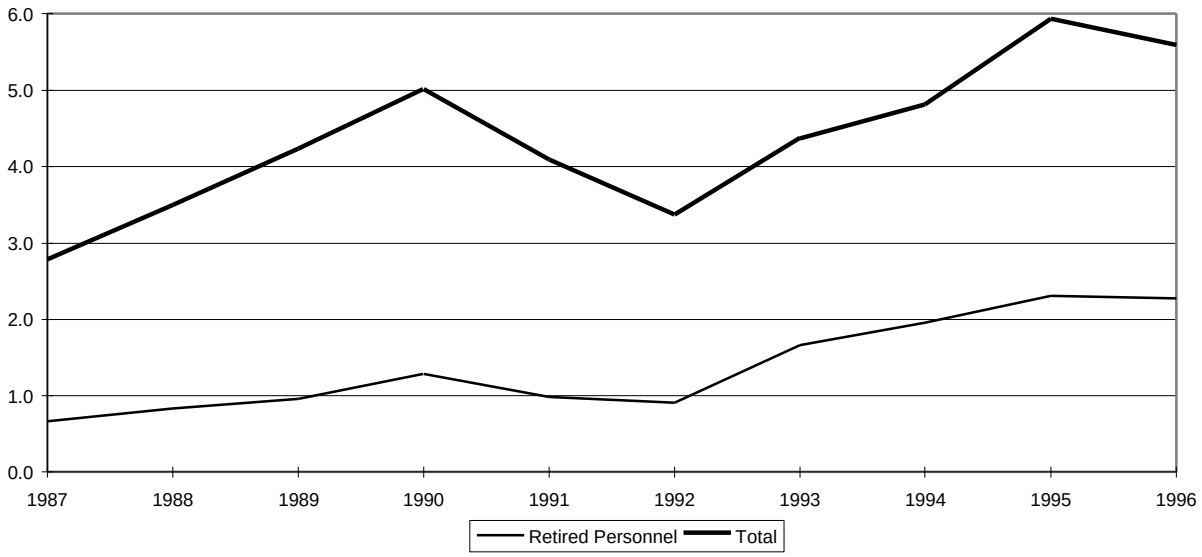
5.1 Payroll Rigidities

The new Constitution brought a very high degree of rigidity to public sector payroll expenditures. All public employees of federal, state and local governments in official civil-servant careers were granted lifetime job tenure. At the federal level, the establishment of a single civil-service code resulted in the extension of all compensation privileges of the official civil-servant career to about 400 thousand employees, previously hired under the rules of private-sector working contracts.[22] The impact on the cost of retirement benefits was particularly important. In contrast to private-sector employees, all public servants are now entitled to a retirement pay that is in general at least equivalent to the value of the last paycheck before retirement. As seen in Figure 5.1, federal payroll expenditures, which includes payments to both active and retired personnel, almost

[21] Bacha and Lamounier (1992, p. 26).
[22] See Velloso (1996b).

doubled as a proportion of GDP between 1987 and 1996. The retired-personnel payroll component was more than trebled during the period.

Figure 5.1
Brazil: Federal Government Payroll Expenditures, 1987-1996
(In percent of GDP)



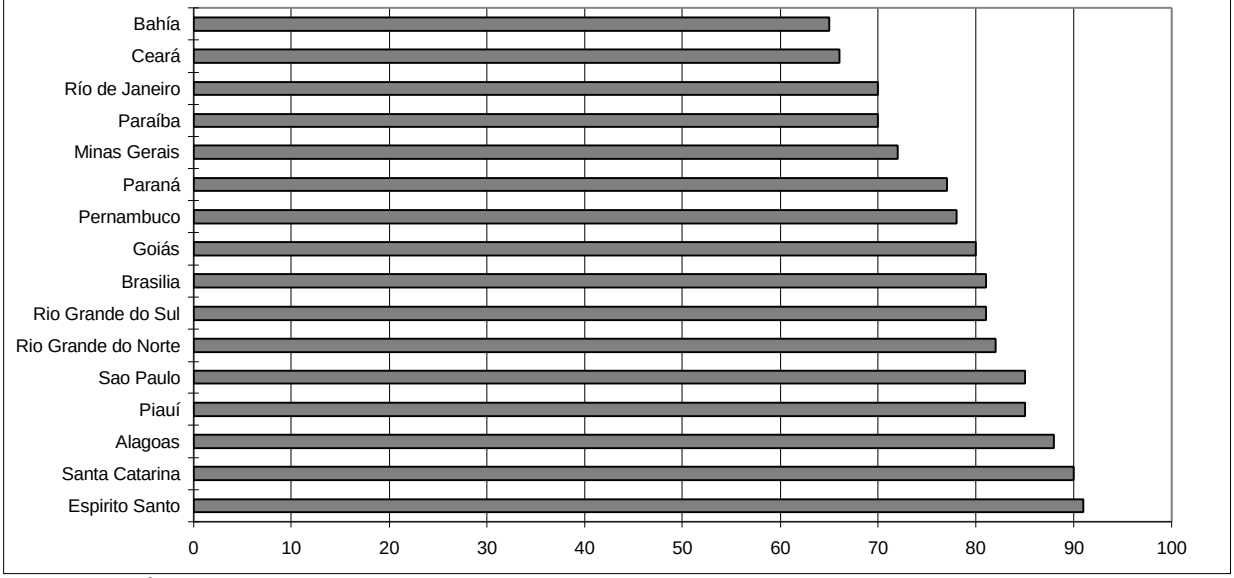
Source: Ministério da Administração e da Reforma do Estado

Something similar happened with state and local governments that also had to adopt a unified civil-service code. As the generalized option was to transfer all employees to the official career, state and local governments became responsible for their retirement benefits without having made any adequate provisions for that. All state governments and more than one thousand local governments offer special social security benefits to their employees. Most of those social-security plans are notoriously generous and highly inconsistent from an actuarial perspective. All the evidence available points to the mounting burden those benefits have been representing in the budgets of infra-national governments.[23] As shown in Figure 5.2, in some of the most important states payroll expenditures consumed more than 80 percent of the net revenue in 1995.

[23] See Ministério da Previdência e Assistência Social (1997) and Rigueira (1997).

It is unlikely that the increase in payroll expenditures will be easily reverted in the near future, as the possible erosion of real salaries by inflation has been much reduced in the wake of the very success of the stabilization plan. In addition, expenditures with retired-personnel, especially in state and local governments, are expected to show a very fast rate of growth in the near future. The Cardoso Administration has been trying to extract from Congress

Figure 5.2
Total State Payroll Expenditures, 1995*
(In percent of the Net Revenue)



Source: Ministério da Administração e Reforma do Estado
** Includes retired-personnel payroll*

constitutional amendments that could slowly reduce the rigidities of payroll expenditures at all three government levels. However, strong vested interests in Congress conspire against such amendments. The extent to which the Government will be able to back out without compromising the idea of turning payroll expenditures considerably less rigid is not yet clear.

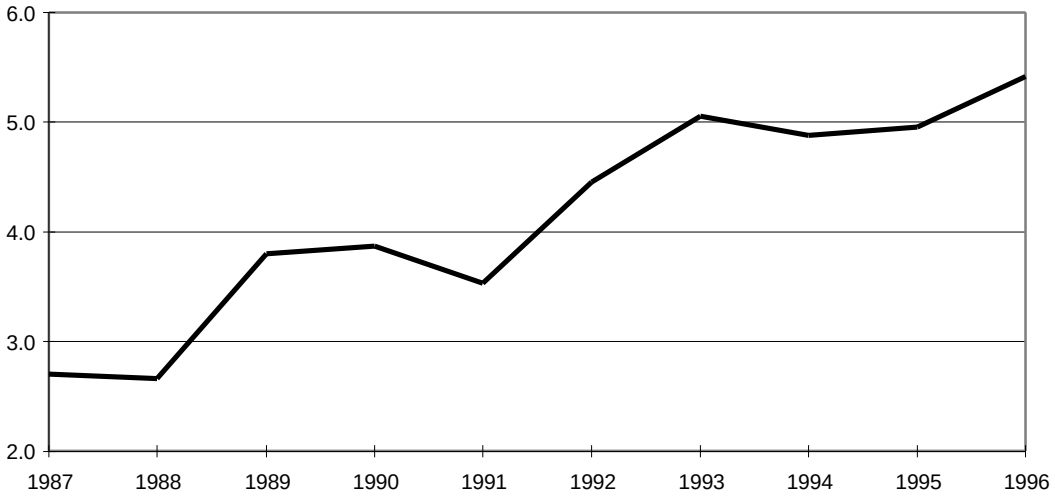
5.2 Social Security Benefits and Health Assistance Programs

"Redemption of the social debt" was a key expression during the drafting of the 1988 Constitution. In practice it meant putting the expansion of entitlement programs in a fast track.

Social insurance benefits were significantly extended, an income-maintenance program for unemployed workers was created and the right to free access to health care programs was established.

The fiscal pressure coming from the present social security system in Brazil probably is the most important aspect to be considered in the assessment of the budgetary consequences of structural trends. As seen in Figure 5.3, federal expenditures with social security benefits doubled between 1987 and 1996. Such a substantial increase can largely be attributed to the effects of the 1988 Constitution. The unit values of all benefits were revised, in order to restore their original values in terms of minimum wages, and a floor of one minimum wage for all social insurance benefits was established. In addition, 5 million retirement benefits in rural areas, earned by beneficiaries which had not contributed to the social insurance system, had to be absorbed by the system since 1988.[24]

Figure 5.3
Brazil: Federal Expenditures with Social Security Benefits
1987-1996
(In percent of GDP)



Source: Secretaria de Política Econômica, Ministério da Fazenda

[24] On the Brazilian social security system, see Oliveira and Beltrão (1995), and Além and Giambiagi (1997).

As with personnel expenditures, it is unlikely that the recent increase in the expenditures with social security benefits will be reduced in the near future. Since most of this increase resulted from a higher quantum of benefits, the expenditures could only be reduced if there is a change in the present set of rules concerning social security entitlements and contributions.

Another important source of rigidity has been the very fast expansion of expenditures with health assistance programs in the wake of the universalization of entitlements imposed by the 1988 Constitution. The unlimited legal right to free health care has created a big open-ended expenditure program and has put the installed health-care supply capacity under great strain. Queuing and deplorable quality of the health care standards became inevitable. Worried with the growing sensitivity of public opinion to the flow of bad news stemming from the health programs, the federal government has been under constant pressure to increase the budgetary allocation of those programs, despite mounting evidences of mismanagement of funds, especially in the reimbursement of private institutions authorized to provide the demanded health-care services. Given the limited possibility of increasing the tax revenue in a more commendable fashion, the federal government has resorted to the earmarked revenue of newly imposed bad-quality turnover taxes.[25]

5.3 Limits to a Heavier Tax Burden and Sustainability of Fiscal Repression

With a gross tax burden in excess of 30 percent of GDP, Brazil occupies a clear outlying position among countries with a similar stage of development. There seems to be little room for a further significant increase in the tax burden as a fiscal adjustment measure, particularly when the country will have to make every effort to become a more competitive economy. Besides, the quality of the tax system has been negatively affected in the last few years, as the federal government tried -- with considerable success -- to recover the revenue loss imposed by the 1988 Constitution.

[25] As the new CPMF, a provisional turnover tax on financial services that is expected to generate an annual revenue of 0.8 percent of GDP earmarked to the financing of health programs.

Facing the need to make a permanent fiscal adjustment, the central government has been constrained by the obligation to transfer to lower level governments a large proportion of the revenue stemming from the personal income tax, profit tax and excise taxes on industrialized products, knowing in advance that any transfer will be immediately spent by state and local governments. That has created a search for exotic federal taxes, capable of generating resources not shared with lower level governments. And that has brought about a serious deterioration in the quality of the tax system. Also, recurrent piece-meal changes in the tax policy and a *sine die* postponement of a comprehensive tax reform have contributed to turn the tax system much more complex than it probably could be.

If there is so little hope of a sizable relief from the revenue side, there are also strong reasons to believe that keeping expenditures under control will have to depend less and less on the application of simple fiscal repression measures, that are bound to become untenable after being extensively used for so many years. There is ample evidence that the political costs of recurrent fiscal repression are in fact contributing to erode the already precarious political coalition that seems to support a major fiscal adjustment effort in the country. Therefore, structural reforms that could really change the nature of the present fiscal regime have become even more urgent than a few years ago, notwithstanding the present widespread skepticism about the political feasibility of implementing reforms of such breadth in the very near future.

As will be seen in the next section, even under reasonably optimistic assumptions on the possible evolution of the determinants of the primary balance, in scenarios that do not contemplate a major fiscal reform, the public-sector debt is bound to show a rapid increase over the period under analysis.

6. DEBT DYNAMICS WITH ENDOGENOUS PRIMARY-BALANCE PATHS

In this section, the simulation model used in Section 4 is extended in order to allow an endogenous determination of the primary balance. Results of simulation exercises based on a set of three different scenarios -- now also involving assumptions about key determinants of the primary balance -- are discussed. Their implications in terms of debt dynamics are then examined and sensitivity-analysis exercises used to pinpoint some important fiscal-adjustment policy issues.

6.1 Simulating the Evolution of the Primary Balance

The determination of the primary balance in the model may be briefly described as follows.[26] The public sector is divided into the three traditional segments: federal government (which includes the Central Bank), state & municipal governments and public enterprises. But attention is concentrated on the first two segments. The public-enterprises primary balance is kept as an exogenous variable.[27]

The primary balance of the federal government (d^F) is the difference between its net tax revenue (which excludes transfers to state and municipal governments) and its non-interest expenditures. The later are broken into active-personnel payroll (*w*), retired personnel payroll (*wr*), social security benefits (*ssb*), health-programs (*he*), investment (*ie*) and other expenditures (*oe*). The primary balance of state and municipal governments (d^{SM}) has expenditures disaggregated into payroll (w^{SM}), purchases of goods and services (*gs*), investment (ie^{SM}), and other expenditures (oe^{SM}). Revenues are divided into transfers from the federal government, state value-added tax revenue (*svat*) and other tax revenue (*ot*).

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[26] A detailed presentation of the model may be found in Appendix 3.

[27] As privatization is pushed forward over the next few years, the relative weight of public enterprises in the public sector as a whole is bound to be considerably reduced. On the other hand, the enterprises that are likely to remain public will tend to be the less profitable ones, with the prominent exception of Petrobrás, if it is really kept out the privatization program after all. Most of them -- Petrobrás included -- will be under pressure to carry on much needed investment programs rather than to be a source of fiscal relief. Having all that in mind, the primary balance of public enterprises was *not* determined endogenously in the model. In all exercises below, that balance was assumed to reach 0.4 percent of GDP (i.e. surplus) in 1997 and to fall linearly over the period 1998-2000 till it reaches zero in 2001-2002, the final years of the simulation period. For an attempt to model public enterprises' accounts in Brazil, when they had more weight in the public sector, see Werneck (1988).

When assumptions on the parameters governing the evolution of those expenditures and revenues are made, the model generates the public-sector primary balance path. Again, three different scenarios were considered. The differences stem from values attributed to a set of parameters identified as having a key role in the determination of the public-sector expenditures. Assumptions concerning the evolution of the revenues of all levels of government were kept invariant across the three scenarios. Attention was concentrated on the behavior of payroll expenditures (*w, wR*, and *wSM*), social-security benefits (*ssb*) and health-programs expenditures (*he*).

Nominal changes in the value of any one of those expenditures may be usefully decomposed into changes in quantum and in price. Payroll expenditures, for example, may continue to grow even when public-employees salaries are frozen, on account of either a rising number of employees or, more likely, simple wage drift, i.e., an increase in the average salary stemming, for instance, from automatic time-of-service promotion rules. This component of the change in payroll expenditures will be labeled change in quantum, as opposed to the price change that stems from the simple across-the-board readjustment of public employees' salaries. As the same kind of reasoning may be used for other expenditures as well, the simulation model allows separate assumptions on relevant quanta and prices to be made.

It is assumed, in all three scenarios, that salaries of public employees in all three levels of government are readjusted yearly according to the inflation rate. The annual readjustment of the minimum wage -- that determines the value of social security benefits -- is also assumed to strictly follow the inflation rate in Scenario A, but to be somewhat above inflation in the other two scenarios: half percentage point in B and one percentage point in C. The remaining differences among the three scenarios concern assumptions on the quantum growth rates of payroll expenditures, social security benefits and health expenditures. The quantum of payroll expenditures of state and municipal governments (which includes a swelling retired-personnel component) is assumed to show a 2 percent annual growth rate in Scenario A, against 3 percent in B and 4 percent in C. At the federal level, the quantum of the active-personnel payroll is

assumed to expand by half percent per year in Scenario A, 1.0 percent in B and 1.5 percent in C. And the federal retired-personnel payroll by 2 percent in Scenario A, 3 percent in B and 4 percent in C. As for the quantum of social security benefits, the growth rates considered in the three scenarios were taken from a recently published prospective study on social-security expenditures.[28] Different assumptions on the real value of health programs expenditures were also made. In Scenario A, the elasticity of that value with respect to real GDP was assumed to be equal to 1.0, in Scenario B, to 1.25 and in Scenario C to 1.5. All three scenarios maintained the same common set of assumptions -- listed in Table 4.2 above -- used in the simulation exercises analyzed in Section 4. The main differences among the scenarios that are now being considered are therefore those that are summarized in Table 6.1.

Results of the simulations for the three scenarios are presented in a set of graphs in Figure 6.1. The top left graph shows the public-sector primary balance paths. In scenario A, the improving primary balance resembles the exogenously assumed path of Scenario 2, considered in Section 4. But the improvement seems a bit less strong, the primary surplus reaching only 1.6 percent of GDP in 2002. Roughly half of that improvement stems from the federal accounts and the other half from state and municipal governments, as may be seen in other two graphs in the upper part of Figure 6.1. In scenario B, the primary balance path shows a much slower upward movement. In 2002, the primary surplus is only half percent of GDP. Finally, the primary-balance path of Scenario C seems to be even worse than the one exogenously assumed in Scenario 1 of Section 4. Instead of a no-improving primary balance, one now gets a slowly worsening one, with the primary deficit reaching 0.8 percent of GDP in 2002.

The evolution of payroll expenditures and expenditures with social-security benefits and health programs are also shown in the same set of graphs of Figure 6.1. Total federal payroll expenditures slide down as a proportion of GDP in all three scenarios, shrinking over the period

[28] See Além and Giambiaggi (1997), p. 20.

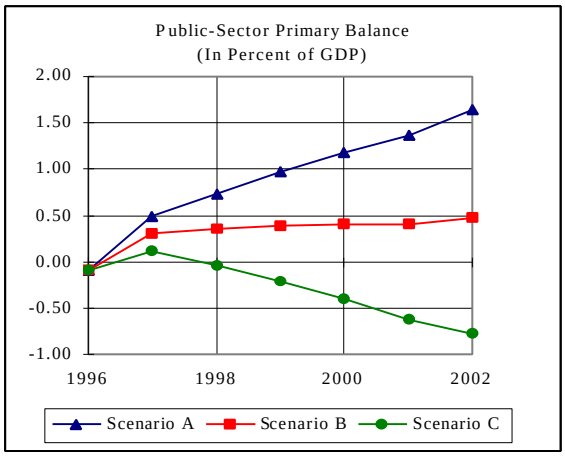
Table 6.1
Determinants of the Evolution of the Primary Balance: Three Scenarios

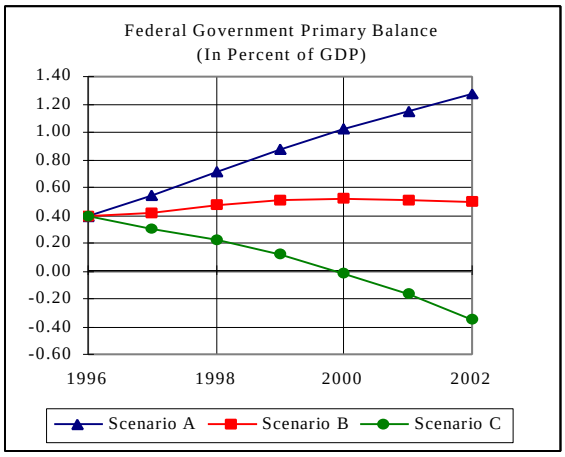
	Nominal Minimum-Salary Re-adjustment Rate (percent)	*Quantum Growth Rates (percent)*				
		Federal Active-Personnel Payroll	*Federal Retired-Personnel Payroll*	*State and Municipal Payroll*	*Social Security Benefits*	*Health Programs*
Parameters	*wm*	*n*	n_R	n_{SM}	*x*	*h*
Scenario 1						
1997	*6.0*	*0.5*	*2.0*	*2.0*	*3.9*	*4.0*
1998	*5.5*	*0.5*	*2.0*	*2.0*	*4.1*	*4.5*
1999	*5.0*	*0.5*	*2.0*	*2.0*	*4.3*	*4.5*
2000	*4.5*	*0.5*	*2.0*	*2.0*	*4.5*	*4.5*
2001	*4.0*	*0.5*	*2.0*	*2.0*	*4.7*	*4.5*
2002	*4.0*	*0.5*	*2.0*	*2.0*	*4.8*	*4.5*
Scenario 2						
1997	*6.5*	*1.0*	*3.0*	*3.0*	*4.8*	*5.0*
1998	*6.0*	*1.0*	*3.0*	*3.0*	*5.1*	*5.6*
1999	*5.5*	*1.0*	*3.0*	*3.0*	*5.3*	*5.6*
2000	*5.0*	*1.0*	*3.0*	*3.0*	*5.6*	*5.6*
2001	*4.5*	*1.0*	*3.0*	*3.0*	*5.8*	*5.6*
2002	*4.5*	*1.0*	*3.0*	*3.0*	*6.0*	*5.6*
Scenario 3						
1997	*7.0*	*1.5*	*4.0*	*4.0*	*5.7*	*6.0*
1998	*6.5*	*1.5*	*4.0*	*4.0*	*6.0*	*6.8*
1999	*6.0*	*1.5*	*4.0*	*4.0*	*6.4*	*6.8*
2000	*5.5*	*1.5*	*4.0*	*4.0*	*6.7*	*6.8*
2001	*5.0*	*1.5*	*4.0*	*4.0*	*7.0*	*6.8*
2002	*5.0*	*1.5*	*4.0*	*4.0*	*7.3*	*6.8*

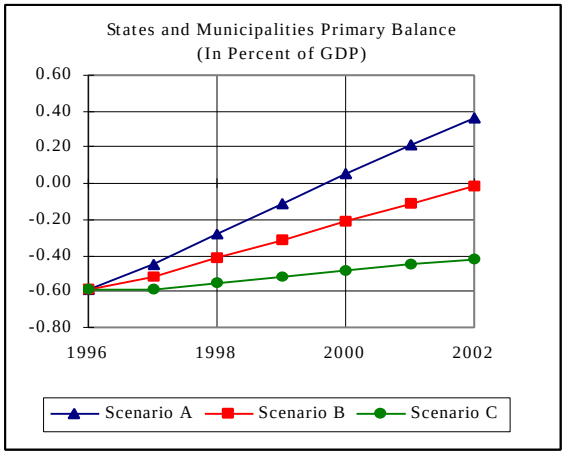
Figure 6.1

Brazil: 1997-2002

Results of the Primary Balance Simulations: Three Scenarios







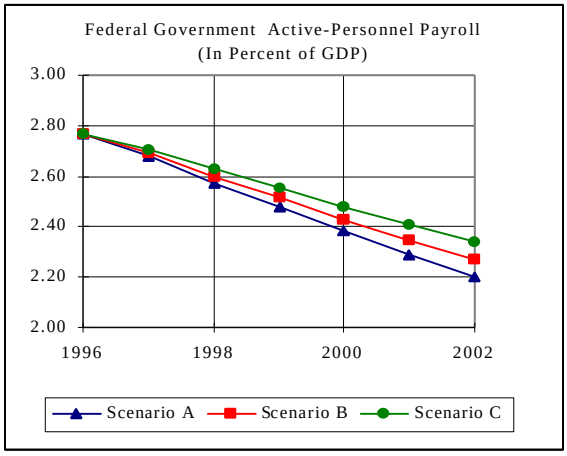
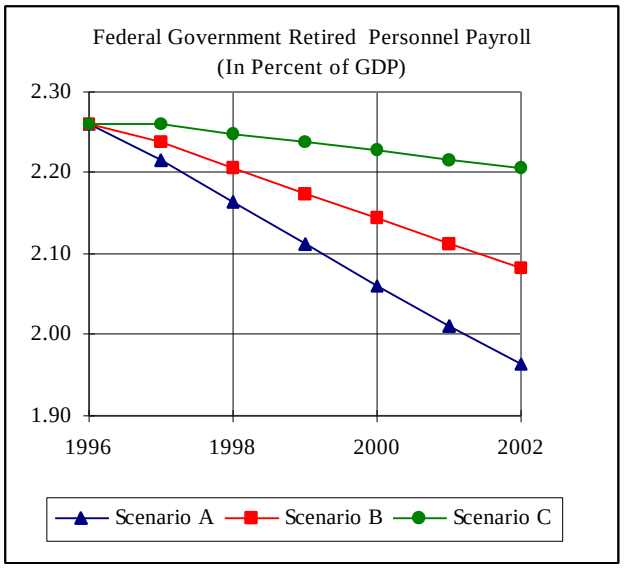
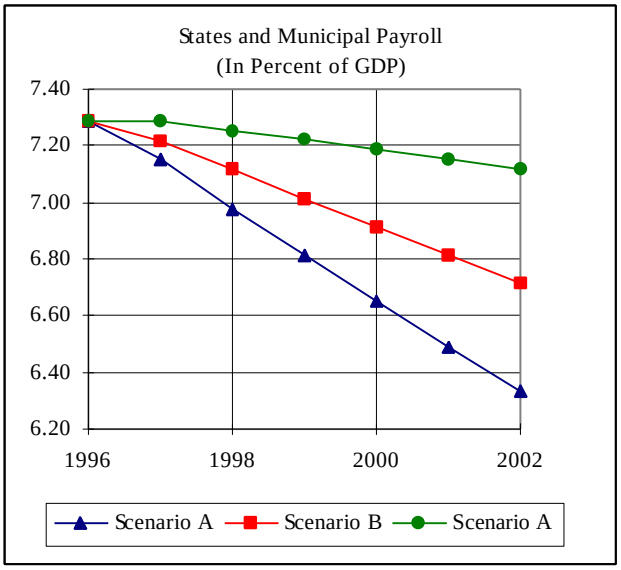


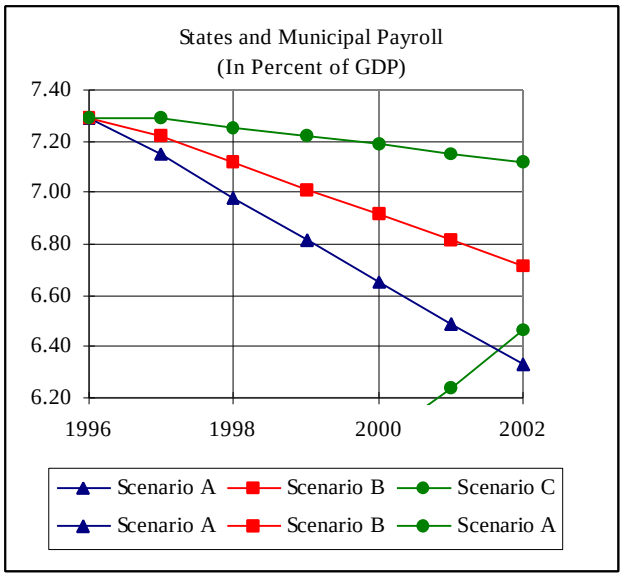
Figure 6.1 (continuation)

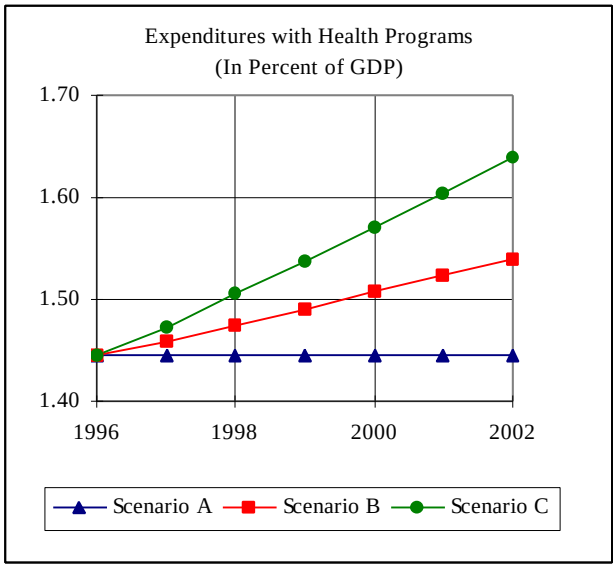
Brazil: 1997-2002

Results of the Primary Balance Simulations: Three Scenarios









from 5 percent of GDP in 1996 to 4.2 percent of GDP in 2002, in Scenario A, to 4.4 percent in B and 4.5 percent in C. Something similar happens with the payroll of state and municipal governments, particularly in the first two scenarios. Social security benefits remain roughly stable as a proportion of GDP in Scenario A, show a strong upward movement in B, but a much stronger one in C, increasing by almost one percentage point of GDP over the period. Finally, as a straightforward consequence of the adopted assumptions, expenditures with health assistance programs, measured as a proportion of GDP, rise in both Scenarios B and C.

6.2 Debt Dynamics Reexamined

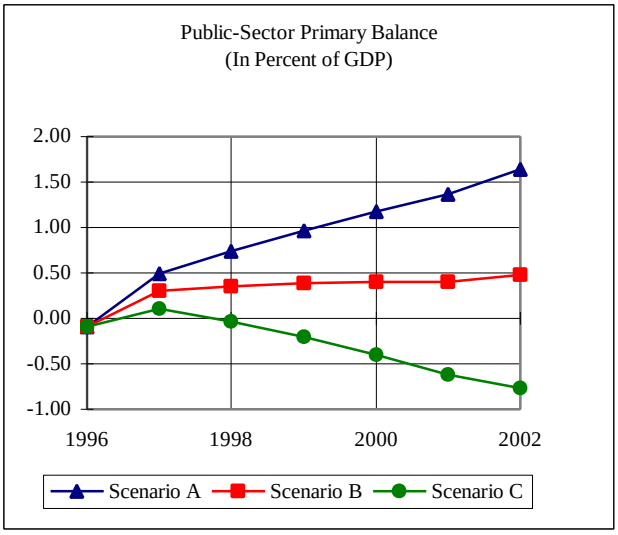
The simulation results just analyzed suggest that the public sector primary-balance path over the coming years could be quite different from those assumed in the debt-dynamics simulation exercises of Section 4. A simple comparison between the top left graphs of Figures 4.1 and 6.1 above helps to establish the main differences. Though, as pointed out in the previous section, the path of Scenario A roughly resembles the one assumed in Scenario 2 of Section 4, none of the endogenously-generated primary-balance paths are even remotely comparable to the somewhat optimistic one assumed in Scenario 3. On the other hand, the primary-balance path that comes out of Scenario C is even worse than the no-improvement path assumed in Scenario 1 of Section 4. The natural step at this point, therefore, is to run new simulations, based on the endogenously-generated primary-balance paths, to reexamine some debt-dynamics issues, keeping the same common set of assumptions of Table 4.2, used in the simulations of Section 4. Results of the new simulations are presented in a set of graphs in Figure 6.2.

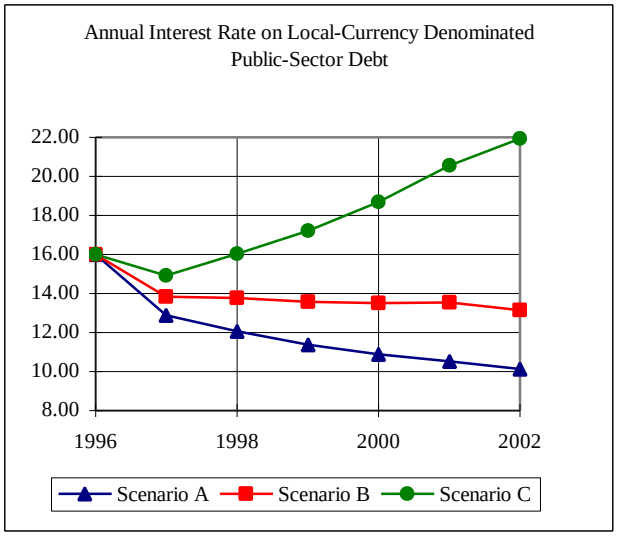
The three endogenous primary-balance paths, presented again in in the top left graph, lead to well different consequences in terms of debt dynamics. The public-sector net debt, in the lower right graph, rises very markedly in all three scenarios, even in Scenario A. The reason has much to do with the effect of the slow pace of primary-balance improvement in Scenario A, that prevents an earlier fall of the interest rate and lower interest payments in the first part of the period. The net

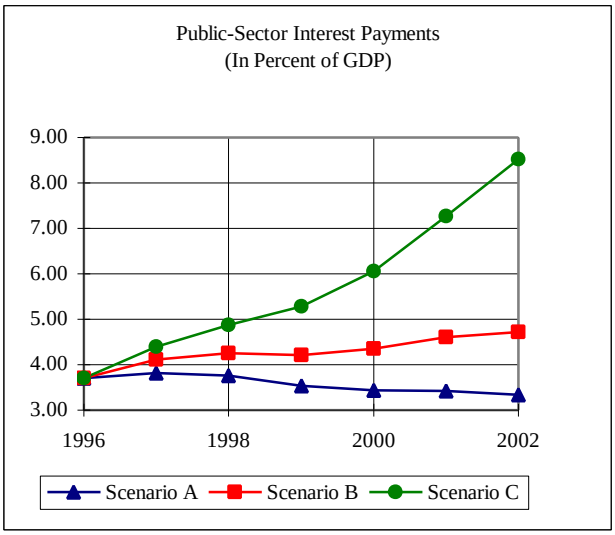
Figure 6.2

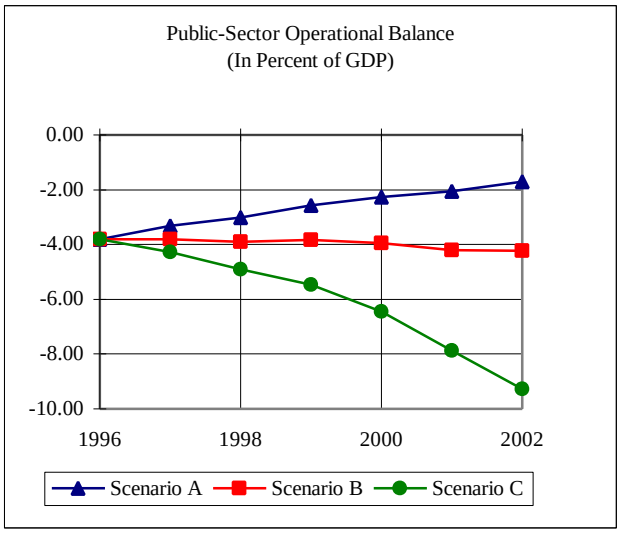
Brazil: 1997-2002

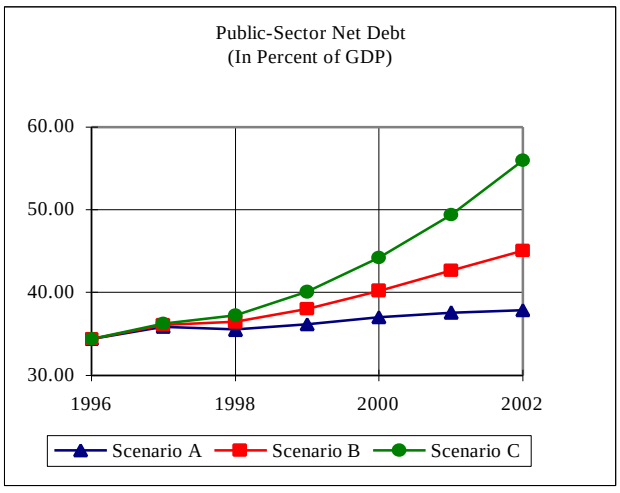
Results of the Simulation Exercises: Three Scenarios











debt rises from 34.4 percent of GDP in 1996 to 37.9 percent of GDP in 2002. After increasing in 1997, the operational deficit falls steadily to 1.7 percent of GDP in 2002.

The worst case, of course, is generated by the deteriorating primary balance of Scenario C, which leads to rising interest rates. Fueled by soaring interest payments, the net debt jumps to 55.9 percent of GDP, and the operational deficit reaches 9.3 percent of GDP in 2002. Scenario B constitutes an intermediate case, in which the net debt rises to 45.1 percent of GDP and the operational deficit remain at a level quite similar to the base year value.

6.3 Sensitivity Analysis

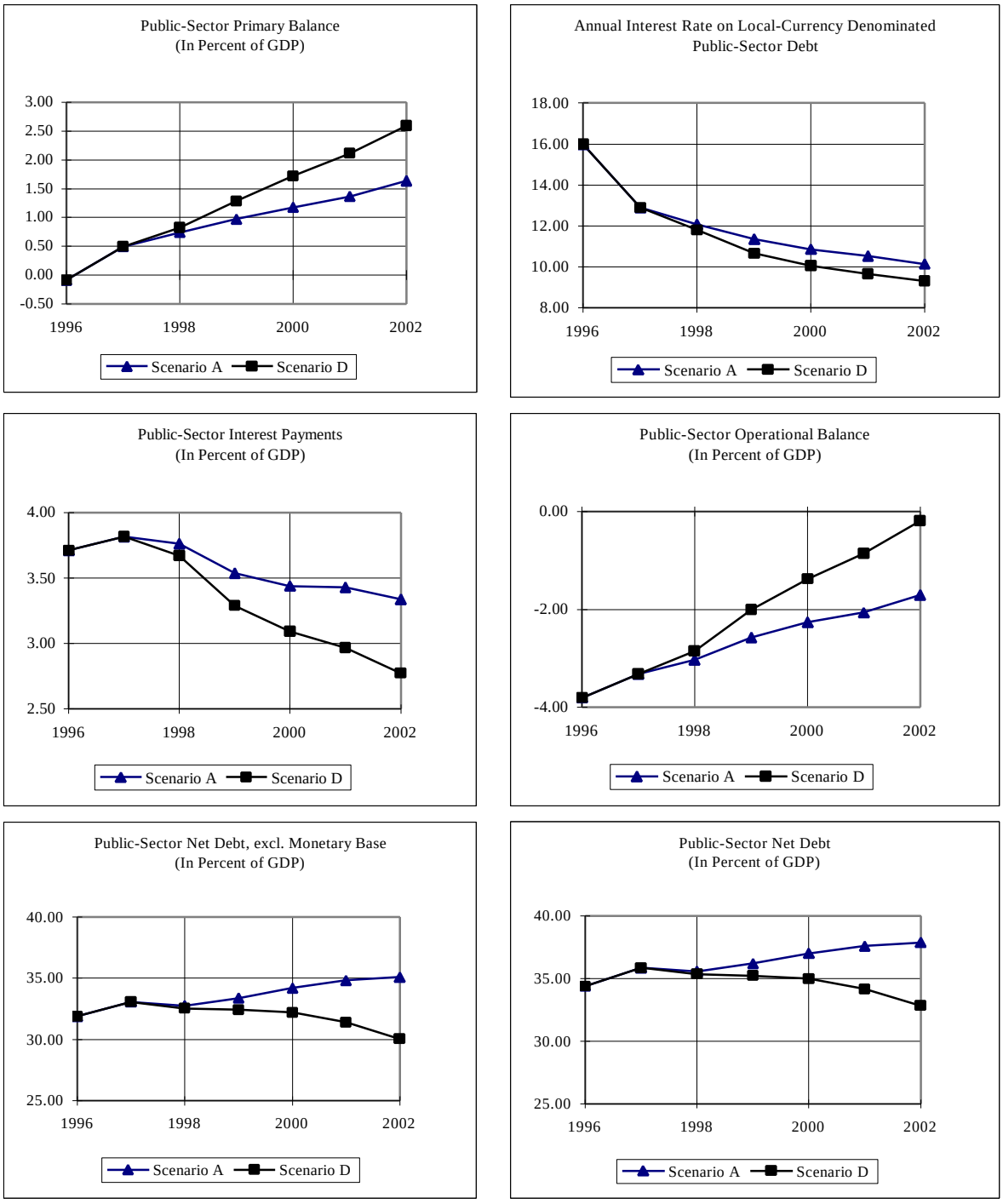
Simulation models are particularly useful because they allow a systematic exploration of the consequences of a set of assumptions. And one of the most fruitful ways to explore those consequences is resorting to sensitivity analysis. As warned in Section 4, the simulation results may be highly sensitive to some of the adopted assumptions, particularly to what is being assumed about the Brazilian economic growth performance during the period. The GDP growth path was kept invariant in both the simulations discussed in Section 4 and in the present section. Although that surely allowed an easier interpretation of the results, it led to some inconsistency in the design of the scenarios. That problem seems to be particularly important in the simulations just discussed, that involve endogenously generated primary-balance paths. Changing assumptions on the GDP growth path affects to a great extent both the determination of the primary balance and the debt dynamics process. Sensitivity analysis exercises are therefore required to gauge the order of magnitude of the implied alterations in the simulation results.

As shown in Table 4.2 above, all simulation exercises assumed that the annual GDP growth rate would be 4 percent in 1997 and 4.5 percent from 1998 to 2002. How would the simulations results be affected if, in Scenario A, that has the best fiscal performance, a more optimistic growth path were assumed? What would be the effect of assuming, for example, that the GDP growth rate will increase to 5 percent in 1998, to 6 percent from 1999 to 2001 and then to 7 percent in 2002? The answer is provided in the set of graphs of Figure 6.3, which allows a comparison

Figure 6.3

Brazil: 1997-2002

Sensitivity of Scenario A to GDP Growth Assumptions



between Scenario A and what has been labeled Scenario D, identical to A except for the assumptions on the expansion of GDP over the period.

For a start, it may be seen that the primary-balance would show a much stronger improvement, since most expenditures would be increasing well below the GDP growth rate. The 1.6 percent primary surplus of 2002 would be converted into a 2.6 percent surplus. As that would lead to a faster fall in interest rates, the end-year operational deficit would not be 1.7 percent of GDP, but only 0.2 percent. The public-sector interest bill in the end of the period would fall from 3.3 to 2.8 percent of GDP. And the 2002 net debt would reach, not 37.9 percent of GDP, but 32.8 percent.[29] Sensitivity-analysis exercises with the less optimistic scenarios B and C also leave no doubts about the crucial importance of the assumptions on economic growth performance.

[29] An assumption of a constant 4.5 percent GDP growth rate in Scenario C, which has the worst fiscal performance, should still be considered very optimistic. Yet its introduction in Scenario C would be enough to make the net debt jump to 63.3 percent of GDP in 2002.

7. CONCLUDING REMARKS

What conclusions about fiscal sustainability in Brazil can be drawn from the previous sections? If a sustainable fiscal policy is defined as a policy such that the public debt to GDP ratio eventually converges back to some determined level[30], the answer is clear: the present fiscal stance is not sustainable. If the current tax rules and spending programs are maintained, the debt to GDP ratio will grow rapidly in the near future.

Under reasonable sets of assumptions, the simulation exercises of section 5 and 6 have shown that a sharp increase in the public sector net debt, as a proportion of GDP, will be unavoidable if there is no improvement in the primary balance in coming years. But even with a significant improvement in the primary balance during the period, the net-debt to GDP ratio would still show an upward trend and public sector real interest payments would not fall, unless extremely optimistic assumptions on GDP growth are made.

Given the obstacles currently faced by fiscal-adjustment efforts, there is a widespread temptation in Brazil to believe that the country may simply grow out of its fiscal problems. If fiscal repression could produce a slowly increasing primary surplus in the near future, one could cross one's fingers and hope that economic growth will save the day and lead naturally to a significant improvement in fiscal indicators. Much as an overfed boy that dreams about getting rid of his obesity problems by simply maintaining his weight while growing up.

There are many reasons to believe that growing out of fiscal problems in Brazil will not be so easy. A slow improvement in the fiscal-stance will mean that for a long time interest rates will have to remain much higher than would be compatible with a growth-conducive economic environment. In addition, long-lasting fiscal repression means public investment deficiencies that will also hamper fast economic growth. Finally, the recent evolution of the Brazilian external accounts, marked by a large and rapidly widening current account deficit, suggests that a faster

[30] Blanchard et al. (1990)

growth rate will probably be unfeasible. And also that the convergence of domestic interest rates to international levels may end up being much slower than assumed in the most optmistic scenarios of the paper.

It seems, therefore, that there is no easy way out. In order to interrupt the vicious circle of bad fiscal stance, high interest rates, slow growth and even worse fiscal stance (and greater external vulnerability), there seems to be no other alternative than a decisive effort to improve the primary balance.

It is highly unrealistic to expect that the already high tax burden can be further increased. Improvements in the primary balance will have to come, therefore, from expenditure reduction. Given the rigidities in the public sector payroll, the fiscal pressure coming from the social security system and the expansion in expenditures with health assistance programs, it is unlikely that the necessary expenditure cuts will be viable without a major fiscal reform. There seems to be no way to circumvent a deep change in the very nature of the fiscal regime that only constitutional amendments will make feasible.

APPENDIX 1

DATA

TABLE A1.1

BRAZIL: TOTAL OPERATIONAL AND PRIMARY DEFICITS OF THE PUBLIC SECTOR: 1985-1996

(In percent of GDP)

CATEGORY AND LEVEL OF GOVERNMENT	*1985*	*1986*	*1987*	*1988*	*1989*	*1990*	*1991*	*1992*	*1993*	*1994*	*1995*	*1996*
Total Borrowing Requirement	*30.24*	*11.78*	*33.96*	*55.88*	*89.87*	*32.00*	*28.25*	*47.24*	*65.01*	*26.49*	*7.40*	*6.09*
Federal Government	*11.02*	*5.19*	*14.58*	*12.41*	*55.09*	*13.26*	*6.90*	*16.93*	*23.97*	*9.97*	*2.40*	*2.64*
States and Municipalities	*7.06*	*2.87*	*8.57*	*14.91*	*17.99*	*9.30*	*10.32*	*17.41*	*27.24*	*11.86*	*3.70*	*2.81*
Public Enterprises	*12.17*	*3.71*	*10.80*	*28.56*	*16.80*	*9.44*	*11.03*	*12.90*	*13.80*	*4.65*	*1.30*	*0.64*
Monetary Correction	*25.57*	*7.97*	*27.66*	*50.97*	*82.43*	*33.83*	*28.05*	*45.47*	*64.28*	*27.61*	*2.40*	*2.19*
Federal Government	*9.82*	*3.82*	*11.28*	*8.11*	*50.84*	*15.76*	*6.82*	*16.28*	*23.36*	*11.52*	*0.66*	*0.94*
States and Municipalities	*6.03*	*1.87*	*6.79*	*14.74*	*17.38*	*9.30*	*11.04*	*16.77*	*27.15*	*11.07*	*1.25*	*0.91*
Public Enterprises	*9.72*	*2.28*	*9.59*	*28.13*	*14.21*	*8.78*	*10.20*	*12.41*	*13.77*	*5.02*	*0.40*	*0.31*
Operational Deficit	*4.67*	*3.81*	*6.29*	*4.90*	*7.44*	*-1.83*	*0.20*	*1.77*	*0.73*	*-1.12*	*5.00*	*3.90*
Federal Government	*1.20*	*1.38*	*3.30*	*4.30*	*4.25*	*-2.50*	*0.08*	*0.64*	*0.61*	*-1.55*	*1.74*	*1.70*
States and Municipalities	*1.02*	*1.00*	*1.78*	*0.17*	*0.60*	*0.00*	*-0.72*	*0.64*	*0.09*	*0.79*	*2.45*	*1.90*
Public Enterprises	*2.45*	*1.43*	*1.21*	*0.43*	*2.58*	*0.67*	*0.84*	*0.48*	*0.04*	*-0.37*	*0.90*	*0.33*
Interest Payments	*7.27*	*5.41*	*5.29*	*5.80*	*6.44*	*1.63*	*3.10*	*3.37*	*3.03*	*4.15*	*5.26*	*3.79*
Federal Government	*2.80*	*1.78*	*1.50*	*3.30*	*2.85*	*-0.94*	*1.08*	*1.74*	*1.51*	*1.65*	*2.24*	*2.07*
States and Municipalities	*1.12*	*0.90*	*1.18*	*0.67*	*0.90*	*0.20*	*0.78*	*0.74*	*0.69*	*1.54*	*2.27*	*1.32*
Public Enterprises	*3.35*	*2.73*	*2.61*	*1.83*	*2.68*	*2.37*	*1.14*	*0.88*	*0.84*	*0.96*	*0.84*	*0.40*
Primary Deficit	*-2.60*	*-1.60*	*1.00*	*-0.90*	*1.00*	*-3.46*	*-2.90*	*-1.60*	*-2.30*	*-5.27*	*-0.26*	*0.10*
Federal Government	*-1.60*	*-0.40*	*1.80*	*1.00*	*1.40*	*-1.56*	*-1.00*	*-1.10*	*-0.90*	*-3.19*	*-0.50*	*-0.40*
States and Municipalities	*-0.10*	*0.10*	*0.60*	*-0.50*	*-0.30*	*-0.20*	*-1.50*	*-0.10*	*-0.60*	*-0.75*	*0.18*	*0.57*
Public Enterprises	*-0.90*	*-1.30*	*-1.40*	*-1.40*	*-0.10*	*-1.70*	*-0.30*	*-0.40*	*-0.80*	*-1.33*	*0.06*	*-0.07*

Source: Secretaria de Política Econômica, Ministério da Fazenda

TABLE A1.2

BRAZIL: SUMMARY OPERATIONS OF THE PUBLIC SECTOR

(In percent of GDP)

	1989	1990	1991	1992	1993	1994	1995	1996
Non-financial Revenue	29.64	34.83	31.12	31.48	31.29	33.04	31.66	32.59
Tax Revenue	13.88	17.87	14.83	15.48	15.60	18.19	18.68	18.79
VAT - IPI	2.21	2.52	2.23	2.40	2.44	2.12	2.04	2.03
Income Tax	4.10	4.27	3.51	3.85	3.89	3.65	4.23	4.16
Finsocial	1.10	1.02	1.38	1.04	1.37	2.32	2.31	2.37
PIS/PASEP	0.54	1.20	1.10	1.12	1.16	1.04	0.93	0.98
IPMF	0.00	0.00	0.00	0.00	0.07	1.02	0.02	-0.19
CSLL	0.21	0.87	0.30	0.75	0.80	0.94	0.89	0.86
Other Federal Taxes	0.80	1.10	0.70	0.60	0.60	0.90	1.10	1.10
State and local Tax Revenue	7.20	9.10	8.48	7.97	7.67	8.17	8.96	9.26
Minus: Public Enterprises Taxes	-2.28	-2.21	-2.87	-2.25	-2.40	-1.97	-1.80	-1.78
Social Security Contributions	4.47	5.35	4.85	4.79	5.47	4.84	4.89	5.08
Other Non-Tax Revenue	11.29	11.61	11.44	11.21	10.22	10.01	8.09	8.72
Federal Government	1.03	2.80	1.14	1.10	1.53	1.74	1.64	1.70
States and Municipalities	1.60	1.73	2.21	1.77	1.83	1.67	1.64	1.48
Public Enterprises Value Added	5.12	5.29	6.75	7.36	4.59	5.52	4.21	4.26
Other Revenue of Public Enterprises	3.54	1.79	1.34	0.98	2.27	1.08	0.60	1.28
Non-financial Expenditure	37.43	38.04	33.60	33.60	35.76	29.92	32.05	33.32
Current Expenditure	29.88	30.84	26.77	27.21	29.35	25.64	28.10	28.38
Wages	16.28	15.71	13.37	13.65	13.77	13.00	13.68	13.71
Goods and Sevices	6.05	5.86	5.79	5.21	6.86	3.73	5.31	5.44
Pensions and Welfare	4.30	4.59	4.07	5.04	5.57	5.37	5.53	6.00
Subsidies and other Current Exp	2.70	4.19	2.93	2.67	2.64	2.91	2.84	2.80
Transfers to Private Sector	0.55	0.49	0.61	0.64	0.51	0.63	0.74	0.43
Capital Expenditure	7.55	7.20	6.83	6.39	6.41	4.28	3.95	4.94
Investment	6.62	6.82	6.39	5.91	5.97	4.06	3.68	4.60
Public Enterprises other Capital Expenditures	0.30	0.24	0.32	0.43	0.40	0.13	0.20	0.33
Credit Op. Expenditures (POOC)	0.63	0.14	0.12	0.05	0.04	0.09	0.07	0.01
Float and Adjustment	6.79	6.67	5.38	3.72	6.77	2.15	0.65	0.63
Primary Deficit	1.00	-3.46	-2.90	-1.60	-2.30	-5.27	-0.26	0.10
Real Interest Payments	6.44	1.63	3.10	3.37	3.03	4.15	5.26	3.79
Operational Deficit	7.44	-1.83	0.20	1.77	0.73	-1.12	5.00	3.90

Source: Secretaria de Política Econômica, Ministério da Fazenda

TABLE A1.3

BRAZIL: FEDERAL GOVERNMENT OPERATIONS

(In percent of GDP)

	1989	1990	1991	1992	1993	1994	1995	1996
Revenue	14.46	19.13	15.21	15.65	17.33	18.57	18.05	18.09
Tax Revenue	8.96	10.98	9.22	9.76	10.33	11.99	11.52	11.31
VAT - IPI	2.21	2.52	2.23	2.40	2.44	2.12	2.04	2.03
Income Tax	4.1	4.27	3.51	3.85	3.89	3.65	4.23	4.16
Finsocial	1.1	1.02	1.38	1.04	1.37	2.32	2.31	2.37
PIS/PASEP	0.54	1.2	1.10	1.12	1.16	1.04	0.93	0.98
IPMF					0.07	1.02	0.02	-0.19
CSLL	0.21	0.87	0.30	0.75	0.80	0.94	0.89	0.86
Other Taxes	0.8	1.1	0.70	0.60	0.60	0.90	1.10	1.10
Social Security Contributions	4.47	5.35	4.85	4.79	5.47	4.84	4.89	5.08
Other	1.03	2.8	1.14	1.10	1.53	1.74	1.64	1.70
Expenditure	20.46	20.49	17.77	17.45	20.49	16.21	18.29	18.42
Current Expenditure	17.77	17.57	15.21	15.68	18.13	15.27	17.26	17.29
Wages	6.95	6.06	4.54	4.60	4.93	5.00	5.31	5.03
Goods and Services	3.75	3.34	3.42	2.58	4.38	1.42	3.02	3.14
Pensions and Welfare	3.8	3.87	3.53	4.45	5.05	4.88	4.95	5.42
Current Transfers	3.27	4.30	3.72	4.05	3.77	3.97	3.98	3.70
Intergovernmental Transfers	2.72	3.81	3.11	3.41	3.26	3.34	3.24	3.27
Other Transfers	0.55	0.49	0.61	0.64	0.51	0.63	0.74	0.43
Capital Expenditure	2.69	2.92	2.56	1.77	2.36	0.94	1.03	1.13
Investment	1.60	2.57	1.99	1.60	2.20	0.84	0.95	1.11
Transfers to P.S Enterprises	0.46	0.21	0.45	0.12	0.12	0.01	0.01	0.01
Credit Op. Expenditures (POOC)	0.63	0.14	0.12	0.05	0.04	0.09	0.07	0.01
Float and Adjustment	4.60	2.92	3.56	2.90	4.06	0.83	0.74	0.73
Primary Deficit	1.40	-1.56	-1.00	-1.10	-0.90	-3.19	-0.50	-0.40
Real Interest Payments	2.85	-0.94	1.08	-1.74	1.51	1.65	2.24	-2.07
Operational Deficit	4.25	-2.50	0.08	0.64	0.61	-1.55	1.74	1.70

Source: Secretaria de Política Econômica, Ministério da Fazenda

TABLE A1.4

BRAZIL: SUMMARY OPERATIONS OF STATES AND MUNICIPALITIES

(In percent of GDP)

	1989	1990	1991	1992	1993	1994	1995	1996
Revenue	12.40	14.74	13.81	13.15	12.76	13.34	14.09	14.01
Tax Revenue	7.20	9.10	8.48	7.97	7.67	8.17	8.96	9.26
VAT-ICMS	6.1	8	7.07	6.66	6.12	7.01	6.79	7.02
Others	1.1	1.1	1.41	1.31	1.55	1.16	2.17	2.24
Nontax Revenue	1.6	1.73	2.21	1.77	1.83	1.67	1.64	1.48
Intergovernmental Transfers	3.6	3.91	3.12	3.41	3.26	3.50	3.49	3.27
Expenditure	13.40	17.18	14.58	14.72	14.43	13.88	14.19	14.79
Current Expenditure	11.10	14.64	12.46	12.70	12.36	12.11	12.70	12.97
Wages	5.6	7.21	6.62	6.81	6.72	6.40	6.99	7.29
Goods and Sevices	2.3	2.52	2.37	2.63	2.48	2.31	2.29	2.30
Pensions and Welfare	0.5	0.72	0.54	0.59	0.52	0.49	0.58	0.58
Subsidies and other Current Exp	2.7	4.19	2.93	2.67	2.64	2.91	2.84	2.80
Investment	2.3	2.54	2.12	2.02	2.07	1.77	1.49	1.82
Float and Adjustment	1.30	2.64	2.27	1.67	2.27	1.29	-0.08	0.21
Primary Deficit	-0.30	-0.20	-1.50	-0.10	-0.60	-0.75	0.18	0.57
Real Interest Payments	0.90	0.20	0.78	0.74	0.69	1.54	2.27	1.32
Operational Deficit	0.60	0.00	-0.72	0.64	0.09	0.79	2.45	1.90

Source: Secretaria de Política Econômica, Ministério da Fazenda

TABLE A1.5

BRAZIL: SUMMARY OPERATIONS OF PUBLIC SECTOR ENTERPRISES

(In percent of GDP)

	1989	1990	1991	1992	1993	1994	1995	1996
Sales of Goods and Services	*11.20*	*9.90*	*12.60*	*12.40*	*8.30*	*8.70*	*7.00*	*7.61*
Wages	*3.73*	*2.44*	*2.21*	*2.24*	*2.12*	*1.6*	*1.38*	*1.39*
Other Current Expenditure	*8.36*	*6.82*	*8.72*	*7.29*	*6.11*	*5.15*	*4.59*	*5.13*
Materials and Supplies	*3.37*	*2.01*	*2.48*	*2.03*	*2.16*	*1.87*	*1.50*	
Services	*1.41*	*1.10*	*1.09*	*0.83*	*0.96*	*0.84*	*0.80*	
Taxes	*2.28*	*2.21*	*2.87*	*2.25*	*2.40*	*1.97*	*1.80*	*1.78*
Others	*1.30*	*1.50*	*2.28*	*2.18*	*0.60*	*0.47*	*0.50*	
Public Enterprises Value Added	*7.94*							

Source: Secretaria de Política Econômica, Ministério da Fazenda

APPENDIX 2

ESTIMATION OF ALTERNATIVE FISCAL POLICY INDICATORS

A2.1 Adjusted Primary Deficit and Fiscal Impulse Measure

The starting point for the construction of the alternative fiscal policy indicators of Section 3 was the estimation of inflation and GDP elasticities of tax revenues and expenditures. [31] For each of the categories of taxes and expenditures, a OLS regression was run with the following specification:

$$\ln A_t = a + b \ln Y_t + g \ln p_t + e_t$$

where A_t represents the specific category, Y_t stands for real GDP, p_t is the inflation rate, and e_t is an error term.

Monthly tax revenues and expenditures data covering the period from January 1989 to December 1996 were first converted to constant prices (December 1996), using the geometric average of the General Price Index (IGP-DI) for the current and the previous month, and then aggregated to generate the quarterly tax revenues and expenditures series. All regressions were then estimated with quarterly data (1989.I to 1996.IV).

Some of the regressions showed evidence of first-order serial correlation and were reestimated using the maximum likelihood procedure of Beach and MacKinnon (1978).[32] In addition, when the estimated coefficient of one of the explanatory variables had very little statistical significance, the variable was dropped from the regression.

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[31] For earlier attempts to estimate the response of federal revenues and expenditures to macroeconomic variables see, respectively, Muriel (1996) and Pereira (1996).

[32] In fact, preliminary inspection of the series suggested that some of them are not stationary. The small span covered by the data, however, raises questions about the adequacy of a cointegration analysis.

Most of the regressions refer to the federal government. For the state and municipal governments the only series that was available on a frequency higher than a year was the Value-Added Tax (ICMS). There was no monthly or quarterly information on the required series for state-owned enterprises.

Estimation results for the series that were significantly related to either one of the explanatory variables are presented in Table A2.1.The adjusted tax revenue and expenditures figures were obtained as the fitted values of the regressions in Table A2.1 using as explanatory variables the inflation rate and/or the GDP of the previous year:

$$\ln\hat{A}_t = \hat{a} + \hat{b}\ln Y_{t-4} + \hat{g}\ln p_{t-4}$$

In the cases in which there was a correction for first-order serial correlation of the error terms the fitted values were generated as:

$$\ln\hat{A}_t = (1-\hat{r})\hat{a} + \hat{b}(\ln Y_{t-4} - \hat{r}\ln Y_{t-5}) + \hat{g}(\ln p_{t-4} - \hat{r}\ln p_{t-5})$$

where $\hat{r}$ is the estimated correlation coefficient between errors in period *t* and period *t-1*. Figures A2.1 to A2.8 present the actual and adjusted values for the different series.

The adjusted public sector primary deficit was then calculated aggregating the adjusted tax revenues and expenditures for the federal government and state and municipal governments to the unadjusted primary deficit of the state owned enterprises. The difference between the actual and the adjusted deficit in each year is decomposed into revenues and expenditures in Table A2.2. The quarterly fiscal impulse measure was obtained as:

$$FI = (\hat{G}_t - \hat{T}_t) - (G_{t-4} - T_{t-4})$$

where G_{t-4} - T_{t-4} and $\hat{G}_t$ - $\hat{T}_t$ are, respectively, the actual primary deficit and the adjusted primary deficit. Figures A2.9 and A2.10 present quarterly values for the actual and adjusted deficits, as well as the change in the primary deficit and the estimated fiscal impulse measure.

Table A2.1

Estimation Results

	Const.	*Y*	*p*	*r*	*Adj. R^2*	*D.W.*	*SER*	*F*
Income tax	*10.90*	*0.98*	-	*0.34*	*0.93*	*1.84*	*0.21*	*382.3*
	(3.95)	*(1.72)*		*(2.01)*				
IPI	*11.64*	*0.72*	-	-	*0.25*	*1.63*	*0.10*	*11.09*
	(11.16)	*(3.33)*						
Import Tax	*6.85*	*1.44*	*-0.07*	*0.42*	*0.95*	*1.84*	*0.18*	*285.9*
	(2.24)	*(2.33)*	*(-2.03)*	*(2.56)*				
Finsocial	*7.70*	*1.45*	-	*0.89*	*0.95*	*1.47*	*0.19*	*585.5*
	(3.00)	*(2.74)*		*(11.01)*				
CSLL	*-27.84*	*8.57*	-	*0.59*	*0.24*	*2.15*	*0.86*	*-7.93*
	(-2.32)	*(3.44)*		*(2.75)*				
PIS-PASEP	*13.02*	*0.28*	-	-	*0.09*	*1.50*	*0.06*	*3.7*
	(18.55)	*(1.93)*						
Total Revenue	*11.60*	*1.10*	*-0.03*	*0.31*	*0.97*	*2.06*	*0.13*	*519.7*
	(5.45)	*(2.56)*	*(-1.44)*	*(1.77)*				
ICM	*13.21*	*0.67*	*-0.05*	*0.76*	*0.99*	*1.77*	*0.06*	*6522*
	(15.36)	*(3.83)*	*(-4.15)*	*(5.82)*				
Federal Payroll	*16.10*	-	*-0.08*	*0.59*	*0.97*	*2.00*	*0.19*	*944.5*
	(112.25)		*(-2.36)*	*(4.05)*				

Note: t statistics in parenthesis

*Sources: Tax Revenues and Expenditures: Central Bank of Brazil; GDP: index of quarterly real GDP from IBGE; Inflation: Quarterly Inflation Rate of the geometric average of the General Price Index (IGP-DI), calculated as: {[(quarter t geometric average of the geometric average of the General Price Index (IGP-DI)/ (quarter t-1 geometric average of the geometric average of the General Price Index (IGP-DI)-1]*100}*

Table A2.2

Decomposition of the Difference between the Adjusted and the Actual Deficit

	89	*90*	*91*	*92*	*93*	*94*	*95*	*96*	*Mean*	*St. Dev.*
Deficit: Adjusted - Actual	*1.70*	*1.76*	*-0.80*	*-0.47*	*0.18*	*1.23*	*0.79*	*0.66*	*0.63*	*0.95*
Revenues: Actual - Adjusted	*2.41*	*1.86*	*-1.47*	*-0.40*	*0.50*	*1.83*	*1.59*	*0.88*	*0.90*	*1.31*
Expenditures: Adjusted - Actual	*-0.71*	*-0.10*	*0.67*	*-0.07*	*-0.32*	*-0.60*	*-0.80*	*-0.22*	*-0.27*	*0.47*

A2.2 Underlying Primary Deficit

The starting point for the derivation of the underlying public sector primary deficit was the application of the Hodrick-Prescott filter to the seasonally adjusted quarterly real GDP series, with the goal of extracting its trend component.[33] Figure A2.11 presents the actual, seasonally adjusted and "filtered" GDP series. After the GDP trend was extracted, the estimated equations from the previous sub-section were used to adjust the revenue values and calculate the underlying deficit. The adjusted tax revenue figures were obtained as the fitted values of the regressions in Table A2.1 using the GDP trend as explanatory variable. Figures A2.12 to A2.19 present the actual and "underlying" values for the different revenue series. The underlying primary deficit was obtained adding to these series the remaining revenue series and subtracting the expenditure series from it. Figure A2.19 presents quarterly values for the actual and underlying primary deficits.

[33] The idea is to decompose an observed series y_t into a trend component μ_t and a stationary component $y_t - \mu_t$. Consider the sum of squares

$$(1/T)\sum_{t=1}^{T}(y_t - m_t)^2 + (1/T)\sum_{t=2}^{T-1}[(m_{t+1} - m_t) - (m_t - m_{t-1})]^2$$

Figure A2.1
Income Tax
(In percent of GDP, accumulated in 4 quarters)

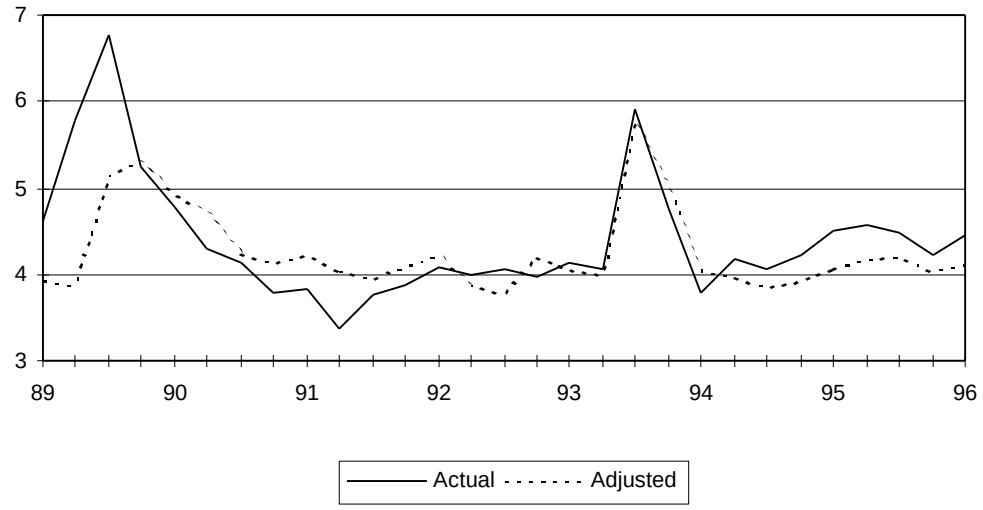
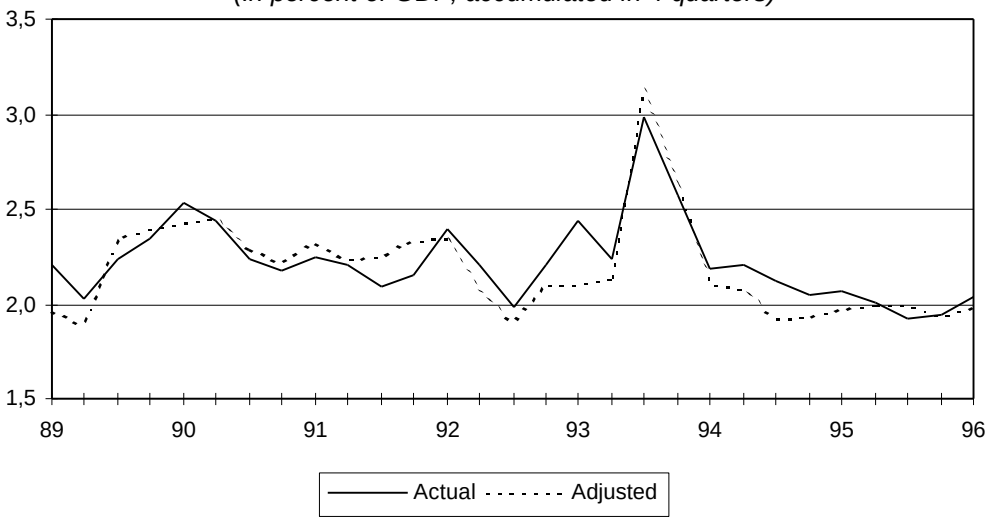


Figure A2.2
IPI
(In percent of GDP, accumulated in 4 quarters)



The problem involves finding a μ_t which minimizes this expression. The constant λ is arbitrarily chosen and reflects the cost of incorporating fluctuations in the trend. In this paper, with quarterly data, the value of λ was set

Figure A2.3
Import Tax
(In percent of GDP, accumulated in 4 quarters)

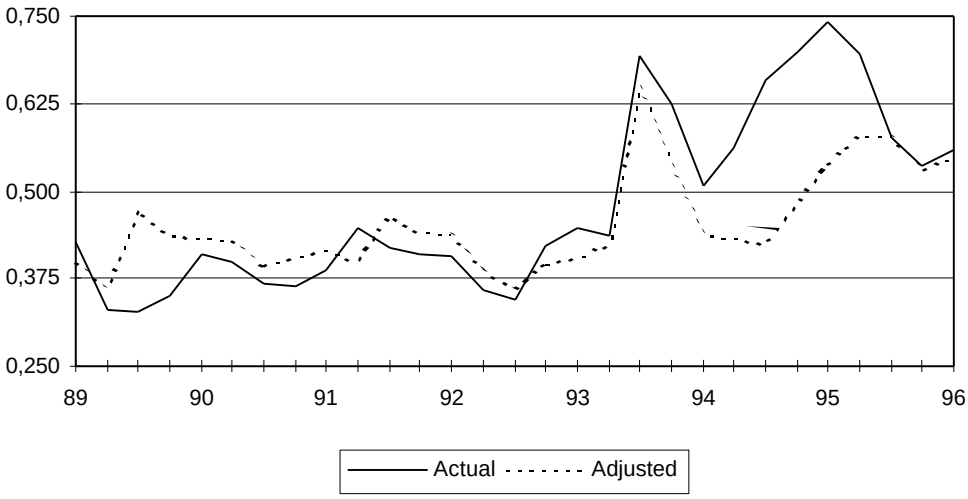
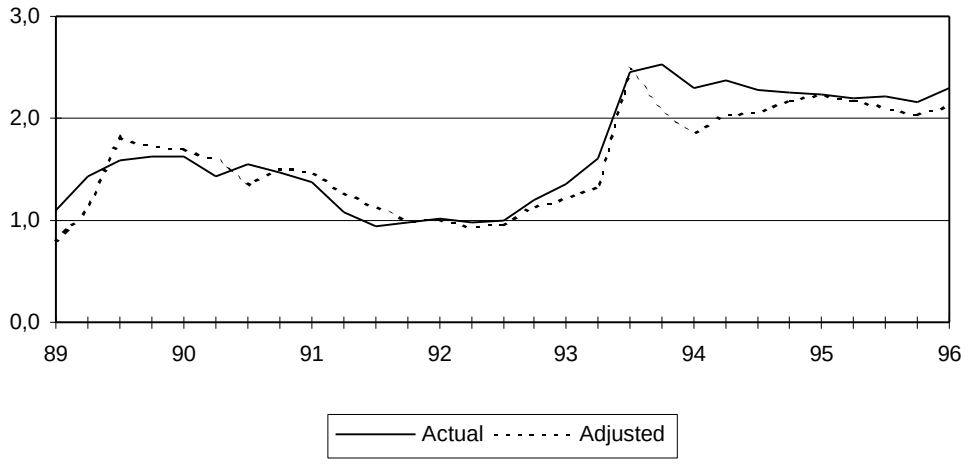


Figure A2.4
Finsocial
(In percent of GDP, accumulated in 4 quarters)



at 1,600, following Hodrick and Prescott (1981).

Figure A2.5
Contribution on Profits
(In percent of GDP, accumulated in 4 quarters)

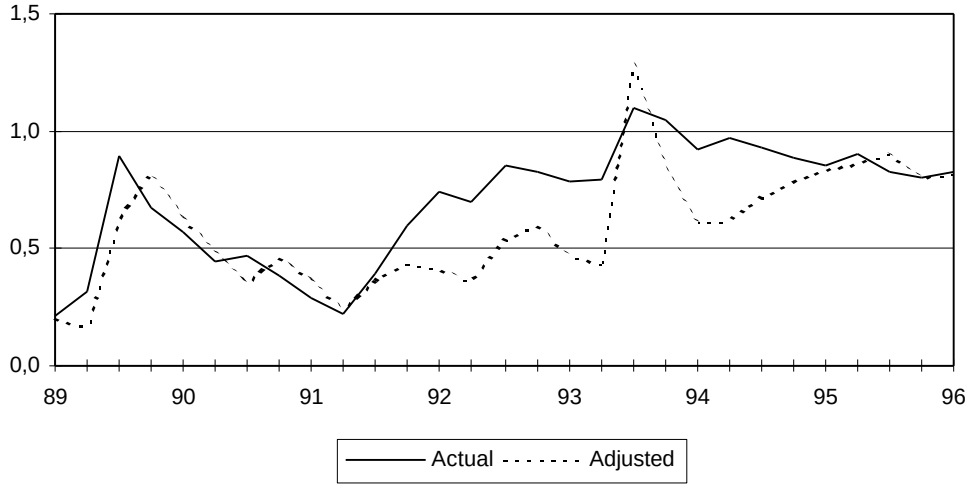


Figure A2.6
PIS PASEP
(In percent of GDP, accumulated in 4 quarters)

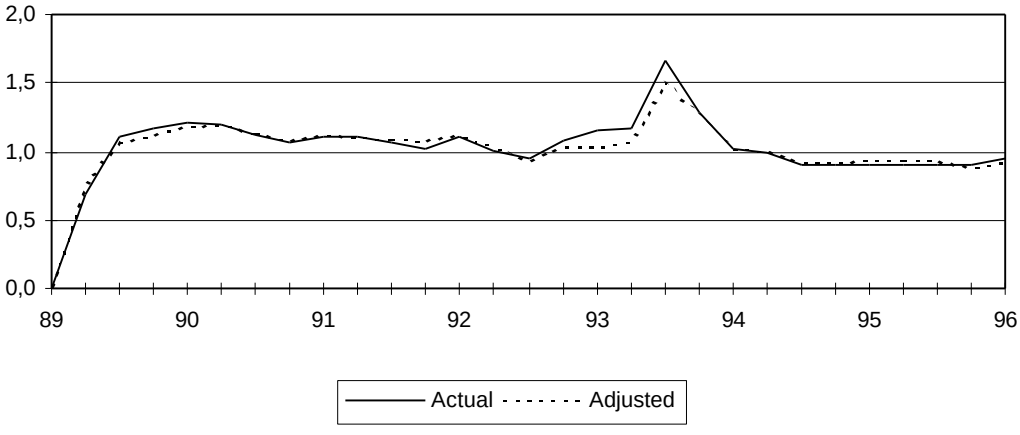


Figure A2.7
ICMS
(In percent of GDP, accumulated in 4 quarters)

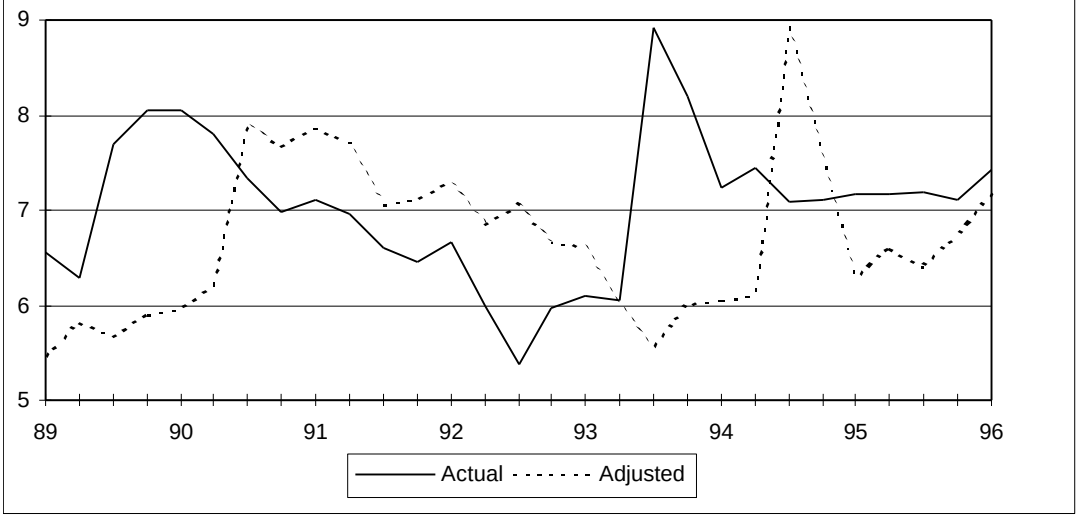


Figure A2.8
Federal Government Payroll
(In percent of GDP, accumulated in 4 quarters)

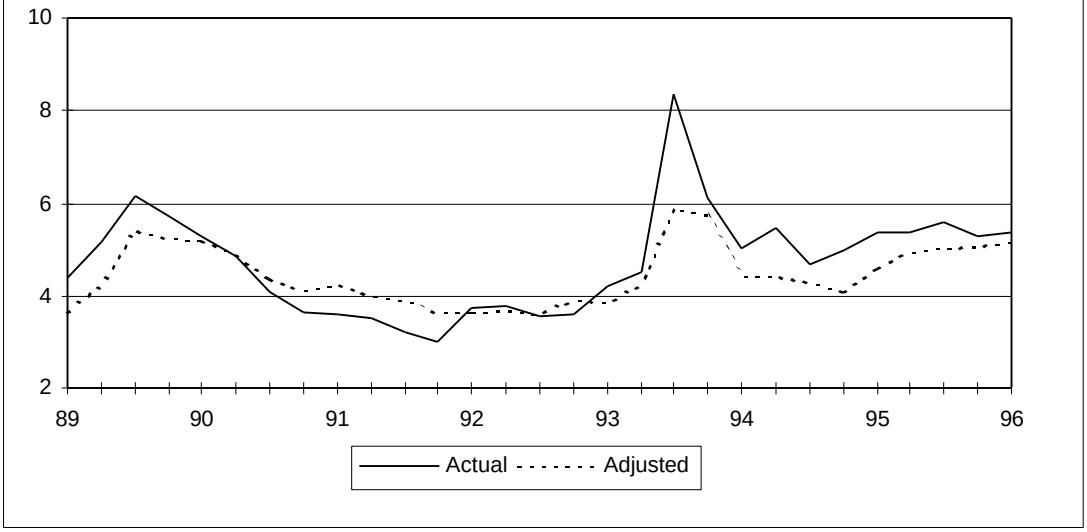


Figure A2.9
Primary Deficit
(In percent of GDP, accumulated in 4 quarters)

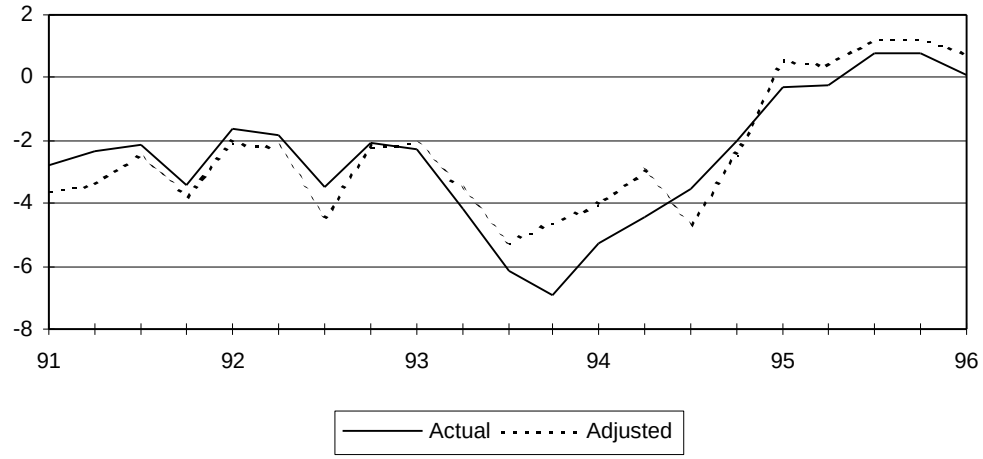


Figure A2.10
Actual Change in Primary Deficit and Fiscal Impulse Measure
(In percent of GDP, accumulated in 4 quarters)

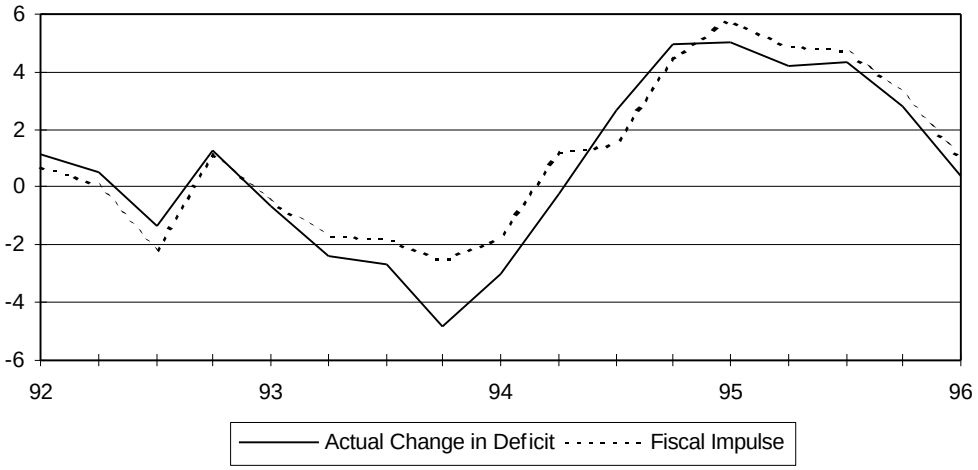


Figure A2.11
Real GDP (1980 = 100)

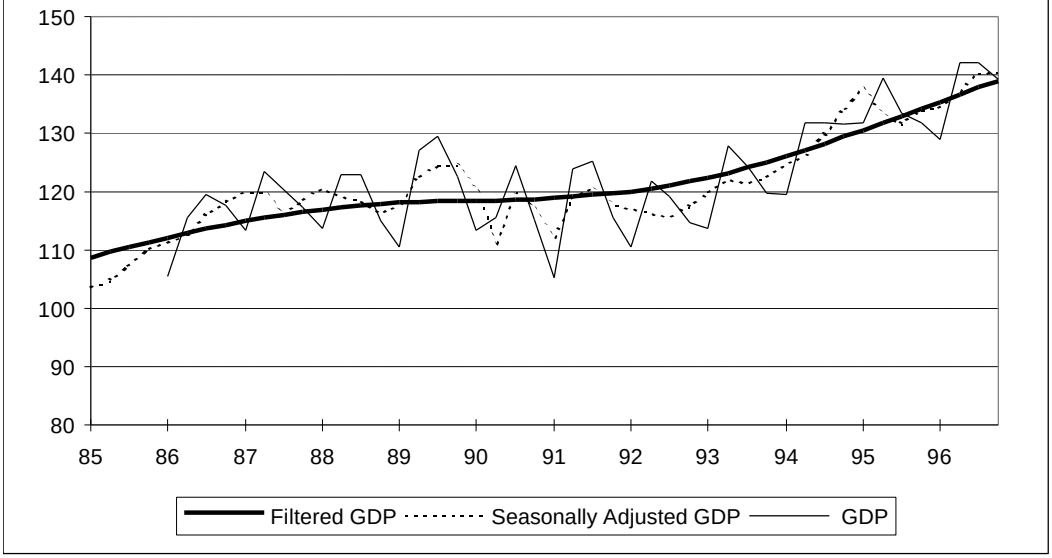


Figure A2.12 Income Tax
(In percent of GDP, accumulated in 4 quarters)

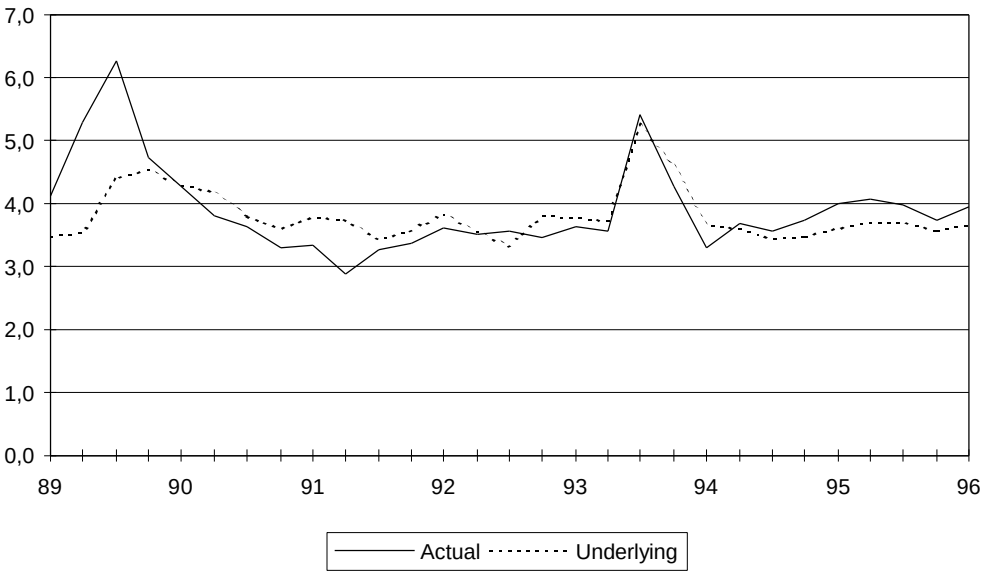


Figure A2.13
IPI
(In percent of GDP, accumulated in 4 quarters)

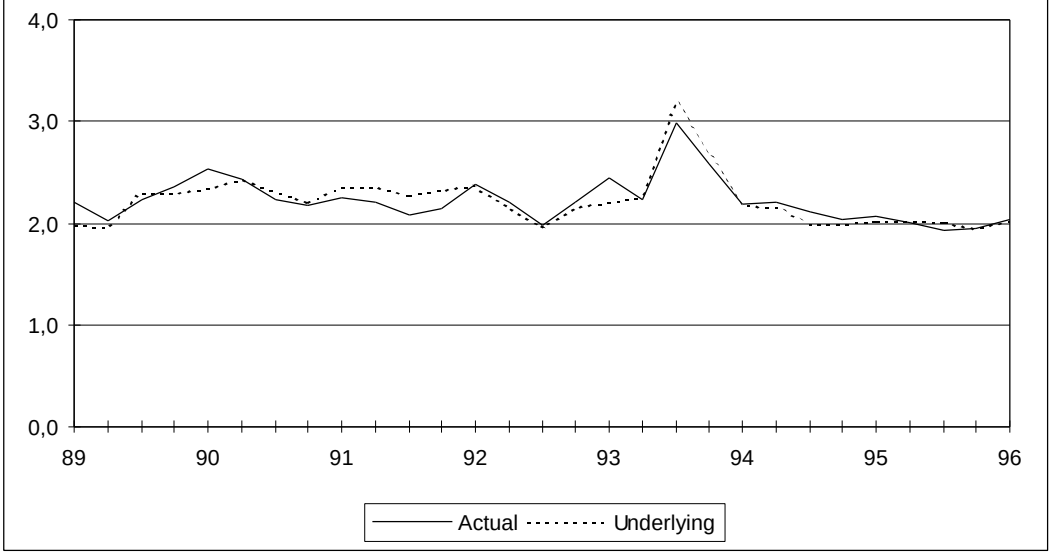


Figure A2.14
Import Tax
(In percent of GDP, accumulated in 4 quarters)

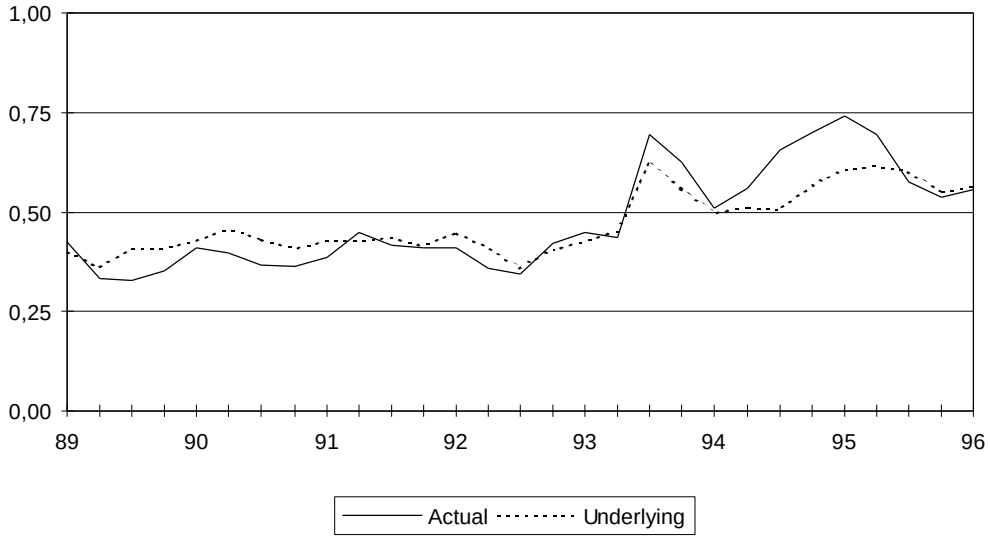


Figure A2.15
Finsocial
(In percent of GDP, accumulated in 4 quarters)

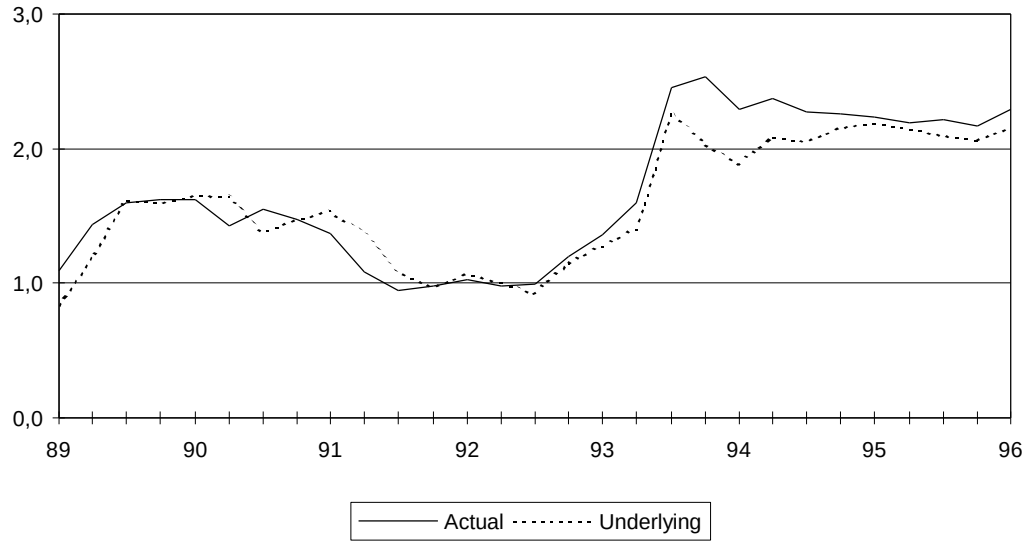


Figure A2.16
Contribution on Profits
(In percent of GDP, accumulated in 4 quarters)

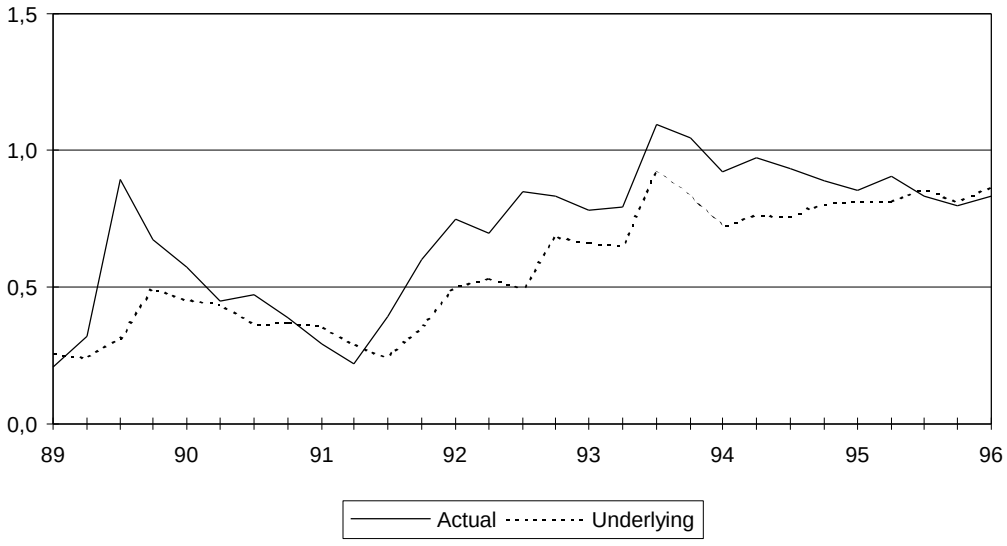


Figure A2.17
PIS-PASEP
(In percent of GDP, accumulated in 4 quarters)

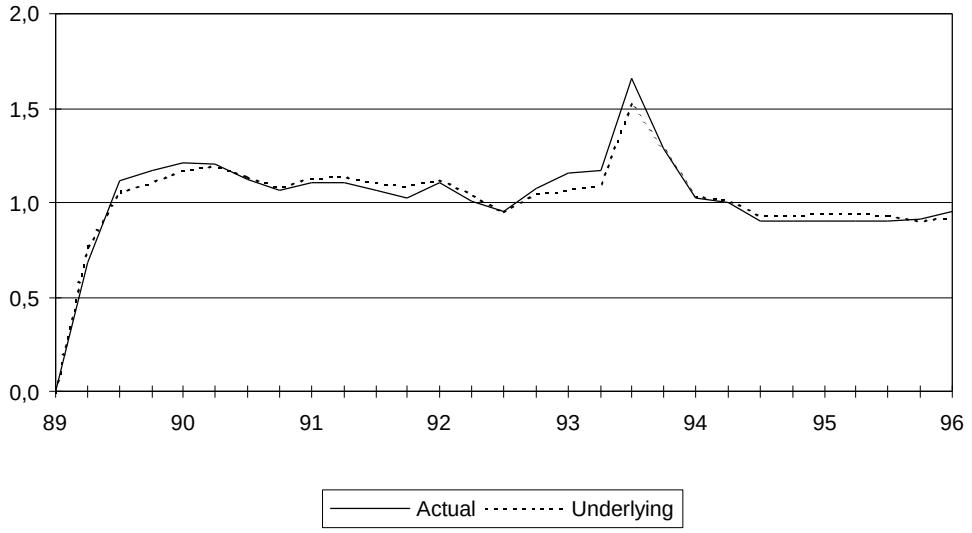


Figure A2.18
ICMS
(In percent of GDP, accumulated in 4 quarters)

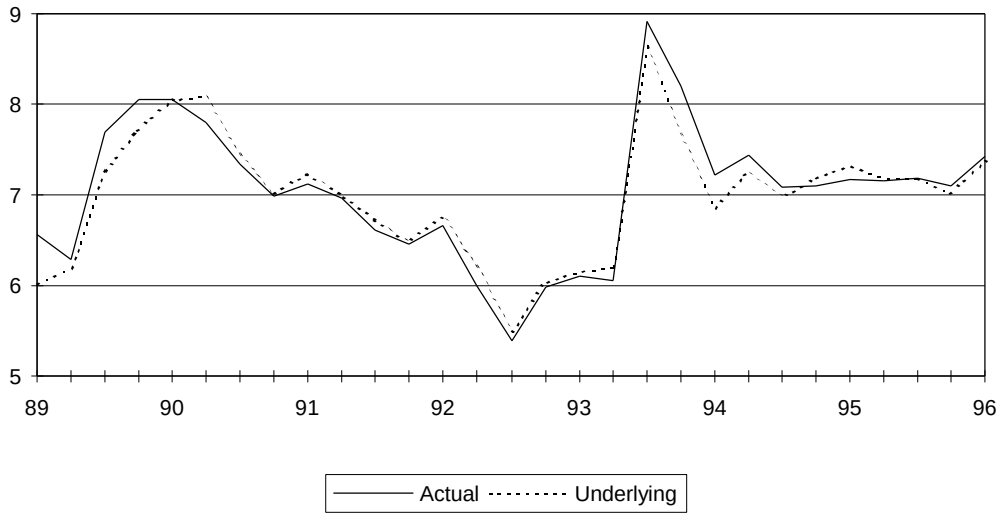
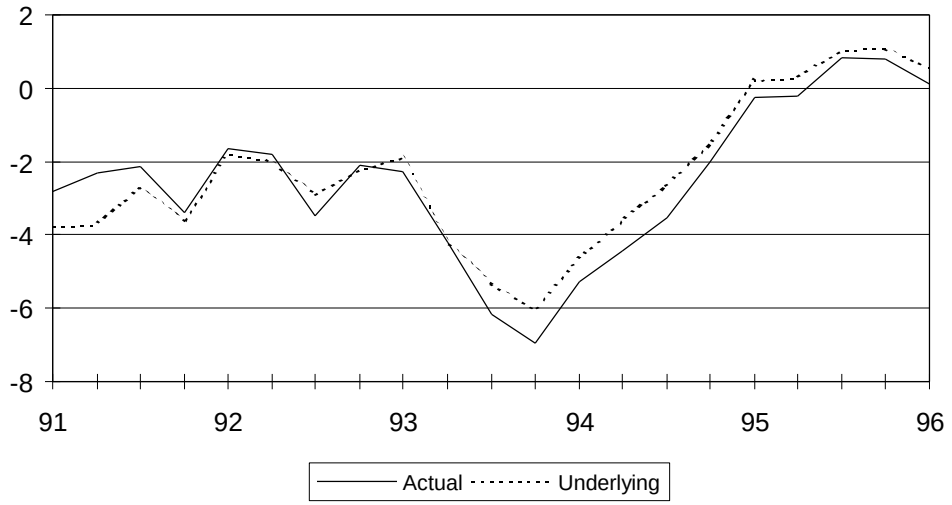


Figure A2.19
Primary Deficit
(In percent of GDP, accumulated in 4 quarters)



APPENDIX 3: THE SIMULATION MODEL

In the model used for the debt-dynamics simulations of Section 5, the public sector net-debt is separated into three components: local-currency denominated registered net-debt (*BR*), foreign-currency denominated registered net-debt (*BRD*) and external net-debt (*D*).[34] All debt-stock variables are defined as a proportion of GDP. As *r** is the external interest rate paid on *D*, the real interest rate on that debt can be written as *r*(1 + e) + (e - p)*, where *e* is the rate of depreciation of the domestic currency and *p* is the inflation rate.[35] Accordingly, as the local-currency denominated net-debt pays an interest *r* above the monetary correction of the debt, the relevant real interest is given by *r(1 + p)*.[36] All interest rates are referred to a basic exogenous external rate *re*. The highest spread *s* is paid on *BR*. Given the covered exchange-rate risk, a smaller spread Ωs is paid on *BRD*, where $0 < \Omega < 1$. A fixed spread *se* is paid on *D*, since the current cost of the external net-debt is highly dominated by the cost of Brady bonds and the returns on the stock of foreign reserves.

The public sector operational balance, as a proportion of GDP, may therefore be written as

[1]
$$dbp_{t+1} = d_{t+1} - \frac{(re_{t+1} + se)(1+e_{t+1}) + (e_{t+1} - p_{t+1})}{(1+p_{t+1})(1+g_{t+1})} D_t -$$

$$- \frac{(re_{t+1} + \Omega_{t+1} \cdot s_{t+1})(1+e_{t+1}) + (e_{t+1} - p_{t+1})}{(1+p_{t+1})(1+g_{t+1})} BRD_t - \frac{re_{t+1} + s_{t+1}}{1+g_{t+1}} BR_t$$

where d is the primary balance, the other three terms in the right hand side are the public sector interest payments, and *g* is the real GDP growth rate.

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[34] The reasons for avoiding the traditional disaggregation into federal, state & municipal and public enterprises' debt have already been discussed in Section 5.

[35] From *(1 + r*)(1 + e) - (1 + p)*.

[36] From *(1 + r)(1 + p) - (1 + p)*.

As explained in Section 5.2, it is reasonable to suppose that a sounder fiscal stance, as measured by the primary balance, should open room for lower interest rates. The model therefore simply determines the interest spread *s* as an isoelastic decreasing function of the primary balance. The sensitiveness of the simulation results to different views on the likely response of interest rates to an improvement in fiscal stance may be easily explored by simply changing the value of the elasticity α in

$$[2] \qquad s_t = s(d_t, \alpha)$$

The debt stocks are determined in the next three equations. The change in the total net-debt depends on the operational balance dbp as well as on three other factors: the expected value of public assets sales *AS*, the expected emergence of contingent and hidden liabilities *BH* and seigniorage. The resulting change in indebtedness is assumed to be distributed in fixed proportions, ϕ and $(1-\phi)$, between *BR* and *BRD*. The local-currency denominated registered net-debt in period $t+1$ is therefore written as

$$[3] \qquad BR_{t+1} = \frac{BR_t}{1+g_{t+1}} + \phi \cdot [BH_{t+1} - dbp_{t+1} - (m+\gamma)AS_{t+1} - \frac{(1+p_{t+1})(1+g_{t+1})-1}{(1+g_{t+1})(1+p_{t+1})} M_t]$$

where m is the part of the privatization proceeds that is effectively set aside for debt redemption, *M* is the monetary base and seigniorage is given by the last term on right-hand side bracket. The impact of public-assets sales on the net-debt is amplified by the "debt reclassification" parameter γ[37] In turn, the foreign-currency denominated registered net-debt evolves according to

[37] Given the peculiarities of public-debt accounting in Brazil, when a public enterprise is privatized its whole debt is reclassified and written off from the the public sector net-debt statistics. Therefore, each billion of privatization proceeds may end up reducing the net debt by more than m times one billion. The intensity of this additional "reclassification effect" on the net debt is measured by γ It may be easily shown that $\gamma = r/[L.(1-r)]$, where r is the leverage ratio of the privatized enterprise (debt/assets) and L is the part of its equity that is being transferred to the private sector. See Werneck (1997).

[4] $$BRD_{t+1} = \frac{1+e_{t+1}}{(1+p_{t+1})(1+g_{t+1})} BRD_t + (1-f)\cdot[BH_{t+1} - dp_{t+1} - (m+g)\cdot AS_{t+1} - \\ - \frac{(1+p_{t+1})(1+g_{t+1})-1}{(1+p_{t+1})(1+g_{t+1})} M_t]$$

As to the external net-debt, it is simply governed by

[5] $$D_{t+1} = \frac{1+e_{t+1}}{(1+p_{t+1})(1+g_{t+1})} D_t$$

The determination of the public sector primary balance, as discussed in Section 6 above, is based on the following three equations. The federal primary balance is given by

[6] $$d = \frac{1}{(1+g_{t+1})(1+p_{t+1})}\cdot[(1-t_{SM})(1+t.g_{t+1})(1+p_{t+1})tr_t - (1+u_{t+1})(1+w_{t+1})w_t - \\ - (1+uR_{t+1})(1+wR_{t+1})wR_t - (1+x_{t+1})(1+wm_{t+1})ssb - (1+y_{t+1})(1+p_{t+1})ie_t - \\ - (1+h_{t+1})(1+p_{t+1})he_t - (1+k_{t+1})(1+p_{t+1})oe_t]$$

And the primary balance of state and municipal governments is determined by

[7] $$d_{SM} = \frac{1}{(1+g_{t+1})(1+p_{t+1})}\cdot[t_{SM}(1+t\cdot g_{t+1})(1+p_{t+1})tr_t + (1+tug_{t+1})(1+p_{t+1})svat_t + \\ + (1+g_{t+1})(1+p_{t+1})ot_t - (1+u_{SM_{t+1}})(1+w_{SM_t})w_{SM_t} - (1+g_{t+1})(1+p_{t+1})gs_{SM_t} - \\ - (1+g_{t+1})(1+p_{t+1})ie_{SM_t} - (1+g_{t+1})(1+p_{t+1})oe_{SM_t}]$$

The public sector primary balance is, of course, simply given by

$$[8] \qquad d_t = dF_t + dSM_t + dPE_t$$

where the dPE, the public enterprises' primary balance, is treated as an exogenous variable. Parameters and variables involved in equations [6] and [7] are defined in Table A3.1.

Table A.3.1
List of Variables and Parameters of the Simulation Model

Symbol	*Endogenous Variables*
dop	*Public sector operational balance*
s	*Interest spread on registered local-currency denominated public sector debt*
r	*Interest rate on local-currency denominated public-sector debt*
BR	*Registered local-currency denominated public sector debt*
BRD	*Registered foreign-currency denominated public sector debt*
D	*Public sector net external debt*
df	*Federal government primary balance*
tr	*Federal government gross tax revenue*
w	*Federal government active-personnel payroll*
wR	*Federal government retired-personnel payroll*
ssb	*Social security benefits*
ie	*Investment expenditures*
he	*Health assistance programs expenditures*
oe	*Other nonfinancial expenditures*
dsM	*State and municipal governments primary balance*
$svat$	*State value added tax revenue*
ot	*Revenue from other state and municipal taxes*
w_{SM}	*Payroll of State and Municipal Governments*
gs_{SM}	*Expenditures of state and municipal governments with goods and services*
ie_{SM}	*Capital expenditures of state and municipal governments*
oe_{SM}	*Other expenditures of state and municipal governments*
d	*Public sector primary balance*

Symbol	*Exogenous Variables*
re	*External interest rate*
e	*Nominal depreciation rate*
p	*Inflation rate*
g	*GDP growth rate*
BH	*Hidden domestic debt*
AS	*Asset sales*
M	*Monetary base*

cont.

Table A.3.1 (continuation)
List of Variables and Parameters of the Simulation Model

	Parameters
se	*Interest spread paid on external debt*
W	*Ratio between interest spreads paid on foreign-currency and local-currency denominated debts*
a	*Elasticity of the spread function*
f	*Fraction of borrowing requirements financed by issuing BRD*
m	*Fraction of privatization proceeds used for debt redemption*
g	*"Debt-reclassification" effect parameter*
tSM	*Revenue sharing parameter*
t	*GDP-elasticity of the federal tax revenue*
u	*Federal active-personnel payroll quantum growth rate*
w	*Nominal rate of change of salaries of the federal active personnel*
uR	*Federal retired-personnel payroll quantum growth rate*
wR	*Nominal rate of change of salaries of the federal retired personnel*
x	*Social security-benefits quantum growth rate*
wm	*Nominal rate of change of the minimum wage*
y	*Real growth rate of federal investment expenditures*
h	*Health-assistance programs quantum growth rate*
k	*Real growth rate of other federal expenditures*
tn	*GDP-elasticity of the state value added tax revenue*
u_{SM}	*State and municipal payroll quantum growth rate*
w_{SM}	*Nominal rate of change of the salaries of state and municipal employees*

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