DEPARTAMENTO DE ECONOMIA

PUC-RIO

TEXTO PARA DISCUSSÃO
Nº 385

THE QUALITY OF THE FEDERAL NET DEBT IN BRAZIL

Afonso S. Bevilaqua   e   Rogério L. F. Werneck
asb@econ.puc-rio.br   *rwerneck@econ.puc-rio.br*

ABRIL 1998

1. INTRODUCTION[1]

Three major stylized facts mark the evolution of the public-sector debt during the 1990s. The first is the substantial reduction in the importance of the foreign debt in the total public-sector debt.[2] The second important fact is that from January 1991 until mid-1995 domestic federal debt growth can be entirely explained by two elements: the conversion of compulsory savings to voluntary savings by the Collor administration, and the substantial accumulation of foreign reserves. The third major stylized fact is that from 1995 on the growth in the domestic federal debt is in large part explained by fiscal developments.

With the sizable accumulation of foreign reserves after 1991, the net public-sector debt acquired an increasing importance as indicator of public indebtedness. As in many other countries, it became routine to refer to the gross indebtedness figures net of the value of major assets in the public sector balance-sheet. In addition to foreign exchange reserves, however, the net debt figures in Brazil include many other lower quality assets that have been growing very rapidly in the last few years. This paper discusses the implications of this fact for the interpretation of the public-sector net debt statistics.

2. RECENT EVOLUTION OF THE PUBLIC-SECTOR NET DEBT

As Table 2.1 shows, the public-sector net debt has increased from 28.5% of GDP in December 1994 to 34.5% of GDP in 1997. This increase is totally explained by the very rapid growth in the domestic net debt, which increased from 20.3% of GDP in 1994 to 30.1% of GDP in 1997, and more than compensated the reduction in the

---

[2] The public-sector foreign gross debt was reduced to from almost 28% of GDP in 1991 to some 11% of GDP in 1997.

foreign net debt from 8.2% of GDP to only 4.4% of GDP in 1997. Given that the domestic net debt of the public sector enterprises was substantially reduced during the period, the increase in the public-sector net debt during 1994-1997 can be entirely explained by the growth in the domestic net debt of the federal government and Central Bank, and state and municipal governments. In fact, the figures in Table 2.1 imply that more than two thirds of this growth can be attributed to the federal government and Central Bank.

This evolution of the federal net-debt figures during 1994-1997 should be interpreted with caution. Though the federal net debt has increased much less dramatically than the federal gross debt, there are reasons to believe that the quality of the net debt has deteriorated substantially during the period.

3. THE QUALITY OF THE FEDERAL NET DEBT

There are two important sources of deterioration in the quality of the public-sector net debt after 1994. The first is the recent restructuring of the Brazilian financial system. The combination of high interest rates and the sudden end of the high inflation regime, following the launching of the stabilization plan in mid-1994, increased considerably the vulnerability of the banking system.

After the Central Bank intervention in *Banco Econômico* in August 1995, the financial health of important private banks became increasingly questioned and there was a growing concern that a major banking crisis could develop. In response to those concerns, the Central Bank decided to promote the restructuring of the private banking system introducing in early November 1995 a series of measures, including the creation of the Program to Promote the Restructuring of the Financial System (PROER). Three big private institutions have been rescued since then, following basically the same procedure: 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

Table 2.1
Brazil, Non Financial Public-Sector Net Debt, 1994-1997
(in percent of GDP)

	December 1994 (A)	December 1995 (B)	December 1996 (C)	December 1997 (D)	Change 94-97 (D) – (A)
(1) Federal Government & Central Bank Net Debt	12.3	13.0	16.4	18.2	5.9
Gross Debt	31.7	34.0	40.9	45.7	14.0
Domestic Debt	19.9	23.6	31.4	37.3	17.4
Foreign Debt	11.8	10.4	9.5	8.4	-3.4
(-) Foreign Reserves	5.8	7.0	7.8	6.4	0.6
(-) Other Assets	13.7	14.0	16.6	21.1	7.4
(2) State and Municipal Governments Net Debt	9.5	10.4	11.9	13.5	4.0
Domestic Net Debt	9.2	10.1	11.5	13.0	3.8
Foreign Net Debt	0.3	0.3	0.4	0.5	0.1
(3) Public Enterprises Net Debt	6.7	6.5	6.1	2.8	-4.0
Domestic Net Debt	4.9	4.8	4.0	0.9	-4.0
Foreign Net Debt	1.9	1.7	2.0	1.9	0.0
Public-Sector Net Debt [(1) + (2) + (3)]	28.5	29.9	34.4	34.5	6.0

Source: Banco Central do Brasil

institution, persuaded to participate in the transaction by the access to a low-interest credit line.

From its launching in November 1995 to March 1997, PROER operations amounted to R$15.1 billion. With the acquisition of *Banco Bamerindus* by the Hong Kong & Shanghai Banking Corporation in May 1997, this amount increased to R$20.8 billion. By November 1997, a total of R$21.0 billion had been released.[3] Some R$1.2 billion have already been paid off by the banks and R$13.2 billion, corresponding to the resources used to finance the purchase of *Banco Econômico* and *Banco Nacional*, have been transferred to the Central Bank department in charge of liquidating financial institutions. Those resources will be paid back only when the Central Bank manages to sell assets of the former *Econômico* and *Nacional* or when it liquidates the guarantees of the PROER loans.

A similar program was launched in mid-1996 to deal with the insolvent state-owned banks. So far, the most important transaction in the context of this program has been the R$8 billion capitalization of *Banco do Brasil* by the Treasury in 1996.

A second important source of deterioration in the quality of the federal net debt has been the generous restructuring by the federal government of the states' sizable outstanding debt during 1997. In the seventh restructuring of this kind in a period of ten years, the federal government has issued bonds with high interest rates and relatively short maturities to extend credit to the states at low interest rates and maturities that in most cases reach 30 years. As of December 1997, some R$54 billion of states' debt had been restructured. It is estimated that the final amount could be as high as R$103 billion.

The 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, have

---

[3] See Mendonça de Barros et alli (1998).

been deducted as assets from the federal gross debt. Analogously, as high-interest state bonds have been swaped for lower-interest federal bonds, the states' debt has been largely converted into debt to the federal government and, therefore, also been subtracted from the federal gross debt in the net-debt figures. 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 2.1 shows an increase of 17.4% of GDP in the gross domestic debt of the federal government and the Central Bank between 1994 and 1997, partly compensated by a reduction in their foreign debt equivalent to 3.4% of GDP. The resulting gross-debt increment of 14% of GDP led to a smaller, though still impressive, increase in the federal net debt largely because it was offset by an accumulation of "other assets" amounting to 7.4% of GDP. The evolution of those assets has been dominated by developments related to the restructuring of the financial system and the states' debt.

It is highly likely that, in the future, part of the assets which are being subtracted from the federal gross public debt may prove to be partially or totally worthless. Some of the assets transferred to the Central Bank when failing banks were bailed out may prove to be worthless, or the states may not fully honor the service of their debts to the federal government. If and when that happens, the federal net-debt figures will have to be adjusted upwards.

4. REASSESSING THE FEDERAL NET DEBT: A SIMPLE MODEL

The contingent liabilities that stemmed from the financial-system restructuring program, as well as the sizeable stock of states' debt included in the assets considered in the federal net-debt figures, may be properly taken into account in a simple model that allows a more careful assessment of the importance of the federal net debt. As the model is developed, the two problems will be dealt with separately at first and jointly afterwards.

The contingent liabilities beneath the financial-system restructuring program may be treated in a very straightforward way. Let Z be the non-performing assets of the bailed out banks that were absorbed by the Central Bank and let h be the proportion of those assets that the Central Bank will be able to recover after they are liquidated. As those assets are currently being entirely subtracted from the gross federal debt, the federal net-debt ND should be transformed into the corrected measure ND_Z according to the following equation

$$ND_Z = ND + (1 - h) Z \qquad [4.1]$$

Of course the value of h is not known yet. But one may deal with the pending uncertainty about it is value assuming a plausible probability distribution for h. Preliminary data on the costs of the financial-system restructuring program show that in the case of *Banco Nacional*, one of the three big private institutions that have been bailed out, the Central Bank will be able to recover as much as 25 percent of the absorbed assets.[4] Just to illustrate the point, it was somewhat optimistically assumed that h has a truncated exponential distribution with mean equal to 0.4 and minimum and maximum values 0.25 and 1.0 respectively.

In 1997, the federal net debt ND corresponded to roughly 18 percent of the GDP. The total value of the assets of *private* bailed-out banks that were transferred to the Central Bank has been estimated at 1.6 percent of GDP. If nothing could be recovered *(h = 0)*, the value of the corrected federal net debt stock ND_Z would be equivalent to 19.6 percent of GDP. Such an extreme case was just assumed away when the distribution for h presupposed that its value would be at least 0.25. Figure 4.1 below shows the distribution for h generated by Monte Carlo simulations. Using the above mentioned values for ND and Z, simulations based on equation 4.1 generated the distribution for

---

[4] See "BC recupera só 1,1 bilhão do Nacional", *Gazeta Mercantil*, February 2, 1998.

ND_Z presented in Figure 4.2.[5] According to this distribution, the mean value of the corrected federal net-debt measure ND_Z would be around 19 percent of GDP.

Figure 4.1

Distribution for h
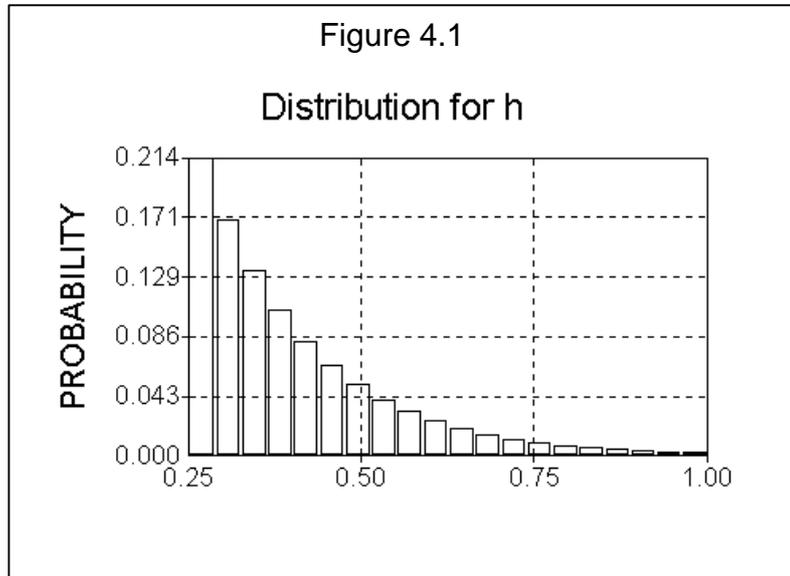
Putting aside for a moment the problem stemming from the existence of contingent liabilities related to the financial-system restructuring program, one may now turn to the problem posed by the importance of the states' debts among the assets considered in the federal net-debt calculation.

Figure 4.2

Distribution for NDZ

---
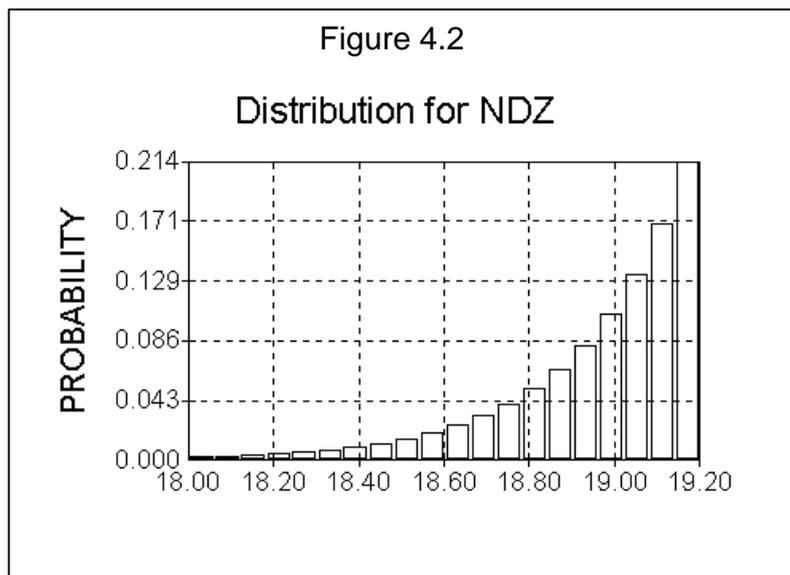
[5] In fact the utilized sampling method was the Latin Hypercube, a variant of the Monte Carlo method.

Assuming that A, the total stock of states' debts to the Union, is the only relevant federal asset, the federal net debt may be written as

$$ND = D - A \qquad [4.2]$$

where D is the gross debt, on which an average interest rate r is paid. The states are supposed to pay an interest rate $\boldsymbol{r}$ on their debt to the Union. The federal net interest payments therefore are

$$J = rD - \boldsymbol{r}A$$

that may be re-written as

$$J = (r - \boldsymbol{ra}) D \qquad [4.3]$$

where

$$\boldsymbol{a} = A/D \qquad [4.4]$$

Dividing both sides of expression *[4.3]* by ND, and taking *[4.2]* and *[4.4]* into account, one may get

$$v = (r - \boldsymbol{ra})/(1 - \boldsymbol{a}) \qquad [4.5]$$

where $v = J/ND$ is the implicit interest rate paid on the federal net debt. Naturally, if $r > \boldsymbol{r}$ and $a < 1$, an increase in $\boldsymbol{a}$ leads to a higher v, as the derivative of v with respect to a may be written as

$$(r - \boldsymbol{r})/(1 - \boldsymbol{a}^2) \qquad [4.6]$$

In other words, if the interest rate r on states' debt to the Union is lower than the interest rate paid by the federal government on its own debt, the implicit interest rate v paid on the federal net debt will be higher the higher, the importance of the state's debt to the Union vis-à-vis the gross federal debt.[6]

In Figure 4.3, which was drawn assuming plausible values for the interest rates in equation *[4]* (r = 15 percent and r = 6 percent), one may have a clearer idea of how an increase in a affects the implicit interest rate v. Since the current value of a is around 0.4, the implicit rate consistent with those values would be around 21 percent.
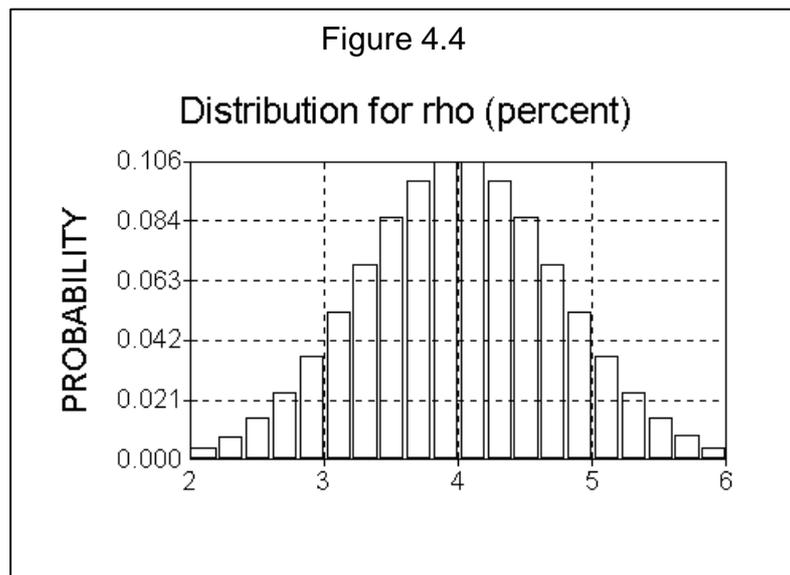

Figure 4.3
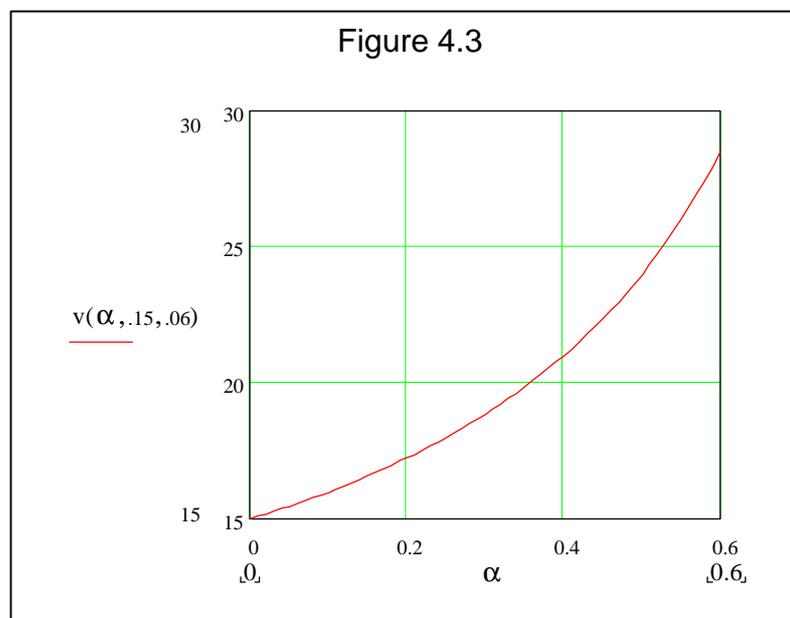
In fact, the implicit interest rate v on the federal net debt should depend not on the contractual interest rate r on the states' debt to the Union but upon the *effective* interest payments that the federal government is finally able to receive from the states. As past experience has shown that such debt service has been subjected to all kind of difficulties, one may take this fact into account in the model, treating r as a random

---

[6] In fact, the second derivative of v with respect to a, which may be written as $2(r - r)/(1 - a)^3$, is also positive if $r > r$ and $a < 1$. The higher a, the higher the sensitivity of net interest paid on the federal net debt to an increase in a.

variable, and running simulations in order to detect the effect of the uncertainty about *r* on the implicit interest rate on the federal net debt.

The maximum interest rate the Union may expect to receive from the states is, of course, the contractual rate, i.e. 6 percent. In the worst case the states could even stop paying interest on their debts to the federal government. It was assumed that *r* has a truncated normal distribution with mean 4 percent, standard deviation 0.75 percent, maximum 6 percent and minimum 2 percent.[7] Figure 4.4 below shows the distribution for *r* generated by the simulations. Keeping *r* = 15 percent and assuming *a* = 0.4, simulations run with the model generated the distribution for *v* presented in Figure 4.5.

As may be seen in the figure, the implicit interest rate *v* on the federal net debt may vary from 21 to 23.7 percent, as a result of the uncertainty about *r*. The average interest rate is around 22.3 percent.

Figure 4.4

Distribution for rho (percent)

Figure 4.5

Distribution for v (percent)
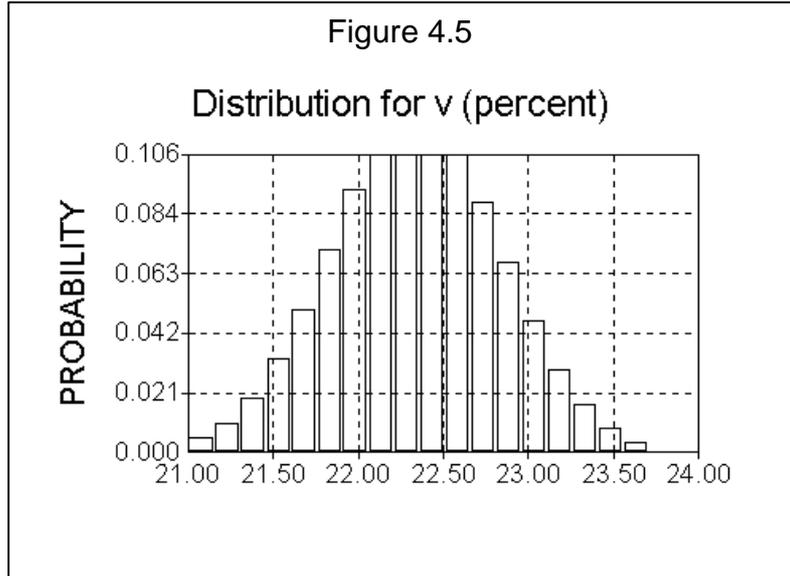
Looking from a different angle, one might notice that although taking federal assets into account may undoubtedly lead to what seems to be more comfortable federal debt figures, as long as $r > r$, the implicit interest rate on the net debt tend to be higher than the rate paid on the gross debt, what could be seen as an indicator of a less comfortable situation. The interest bill that stems from paying an annual implicit interest rate of v on a net federal debt $D - A$ is equivalent to the bill that would result from paying the lower interest rate r on a much higher debt stock, which would be a measure more appropriate for comparisons involving debt accumulated before the restructuring of the states' debt. Labeling such a virtual debt stock ND_A one may write

$$v\ (D - A) = r\ ND_A \qquad [4.7]$$

and get

$$ND_A = (D - A)\ v/r \qquad [4.8]$$

an expression that, when *[4.2]* and *[4.5]* are used, may be rewritten as

---

[7] However, no credit risk was assumed. The optimistically underlying hypothesis is that the states will

$$ND_A = [ND/r][(r - ra)/(1 - a)] \qquad [4.9]$$

That expression provides a corrected measure of the federal net debt that takes into account the relatively low interest paid by the states on their debts to the Union. For a given level of ND, ND_A will be higher the higher the value of a, as illustrated in Figure 4.6, for $r = 15$ percent and $r = 6$ percent
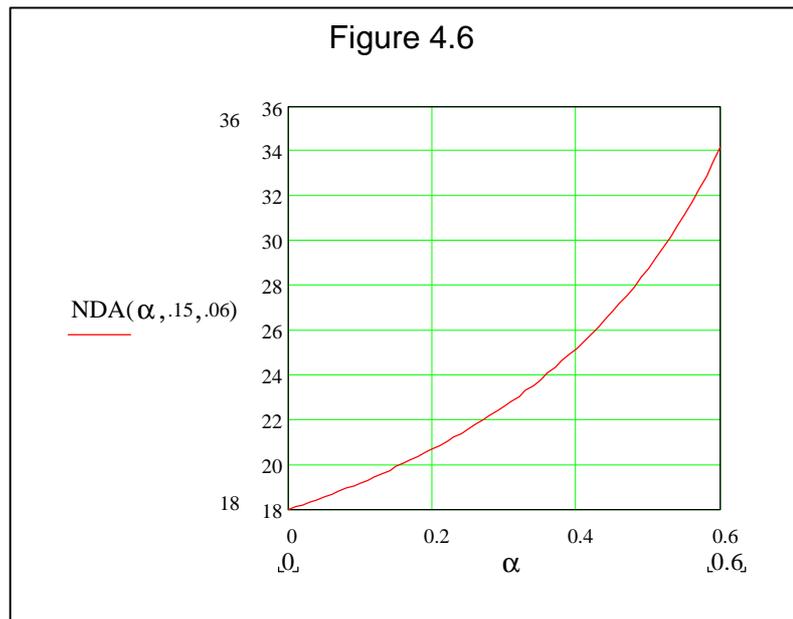
Figure 4.6

As the current value of a is 0.4, what Figure 4.6 shows is that even if the states duly pay the contractual 6 percent interest rate on their debt to the Union, the interest bill on the 18 percent of GDP federal net debt would be equivalent to the bill that would result from paying a 15 percent interest on a debt corresponding to more than 25 percent of GDP. Of course, ND_A could be much higher if the effective interest rate on the states' debt to the Union prove to be well below 6 percent. Again, simulations may be helpful at this point. Using the distribution for r from above, one may generate the distribution ND_A presented in Figure 4.7, which has a mean value of 26.8 percent

---

eventually pay their debts to the Union.

Up to now the problem posed by the existence of contingent liabilities related to the financial system restructuring program, on one side, and the problem stemming from the importance of the states debt to Union, on the other, were treated separately. It is now time to consider both problems together.

Figure 4.7

Distribution for NDA
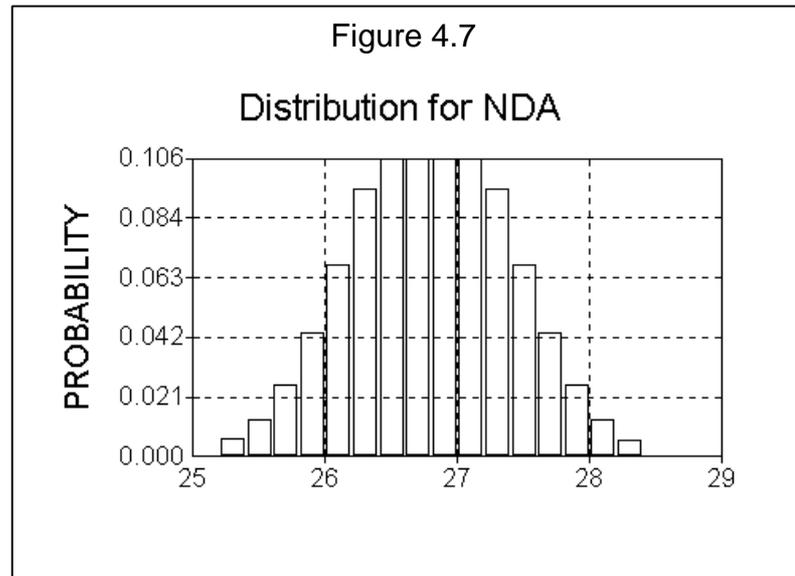
The first problem was dealt with above by equation *[4.1]*

$$ND_Z = ND + (1 - h)\,Z \qquad [4.1]$$

which provided a correction of the federal net debt that allowed for the existence of the contingent liabilities. Using *[4.2]*, that equation may be rewritten as

$$ND_Z = D - A + (1 - h)\,Z \qquad [4.10]$$

Repeating the same reasoning above around equation *[4.7]*, one may say that the interest bill brought about by paying an implicit interest rate *v* on *D – A + (1 – h) Z* is equivalent to the bill that would result from paying the lower interest rate *r* on a higher debt stock. Labeling now such a debt stock ND_{AZ} one may write

$$v\ [D - A + (1 - h)\ Z] = r\ ND_{AZ} \qquad [4.11]$$

and get

$$ND_{AZ} = [D - A + (1 - h)\ Z]\ v/r \qquad [4.12]$$

And, using *[4.2]* and *[4.5]*, one may write

$$ND_{AZ} = [ND + (1 - h)\ Z]\ [(r - \boldsymbol{ra})/(1 - \boldsymbol{a})r] \qquad [4.13]$$

that provides a corrected measure of the federal net debt that *jointly* takes into account the problem posed by the existence of contingent liabilities related to the financial system restructuring program and the problem stemming from the importance of the states debt to the Union.

The uncertainty about both h and $\boldsymbol{r}$ may now be jointly considered. Taking the distributions assumed for h and $\boldsymbol{r}$ above, one may use equation *[4.13]* to simulate the distribution for ND_{AZ}, as shown in Figure 4.8. The corrected measure ND_{AZ} could reach as much as 30 percent, with a mean value of roughly 28.2 percent.

Figure 4.8

Distribution for NDAZ

16
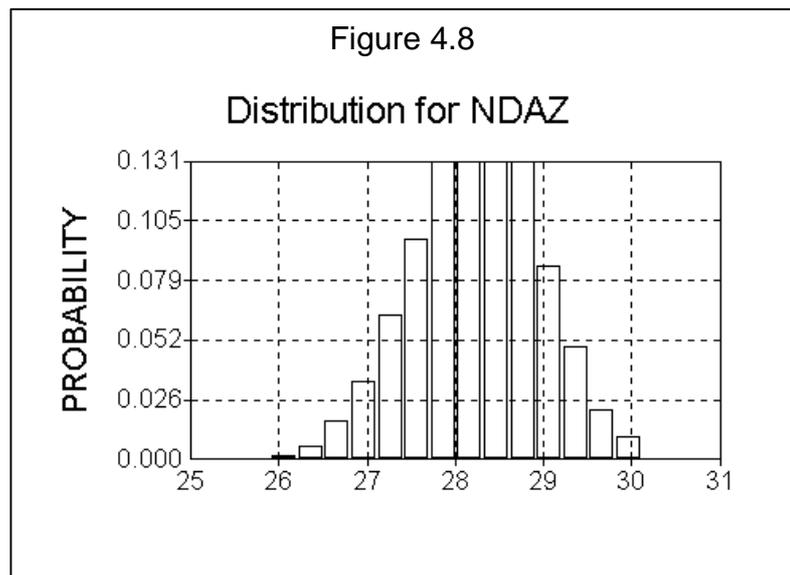
Taking into account the combined uncertainty entailed in two of the main assets that have been deducted from the gross federal debt leads, therefore, to a corrected measure of the federal net debt that could easily involve adding 10 percent of GDP to the official net debt measure.

5. CONCLUDING REMARKS

Many analysts and government officials have been arguing that, despite the rapidly widening primary deficit and the increasing borrowing requirements, the public-sector net-debt figure has remained surprisingly stable in Brazil. And that such stability seems to indicate that, after all, the country's fiscal policy has not been as unsustainable as one might think. The analysis of the previous sections has shown that such a conclusion is wrongly taken. The main point is that the stability of the net-debt figure masks the strong deterioration that has been taking place during the last few years in the quality of the federal net debt, the most important component of the public-sector net debt. Therefore, steering the fiscal policy having one's eye on the net-debt figure may prove to be quite misleading.

R<small>EFERENCES</small>

Bevilaqua, A., D. Carneiro, M. G. P. Garcia and R. L. F. Werneck (1998). "The Structure of Public Sector Debt in Brazil", paper prepared as part of a broader research program on The Structure of Public Sector Debt in Latin America, sponsored by The Inter-American Development Bank, March.

Mendonça de Barros, J. R. , G. J. L. Loyola and J. Bogdanski (1998). "Reestruturação do Setor Financeiro", Ministério da Fazenda, Secretaria de Política Econômica, mimeo..