The George Washington University
WASHINGTON DC
THE SCHOOL OF BUSINESS AND PUBLIC MANAGEMENT
INSTITUTE OF BRAZILIAN BUSINESS AND PUBLIC MANAGEMENT ISSUES

# Public Debt Sustainability in Brazil

**Guilherme B. V. Pedras**

**Advisor: Prof. William Handorf**

Minerva Program
Spring 2000
Washington, D.C.

I would like to thank my colleagues at the National Treasury Secretariat and Central Bank of Brazil for helping me in gathering the data without which this paper could never be completed. I am also grateful to Prof. William Handorf for the important contributions to this work.

**Summary**


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## Introduction

The growth of public debt in Brazil in the last few years has been causing some concern about its sustainability, and consequently, has been increasing the market perceived risk of debt default. Although debt solvency in Brazil has been questioned from time to time, Brazil has a small Debt/GDP ratio, if compared to other countries. On one hand this can be explained by the fact that countries with high GDP growth rates and high primary surplus can maintain much higher ratios than countries with less disciplined fiscal results. On the other hand, it can also be explained by the short term profile of the debt, which requires a high amount of issuance at each period.

This paper will analyze what the macroeconomic conditions are that should be met in order to allow Brazil to stay in a sustainable path, and its impacts on the average maturity of the debt that should take place in order to improve or keep constant the government ability to get financing from the market.

The first chapter gives a brief description on the evolution of the debt in the last decade, trying to focus on the relevant points for debt sustainability. The following chapter then derives the formal conditions for debt solvency. These conditions are then applied to Brazil in chapter III, using different scenarios for the relevant economic variables, in order to obtain estimates for the Debt/GDP ratio for the next years. Chapter IV uses the figures derived before to estimate what should be the improvements in the debt profile in order to keep the same monthly financing requirements by the government. Finally the last section contains some concluding remarks.

## I - Debt Evolution During the Nineties

Before starting to talk about public debt, it is important to fully understand its various concepts. It is possible to divide the data on public debt in various ways, depending on, for instance (1) what agency issues the debt; (2) what governmental level does it; (3) who owns the debt; (4) how it is placed to the market, (5) whether it is issued domestically or externally, and (6) whether it is gross or net.

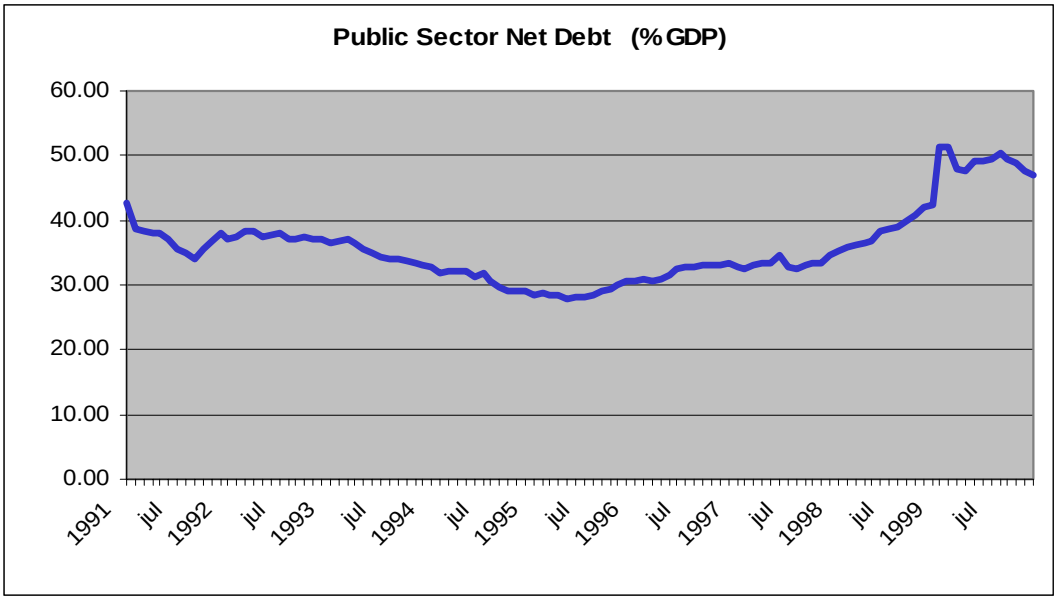
The first point seems to be of some importance to Brazil since it is one of the few countries in the world where the Central Bank issues bonds in a regular way. Although it does it mainly for monetary policy purposes, it is important to recognize that, from the market point of view, it is just "government debt". Secondly, one can consider debt only from the federal level, or can use a more broader concept which includes debt from the state companies as well as debt from states and municipalities. Thirdly, the debt can be in the hands of the market or in the hands of the Central Bank in order to this body pursue its monetary policy. Fourthly, and this is quite relevant for the case of Brazil, debt can be a market instrument or it can be instruments derived from contracts[1]. Fifthly, it is very relevant to consider where the debt is issued (to the foreign market or to the internal market), especially because of the nature of the risks may be very different from each other. And finally one can consider, also in the concept of debt, the assets owned by the government.

[1] The former represents debt that has market characteristics - whether issued competitively or to specific parts - and has a liquid secondary market, while de latter is the debt in contractual form, and thus, with not a relevant secondary market.

The nineties experienced deep changes in regard to the evolution of the Public Debt. This applies either to the size of it and also to the composition among the different concepts discussed earlier. The understanding of what is involved in this movement is important to the understanding of the concept that will be used later in this paper.

The graph below shows the evolution of the DLSP[2] - which stands for Net Public Sector Debt - during the past decade. This is the most used concept and includes (1) debt issued by Treasury and Central Bank (excluding, for obvious reasons, public debt on the portfolio of the latter), (2) Federal government, state enterprises, states and municipalities, (3) marketable and contractual securities, (4) domestically and externally issued debt and (5) also the public assets. One can easily see that, specially after 1995, the question of its sustainability deserves increased attention.

Graph 1:



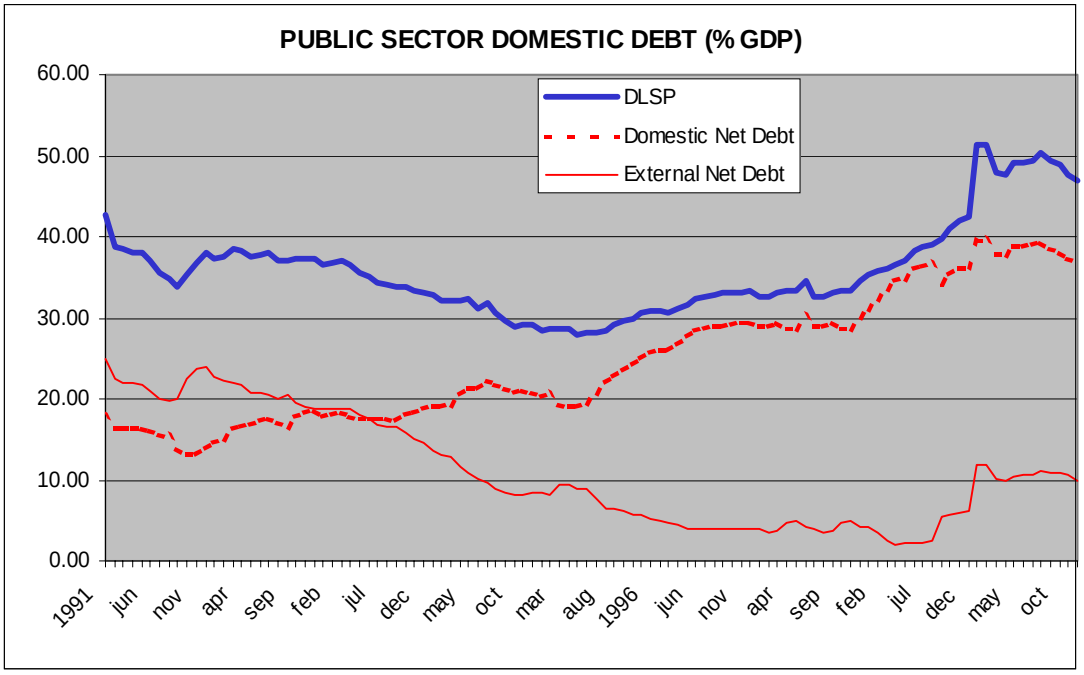

[2] Divida Liquida do Setor Publico.

One can either analyze the evolution of the debt from its size, or by considering its different components. From the size perspective it is possible to divide the decade in two parts. The first one, up to 1995, where the stock experienced a decrease, falling from around 40% of GDP to about 30% of GDP (it is worth noting though, that in the beginning of the 90's its share of GDP was higher than in earlier years). After 95, due do factors that will be briefly described here, a rapid increase of this variable takes place. The maintenance of such high rates of growth may lead Brazil to an unsustainable path. This paper will study whether this is possible and what should be done to avoid it.

In this sense, it is worthwhile to open the data to have a more clear understanding of the debt composition in the decade. Graph 2 below shows a substantial change in the debt profile, in regard to its composition between domestic and external debt. In the early 90's, due to problems of the domestic market, the vast majority of the liabilities where external ones (25% of GDP), and only around 18% of GDP was internally issued debt.[3] From 1993 on, one can observe a reversion of this pattern, by the domestic debt gaining increased importance. As a matter of fact, it is nowadays responsible for almost 40% of GDP, corresponding to around 80% of the total of DLSP.

[3]At this point it should be noted that, in this concept is included bonds indexed to the foreign exchange rate. The name refers to instruments issued in the domestic market.

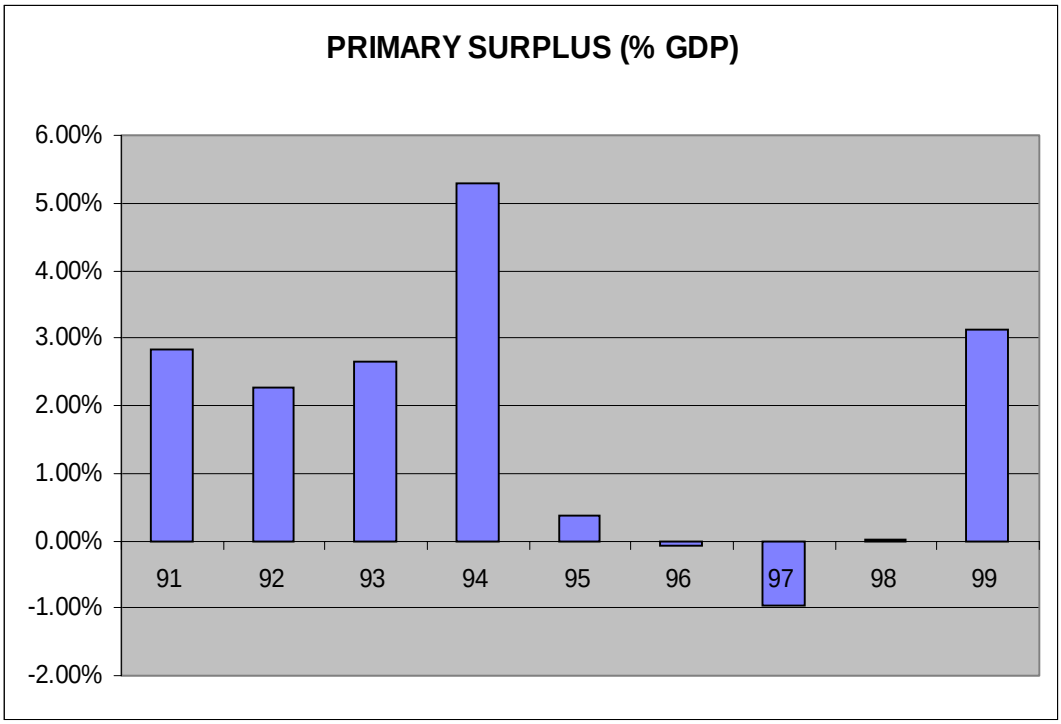
Graph 2:




Given the above, to analyze the debt behavior in the period, one should focus attention on the factors that affect the domestic debt. In particular, one can observe that the huge increase of debt can be a result of the economic policies of the time, within the process of the stabilization plan taken place by the government (Real Plan). In this context, some variables can be taken as the causes of the mentioned behavior: (1) the high interest rates; (2) the increase of the primary deficit and (3) the huge inflow of capitals.

One of the pillars of the Real Plan was an overvalued exchange rate, which generated the need of high interest rates to face the current account deficit and control the aggregate demand. Such an interest rate, by itself, can be considered a major factor in the public debt behavior. Besides, the primary deficits also may be appointed as a major factor. The graph below shows the change in the patterns of this variable for these years.

Graph 3:

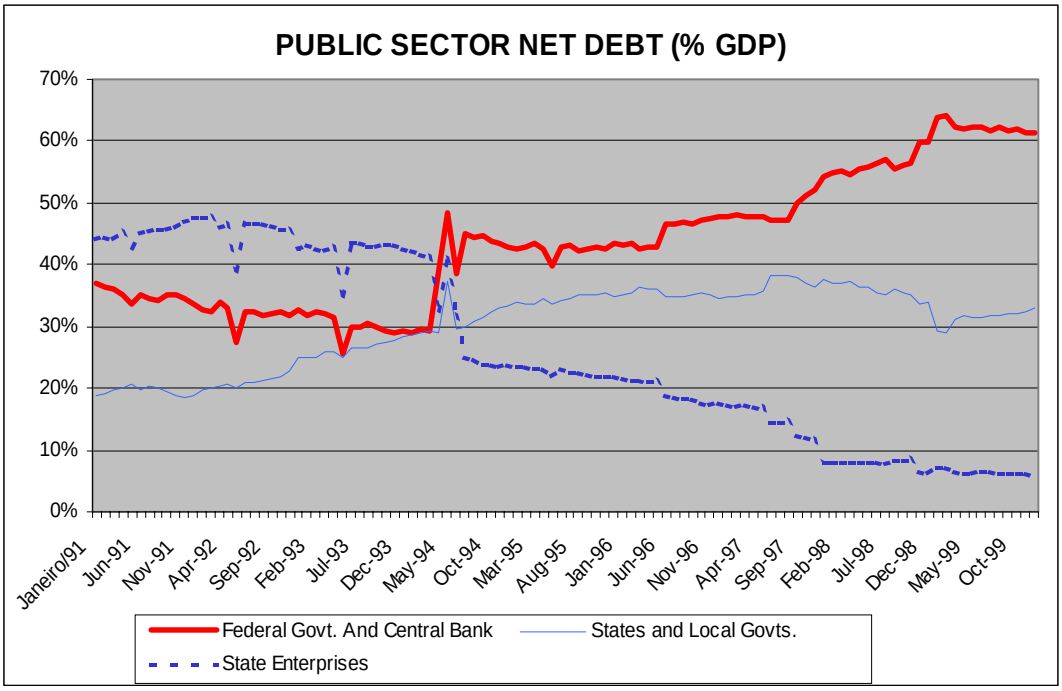



It should still be pointed out the significant effect of the exchange rate devaluation in January 1999, which, by itself, was responsible for around 5 percentage points in the increase of the Debt/GDP ratio (see Graph 1). The above discussion is important to stress the consequences of keeping this kind of policy on the debt solvency conditions. As will be argued later, it seems clear that such a policy requires high primary surpluses for the next years.

However, many other things happened to the structure of the debt than just a shift from external to domestic debt. As shown by Graph 4 below, the share of federal debt as a proportion of GDP rose considerably, at the same time as there was a decrease in the share of debt issued by state enterprises. In regard to the States and Municipalities debt, this one has its role reduced by the constraints imposed by the federal government under

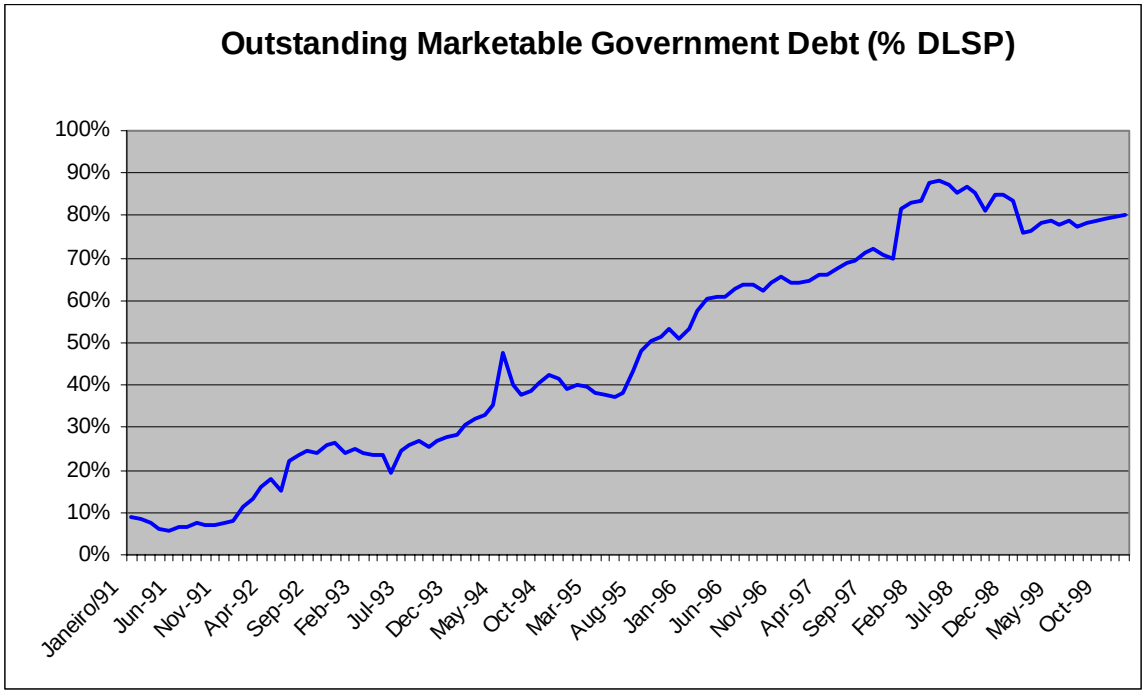
the program of restructuring the states debt in accordance with Resolution 78, from the Brazilian Federal Senate.

Graph 4:




As being so, at the end of the decade more than 60% of the DLSP was issued by the federal government, which points to another very important fundamental change in the composition of the public debt, that is, the increase of its liquidity in the secondary market. Still, another important change in this direction was the significant increase in the share of the marketable federal debt as a share of the DLSP, as shown in Graph 5 below.[4]

Graph 5:




The very small share of the marketable debt in the beginning of the decade can be explained by the implementation of the Collor Plan. "The 1990's begun thus with the most extraordinary of government interventions in the public debt market, which was announced at the inaugural day of the Collor Presidency (March 15, 1990). For the first time in Brazil since markets for public debt were overhauled in 1964, default risk was explicitly introduced in the market"[5]. So, this "hijack" of a huge amount of debt instruments in the hands of the public represented a major impact on the evolution of the public debt profile in the next years. As the decade went on, the market started gradually to realize that what happened was something very extraordinary that should not likely happen again, and the government was able to increase the placement of bonds to the

[4] Must be noticed that The Net Public Sector Debt is a net concept, as the name says, so this ratio could be indeed grater than one. The point to be highlighted here, however, is how the outstanding domestic debt has gained considerably importance trough the years.
[5] Garcia, Marcio, "The Structure of the Public Sector Debt in Brazil". Department of Economics, PUC-RJ, June 1998.

public. It Should be noticed, as a side, that this fact still contributes to short term average maturity of the debt.

The discussion above is a major fact for the analysis and is highly correlated to the ability of the market in absorbing the supply of public debt. Indeed, the marketable debt represents the most sensible part to the government in rolling over its debt. In this sense, and for the purposes of this paper, it is argued here that debt sustainability in Brazil, can be evaluated by the capacity of placing this kinds of instruments to the market.

## II – Solvency Conditions and The Dynamics of Debt Sustainability

A given debt is said to be sustainable if the present value of the future primary surpluses is equal or superior than today's stock of the public debt. In other words, future revenues must be at least sufficient to face its primary expenditures, as well as the expenditures on interest rates due to the debt stock. Theoretically, if the market perceives this condition as not feasible, it most likely will not be willing to finance government deficits anymore. That is to say, it will not be willing to buy bonds in the auctions and will jeopardize the roll over of the debt. In this case the government is left with two alternatives: either it prints money, which can have negative effects on inflation rates or it renegotiates the debt with its creditors, causing a very bad signal on future issuance. Anyway, there is always the possibility that the Debt/GDP ratio can increase – up to a certain point – without causing much pressure on the solvency conditions. This possibility will be discussed later.

In this sense it is important to try to evaluate the impact of the various variables on the government ability in placing its bonds in the market. Among these variables the most closely related to debt path are as follows:

Economic growth: The higher the rates of growth, the higher can be the stock of debt in the next period, in order to keep the same Debt/GDP ratio. Also, the higher tends to be government revenues and, therefore, the primary surplus.

Interest rates: This variable is specially important in countries with a high share of domestic debt. An interesting aspect is it self reinforcing pattern, that is, an improvement in expectations can decrease interest rates, which will have positive effects on the debt that may contribute to further enhance expectations. Of course, the other way around is also true. Another major aspect is that it is the best variable to reflect economic agents expectations.

Primary surplus: Naturally, the higher the primary surplus, the more likely the chances are for the debt to be sustainable. It should be noticed that a country can obtain primary surplus by increasing taxes or by decreasing expenditures. It must be argued that the effects on debt sustainability may be different depending on the option chosen by the government. Expenditures reductions would have much stronger effects than an increase in revenues due to the fact that it can do the following:

1) Contribute to reduce interest rates trough a reduction in the crowding out effect;
2) Increase economic growth trough enhancing economic efficiency in resource allocation and smaller interest rates; and
3) Increase the demand for money, increasing then the seigniorage revenue.

For the objectives of this paper, however, the variable to be considered will be the primary surplus, no matter how it is achieved.

These variables described above will be very important in determining the solvency conditions. It should be noticed, though, as Ghani and Zang have already pointed out, "debt sustainability (both domestic and external) is an integral element of macroeconomic stability. Interactions between different policy variables (such as debt,

fiscal and interest rates policies), outcome variables (such as GDP and export growth), and international economic conditions (international interest rates) jointly define whether a country is on a sustainable debt path"[6]. The discussion above is important to emphasize that different countries may have different levels of sustainable debt. That is, one specific country may have a sustainable pattern with a much higher Debt/GDP ratio than others, depending on market expectations, quality of governments expenditures, society's accepted level of inflation, etc.

Besides all that, one should consider that the government has also the option of financing its financial requirements through monetary supply, the solvency conditions change so that it is possible to say that the debt is sustainable if the present value of the future primary surpluses plus the seigniorage are equal or superior to the today's debt stock. So, another important variable to consider is the seigniorage revenues to be obtained by the government. Its value, in turn, will depend on the inflation rate, the economic growth rate and on the income speed of money. Anyway, it is important to notice that this kind of financing may have perverse effects on the economy, by leading to higher inflation rates (this may not always happen, as will be briefly explained later).

There are some other very important variables that should be considered in analyzing debt sustainability, for instance the effects of future privatization and "hidden liabilities". These issues may get extremely complex since it deals with variables extremely hard to forecast. For the purposes of this paper, however, it may be reasonable to admit the simplified hypothesis that the present values of both variables compensate each other.

[6] Ghani, Ejaz and Hyoungsoo Zang, 1995. "Is Ethiopia's Debt Sustainable?" Policy Research Working Paper N. 1525. World Bank.

Given the above, one may mathematically derive the public debt solvency requirements, which will determine the conditions that should be met by the various variables in order for the Debt/GDP ratio to be in a stable path.

The primary deficit can be defined as the difference between the nominal deficit and the government interest payments on it. So:

$$DP = DT - J = G - T$$

where:

$DP \Rightarrow$ primary deficit

$DT \Rightarrow$ nominal deficit

$J \Rightarrow$ interest payments

$G \Rightarrow$ government expenditures

$T \Rightarrow$ government revenues

The concept of primary surplus is extremely useful since it separates, from the total deficit, what should be obtained to face interest rates payments. In other words, in order to get equilibrium in government fiscal balance it must obtain a primary surplus in the same amount as the value of the interest rates payments.

The change in the stock of debt will be given by the nominal deficit less the part of it financed by money issuance. That is:

$$D - D_{-1} = DT - (B - B_{-1})$$

where:

$B \Rightarrow$ Monetary Base

$D \Rightarrow$ Stock of Debt

The interest expenditures can be considered as a function of the real interest rate, the inflation rate and the stock of debt of the previous period.

$$J = \pi D_{-1} + i(1+\pi)D_{-1}$$

where:

$\pi \Rightarrow$ inflation rate of the period

$i \Rightarrow$ real interest rate of the period

At this time it should be noted that the expenditures on interest payments include payments on external and domestic debt. For simplification reasons, this paper treats only about domestic interest rates. Given international arbitrage conditions and the larger importance of domestic debt on the total debt, this hypothesis does not damage the analysis. Putting together the above equations, one gets to:

$$D = (G - T) + J - (B - B_{-1}) + D_{-1}$$

Expressing the above variables as a share of GDP:

$$d = \frac{(G-T)}{Y} + \frac{i(1+\pi)D_{-1}}{Y} + \frac{\pi D_{-1}}{Y} - \frac{(B-B_{-1})}{Y} + \frac{D_{-1}}{Y}$$

Considering that this years GDP is given by:

$$Y = (1+y)(1+\pi)Y_{-1}$$

and

$$s = \frac{(T-G)}{Y}$$

$$b = \frac{(B-B_{-1})}{Y}$$

one gets to:

$$d = \frac{iD_{-1}}{(1+y)Y_{-1}} + \frac{\pi D_{-1}}{(1+\pi)(1+y)Y_{-1}} + \frac{D_{-1}}{(1+\pi)(1+y)Y_{-1}} - (s+b)$$

Which can be simplified to:

$$\boxed{d = \frac{(1+i)}{(1+y)} d_{-1} - (s+b)}$$

The above equation shows the condition that must hold in order to keep Debt/GDP ratio stable over time. Again, it gives the interrelations that must be met by the various variables.

By this equation one can confirm that higher real interest rates tends to increase indebtedness, and the opposite happens to higher economic growth rates. Also, higher surplus will decrease the share of debt in GNP and the same happens to the financing by seigniorage revenues.

One can still express these relations in terms of the primary surplus. This will give its minimum level required to avoid a deterioration in the Debt/GDP ratio.

$$s^* = \frac{(i-y).d_{-1}}{(1+y)} - b$$

where:

$s^* \Rightarrow$ required surplus (as a share of GDP) to stabilize the Debt/GDP ratio;

The equation shows that the higher the difference between the real interest rate and the economic growth rate, the bigger must be the required fiscal efforts.

## III – Sensitive Analysis and Policy Dilemmas

The purpose of this chapter is to analyze, from the relations expressed in the previous chapter - and given the related values to the Brazilian economy for the specific variables - the chances that the country will face an unsustainable path for the public debt over the next few years. In short, the point this paper tries to address is what will be the value of "d" given possible paths for real interest rates, real economic growth rates and the primary surpluses.

The table below shows the levels of primary surpluses, given various levels of real interest rates and real growth rates required to stabilize the Debt/GDP ratio in the previous level (that is, for this specific case, 47% of GDP). At this point it should be noted that the real interest rate used here is the so called "implicit real interest rate", which is a little lower than the usual one. The reason for that is that the latter one refers to the interest rates that are paid on the DLSP and this concept includes also the monetary base, which accrues no interest rate. Also to be noted, the values for the seigniorage are given as dependent on the other variables figures[7].

[7] The seigniorage values used here are given by the following equation: $b = \frac{(\pi + y)}{V}$ ; where V is the income velocity of money.

Table 1:

| Required Primary Surplus | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| **y/i** | **5%** | **6%** | **7%** | **8%** | **9%** | **10%** | **11%** | **12%** | **13%** | **14%** |
| **-0.5%** | 2.7% | 3.1% | 3.6% | 4.1% | 4.5% | 5.0% | 5.4% | 5.9% | 6.3% | 6.8% |
| **0.0%** | 2.5% | 2.9% | 3.4% | 3.8% | 4.3% | 4.8% | 5.2% | 5.7% | 6.1% | 6.6% |
| **0.5%** | 2.2% | 2.7% | 3.1% | 3.6% | 4.1% | 4.5% | 5.0% | 5.4% | 5.9% | 6.3% |
| **1.0%** | 2.0% | 2.4% | 2.9% | 3.4% | 3.8% | 4.3% | 4.8% | 5.2% | 5.7% | 6.1% |
| **1.5%** | 1.7% | 2.2% | 2.7% | 3.1% | 3.6% | 4.1% | 4.5% | 5.0% | 5.4% | 5.9% |
| **2.0%** | 1.5% | 2.0% | 2.4% | **2.9%** | **3.4%** | **3.8%** | **4.3%** | 4.8% | 5.2% | 5.7% |
| **2.5%** | 1.2% | 1.7% | 2.2% | **2.7%** | **3.1%** | **3.6%** | **4.1%** | 4.5% | 5.0% | 5.4% |
| **3.0%** | 1.0% | 1.5% | 2.0% | **2.4%** | **2.9%** | **3.4%** | **3.8%** | 4.3% | 4.8% | 5.2% |
| **3.5%** | 0.7% | 1.2% | 1.7% | **2.2%** | **2.7%** | **3.1%** | **3.6%** | 4.1% | 4.5% | 5.0% |
| **4.0%** | 0.5% | 1.0% | 1.5% | **2.0%** | **2.4%** | **2.9%** | **3.4%** | 3.8% | 4.3% | 4.8% |
| **4.5%** | 0.2% | 0.7% | 1.2% | **1.7%** | **2.2%** | **2.7%** | **3.1%** | 3.6% | 4.1% | 4.5% |
| **5.0%** | 0.0% | 0.5% | 1.0% | 1.5% | 2.0% | 2.4% | 2.9% | 3.4% | 3.8% | 4.3% |
| **5.5%** | -0.2% | 0.2% | 0.7% | 1.2% | 1.7% | 2.2% | 2.7% | 3.1% | 3.6% | 4.1% |
| **6.0%** | -0.5% | 0.0% | 0.5% | 1.0% | 1.5% | 2.0% | 2.4% | 2.9% | 3.4% | 3.8% |

The first thing to be observed in table 1 above is the clear relationship between these variables. The higher the economic growth the higher can be the real interest rate in order to keep the same required primary surplus that keeps constant the Debt/GDP ratio. One important thing to keep in mind is that these variables are all endogenous variables, which complicates considerably the analysis. This point will be further explored in a while.

The square inside Table 1 points out the most likely scenarios for next few years. It shows that, in order to keep the debt stable, and considering the best path, the primary surplus must be at least 1.7%. On the other hand, if the worse scenario happens, the fiscal effort must be huge enough to make the primary surplus to increase to 4.7%.

There are several alternative policies aiming at reducing the Debt/GDP ratio (or keeping it constant). The government can either opt for policies that will try to reduce the interest rates, to increase the pace of economic growth or rather choose to finance the deficit trough money issuance. In this case, the country may have less debt but, most likely, higher inflation rates.

In a fixed exchange rate regime, as adopted by Brazil up to January 99, the dynamics of debt was quite different from the today's model, at least from a theoretical point of view. Up to that time, the exchange rate worked as the monetary anchor, in the sense that it had the major role of keeping inflation under control. Pressures on economic agents expectations would influence interest rats in a direct way, through the international arbitrage equation, by the immediate rise of the country risk. In this sense, the instability sources on the debt were exactly the risks of an abrupt and strong devaluation. Indeed it happened in January 1999, and caused a huge impact on the Debt/GDP ratio of about 5 percentage points. In this model the need to fiscal discipline is still very important to reduce the country risk and then the interest rate accrued to the debt.

After the devaluation and the changes in the command of the Central Bank, the monetary regime changed to the so called "inflation targeting mechanism". By this model the government commits itself to a certain published level of inflation. Interest rates are the main "anchor" to achieve its objective and the exchange rate is free to flow. Devaluation on its value will affect interest rates in the sense that it may cause increase in inflation expectations. Theoretically, then, it may lead to a bigger exchange rate volatility (although strong and abrupt devaluation is less likely) but less volatility on interest rates.

In this model, the primary surplus still plays a major role on expectations. If it falls, the exchange rate may devaluate, because of higher outflows of capital due to a deterioration in expectations. This devaluation, as explained, may push the government to increase interest rates. One other way to come to the same conclusion is that worse fiscal results may lead to higher interest rates asked by the market to buy government bonds.

Although it was mentioned about the interdependence on the variables, the role played by the primary results may be stressed. It depends on a certain degree to the pace of economic growth, but may be considered not to be directly affected by the interest rates. The opposite is not true at all, as already emphasized. Also, it is a variable that can be quite controlled by the government (as opposed to the interest rates – which is set by the market – and the economic growth). Most important, primary results have strong effect on both these other variables.

For the reason given above, the primary surpluses may be considered the most crucial variable to determine the sustainability of the debt. For the sake of simplicity one can trace two basic scenarios for it. In the good one, it is possible to expect for favorable expectations from the economic agents, which will contribute to keep the exchange rate, reducing inflationary pressures and then, allowing the government to reduce the interest rates. Given all that, the basic conditions for solving the debt dynamic are also given**.**

On the other hand, the government incapacity to achieve the expected levels of primary surplus can lead to a vicious cycle where debt can go to the insolvency path. In this case, the economic agents perception may be such that will generate pressures on the flow of capital, and then on pressures for the domestic currency devaluation, and thus pressuring

the inflation rate. Given that scenario, the government will have to opt for one of the two policies: (1) either it raises the interest rates, in order to accomplish to the inflation targets, and thus fueling the perverse effects on the economy, or (2) give up the inflation targeting, and tries to reduce the pressures on the public debt.

With flexible exchange rates, one should not expect for strong changes on the international reserves level, since the market adjusts itself. In this way it is possible to imagine that will not be substantial pressures to issue bonds for monetary sterilization purposes.

To better understand the chances of going into an unsustainable path, five 'naive"[8] scenarios were traced. Each scenario started from a different hypothesis over the government will to combat public deficit. From this, and using the theoretical logic of the inflation targeting mechanism the paths for the other variables were traced. All of them have the scenario 3 as a start point, which means the hypothetical paths are alternative ones from it.

**Scenario 1**:

| Year | Exchange Rate | Inflation | Real Interest Rates | Economic Growth | Primary Surplus | Seigniorage | D/Y |
|---|---|---|---|---|---|---|---|
| 1999 | | | | | | | 47.0% |
| 2000 | 0.0% | 5.0% | 8.0% | 5.0% | 3.5% | 0.35% | 44.5% |
| 2001 | 2.0% | 4.0% | 7.0% | 6.0% | 3.5% | 0.35% | 41.1% |
| 2002 | 0.5% | 2.0% | 6.0% | 7.0% | 3.5% | 0.33% | 36.8% |

[8] The word is used in the sense that no deep analysis was done to prepare them. The idea was to give some insight on different paths for different scenarios. Even though, the main concern was to use consistent hypothesis among the variables.

This is the most positive scenario, where the government is very competent in dealing with the fiscal question. By being able to obtain primary surplus of 3.5% in this and in the following years, the government can obtain good expectations from the economic agents and, therefore, is able to keep the exchange rate relatively stable and reduce interest rates in a consistent (although slow) way. As a consequence, the country may be able to achieve fast economic growth. Must be emphasized here that, given good primary results, all the other variables moves towards improving the debt sustainability. In this best scenario, the country may expect to have, at the end of 2002 a Debt/GDP ratio of almost 37%, far below, then, than the figure for 1999.

**Scenario 2**:

| Year | Exchange Rate | Inflation | Real Interest Rates | Economic Growth | Primary Surplus | Seigniorage | D/Y |
|---|---|---|---|---|---|---|---|
| 1999 | | | | | | | 47.0% |
| 2000 | 0.0% | 6.0% | 8.0% | 5.0% | 3.0% | 0.39% | 45.0% |
| 2001 | 2.0% | 4.0% | 8.0% | 5.0% | 3.0% | 0.32% | 42.9% |
| 2002 | 1.0% | 3.0% | 7.0% | 5.0% | 3.0% | 0.28% | 40.5% |

In this second scenario, government is still quite successful in achieving good primary results, although not as much as in the previous one. As a consequence, the other variables improve as well but a slower pace. Interest rates keep falling but in a slower way, which also reduces the rates of the economic growth. As should be expected, the results on debt solvency are not as good as in the previous scenario, but anyway, represents a good improvement in debt conditions.

**Scenario 3**:

| Year | Exchange Rate | Inflation | Real Interest Rates | Economic Growth | Primary Surplus | Seigniorage | D/Y |
|---|---|---|---|---|---|---|---|
| 1999 | | | | | | | 47.0% |
| 2000 | 0.0% | 6.0% | 9.0% | 4.0% | 2.65% | 0.35% | 46.3% |
| 2001 | 2.0% | 4.0% | 8.0% | 4.0% | 2.65% | 0.28% | 45.1% |
| 2002 | 2.0% | 4.0% | 8.0% | 4.0% | 2.65% | 0.28% | 43.9% |

This is the "basic" scenario, and the hypothesis behind are basically the ones foreseen by the Brazil-IMF agreement for this year. It starts from the 2.65% primary surplus, and the published inflation target figures for this year (6%). The exchange rate in this case can be expected to remain constant in the year 2000 and then follow the inflation level. Here the real interest rates may fall, due to the compliance with the goals, but at a very low pace. Economic growth will be higher than in the previous years and is expected to remain at the level of 4% in the next few years. If this scenario proves to be feasible, the country will experience a short reduction in the Debt/GDP ratio. So far, this scenario has considerably chances to be accomplished, and can, as a matter of fact, be still considered a conservative one.

**Scenario 4**:

| Year | Exchange Rate | Inflation | Real Interest Rates | Economic Growth | Primary Surplus | Seigniorage | D/Y |
|---|---|---|---|---|---|---|---|
| 1999 | | | | | | | 47.0% |
| 2000 | 7.0% | 7.0% | 12.0% | 3.0% | 2.0% | 0.35% | 48.8% |
| 2001 | 5.0% | 7.0% | 12.0% | 2.0% | 2.0% | 0.32% | 51.2% |
| 2002 | 5.0% | 7.0% | 12.0% | 2.0% | 2.0% | 0.32% | 53.9% |

In this case it is assumed that the fiscal situation goes worse than what is expected and as a consequence the market requires higher interest to buy government bonds. Exchange

rats also devaluates at high paces and increases inflation. Again, interest rates must be high to control the prices. As a consequence, the economy grows, but at a very slow rate. If this scenario happens, there are strong effects on the Debt/GDP ratio, as showed above. The ratio goes from 47% in 1999 to almost 54% at the end of 2002.

**Scenario 5**:

| Year | Exchange Rate | Inflation | Real Interest Rates | Economic Growth | Primary Surplus | Seigniorage | D/Y |
|---|---|---|---|---|---|---|---|
| 1999 | | | | | | | 47.0% |
| 2000 | 15.0% | 15.0% | 25.0% | 1.5% | 1.0% | 0.58% | 56.3% |
| 2001 | 8.0% | 10.0% | 20.0% | 0.0% | 1.0% | 0.35% | 66.2% |
| 2002 | 8.0% | 10.0% | 15.0% | 0.0% | 1.0% | 0.35% | 74.8% |

In this last scenario it is assume that the government shows very weak commitment to the fiscal situation. There is still a primary surplus but at a very low level. The market gets very concerned and a huge outflow of capital takes place. As a consequence the government is forced to devalue the domestic currency. In order to protect it, also a policy of very high real interest rates is used. As a consequence, the economy stops again and by the next year no real economic growth is obtained. This last case may illustrate quite well the hazardous consequences on the debt solvency conditions of fiscal looseness. The Debt/GDP ratio goes to almost 75%, which can be considered a very high level.

The analysis above aimed at demonstrating the major role played by the fiscal results to achieve a stable path to Debt/GDP ratio. This is true not only for the direct impacts, but also for the improvements it causes on the other relevant variables. If it behaves

favorably it is possible to attain a virtuous cycle in which capital inflows and lower inflationary pressures would allow for substantial reductions on interest rates. On the other hand, the opposite scenario shows that if results worse than the expected happen, the government might see itself in a situation where it should raise interest rates, leading to an unsustainable path for the debt.

In this latter case, the relevant question becomes what would be the higher possible Debt/GDP ratio, or in a different way, what would be the point up to what the market wouldn’t be willing to finance the government anymore.

## IV – The insolvency Risks

The previous chapter indicates the need to evaluate from what Debt/GDP ratio the market won't be willing to buy government bonds anymore. Certainly, there is no easy answer for this question, if there is any. The attempt in this paper is to address the subject by studying the debt average maturity.

More than figuring out what are the alternative paths of the different variables so that the Debt/GDP ratio doesn't go beyond a certain level, the attempt is to establish what is the maximum level for this ratio. As argued before, this ratio in Brazil can't be considered high, if compared to other countries. The point of the matter about the solvency of the debt seems to lie more on its profile than on its value as a share of GDP.

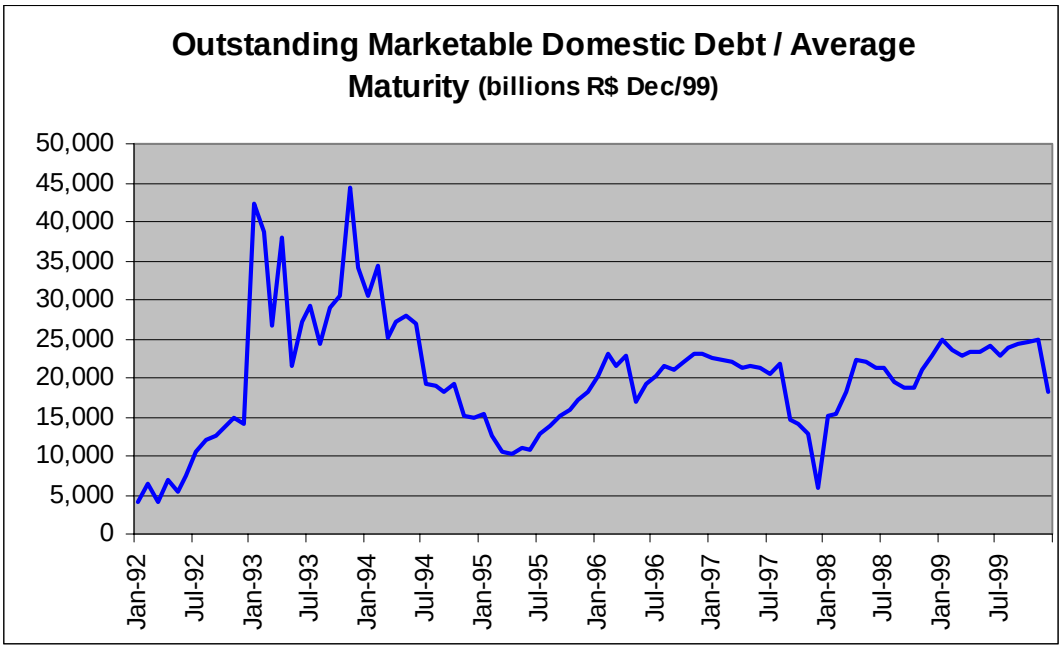
The risk analyses departs from the hypothesis that the debt profile should be taken into account. In this sense, two must be the criteria to be analyzed: the characteristics of the outstanding bonds, in what regards to (1) its indexation and (2) to its maturity. From the point of view of debt roll over risk, the maturity of debt outstanding plays a major role. The bigger the maturity, the smaller the need to place bonds in the market, at each period. And consequently, the higher the amount to be placed, at each period, the higher the chances that the government gets unsuccessful in its attempt.

The Real Plan, in spite of the huge increase on public debt, as argued before, contributed decisively to the increase in outstanding debt average maturity, by enhancing transparency to the economic agents. The relevant question here is to know what would

be the point up to what the market is not willing to finance the government anymore. The idea in this part is to come to some conclusions in this matter.

The Graph 6 below shows the evolution of public debt as a multiple of its monthly average maturity. In other words, represents government monthly needs of market financing. Naturally, the higher these values, the lower the chances of getting the financing at each auction.

Graph 6:




As one can see, the graph shows a behavior different from the ones showed in the first part, where debt experienced a strong increase in the second half of the last decade. In spite of that, the monthly financial needs have become lower than in the earlier years. As already pointed out, this is a result of the more credibility made possible by the Real Plan. Not only that, the variable has become substantially smoother. Nonetheless, one can still notice that has been an upward trend in that variable.

After the Real Plan, the government was able to increase the share of Monetary Base as a proportion of GDP, without harming the inflationary control. The fact is that inflation pressures come when money supply is higher than demand for money, and after 94, what Brazil experienced was a big demand for money given the strong decrease in inflation rates. This fact also explains why the Debt/GDP ratio were able o grow at very high rates without affecting hardly the market perception of it.

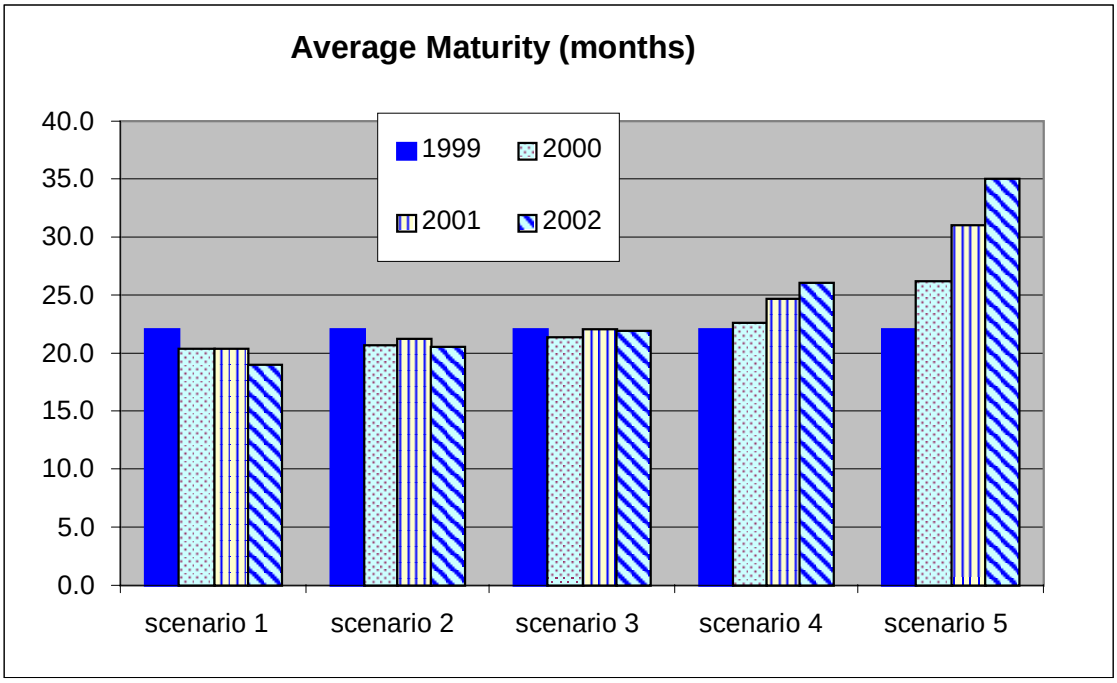
As seen by the graph, in spite of the increase in the debt mentioned in the first chapter, economic stability allowed substantial improvements in debt profile. This fact is crucial in understanding how could be possible the huge increase in the Debt/GDP ratio in the second half of the decade. As a negative point, however, it is reasonable to attribute little probability that such an increase in average maturity will continue in the next years, given that the “transparency gains” are already incorporated into the market.

Should be noted, however, that many other important factors may determine the solvency of the public debt. In special on what concerns to the ability of the public debt to compete with other instruments. In this sense, the level of development of the secondary markets is a crucial one. This factor can be extremely important in the market willingness to purchase the bonds. Since debt is becoming more and more a market driven variable, as pointed out before, the ability of placing the bonds in the market becomes the solvency conditions itself.

As argued before, the approach here is to consider the amount to be placed in the market, at each period (in this specific case, measured in months). So, the higher the average

maturity of the debt, the lower the need to be sold at each auction, and thus, smaller the risk of failure. For this purpose, the concept of debt used is the Total Outstanding Marketable Debt.

Graph 7:




The graph 7 above shows the outcome of the five scenarios traced on the previous section. It tells the average maturity the debt must have in the next three years in order to keep the same average level of monthly financing needs of 1999. In the first one, one can see that the improvement in fiscal conditions allow a reduction in he average maturity in order to keep the same monthly financial requirement needs. Scenario 3 shows that, by being able to achieve the targets set, the financial needs would be almost the same as today. Finally, the fourth and fifth scenarios are the ones to be concerned about. In these, the average maturity has to increase considerably, in order to keep the same level of risk.

Of course, there is quite a bit of a self reinforcing process, where an increase in the credibility may be followed by an increase in the average maturity of the debt, which in turn, may contribute to further enhance the credibility. In the last two cases, is not likely that an increase in average maturity is feasible. Certainly, there must be a change towards interest rates indexed bonds, reducing the fixed rate share of the debt, to try to avoid more serious consequences.

On the other hand, one can expect that, if scenario 3 (or better) comes to be true, naturally the average maturity of the debt will increase. As a matter of fact, this is what has happened in the first three months of the year. That is to say that the debt profile may be a lot better than nowadays, if the scenario 3 turns out to become true.

## Conclusion

The Brazilian public debt experienced deep changes in the course of the last decade. This is true in what regards to its size and its composition. In the first case, the last years have caused come concern about debt sustainability, although the Real Plan has decisively contributed to an increase in government confidence. Also, there was a shift from external to domestic debt, to an increase in federal government indebtedness and, at the same time to a more market oriented profile. All these patterns have their implications on the analysis of debt sustainability.

In order to get some insight about debt sustainability, five possible scenarios for the macroeconomic variables were traced, so it was possible to estimate their impact on the Debt/GDP ratio. By doing this, it was possible to observe that the country can, either go into a virtuous cycle, where better fiscal results decrease interest rates and stimulates economic growth, contributing to improve solvency conditions, or else, bad fiscal results may lead to worse expectations, higher interest rates and lower economic growth. This path may lead to debt solvency concerns.

Given government last actions, though, Brazil seems to be committed to fiscal discipline. By meeting its inflationary targets and the IMF agreement, most likely Brazil will be able to improve debt profile and also reduce the concerns about its sustainability.

Whatever is the scenario to turn out to be true, should be emphasized the importance of fiscal discipline to generate positive effects on the economy. This variable seems to play

a major role in debt sustainability, not only for its direct effects, but also because of its impacts on the other economic variables, specially the interest rates and the economic growth. It represents, thus, the main point to be addressed by the government in order to break the vicious cycle that the Brazilian economy experienced in the previous years.

## Bibliography


- **Bevilaqua, S. Afonso and Werneck L.F. Rogerio**. "Public Sector debt Dynamics in Brazil", Department of Economics PUC-RJ, 1997;

- **Dooley, Michael**. "Debt Management and Crises in Developing Countries", Speech on the 11th Annual Inter-American Seminar on Economics, PUC-RJ, 1998;

- **Garcia, Marcio**. "The Structure of The Public Sector Debt in Brazil", Department of Economics, PUC-RJ, 1998;

- **Garcia, F. Valeriano**. "The Demand for Base Money and the Sustainability of Public Debt", Policy Research Working Paper No 1774. The World Bank, 1997;

- **Ghani, Ejaz and Hyoungsoo Zang**. "Is Ethiopia's Debt Sustainable?", Policy Research Working Paper No 1525. The World Bank, 1995;

- Llusa, A. J. Fernanda. "Credibilidade e Administração da Divida Publica: Um Estudo para o Brasil", 21º Prêmio BNDES de Economia, 1998.

- **Nunes, P. Selene**. "Divida Publica, Deficits Quasi-Fiscais e Coordenação Entre Políticas Econômicas no Brasil", 2º Prêmio de Monografia STN, 1997;

- **Perry, Guillermo**. "Deuda y Sostenabilidad Fiscal: Se Repite la Historia?", Speech on the Seminario Regional Sobre Politica Fiscal, United Nations-CEPAL, 1997.