Comparative Analysis of the Federal Public Debt – Do Poorly Suited Rules and Metrics Generate Significant Distortions?

Introduction

The objective defined for Brazilian Federal Public Debt (FPD) management is to efficiently provide for federal government borrowing requirements at the lowest long-term financing cost, while maintaining prudent risk levels and, at the same time, seeking to contribute to the well functioning of the Brazilian government bond market. It is precisely for this reason that the wider guideline underlying National Treasury financing strategy is to reduce the refinancing risk consequent upon the public debt maturity profile, and of market risk, through monitoring of mismatches between assets and liabilities in terms of their respective indexing factors.

Market risk captures the possibility of growth in the debt stock resulting from alterations in market condition that impact the cost of public sector bonds, such as changes in short-term interest, exchange and inflation rates or in the long-term interest rate structure. In its turn, refinancing risk – the concept on which this report focuses – reflects the volume and volatility of short-term flows still to mature, describing the possibility of the National Treasury having to bear high costs in order to finance its operations or, in an extreme scenario, being unable to obtain the funding required to honor its maturities on their respective maturity dates.

In order to mitigate refinancing risk, the National Treasury is constantly pursuing a more adequate maturity profile by lengthening the average maturity of the FPD stock and reducing its percentage maturing in 12 months.

However, on classifying these two indicators – average maturity and percentage of the debt maturing in 12 months – as fundamental for elaboration of the Treasury's financing strategy, it is essential that calculation methodologies be clearly and objectively defined, giving due consideration to all of the elements that can in any way impact the risks under measurement. Only in this way can someone ensure that the indicators will consistently provide an effective measurement for debt refinancing risk.

In this sense, the purpose of this report is to present the methodology used by Brazil to calculate the average maturity of FPD and the share of the debt maturing in 12 months. It is

thought that the way in which these Brazilian indicators are calculated is the method best suited to describe the reality with which managers of federal liabilities have to cope. However, by lack of interest in this very important theme, or lack of knowledge regarding the nuances underlying calculation of these numbers, major distortions can be generated and reverberate on the profile of public-sector liabilities based on comparative analyses among countries.

From the point of view of comparability among the numbers presented in reports on the Brazilian FPD and what is observed in a survey carried out with other countries, our indicators occupied a significantly disadvantageous position. To a great extent, this disadvantage lies in the methodology currently adopted by this Ministry of Finance, which is - at one and the same time - more conservative and more adequate for a correct evaluation of refinancing risk.

The fact of the matter is that the National Treasury has greatly intensified its efforts, particularly with the International Monetary Fund (IMF), the World Bank (IBRD) and various rating agencies, in support of standardization of the indicators required for a correct perception of refinancing risks. This would make it possible for the community of analysts and investors to elaborate more precise analyses regarding the risks faced by specific countries, while also generating comparative analyses among similar nations.

1) Percentage Maturing in 12 Months

On calculating the percentage maturing in 12 months and the debt service for the coming years, the National Treasury considers not only the principal of its debt but also the intermediary interest flow. In our understanding, since coupon payments also impact cash flow and, therefore, borrowing requirements, the impact of these payments must also be considered. This enhances the robustness of this methodology, making it possible to capture the refinancing risk of the federal public debt more correctly.

At the same time, the methodology used by Brazil considers the value of money in its appropriate time context, adjusting the entire disbursement flow to present values. In this way, this indicator gives greater weight to upcoming flows and lesser weight to those that will occur in the more distant future, considering that the effect of the discount is powered over time.

Although it is doubtlessly the most correct from the financing risk management viewpoint, this calculation methodology is clearly the most conservative. Perhaps for this reason, some countries commonly provide data on their debt flows and the debt percentage to mature over the short-term, considering only debt principal or, in other words, excluding intermediate coupons and,

in some cases, without adjusting these flows to present value. This fact obviously makes it difficult to draw any comparisons with the methodology used in Brazil.

Graph 1 below shows the percentage of the Brazilian debt maturing in 12 months following the methodology adopted by the National Treasury and according to methodologies applied by some other countries with which we are frequently compared. Our purpose in doing so is to present a more adequate comparison with the indicators released by other countries, while also demonstrating the impact generated by the different methodologies, which are:

- Present value with coupon – This methodology is currently used by Brazil and considers the flows of principal and interest and discounts them at present value;
- Maturity with coupon - Though it considers the value of interest coupons, this methodology does not discount the cash flow at present value; and
- Maturity without coupon – This methodology does not consider the value of interest coupons nor discounts the flow of principal at present value.

**GRAPH 1 – Percentage Maturing in 12 Months (FPD)**
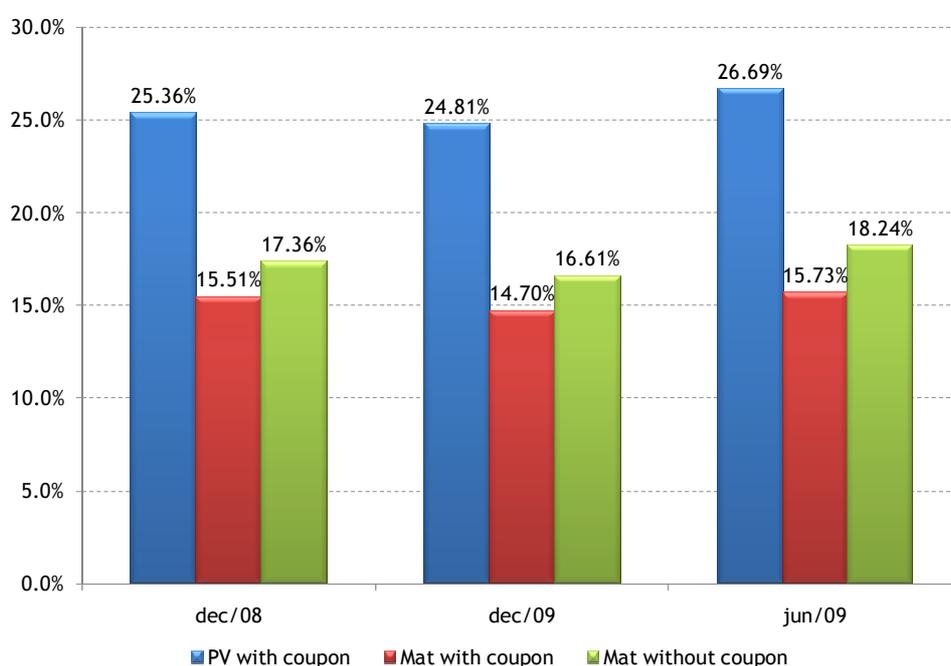
As can be noted in the results above, the methodology used in Brazil (and which we consider the most correct) is by far the most conservative. In the Brazilian case, calculation of the percentage maturing in 12 months, based on the present value of the entire cash flow (principal + interest), generated an indicator equivalent to 26.69% last June. If we adopted the alternative

methodologies, the percentages would be 15.73% (principal + interest, without adjustment to present value) and 18.24% (only principal, without adjustment to present value).

In light of the distortions created as a result of the concepts presented above, some examples stand out, clearly demonstrating that utilization of less conservative methodologies would result in underestimation of borrowing requirements. At the end of 2009, for example, the percentage of the Brazilian Federal Public Debt maturing in the coming 12 months totaled R$ 346.95 billion. If this indicator had been calculated according to the other two methodologies, the resulting values would be R$ 205.55 and R$ 232.33 billion.

As shown in graph 2 below, the choice of a less conservative indicator would affect third-party analyses of real borrowing requirements rooted in public-sector liabilities, giving the incorrect perception that public debt managers would have greater operational flexibility, a message that would be clearly out of step with reality.

GRAPH 2 - Short-term maturities in the different methods (FPD)
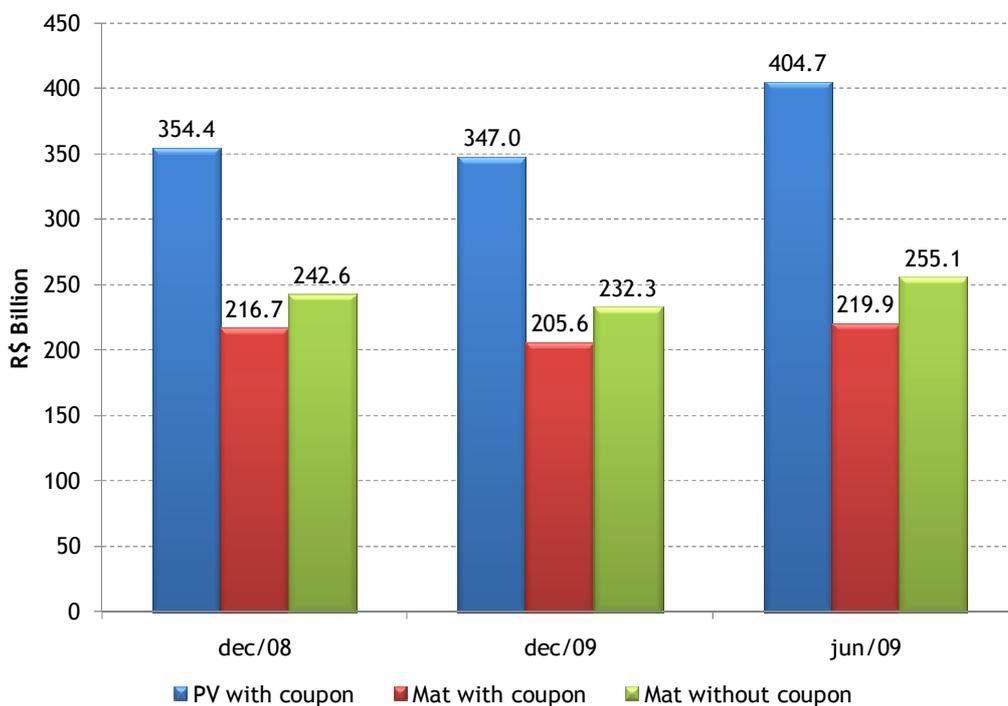
For purposes of comparison, the following chart exemplifies various countries and the methodologies released by them according to the consulted sources. One can also observe the values of these percentages for 2010:

TABLE I - Percentage Maturing in 12 Months

Country	Maturity without coupon	Maturity with coupon	Present Value with coupon
Argentina	10.1	-	-
Brazil	16.6	14.7	24.8
Chile	0.0	-	-
Colombia	11	-	-
Mexico	11.6	-	-
Peru	3.7	9.4	-
Uruguay	3.6	-	-
China	7.6	-	-
Korea	5.4	-	-
India	6.8	-	-
Poland	50.0	-	-
US	35.8	-	-
Germany	13.3	-	-
France	17.1	-	-
UK	7.2	-	-
Spain	11.7	-	-

Source: Credit Suisse F.B., Moody's Report, National Treasury and other countries.
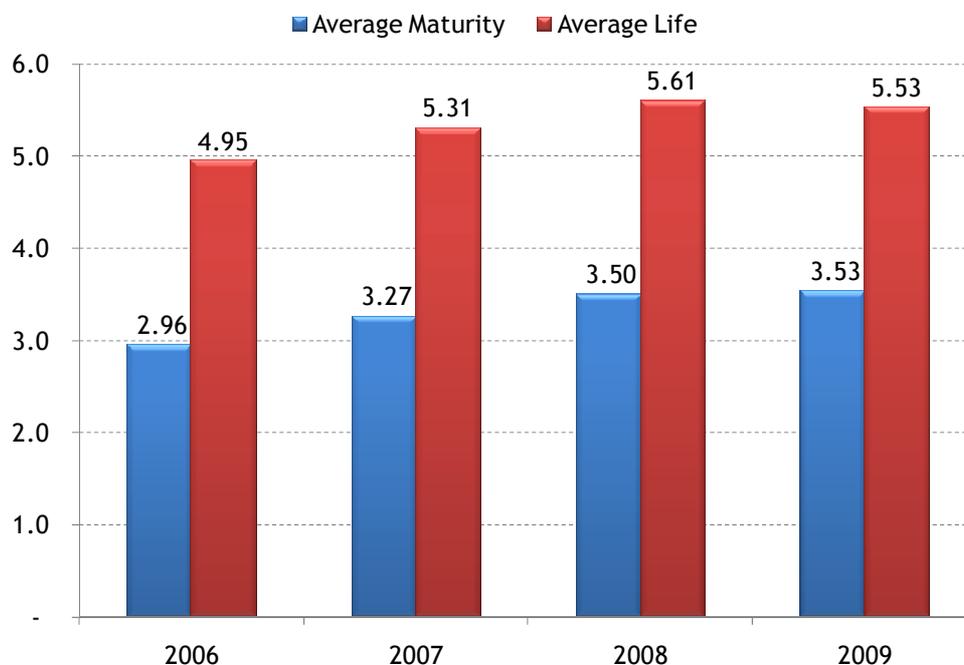
2) Average Maturity

A similar analysis can be performed for the average maturity of the Brazilian Federal Public Debt. Following the example of the percentage maturing in 12 months, the calculation of this indicator (see methodology in appendix) focuses on computing all disbursement flows, including payment of interest coupons, in order to attribute weights to intermediate maturities. Furthermore, since the present value of the entire cash flow is utilized in its methodology, this indicator attributes greater weight to more proximate flows and lesser weight to those maturing further into the future, when, once again, the effect of the discount is again powered by time.

It is important to mention that, for most countries, the methodology utilized to calculate the maturity indicators of their debts just considers payments of principal. In order to allow comparisons with other countries, in recent years, the National Treasury has been announcing the "average life" of its Federal Public Debt. Although it considers the value of the money over time, adjusting flows to present value, this indicator determines the remaining maturity for public debt principal only.

Though this indicator is not considered the most appropriate for evaluating refinancing risk, it is announced in monthly and annual FPD reports, together with average maturity, for purposes of

international comparisons. This provides analysts with the chance to elaborate more adequate analysis on the Brazilian debt profile, when contrasted to other countries.

GRAPH 3 – AVERAGE MATURITY AND AVERAGE LIFE OF FPD

Analysis of graph 3 shows how more conservative is the concept of average maturity when compared to average life. Although, based on the arguments presented above, the first of these concepts is clearly more adequate. Therefore it is easy to understand why the latter methodology is often preferable, as it generates figures significantly more favorable to those analyzing the debt profile.

For purposes of comparison, the chart below shows some countries and the methodologies released by them to calculate average maturity, according to the research, tandem with the values of that indicator for 2010. Once again, in the case of Brazil, one can note relative improvement when average life is used in place of average maturity.

TABLE II – Average Life and Average Maturity (years)

Country	Average Life	Average Maturity
Argentina	11.1	-
Brazil	5.5	3.5
Chile	12.1	8.8
Colombia	6.6	4.3
Mexico	7	4.3
Peru	11.4	7
Uruguay	12.7	10.3
US	4.5	-
Germany	5.8	-
France	6.9	-
UK	13.7	-
Spain	6.7	-

Source: Credit Suisse F.B., Moody's Report and National Treasury.

3) Final Considerations

The objective of this report was to clarify the reasons that led the Brazilian National Treasury to adopt the aforementioned methodologies for calculating the percentage maturing in 12 months and the average maturity of the Federal Public Debt. One should highlight that the central concern of public debt management must always consider all risks to which it is subject, even when conservative methods are used for this purpose. Evidently, this places Brazilian indicators at a clear disadvantage compared to some other countries that utilize different, often simplified approaches, to this theme.

In this sense, it is hoped that the disadvantages found in our indicators, when compared to those of other countries, are often exclusively a result of methodological differences, since the National Treasury opted for adoption of FPD management methods considered more robust and realistic. For this reason, it is our belief that these differences must be taken into account not only by market analysts, but mainly by credit rating agencies. This, of course, in light of the fact that the average maturity and the percentage maturing over the short term methodologies adopted in Brazil have correctly captured the sovereign's real borrowing requirements.

It should be stressed that the National Treasury, responsible for the Brazilian Federal Public Debt, has insisted on the importance of this theme in its relations with the International Monetary Fund and World Bank, two institutions that are constantly trying to disseminate good international

practices, with the objective of improving public debt management in the different member countries, while standardizing the debt indicators published in their reports.

Working with these organizations, the effort to standardize average maturity, debt service and the percentage of short-term maturities has the objective not only of making it possible to measure refinancing risks correctly, but also of enhancing analysts' capacity to compare the debt structures of different countries.

Finally, but no less important, in keeping with good principles of finance and liability management, dissemination of a standardized calculation methodology for these indicators would avoid the practice of utilizing simplistic methodologies that tend to reflect situations clearly more comfortable than they truly are.

Public Debt Strategic Planning Department

Investors Relations

Staff:
Manager: André Proite
Deputy: Flávia Fernandes Rodrigues Barbosa
Beatriz Silva Garcia
David Rebelo Athayde
Mathias Lenz Neto
Sofia Hauschild

e-mail: **brazildebt@fazenda.gov.br**
fax: ++ 55 61 3412-1565

APPENDIX

AVERAGE MATURITY:

$$\text{Average Maturiy} = \frac{\sum_{i=1}^{n}\left(\frac{Flow_i}{(1+IRR)^{\frac{n}{p}}} \times n_i\right)}{\sum_{i=1}^{n}\left(\frac{Flow_i}{(1+IRR)^{\frac{n}{p}}}\right)}$$

Flow = payment of coupon or principal;

n_i = is the number of days between the flow date and the date of the stock, based on the DC/360 standards for exchange bills and DU/252 for other liabilities;

IRR = internal rate of return from date of issue;

n = number of days between the reference date for calculating average maturity and the date of the flow;

p = counting standard for 252 days or 360 days, depending on the type of security;

AVERAGE LIFE:

$$\text{Average Life} = \frac{\sum_{i=1}^{n}\left(\frac{Flow_i}{(1+IRR)^{\frac{n}{p}}} \times n_i\right)}{\sum_{i=1}^{n}\left(\frac{Flow_i}{(1+IRR)^{\frac{n}{p}}}\right)}$$

Flow = only payment of principal (amortization);

n_i = is the number of days between the flow date and the date of the stock, based on the DC/360 standards for exchange bills and DU/252 for other liabilities;

IRR = internal rate of return from date of issue;

n = number of days between the reference date for calculating average maturity and the date of the flow;

p = counting standard for 252 days or 360 days, depending on the type of security;

PERCENTAGE MATURING IN 12 MONTHS:

$$\text{Percentage Maturing in 12 Months} = \frac{\sum\limits_{i=1}^{n}\left(\dfrac{Flow_i\,(in\,12m)}{(1+IRR)^{\frac{n}{p}}}\right)}{\sum\limits_{i=1}^{n}\left(\dfrac{Flow_i}{(1+IRR)^{\frac{n}{p}}}\right)}$$

Flow = only payment of coupon or principal;

Flow (in 12m) = payment of coupon or principal maturing in next 12 months;

n_i = is the number of days between the flow date and the date of the stock, based on the DC/360 standards for exchange bills and DU/252 for other liabilities;

IRR = internal rate of return from date of issue;

n = number of days between the reference date for calculating average maturity and the date of the flow;

p = counting standard for 252 days or 360 days, depending on the type of security;