

Brazil – Public Sector Debt

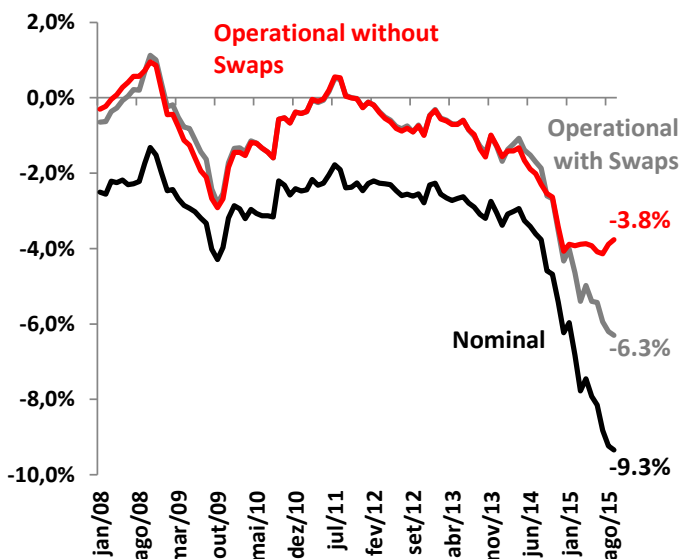
The Walking Dead? (Part I): Useful Alternative Fiscal Indicators and Debt Tutorial

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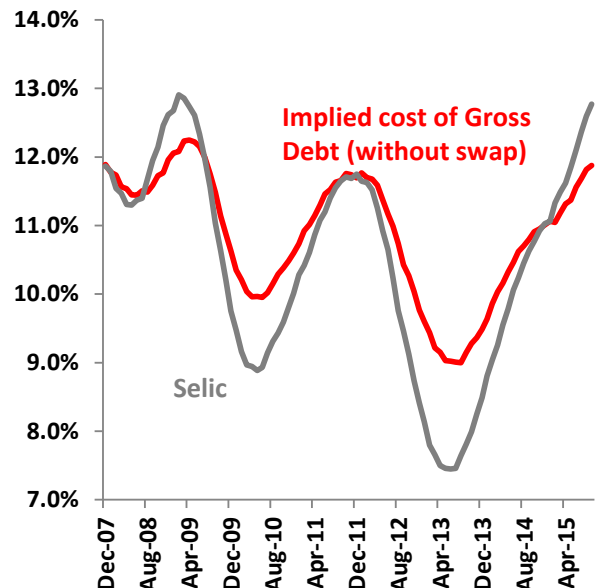
- In this piece we calculate and analyze alternative fiscal indicators, going beyond official data currently released by the BCB: specifically, the fiscal result adjusted by inflation (the operational concept), this measure adjusted by the cost of swap operations, and the implied interest rate of gross debt (the BCB currently releases only implied cost of net debt).
- According to our estimates, despite an increase in general government gross debt of 12 p.p. of GDP in the last 18 months, a primary deficit of 1 p.p. will most likely be associated with an annual increase of 5 p.p. for net debt and 3.5 p.p. for gross debt in the next couple of years.
- Tutorial: we detail a framework suggested for understanding Brazilian public sector liabilities, focused on the interaction of gross government debt and consolidated public sector net debt.
- The approach allows us to understand and quantify the relationship between financial variables (such as interest rates and FX), fiscal policy (the primary surplus), and macroeconomic performance (economic growth).

Fiscal Result (Official, Operational and Adjusted by Swaps)
(% 12 months)



Source: Santander estimates based on BCB data.

Gross Debt Implied Cost and Selic
(% 12 months)



Source: Santander estimates based on BCB data.

Conclusion: A recent deterioration of debt dynamics should be seen as a serious concern, in our opinion. However, we believe that a closer look suggests the performance of some variables is not as negative as official figures suggest.

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Alternative Fiscal Indicators

It is widely known that the Brazilian economy has recently dived into a major recession, mostly associated with uncertainties related to fiscal accounts. Gross public sector debt to GDP has substantially increased, from 53% of GDP at the end of 2013 to 66% at September 2015. This dynamic has raised significant concerns about the health of public sector finances, illustrated by rating agencies downgrades in recent years, and has triggered major corrections of risk premiums and asset prices.

The evolution of public sector debt has taken center stage in the economic debate. Official figures released by the BCB have been useful in exposing the problem. However, we believe a more detailed approach is necessary to fully understand the dynamics and to elaborate on the scenarios.

Our purpose here is to calculate and analyze alternative measures.

Implied Cost of Gross and Net Debt (with and without Swaps)

The BCB releases the implied interest rate on net debt. This indicator has risen steeply, increasing from a “normal” 15% two years ago to 29% in the 12 months ended September 2015, which could lead to the conclusion (mistaken, in our view) that the monetary policy tightening process has been the main culprit behind the recent debt dynamics.

But:

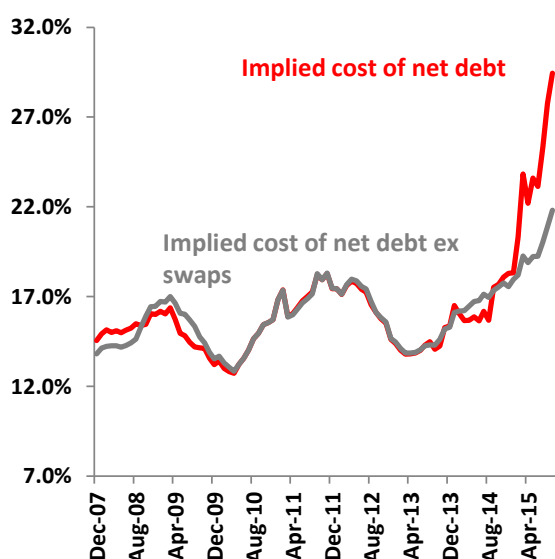
1) There has been a significant contribution by the BCB swaps operation to the recent debt dynamics. The depreciation of the BRL leads to margin adjustments accounted as interest payments. The chart on the left below shows the implied cost of net debt adjusted to exclude the contribution of the swaps, along with the usual BCB measure. According to this measure, the implied cost of debt increases not to 29% but to 22%.

2) The implied cost of net debt incorporates the fact that interest received on assets is lower than the cost of liabilities. Therefore, an equal amount of increase of assets and liabilities, although not changing net debt, would increase the implied cost. This is what has happened in 2015. While gross debt increased by 7 p.p. of GDP YTD (through September), international reserves have risen by 7.5 p.p. This has contributed to substantially increase the implied cost of debt in the period.

Therefore, the positive news is that net debt – a fair measure of the health of public sector finances – has not deteriorated nearly by as much as gross debt in the period. The negative news is that its higher implied cost will impose a much more severe upward trend in the future, according to our projections.

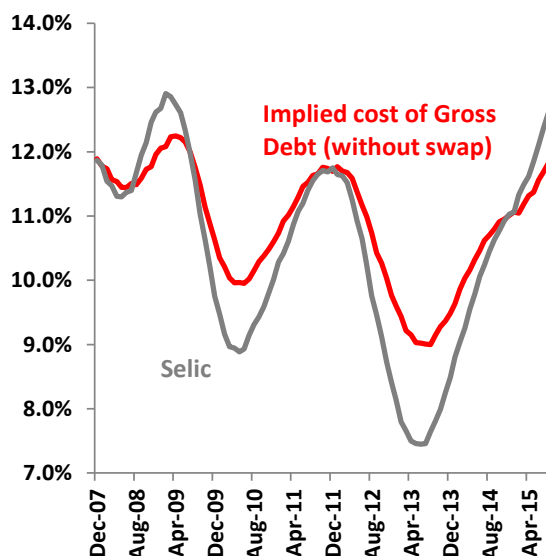
3) We have also estimated the implied cost of general government gross debt (ex swap adjustments), which shows a much closer relationship with the Selic than the implied cost of net debt (see chart on the right).

Net Debt Implied Cost (Official and Adjusted by Swaps)
(% 12 months)



Source: Santander estimates based on BCB data.

Gross Debt Implied Cost and Selic
(% 12 months)



Source: Santander estimates based on BCB data.



A straightforward implication of our estimations is that, if interest and exchange rates stabilize not far from current levels, a 22% cost of net debt would be a reasonable assumption to be used in net public sector debt dynamics simulations, in our view. The same applies for the gross debt, with an interest rate of 12%.

“Back of the envelope” debt dynamics could be applied considering the following equations:

$$d(\text{GD}) = (i_{\text{GD}} - y) \text{GD} - \text{pr}$$

and

$$d(\text{ND}) = (i_{\text{ND}} - y) - \text{pr}$$

where $d(\text{GD})$ is the variation of gross debt, y is nominal GDP growth, pr is the primary surplus, i_{GD} is the implied cost of gross debt, and i_{ND} is the implied cost of net debt.

Example:

Assuming $\text{pr} = -1\%$ and long term / potential y of 8.5% (6.5% inflation with 2% real growth)

$$d(\text{GD}) = 3.3 \text{ p.p.}$$

$$d(\text{ND}) = 5.4 \text{ p.p.}$$

This suggests an equilibrium primary surplus would be 2.3% of GDP for gross debt and 4.4% of GDP for net debt.

Operational Deficit

There has been intense debate among market observers recently on the importance of the nominal deficit as a measure of fiscal health. In our view, both Brazilian high inflation and recent adjustments of swap operations have been important sources of distortion on this indicator.

From the point of view of debt dynamics, the implied cost of debt measured in **real terms** (using the GDP deflator) may be a more straightforward indicator to access.

Assuming the implied cost of net debt in real terms is $r_{\text{ND}} = i_{\text{ND}} - \pi$

where π is the GDP deflator,

and

real GDP growth is $g = y - \pi$,

we have

$$d(\text{ND}) = [(r_{\text{ND}}) - (g)] \text{ND} - \text{pr}$$

where

$[(r_{\text{D}}) \text{D} - \text{pr}]$ is the operational deficit.

The nominal deficit would be $[(i_{\text{GD}} \text{D}) - \text{pr}]$

As for the **cost of swap operations**, although its impact on historical data is real and permanent, an adjustment is required in order not to extrapolate nonrecurring events.

On the following page, the chart on the right shows fiscal results from different points of view: the nominal deficit, the operational deficit (excluding inflation), and the operational concept, adjusted by swaps.

The chart on the right-hand side provides a good illustration on how the operational deficit, and therefore, debt dynamics, has been closely related to the disappearance of the primary surplus.

Once again, “back of the envelope” debt dynamics could be easily applied, considering the following equations:

$$d(\text{GD}) = (r_{\text{GD}} - g) \text{GD} - \text{pr} \quad \text{and} \quad d(\text{ND}) = (r_{\text{ND}} - g) - \text{pr}$$

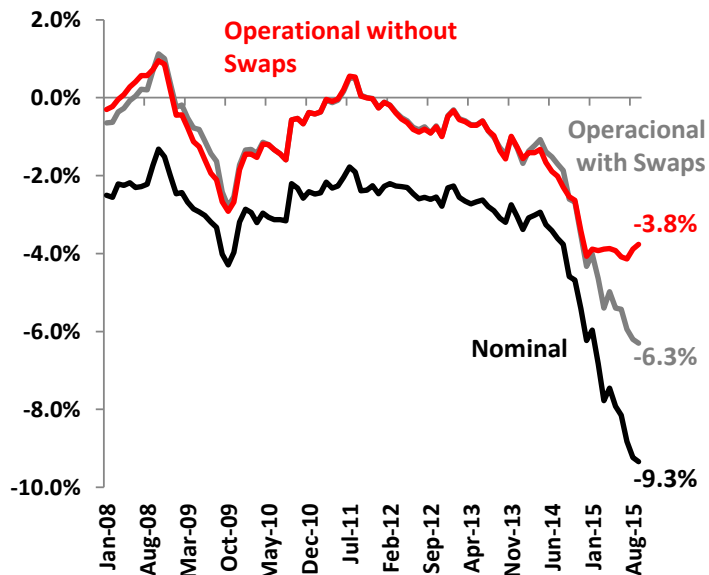
Example (using the hypotheses of previous exercise):

Assuming $\text{pr} = -1\%$ and long term / potential g of 2%, $\pi = 6.5\%$, $r_{\text{GD}} = 5.5\%$ (12%-6.5%) and $r_{\text{ND}} = 15.5\% = (22\%-6.5\%)$,

$d(\text{GD}) = 3.6 \text{ p.p.}$ $d(\text{ND}) = 5.6 \text{ p.p.}$; and the equilibrium primary surplus would be 2.6% of GDP for gross debt and 4.6% of GDP for net debt.

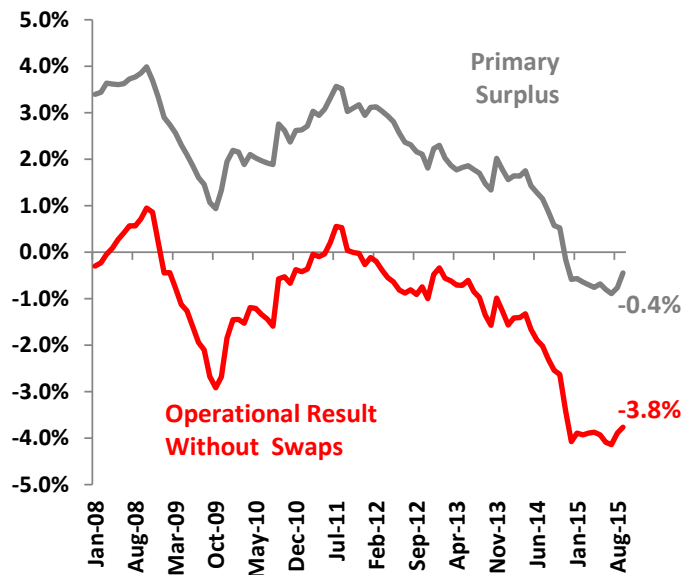


**Net Debt Implied Cost (Official and Adjusted by Swaps)
(% 12 months)**



Source: Santander estimates based on BCB data.

**Operational Result and Primary Surplus
(% of GDP)**



Source: Santander estimates based on BCB data.

From previous equations: the operational deficit consistent with stable debt, assuming potential GDP growth of 2%, would be 0.5% for net debt and 1.0% for gross debt, a long way from the current 3.8%.



Appendix: Public Sector Debt – Tutorial

Summarized Version of Public Sector Accounts as of September 2015 (consolidated according to Santander's methodology, % of GDP)

General Government (Federal and Local)				BCB			
Assets		Liabilities		Assets		Liabilities	
Federal Treasury Cash at the BCB	16.0	44.2	Treasury Securities Outstanding	Federal Securities at the BCB	21.1	16.0	Federal Treasury Cash at the BCB
Federal Gov. Funds (1)	6.3	21.1	Federal Securities at the BCB	Other BCB Assets (5)	(0.1)	14.9	BCB Repo operations
FX Equalization (2)	2.8	1.1	Other Government Liabilities (4)			4.0	Monetary Base
Loans to Financial Institutions (3)	10.1					5.6	Deposits from Financial Institutions (6)
						2.8	FX Equalization (2)
		4.6	External Debt	International Reserves	25.2		

Net Internal Government Debt	31.4	Net Internal BCB Debt	22.3
Net External Government Debt	4.6	Net External BCB Debt	(25.2)
Net Total Government Debt	36.0	Net Total BCB Debt	(2.9)

Net Consolidated Public Sector Debt: 33.1

Source: Santander based on Brazilian Central Bank Data.

(1) Includes the Workers Assistant Fund (FAT), constitutional funds, and other funds and federal programs.

(2) FX equalization refers to the financial results of external debt / reserves operations and FX derivatives operations carried out by the Central Bank (MP 435).

(3) Credits with official financial institutions; includes Treasury Loans to BNDES.

(4) Consolidation of other less important accounts of the general government. (4) = net government internal debt (-) Treasury Securities Outstanding (-) Federal Securities at the BCB (+) Federal Treasury Cash at the BCB (+) Federal Government Funds (+) FX Equalization (+) Loans to Financial Institutions.

(5) Consolidation of other less important BCB assets. (5) = FX Equalization (+) Deposits from Financial Institutions (+) Base Money (+) BCB Repo (+) Treasury Cash at the BCB (-) Net BCB Internal Debt (-) Federal Securities at the BCB.

(6) Includes reserve requirements.

The table on the following page unifies the BCB's and general government accounts into consolidated public sector accounts. (A) The items in red cancel out when consolidated. (B) By methodological definition, gross debt does not include Central Bank accounts, except repos.

Moreover, we propose a different way of linking consolidated net public sector debt with general government gross debt. Our methodology highlights international reserves and cancels out the interactions (in our view, these are less important) between the BCB and the Treasury (Treasury Securities available for sales¹ at the BCB, other deposits, Treasury cash at the BCB, etc.).

¹ Treasury Securities available for sales = Federal Securities with the BCB (-) Repos



Consolidating Public Sector Accounts (BCB + Government) as of September 2015 (% of GDP)
Santander Version (% of GDP) **Official (BCB) Version (% of GDP)**

Consolidated Public Sector			
Assets		Liabilities	
Federal Gov. Funds (1)	6.3	14.9	BCB Repo operations
Other BCB Assets (5)	(0.1)	44.2	Treasury Securities Outstanding
Loans to Financial Institutions (3)	10.1	1.2	Other Government Liabilities (4)
		4.0	Monetary Base
		5.6	Other Deposits
International Reserves	25.2	4.6	External Debt

Public Sector Net Debt (Liab. (-) Assets)	33.1
General Government Gross Debt (% of GDP)	
Liabilities ex BCB + Repos	64.9
Other Adjustments (7)	1.1
Gross Debt	66.0

Consolidated Public Sector			
Assets		Liabilities	
Government Credits (8)	34.1	44.2	Treasury Securities Outstanding
		14.9	BCB Repo operations
FX Equalization	2.8	1.2	Other Government Liabilities (4)
		(2.3)	Net Debt BCB and S&M
		1.1	Other adjustments (7)
		6.3	Federal securities (-) BCB Repos
		4.6	External Debt

Public Sector Net Debt (Liab. (-) Assets)	33.1
General Government Gross Debt (% of GDP)	
Liabilities ex BCB + Repos	64.9
Other Adjustments (7)	1.1
Gross Debt	66.0

Source: Santander estimates

(1) Includes the Workers Assistant Fund (FAT), constitutional funds, and other funds and federal programs.

(2) FX equalization refers to the financial results of external debt / reserves operations and FX derivatives operations carried out by the Central Bank (MP 435).

(3) Credits with official financial institutions; includes Treasury Loans to BNDES.

(4) Consolidation of other less important accounts of the general government. (4) = net government internal debt (-) Treasury Securities Outstanding (-) Federal Securities at the BCB (+) Federal Treasury Cash at the BCB (+) Federal Government Funds (+) FX Equalization (+) Loans to Financial Institutions.

Source: Santander estimates

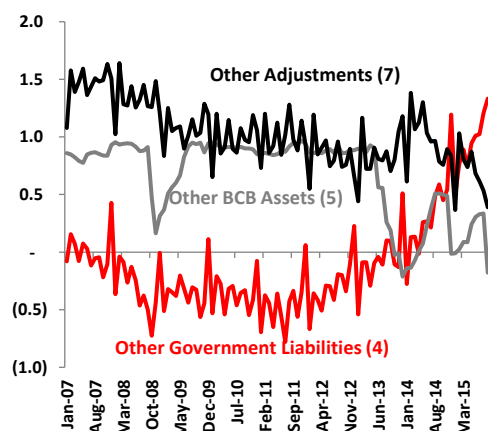
(5) Consolidation of other less important BCB assets. (5) = FX Equalization (+) Deposits from Financial Institutions (+) Base Money (+) BCB Repo (+) Treasury Cash at the BCB (-) Net BCB Internal Debt (-) Federal Securities at the BCB.

(6) Includes reserve requirements

(7) Other Adjustments: Adjustment value to match the consolidated public sector debt (which includes the BCB) with general government gross debt (which does not include BCB accounts, except repos). (7) = Gross Debt (-) BCB Repo (-) Treasury Outstanding (-) Other Government Liabilities (-) External Debt.

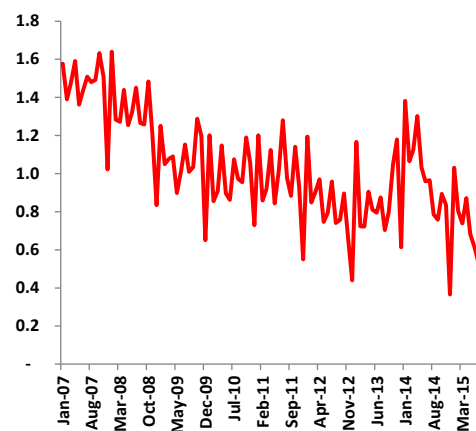
The following charts show that, although there may be a trend on the behavior of aggregated residuals, they seem to be less important in terms of magnitude, particularly from a long-term perspective.

Residuals (% of GDP)



Source: Santander estimates.

Aggregated Residuals (% of GDP)



Sources: Santander estimates.



While the previous tables illustrate the main differences and the relationship between general government gross debt and consolidated public sector debt, the following table summarizes this interaction according to both ways of aggregating accounts: ours (Santander), which we consider more straightforward to understand and run simulations, and the official one (the BCB's table).

General Government Gross Debt → Consolidated Public Sector Debt as of September 2015 (% of GDP)

Santander Version		BCB Version	
(+) BCB Repos	14.9	(+) BCB Repos	14.9
(+) National Treasury Securities Outstanding	44.2	(+) National Treasury Securities Outstanding	44.2
(+) Other Government Liabilities (4)	1.2	(+) Other Government Liabilities (4)	1.2
(+) External Debt	4.6	(+) External Debt	4.6
(+) Other Adjustments (7)	1.1	(+) Other Adjustments (7)	1.1
General Government Gross Debt	66.0	General Government Gross Debt	66.0
(+) Other BCB Liabilities			
Deposits From Financial Institutions	5.6	(+) Treasury Securities at the BCB (-) Repos	6.3
Base Money	4.0	(+) Net Debt BCB and SOE	(2.3)
(-) Assets			
Federal Government Funds (1)	(6.3)	Federal Government Funds (1)	(6.3)
Other Federal Gov. Asset	0.1	Other Credits	(17.7)
Loans to Financial Institutions	(10.1)	Loans to Financial Institutions	(10.1)
International Reserves	(25.2)	FX Equalization	(2.8)
Other Adjustments (7)	(1.1)		
Net Public Sector Debt	33.1	Net Public Sector Debt	33.1

Source: Santander based on BCB data.

Source: Santander based on BCB data.

(1) Includes the Workers Assistant Fund (FAT), constitutional funds, and other funds and federal programs.

(5) Consolidation of other less important BCB assets. (5) = FX Equalization (+) Deposits from Financial Institutions (+) Base Money (+) BCB Repo (+) Treasury Cash at the BCB (-) Net BCB Internal Debt (-) Federal Securities at the BCB.

(2) FX equalization refers to the financial results of external debt / reserves operations and FX derivatives operations carried out by the Central Bank (MP 435).

(6) Includes reserve requirements

(3) Credits with official financial institutions; includes Treasury Loans to BNDES.

(7) Other Adjustments: Adjustment value to match the consolidated public sector debt (which includes the BCB) with general government gross debt (which does not include BCB accounts, except repos). (7) = Gross Debt (-) BCB Repo (-) Treasury Outstanding (-) Other Government Liabilities (-) External Debt.

(4) Consolidation of other less important accounts of the general government. (4) = net government internal debt (-) Treasury Securities Outstanding (-) Federal Securities at the BCB (+) Federal Treasury Cash at the BCB (+) Federal Government Funds (+) FX Equalization (+) Loans to Financial Institutions.



Modeling Net and Gross Public Sector Debt

The following table consolidates further some of the calculations in the previous table, according to **Santander's** version.

General Government Gross Debt → Consolidated Public Sector Debt (% of GDP) as of September 2015
Santander Version (Simplified) (% of GDP)

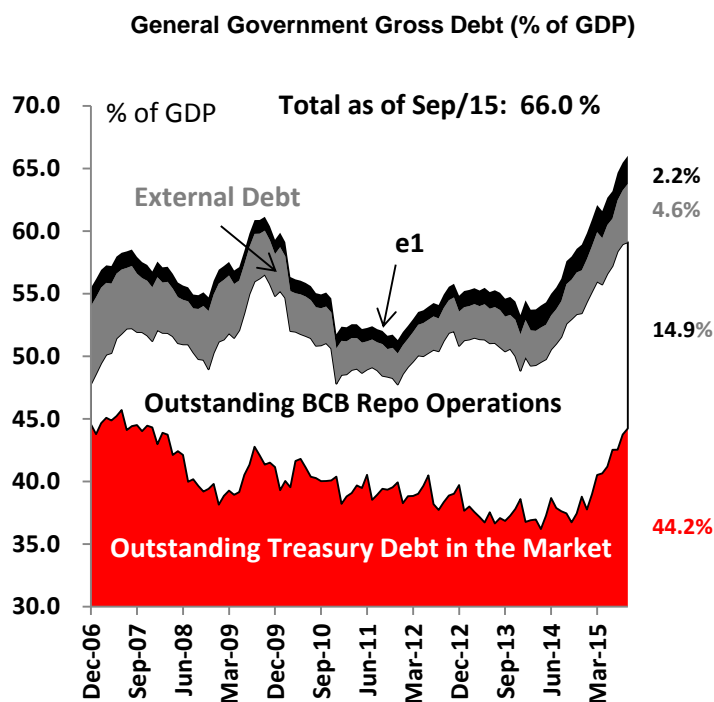
Securities (Treasury Securities + Repos)	59.1
(+) External Debt	4.6
(+) residual 1	2.3
General Government Gross Debt	66.0
(+) Other BCB liabilities (Deposits and Monetary Base)	9.6
(-) International Reserves	(25.2)
(-) Other Credits	(17.3)
Net Consolidated Public Sector Debt	33.1

Source: Santander based on BCB data.

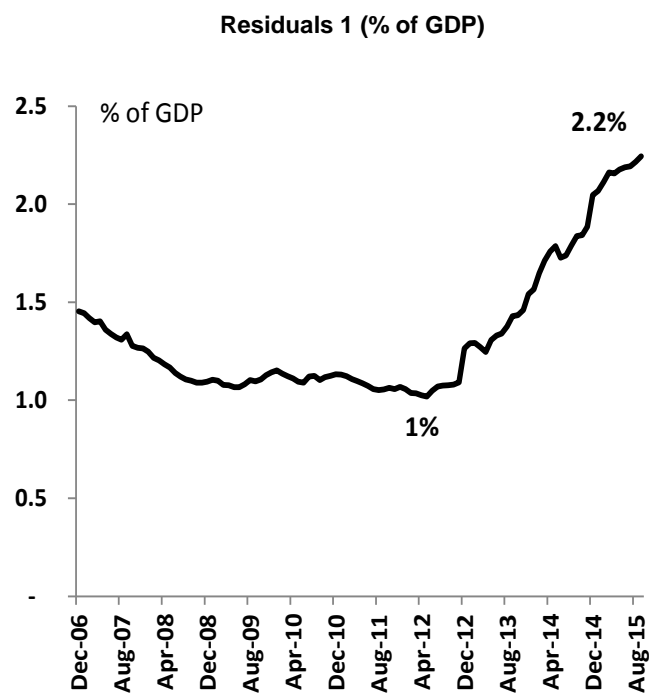
The previous table illustrates straightforward relationships:

$$(I) \text{ GD} = \text{Bond} + \text{Dex} + e_1$$

Where GD is the general government debt, bond is the amount of outstanding treasury debt in the market plus BCB repos and e_1 (Residual 1) rounds up and aggregate other less important factors. The following charts show historical values for those variables:



Source: Brazilian Central Bank.



Source: Brazilian Central Bank.

$$(II) \text{ ND} = \text{GD} + \text{BL} - \text{R} - \text{Cr}$$

Where ND is consolidated public sector net debt, GD is general government gross debt, BL are other BCB's liabilities (deposits from financial institutions + monetary base), R accounts for international reserves, and Cr includes other government credits



(mostly (95%) comprising federal government funds and loans to financial institutions (BNDES included).

From (II) and (I),

$$(III) ND = Bond + Dex + e1 + BL - R - Cr$$

Therefore,

$$(IV) d(ND) = d(Bond) + d(Dex) + d(e1) + d(BL) - d(R) - d(Cr),$$

Where d() stands for the variation of the variable in the period.

We also define that:

$$(V) d(ND) = -pr + i_{ND}(ND) + Aj$$

Where pr is the Primary Surplus, i is the implied cost of net debt, and Aj stands for methodological adjustments on debt (the impact of exchange rate variation on reserves and external debt affects this adjustment, as well as privatizations or other debt adjustments not related to the nominal deficit).

The nominal deficit is:

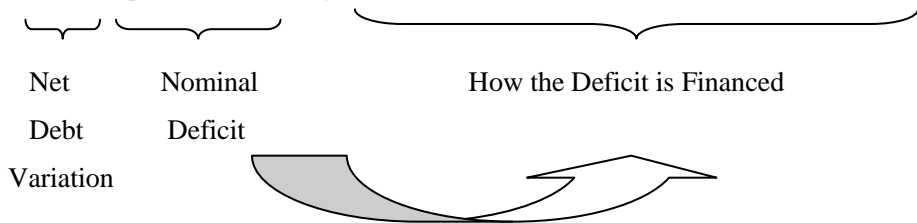
$$(VI) N = -pr + i_{ND}(ND)$$

The operational deficit is:

$$(VII) O = -pr + (i_{ND} - \pi)(ND), \text{ where } \pi \text{ represents inflation.}$$

From (IV) and (V):

$$(VII) d(ND) = -pr + i_{ND}(ND) + Aj = d(Bond) + d(Dex) + d(e1) + d(BL) - d(R) - d(Cr)$$



Implied Cost of Net and Gross Debt

The implied cost of debt is the composition interest rate of each “type” of asset or liability plus the swap adjustment:

$$(VIII) i_{ND} = i_{Bond} * Bond + i_{Dex} * Dex + i_{e1} * e1 + i_{BL} * BL - i_R * R - i_{Cr} * Cr + i_s$$

$$(IX) i_{GD} = i_{Bond} * Bond + i_{Dex} * Dex + i_{e1} * e1 + i_s$$

The goal here is to estimate the cost of debt based on different “types” of assets / liabilities outstanding and market variables.

A simple approach is to make “ad hoc” assumptions for each different interest rate type:

Examples:

External Debt and International Reserves:

i_R = interest rate on reserves → “ad hoc” use of 2 years Treasury or a multiple.

i_{Dex} = interest rate on external debt → “ad hoc” use of 2 years Treasury or a multiple.

In our view, it makes sense to assume the cost of debt will be greater than yield on reserves.



Swaps:

$$(X): i_s = -S*(e_t/e_{t-1} - 1)*(i^* - i_{Selic})$$

Where:

i^* is the domestic interest rate on FX-denominated instruments (coupon cambial): we could use once again a multiple of the Treasury.

and i_{Selic} is the domestic overnight rate.

Other “Ad Hoc” Assumptions:

i_{e1} → nominal variation of the GDP as a way of stabilizing this account as percentage of GDP.

i_{Cr} → suggested – the average between the overnight rate and the TJLP, as loans to financial institutions; an important part of this bill yields precisely the TJLP for the Treasury.

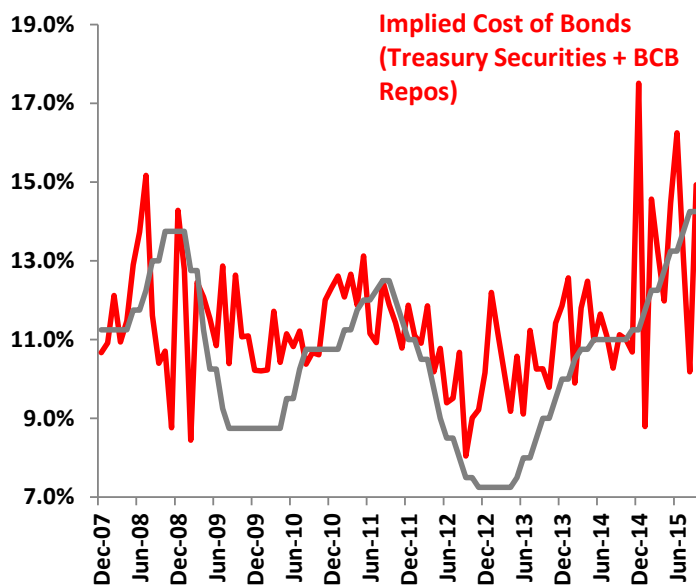
i_{BL} → a share of the overnight rate, in order to incorporate the “zero” cost of monetary base.

Implied Cost of Securities (Bonds):

We find the implied cost of securities (bonds) as the residual result of equation (VIII).

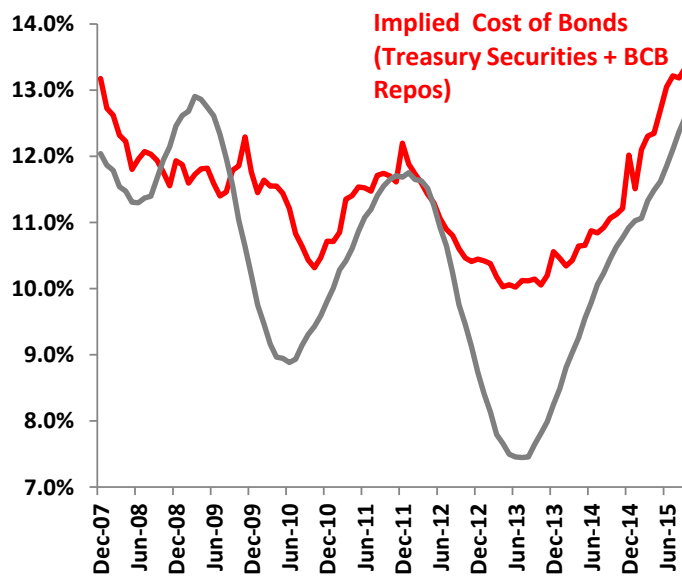
As should be expected, there is a decent correlation between the implied cost of bonds and the Selic, as shown by the following charts. Note that, when the Selic has fallen toward 7%, the cost of debt has not decreased by the same proportion. This is a result of interest rate term structure, which assigns high costs for previously issued fixed rate debt.

Implied Cost of Bonds (Treasury Securities + BCB Repos) and Selic (Monthly Annualized Rates)



Sources: Santander estimates and Brazilian Central Bank.

Implied Cost of Bonds (Treasury Securities + BCB Repos) and Selic (12 months)



Sources: Santander estimates and Brazilian Central Bank.

The next step is to run a simple regression relating our implied cost of bonds to the Selic in order to forecast the implied interest rate on net and gross public sector debt.

Forecasting Debt to GDP Dynamics

After establishing the relationship between the Selic and the cost of debt (both gross and net) and estimating the impact of swap operations, the next steps include the estimation of the “methodological adjustment” and the primary surplus adjustment, in order to forecast both public sector consolidated net debt and general government gross debt.



Methodological Adjustment of External Debt and International Reserves

According to the methodology adopted by the BCB, the impact of exchange rate variations on external debt and international reserves is not accounted as deficit (through the interest bill), as it is in the case of swaps. In the case of those accounts, the exchange rate variation is incorporated as a “methodological adjustment.”

Therefore, the usual debt dynamic formula, $d(\text{ND}) = (i_{\text{ND}} - y) - pr$, assumes no BRL variation and, therefore, no methodological adjustment. The modified version should be:

$$(XI) \ d(\text{ND}) = (i_{\text{ND}} - y)\text{ND} - pr + A_j,$$

Considering that

$$(XI): A_j = (E_{dt} * e_t - E_{dt-1} * e_{t-1}) - (E_{dt} - E_{dt-1}) * e_t$$

Where:

e is the exchange rate and E the Outstanding Stock of External Debt or Reserves



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