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Caroline Teixeira Jorge

PhD Candidate at the Economics Institute, Federal University of Rio de Janeiro, Brazil

Carlos Pinkusfeld Monteiro Bastos

Professor at the Economics Institute, Federal University of Rio de Janeiro, Brazil

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Caroline Teixeira Jorge

PhD Candidate at the Economics Institute, Federal University of Rio de Janeiro, Brazil

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1 Introduction

There are many factors to consider when discussing the impact of the stock of domestic public debt on long-term interest rates and the government's ability to issue obligations at said rates. Primary factors include the stock of debt relative to GDP, as it is argued that large stocks of government domestic debt relative to GDP cause market participants to distrust the government's ability to honor future payments, which in turn exerts upward pressure on the interest rate and may hinder the Government's ability to finance itself.

In this view, investors in public bonds would have bargaining power to "reject" some types of bonds and/or to "accept" buying them only at high interest rates. They would be "bond vigilantes" that could cause difficulties in rolling-over the debt and pressure interest rates to move higher. This "vigilance" would be reinforced by the International Rating Agencies, whose downgrades would increase the pressure on debt costs and, in the worst-case scenario, causing a flight of capital, especially in the case of a loss of the investment grade rating.

This paper aims to analyze if these arguments can accurately describe Brazil's experience in the 2000s, through an examination of the results of the Brazilian National Treasury (BNT) primary auctions. We analyze if there is evidence to support the hypothesis that the stock of Brazilian Domestic Public debt exerted any pressure on costs and influenced volume of new issues of debt by the Brazilian National Treasury auctions. Regard to the downgrade of Brazilian debt by international agencies, we examine if they exerted strong and persistent impacts on auctions in terms of volume, types, and interest rates on bonds. Finally, we briefly examine repurchase ("repo") operations of the Brazilian Central Bank, looking for evidence of the coordination between BNT and BCB, which always maintains the interest rate target and, if necessary, drains the liquidity generated by Treasury operations.

In order to explore the topics raised above, the paper is divided in four sections. Section 2 discusses the theoretical framework of the current analysis, based on the Functional Finance approach and Modern Monetary Theory. Section 3 presents the results of the Brazilian National Treasury auctions, including a detailed examination encompassing the

period of downgrades by international rating agencies, and this relationship with the repo operations by the Brazilian Central Bank. Section 4 concludes the analysis.

2 Theoretical and institucional framework

The theoretical framework of this paper is based upon the Functional Finance approach and Modern Monetary Theory (MMT). MMT was originally inspired by Smith, Knapp, as well as Keynes, and with respect to fiscal issues is inspired by the work of Abba Lerner. The approach is also strongly enriched by the contributions of Godley, Mosler and Minsky. The theory seeks to show the validity of the analytical framework of functional finance in contemporary economics, looking at the elements of modern monetary systems. Two theoretical premises are relevant to our analysis: i) the short term interest rate is exogenously fixed by the Monetary Authority; ii) The State cannot default on its obligations denominated in its own currency.

The first premise sustains that the interest rate is exogenously determined by the Central Bank as a policy variable and implies there is no process of market-clearing, or, in other words, it is not determined by the balance of an exogenous supply of money and the demand for money. On the contrary, the stock of money adjusts to the given exogenous interest rate, resulting in the endogeneity of money. In this interpretation the volume of credit lent by banks has as its counterpart the creation of demand deposits, which, in turn, determine the volume of bank reserves. Given the exogenous interest rate, the government adjusts the monetary base by selling and buying bonds, that is, it controls the reserves in the banking system in order to keep the actual rate at its target level.

The exogeneity of the short-term interest rate also applies, in a large extent, to the long run, since in the real world the long rate tends to be a function of the expectation of the short rate in the future. In this way, the government can influence long-term interest rates, among others, giving clear indication of the direction in which it will fix short-term rates in the future.

The second premise, that a government which issues domestic debt in its domestic currency will never default, is related to the fact that the government spends by crediting private bank accounts thereby adding reserves into the banking system, which suggests there is no need for the government to finance its spending by the private sector, as it has been extensively defended by MMT (Wray 1998, 2010, Wray 2015, Bell 2000, Rezende 2009).

An important point, stressed by the heterodox literature that share the basic tenets of the MMT approach (see Lavoie 2010 and Cesaratto 2016), is the way this credit creation occurs, or the Central Bank – Treasury relationship. There is no divergence among authors that the final picture, in terms of Treasury, Central Bank, and private financial sector balance sheets, is the same whether the analysis separates the Central Bank from the Treasury. However, the institutional setting that is behind the nexus between these two institutions is an important policy variable. Therefore, before proceeding in our analysis we should present the basic institutional characteristics of the Treasury – Central Bank relationship in Brazil.

Brazilian Central Bank cannot directly finance the Treasury. There is an exception given by Law n. 11.803/2008, which allows the Central Bank to buy treasuries in primary auctions only for the purpose of monetary policy, depending upon the volume of bonds in its portfolio. Besides, when the Treasury spends, a debit is generated in its account at the Central Bank. This account, in turn, is credited when the Treasury collects taxes and sell bonds. As the Central Bank usually cannot buy bonds directly from the Treasury, they have to be sold to the private sector.

In this process where the Treasury has to sell bonds to the private market, a crucial role is played by the Primary Dealer System¹. Dealers are financial institutions that are obliged to make bids in the Primary Treasury Auctions. Therefore, there will always be an offer which the Treasury can accept or not. Eventually the rate may not be of interest for the Treasury, accordingly the public manager can wait to issue in better market conditions, but there will never be a case where government bonds are not “accepted” by the market. Dealers cannot refuse to make the bids. And if the rate is too high, the bid might be not accepted by the Treasury, not by the market. In Brazil, in the case of a dealer persistently underperforming, it can be substituted by another institution. This performance is based, mainly, on the participation in the public offers and in the secondary market of public bonds.

¹ The rules and criteria of the Brazilian Primary Dealer System is defined by the “Portaria n. 90”, since 7th February 2018.

As noted by Tymoigne (2014), referring to the case of United States:

“The Primary Dealer system has created a very stable and dependable demand for treasuries because the Federal reserve ensures primary dealers always have sufficient funds to participate in auctions by accepting treasuries as collateral for repos or by buying treasuries outright. (...) While the Federal Reserve is not directly buying treasuries from the Treasury, the end result is exactly the same as if it did.” (Tymoigne 2014, p. 656).

This is exactly the same case in Brazil, the Brazilian Central Bank must provide funds as soon as there is pressure in the open market in order to maintain the interest rate target. This fact actually leads to the second reason why the Treasury is not subjected to market power bargaining. Although the Central Bank cannot participate in the primary auctions, its operations in the secondary market influence the yield curve by buying and selling long-term treasuries and by influencing expectations about short term rates in future dates, exactly the way it is highlighted by liquidity premium and habitat theories of term structure interest rates². The Central Bank’s interest-rate policy, therefore, plays a crucial role in determining both the level and slope of the yield curve on Treasuries.

The fact that the Central Bank always has to act in the secondary market in order to maintain the interest rate target also suggests that public bonds in the local currency are highly liquid, and therefore will always be an asset desired by investors to incorporate them into their portfolio. It should be added that there is no substitute in the Brazilian financial market in terms of liquidity and size (stock held by the private sector) for the public debt.

² For more information about theories of term structure interest rates, see Mishkin (2011) and Smithin (2006).

Finally, in macroeconomic terms, the result of government spending is private net savings or the difference between private savings and investment³.

“Government deficit spending creates nongovernment sector saving in the form of domestic currency (cash, reserves and Treasuries). This is because government deficits necessarily mean the government has credited more accounts through its spending than it debited through taxes”. (Wray, 2015, p. 110).

If deficit spending means that banks have more reserves, the purchase of bonds is a profitable wealth allocation decision for them. It is unlikely that banks would prefer to hold reserves earning zero percent interest rates than buying public bonds and earning the rate at which the Treasury is willing to accept. It seems to always be a rational economic decision to asset managers to buy treasury bonds if they provide even slightly positive spread over the remuneration of reserves. If the Treasury doesn't accept their bids, the government will be paying less in interest expenses, rather than higher:

“Refusing to “roll over” maturing bonds simply means that banks taken globally will have more reserves (credits at the issuing government's central bank) and less bonds. Selling bonds that have not yet matured simply shifts reserves about – from the buyer to the seller.(...) Neither of these activities will force the hand of the issuing government; there is no pressure on it to offer higher interest rates to try to find buyers of its bonds. From the perspective of government, it is perfectly sensible to let banks hold more reserves while issuing fewer bonds.” (Wray 2015, p 120).

From the analysis above, and remembering that the demand for government bonds comprises the issue of new and rolling over maturing bonds, we could conclude that, at each primary auction the bids by the private sector reflects its demand for wealth

³ In an open economy - depending on the behavior of private investment, exports and imports - it is possible that the three savings accounting identity shows, for example, a private net surplus zero and a positive value for external savings.

allocation, and also, eventually, capital flows from external investors and credit expansion to the public sector.

As a consequence, given the Brazilian institutional framework and the unique role played by the government debt in wealth allocation by the private sector, the government will always be able to pay for goods, services, and its maturing debt denominated in its own currency, and therefore, there is no risk of default in sovereign debt. The role of Central Bank purchasing Treasury debt in the secondary market provides infinite liquidity for it. This fact, reinforced by the Primary Dealer System, guarantees an elastic demand for primary auctions.

To illustrate the points here presented, the next section will examine the results of the Brazilian National Treasury. It will provide strong evidence that the MMT framework helps to understand why there are concrete conditions to rely in fiscal policy and public debt as an instrument to achieve economic and social development.

3 Auctions of Brazilian National Treasury in the 2000s

In this section, we aim to show how the Brazilian National Treasury has been able to successfully sell bonds and has not been “threatened” by any supposed bargaining power of the market, in the period analyzed. On the contrary, there is no evidence of any veto power for government financing, or even upward pressure on interest rates as the result of the change in fiscal variables, by “bond vigilantes”⁴. Additionally, downgrades of international agencies *did not* cause a persistent pressure on auction rates nor a persistent change in the amount of bonds sold to the market. It will be argued that the market doesn’t “reject” Brazilian Treasury offers, on the contrary, it is the Treasury who has the bargaining power to reject market offers at rates the Treasury does not want to pay. If the Treasury doesn’t sell bonds in the auctions, we will show evidence that the Brazilian Central Bank (BCB) drains the excess reserves in the secondary market by repo operations in order to maintain its interest rate target.

The present analysis concentrates on the auctions where the BNT sells bonds to the market (in opposition to the ones which it buys bonds, the purchase auction), in a competitive way. The BNT announces the volume it is going to offer and the dealers offer the price they are willing to pay. We are also only analyzing domestic public debt in local currency – the Real.

3.1 General performance of the BTN Auctions

Firstly, we want to note that our goal is to verify if there is a persistent relationship between changes in fiscal variables and both the ability of government to sell its treasury

⁴ We should stress that the expression “bond vigilantes” refer to the idea that bond buyers (mainly private financial sector) can react to the deterioration of fiscal variables, pressuring to not finance the government or to corner the Treasury and impinge long term interest terms hikes. As mentioned before there is no substitute for Treasury bonds in terms of combination of liquidity and remuneration. However, it is not the same to say that the definition of the basic interest rate by the Central Bank, and hence the interest rate of treasury bonds, has no structural constraints. In a developing country there is a floor given by the Federal Fund Rate plus country risk and expected rate of devaluation. Interest rates also play an important role through capital inflows and exchange rate control to curb inflation. Besides that, as we mention in footnote 6 the literature suggests that rentiers use their political clout to influence interest rate policies. It is completely different from a market pressure on Treasury auctions.

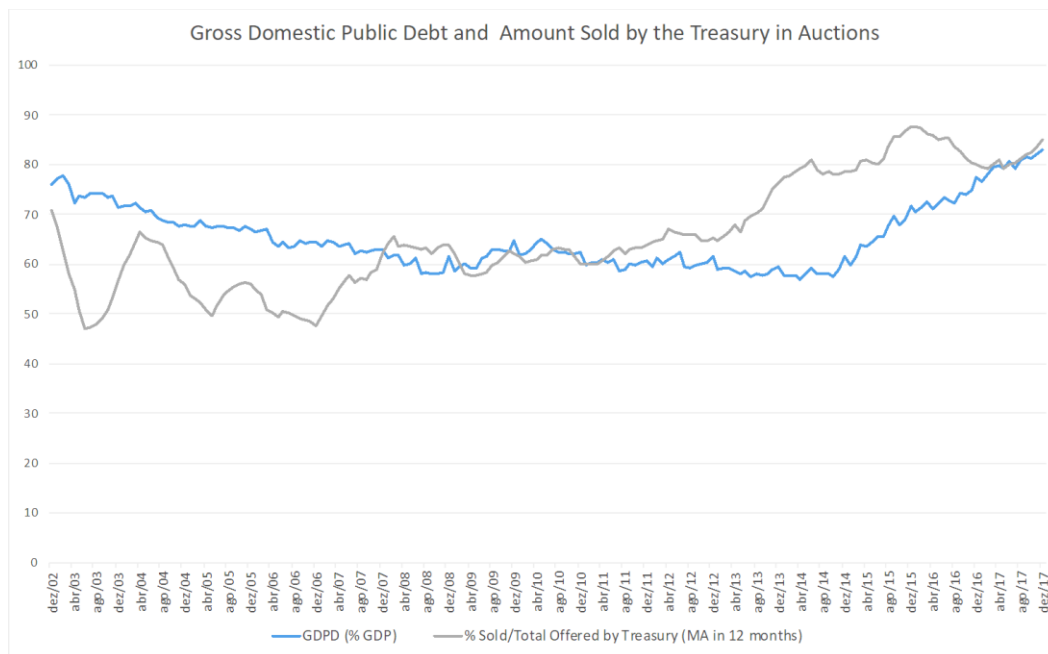
bonds as well as to accept higher spreads in these same bonds. We are not discussing the level of the short-term interest rate set by the Central Bank for the purpose of monetary policy. Brazil has a well-known history of high interest rates in comparison to other developing countries, since the middle of the 1990's, in spite of the recent lower levels⁵. Of course, Brazil's basic interest rate floor is given by the Federal Funds Rate plus country risk and the expected rate of devaluation. This already sets a higher basic rate, but does not explain why Brazilian rates are on average higher than other developing countries. Reis (2018) analyzes such "outlier" behavior of Brazil's interest rate and show that the usual orthodox explanations such as "... low saving rates, the default history of the country, strong capital controls, and jurisdictional uncertainty ..[and also heterodox approach that] discuss the importance of the exchange rate volatility and the inappropriateness of monetary policy to control inflation in Brazil due to indexed prices and the exchange rate pass-through" (p. 94) are not supported by empirical evidence. She then suggests that rentiers have a strong political influence on Central Bank's basic interest rate setting. Ferrari Filho and Milan (2018), do a similar analysis and reach a similar conclusion, but suggesting that this political influence is reflected in the way inflation expectations are considered by the Central Bank. It should be noted that both articles refer to the historical level of basic interest rates and that, in 2019, this level is very close to the floor mentioned above.

Beginning with the empirical analysis, despite the increasing stock of public debt to GDP since 2014, the amount of bonds sold, in relation to the total amount offered by the Treasury in the auctions, has increased. This fact indicates that there is no sign of "distrust" or "rejection" of the market to buy Brazilian domestic public bonds in Reais due to the increasing stock of the debt. Actually, as shown in graph 1 below, the percentage sold in relation to the total offered by the Treasury, which could be a proxy of the level of the "acceptance" by the market, increased in 2014-15, when the debt/GDP was also increasing. And it is higher than the level in 2003-06, when the debt/GDP was

⁵ The interest rate target by Brazilian Central Bank, Selic, was on average 14,1% p.y in 2016, and dropped to 10,1% p.y. in 2017 and to 6,5% p.y. in 2018.

decreasing. It doesn't seem that an increasing stock of the debt leads to a distrust in the Treasury by the market in the form of refusing to buy its bonds at issue.

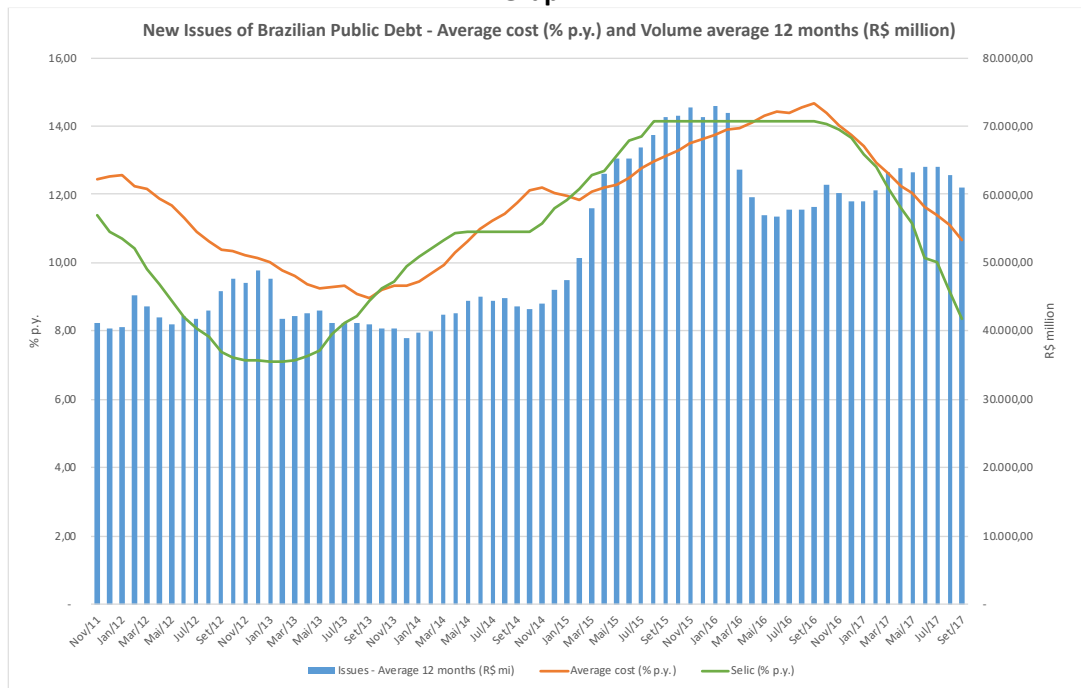
Graph 1



Source: Brazilian National Treasury and Brazilian Central Bank.

The next graph also shows, that despite the increasing stock of the domestic debt in relation to GDP from 2014, the BTN could increase the volume of new issues, and with an average cost that follows the target rate of the BCB, the Selic. Actually, despite the increasing stock of debt to GDP, its cost decreased, starting in 2016, following the trajectory of the Selic. Therefore, the argument that an increasing size of the debt stock creates pressure for “risk premium” or hampers the ability to sell bonds doesn't correlate with the data.

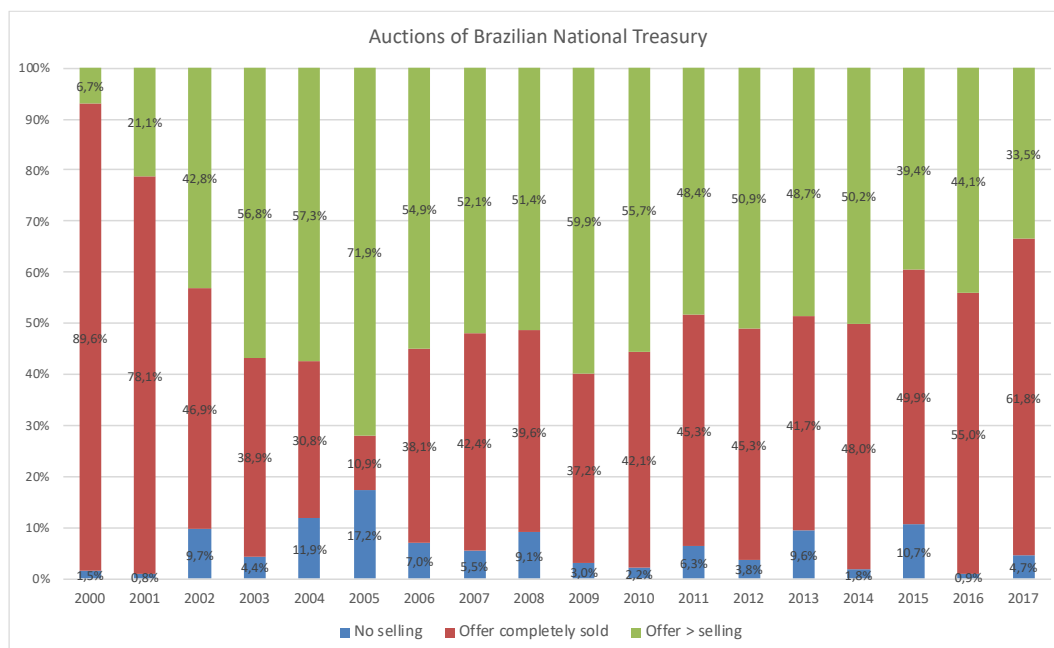
Graph 2



Source: Brazilian National Treasury and Brazilian Central Bank.

Reinforcing the argument that the Treasury is not “captured” by the market, we can see, in graph 3, that auctions in which the Treasury doesn’t sell any bonds corresponds to the smallest share through the whole period of analysis, from 2000 to 2017. Even in this situation, one can argue that instead of a “rejection” by the market, the Treasury was the one who rejected the prices offered by the market for they could have raised the cost of the public debt considerably. In addition, the share of auctions in which the Treasury sold all the bonds it offered was relatively high, more than 45%, for the majority of the time.

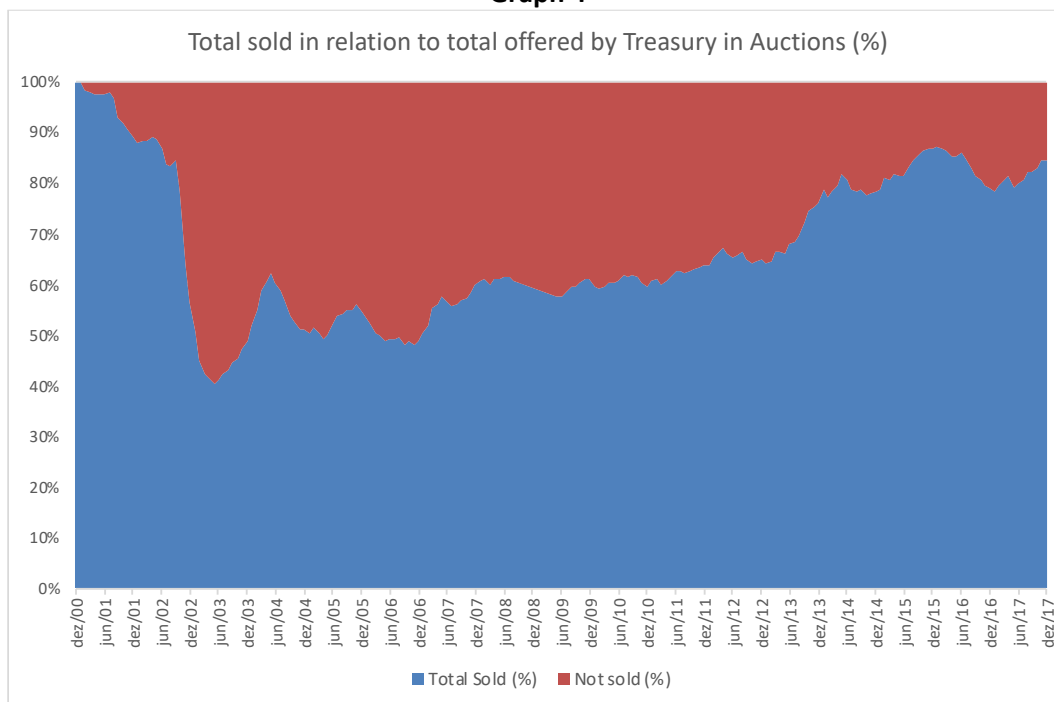
Graph 3



Source: Brazilian National Treasury and Brazilian Central Bank.

If we examine the amount sold in relation to the amount offered by the Treasury (detailing the green bars of graph 3), the results reinforce the previous argument. There is a pattern of an increase since 2005, that is, the market has been buying increasing amounts of bonds offered by the Treasury. Particularly, this pattern didn't change despite the increasing stock of debt to GDP beginning in 2014, as shown in Graph 1. Again, there is no sign of difficulty of selling bonds by the Brazilian National Treasury or more important any relationship, following the "expected" causation by "bond vigilantes" theorists: the smaller is the demand for bonds the greater is the public debt.

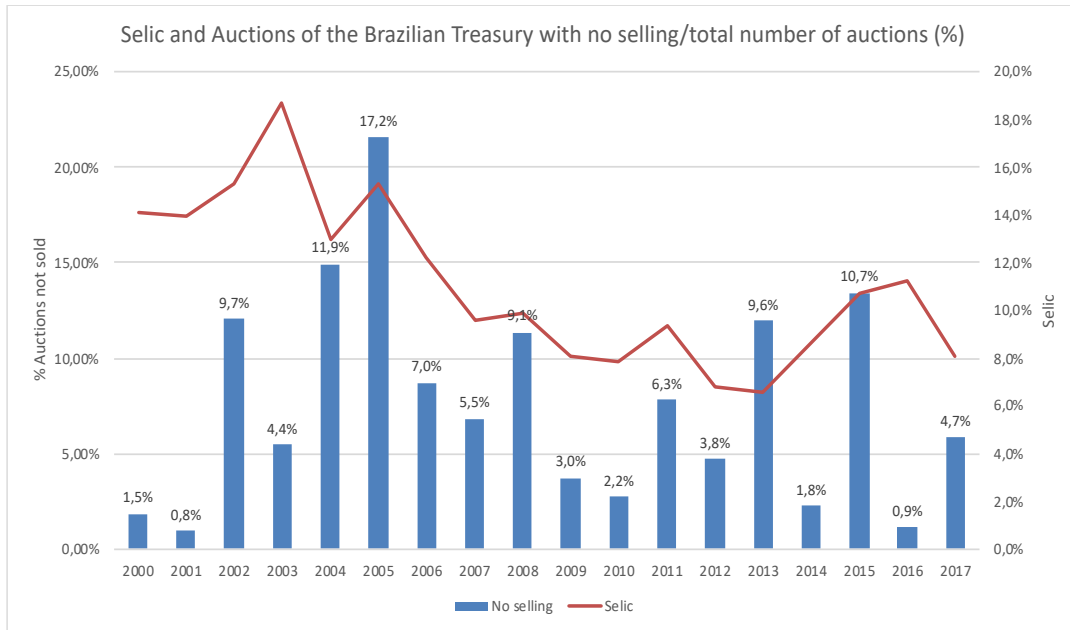
Graph 4



Source: Brazilian National Treasury.

In addition, if we analyze the auctions with zero selling, the percentage in relation to the total number of auctions is mainly less than 10% in the period of analysis (graph 5). The highest levels occurred in times of greater uncertainty and political instability, such as 2002 (Luiz Inácio Lula da Silva presidential election), 2008 (global financial crisis), 2013 and 2015 (domestic political crisis) which has been previously mentioned. These events show there might be periods of great economic uncertainty as a consequence of a political crisis, but they are not connected with the size of the public deficit or debt. It is normal during periods of uncertain political times, which might be followed by some radical change of policy orientation (especially monetary policy), private agents tend to assume a defensive position, waiting for the solution of such political crises to make any decision about long-term portfolio allocation. Furthermore, the pattern of auctions in relation to the interest rate is evident, since the Selic showed an upward trend in those years, which may indicate two possibilities: agents might prefer to wait to buy bonds in future auctions, when the interest rates are expected to be higher, or, the Treasury refused to pay the premiums required by the agents (which might be high in relation to the expectation of an interest trajectory rise). This was most likely the case in 2004 and 2005.

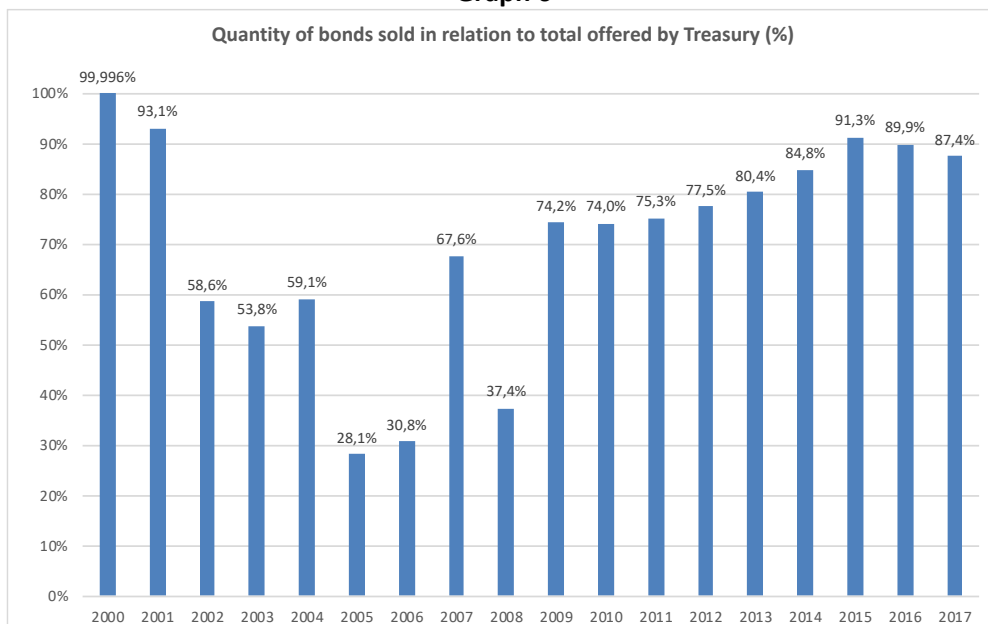
Graph 5



Source: Brazilian National Treasury and Brazilian Central Bank.

Finally, the quantity of bonds sold in relation to the total offered, suggests the same results as seen above. Between 2009 and 2012, the market bought, on average, 75,25% of public bonds offered by the Treasury. This number increased to 86,76% between 2013 and 2017. The smallest numbers were in the same unstable periods pointed out before.

Graph 6



Source: Brazilian National Treasury and Brazilian Central Bank.

3.2 Impact of downgrades on the Brazilian National Treasury Auctions

To simplify the analysis, we will adopt a methodology similar to Canuto & Fonseca dos Santos (2003), assigning a scale from zero to ten to the agency's notes, as shown in table 1. It is worth noting that the three agencies do not follow the same standard of classification, but the grades are comparable. It should also be noted that a downgrade occurs when the agency decreases the rating, and a downgrade with loss of "investment grade" occurs when the rating falls below "BBB-" or "Baa3". The loss of investment grade should have a more significant impact because the rules of pension funds based in the US and other European countries do not allow them to invest in assets of countries without this rating.

Table 1

| Ratings of International Agencies | | | | |
|-----------------------------------|---------|------|-------|-------|
| | Moody's | S&P | Fitch | Scale |
| Investment Grade | Aaa | AAA | AAA | 10 |
| | Aa1 | AA+ | AA+ | 9,5 |
| | Aa2 | AA | AA | 9 |
| | Aa3 | AA- | AA- | 8,5 |
| | A1 | A+ | A+ | 8 |
| | A2 | A | A | 7,5 |
| | A3 | A- | A- | 7 |
| | Baa1 | BBB+ | BBB+ | 6,5 |
| | Baa2 | BBB | BBB | 6 |
| | Baa3 | BBB- | BBB- | 5,5 |
| Non-investment grade | Ba1 | BB+ | BB+ | 5 |
| | Ba2 | BB | BB | 4,5 |
| | Ba3 | BB- | BB- | 4 |
| | B1 | B+ | B+ | 3,5 |
| | B2 | B | B | 3 |
| | B3 | B- | B- | 2,5 |
| | Caa1 | CCC+ | CCC+ | 2 |
| | Caa2 | CCC | CCC | 1,5 |
| | Caa3 | CCC- | CCC- | 1 |
| | Ca | CC | CC | 0 |

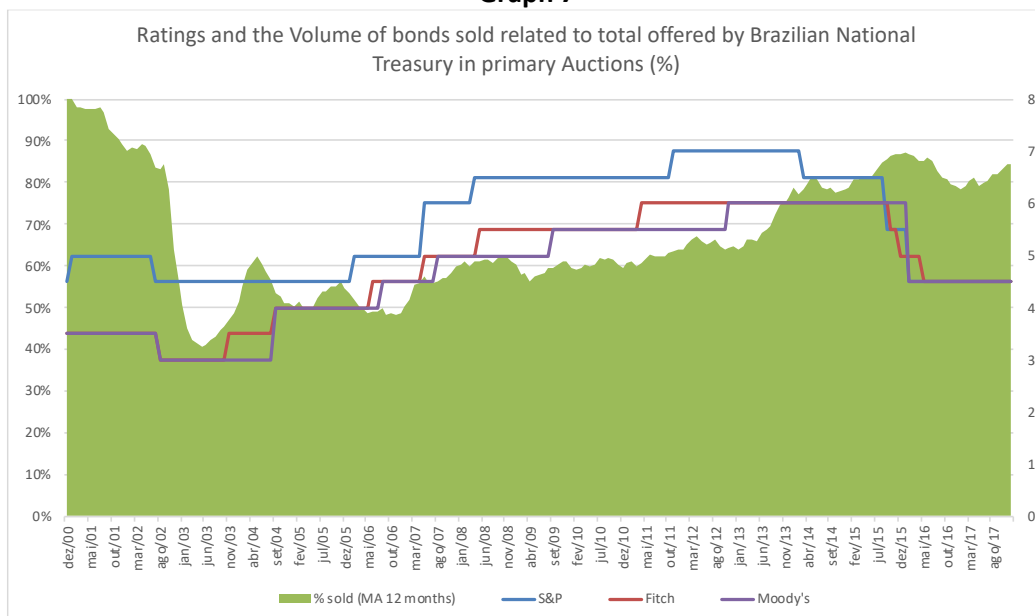
In Brazil, there was a loss of “investment grade” in assets denominated in the local currency at the end of 2015 and early 2016, a movement initiated by Standard & Poor's and followed by Fitch and Moody's.

Table 2

| Downgrades for long term-debt | | | | | |
|-------------------------------|-------------------|------------------|----------------|--|-------|
| Period | Agency | Foreign Currency | Local currency | Action | Embit |
| 20/jun/02 | Fitch | B+ | - | Downgrade, negative perspective | 1.593 |
| 21/jul/02 | Standard & Poor's | B+ | BB | Downgrade, negative perspective | 1.619 |
| 21/ago/02 | Moody's | B2 | B2 | Downgrade, stable perspective | 1.877 |
| 21/out/02 | Fitch | B | B | Downgrade, negative perspective | 1.988 |
| 21/mar/14 | Standard & Poor's | BBB- | BBB+ | Downgrade, review of perspective to stable | 234 |
| 11/ago/15 | Moody's | Baa3 | Baa2 | Downgrade, review of perspective to stable | 342 |
| 09/set/15 | Standard & Poor's | BB+ | BBB- | Downgrade, review of perspective to negative | 363 |
| 15/out/15 | Fitch | BBB- | BBB- | Downgrade, negative perspective | 408 |
| 16/dez/15 | Fitch | BB+ | BB+ | Downgrade with Loss of "investment grade" | 499 |
| 17/fev/16 | Standard & Poor's | BB | BB | Downgrade with Loss of "investment grade" | 535 |
| 24/fev/16 | Moody's | Ba2 | Ba2 | Downgrade with Loss of "investment grade" | 506 |
| 05/mai/16 | Fitch | BB | BB | Downgrade, negative perspective | 397 |
| 11/jan/18 | Standard & Poor's | BB- | BB- | Downgrade, review of perspective to stable | 223 |
| 23/fev/18 | Fitch | BB- | BB- | Downgrade, review of perspective to stable | 236 |

As can be seen in Graph 7, the volume of bonds sold by BNT has not been affected persistently after rating agencies assigned downgrades. The most critical year was 2002, with a significant decrease in the volume sold (compared to the volume offered), due to the strong instability in financial markets associated to President Lula's election, with impacts on exchange rates and long-term interest rates. Also, monetary policy fixed an abnormal low level for the interest rate target and adopted strategies that added unnecessary instability to the financial market, such as the anticipation of the mark-to-market value of investment fund shares. Even though, the effect was not persistent, the volume sold by the BTN increased months later, in March of 2003.

Graph 7



Source: Brazilian National Treasury.

Beside the year of 2002, there was a decrease in the amount sold by the Treasury in late 2015 and early 2016, when the downgrade was accompanied by a loss of the "investment grade" rating. We will examine these periods in more detail, by first analyzing issues per type of bond and maturity, then external capital flows and foreign holdings of public bonds, and finally, the interest rates on bonds sold in the primary auctions.

An overview of issues between 2000 and 2017 shows that during these downturns (2002, and 2015-16), when financial market volatility increased, the issue of “Letras Financeiras do Tesouro” (LFTs) had increased (see Table 3). Given that this is a post-fixed security indexed to the overnight rate target by BCB (Selic), this result is expected, since the market prefers not to assume fixed positions in times of uncertainty and the Treasury, in turn, does not sanction the market-required premiums on prefixed bonds, which tend to be higher due to uncertainty. In 2015, when the “investment grade” was lost, there was a reduction in the share of “Letras do Tesouro Nacional” (LTN), a prefixed bond, as well as in the “Notas do Tesouro Nacional Série B” (NTN-B), bonds with a prefixed rate and indexed to the consumer inflation rate with a longer maturity.

The average maturity of the LFT actually increased during the period, achieving the highest level of 6 years, on average, even after the downgrades, which means portfolio managers chose to “lock-in” their position in secure indexed bonds instead of speculating

as to the direction of interest rates. The lengthening of debt structure, as it should be, resulted not from a “virtuous” cycle of the economy nor of debt management efficiency, but followed a rational calculation of market operators that was sanctioned by treasury operators trying to stabilize debt operations under unstable conditions. The maximum maturity of LTNs issued after the downgrade of 2015 did not change in relation to previous years – 4 years maturity.

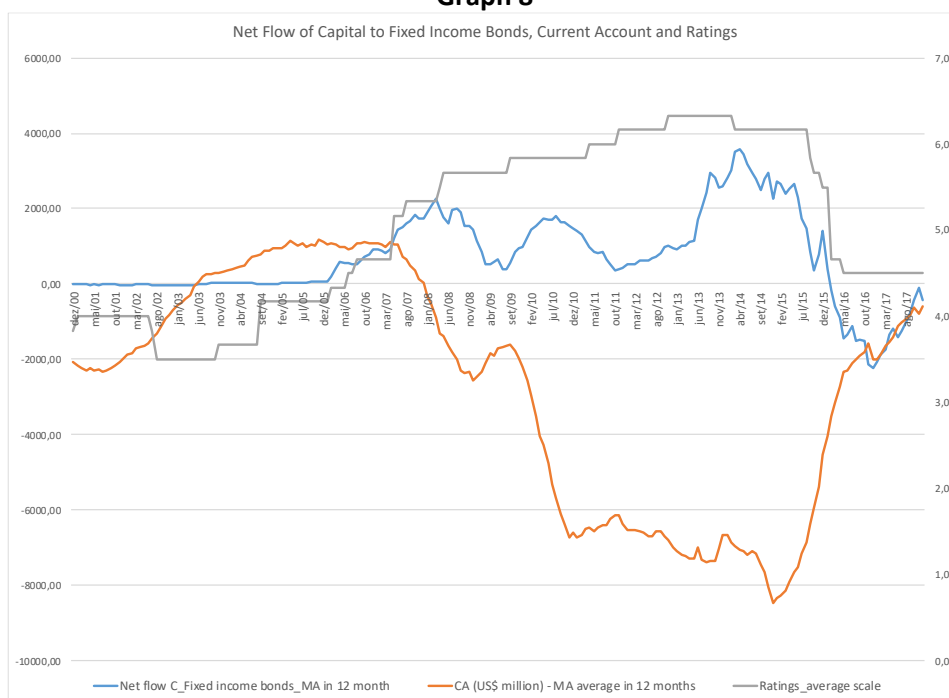
Table 3

| | Share of bonds issued by BNT | | | | | | | Maturity (years) | |
|------|------------------------------|-------|-------|-------|-------|-------|-------|------------------|------|
| | LFT | LTN | NTN-B | NTN-C | NTN-D | NTN-F | Total | LFT | LTN |
| 2000 | 51,8% | 48,2% | - | - | - | 0,0% | 100% | 1 to 6 | 1,83 |
| 2001 | 53,3% | 39,0% | - | 7,6% | 0,1% | 0,0% | 100% | 2 to 5,3 | 2,2 |
| 2002 | 48,4% | 42,2% | - | 5,0% | 4,3% | 0,0% | 100% | 0 to 3,1 | 1,8 |
| 2003 | 62,7% | 34,2% | 1,0% | 2,1% | - | 0,0% | 100% | 0 to 4,6 | 1,7 |
| 2004 | 38,8% | 56,3% | 1,8% | 2,2% | - | 0,9% | 100% | 0 to 5,2 | 1,8 |
| 2005 | 33,3% | 58,3% | 6,1% | 0,3% | - | 2,0% | 100% | 1 to 4,4 | 2,5 |
| 2006 | 18,8% | 56,4% | 14,0% | 0,4% | - | 10,4% | 100% | 3 to 5 | 2,7 |
| 2007 | 23,5% | 39,1% | 15,7% | - | - | 21,8% | 100% | 3 to 6 | 2,25 |
| 2008 | 39,6% | 34,6% | 13,4% | - | - | 12,4% | 100% | 3 to 6 | 2,33 |
| 2009 | 29,4% | 47,0% | 8,4% | - | - | 15,1% | 100% | 3 to 6 | 2 |
| 2010 | 24,5% | 46,1% | 15,2% | - | - | 14,2% | 100% | 3,5 to 6 | 2,5 |
| 2011 | 14,9% | 58,9% | 20,0% | - | - | 6,2% | 100% | 4 to 6,7 | 4 |
| 2012 | 4,0% | 67,0% | 21,0% | - | - | 8,1% | 100% | 5 to 6 | 4,04 |
| 2013 | 24,2% | 52,4% | 12,7% | - | - | 10,8% | 100% | 5 to 6 | 3,75 |
| 2014 | 23,3% | 56,8% | 9,8% | - | - | 10,0% | 100% | 6 | 4,05 |
| 2015 | 34,5% | 48,3% | 8,9% | - | - | 8,4% | 100% | 6 | 4,05 |
| 2016 | 24,9% | 51,7% | 14,2% | - | - | 9,2% | 100% | 6 | 4,05 |
| 2017 | 31,3% | 47,0% | 11,7% | - | - | 10,0% | 100% | 6 | 4,04 |

Source: Brazilian National Treasury.

In regard to foreign capital flows, it can be seen in graph 8 the net inflow to buy fixed income bonds (both public and private) started decreasing *before* the downgrades, probably due to the perception of an oncoming crisis and the deterioration of the external situation which triggers the fear of exchange rate devaluation. We are not testing causality, but it can be seen that downgrades occurred after the inflection of the external net flow path. After the downgrades, the net flow became negative, but seemed to return in 2017. Since the downgrade meant also the “loss of investment grade”, this might have affected pension funds, which cannot invest in assets without this rating and would require the immediate liquidation of their positions.

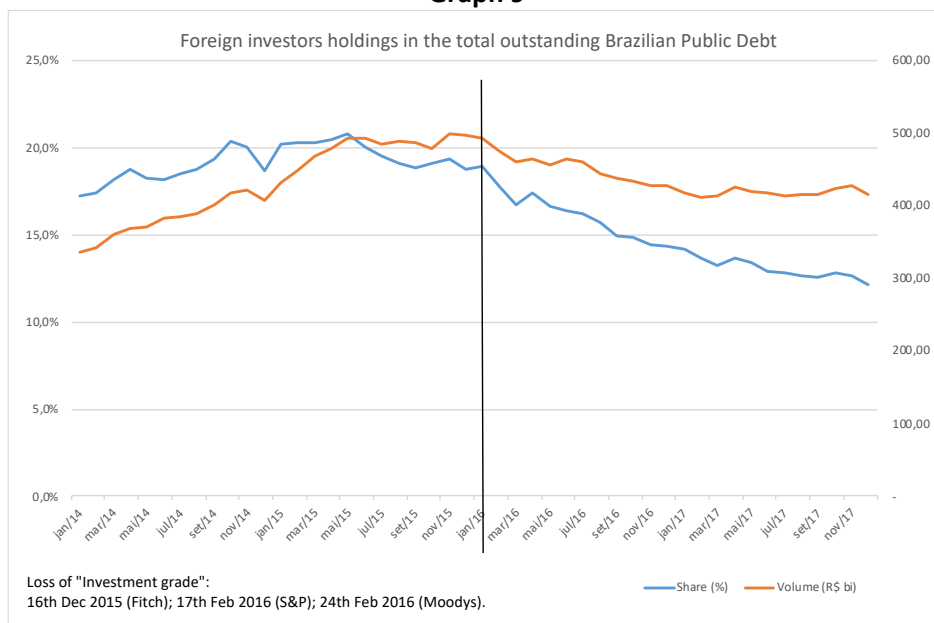
Graph 8



Source: Brazilian Central Bank and International Rating Agencies.

However, if we examine the total outstanding domestic public debt in Reais, we find both the share and volume of foreign investors holdings were not strongly affected. We cannot claim with complete accuracy if this capital left the country (since capital account data aggregates capital flows to private and public assets), but there is no evidence that, in regards to public bonds, the loss of investment grade caused a strong selling movement by non-resident investors in public bonds in Reais.

Graph 9

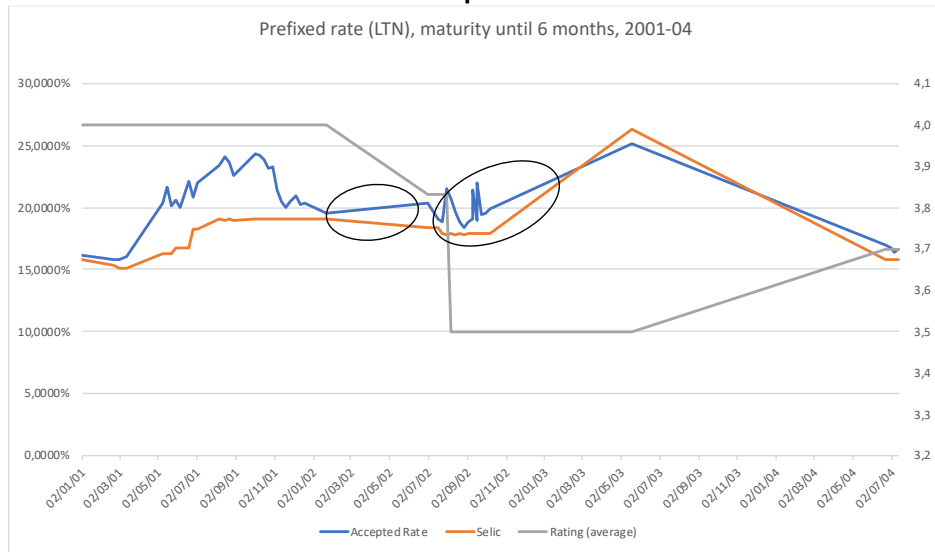


Source: Brazilian National Treasury.

Finally, we are going to analyze the behavior of interest rates of public bonds sold in the primary auctions during the period of downgrades. We chose to focus on the LTN because it is a fixed-rate bond and therefore we can compare the LTN with the Selic rate to analyze the spread between the two. As maturities affect interest rates, we divide these bonds into three groups: up to six months, six months to one year, and more than one year. We will first analyze the 2002 case, when there was only one downgrade, and moving to the 2015-16 case, when the downgrade represented a loss of investment grade. To facilitate the graph interpretations, we built an average rate with rating values of the three international agencies (S&P, Fitch and Moody's).

In the case of short LTNs of up to six months, it can be observed that after the first downgrade announced by Fitch in June 2002, there was a small increase in auctions rates, with a spread in relation to the Selic (first circle). When the other agencies followed the downgrade, the rates showed a greater oscillation and rose, but with a decreasing spread in relation to the Selic (second circle). Most likely due to the expectations of a future reduction in Selic, LTN rates were even below the Selic for a period (negative spread) until the beginning of 2004. We can, therefore, say that the downgrades had a temporary instability effect on the rates, which did not persist.

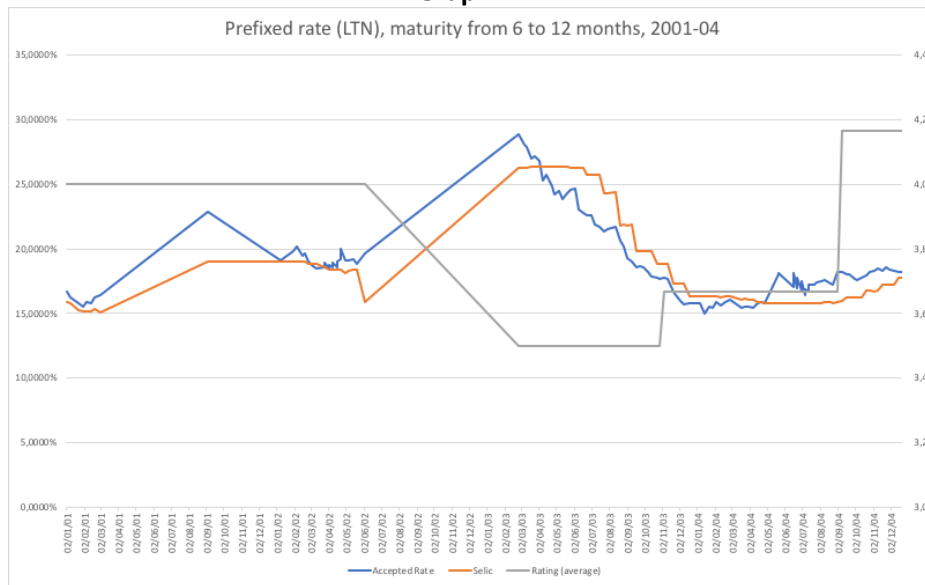
Graph 10



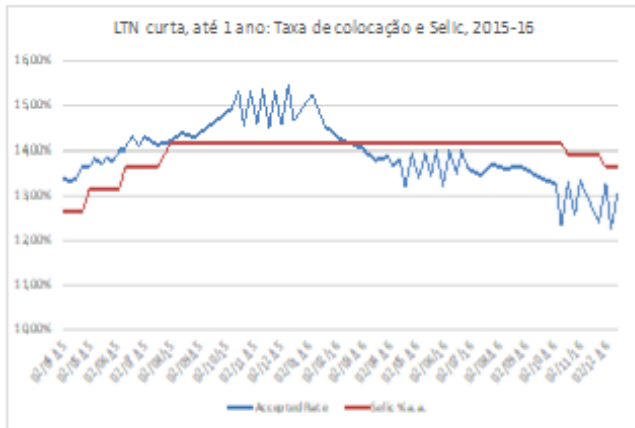
Source: Brazilian National Treasury and Central Bank, and International Rating Agencies.

For LTNs with 6 to 12 months maturity, rates also rose after the 2002 downgrades, but without much volatility in the days ahead of the downgrade. In the auctions, the rates of these bonds were also below the Selic for a while, showing that the agents had already incorporated the future declining trajectory of the Selic into their expectations (see graph 11 below). The LTNs with a maturity greater than 1 year presented a very similar pattern. The rates increased right after the downgrade, following the Selic, and remained lower than the Selic between August 2002 and early 2004, reflecting, in the same way, that the agents had already incorporated in their expectations the reduction of the target of the BCB.

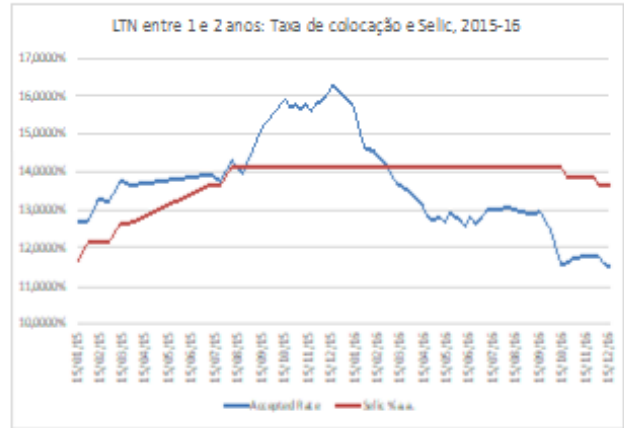
Graph 11



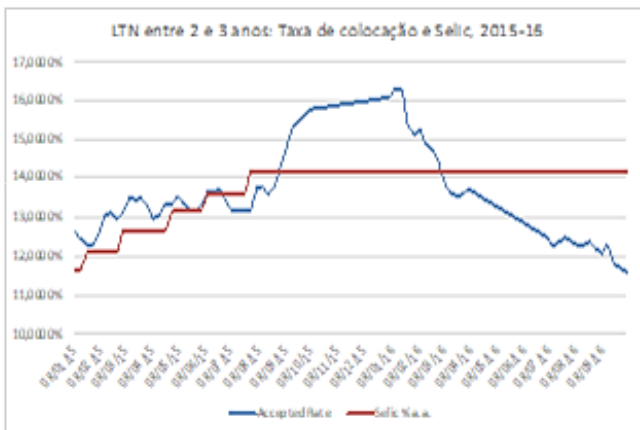
Graph 12



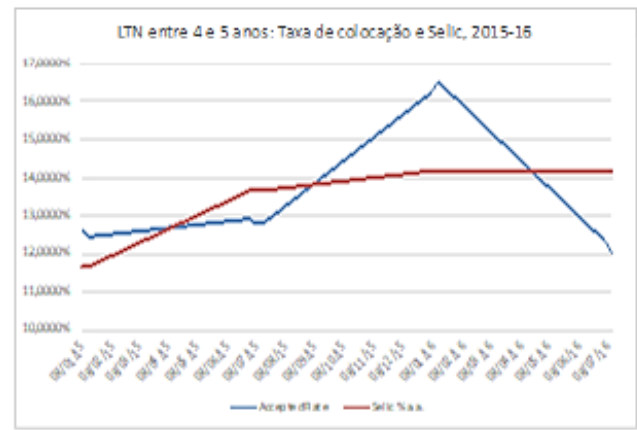
Graph 13



Graph 14



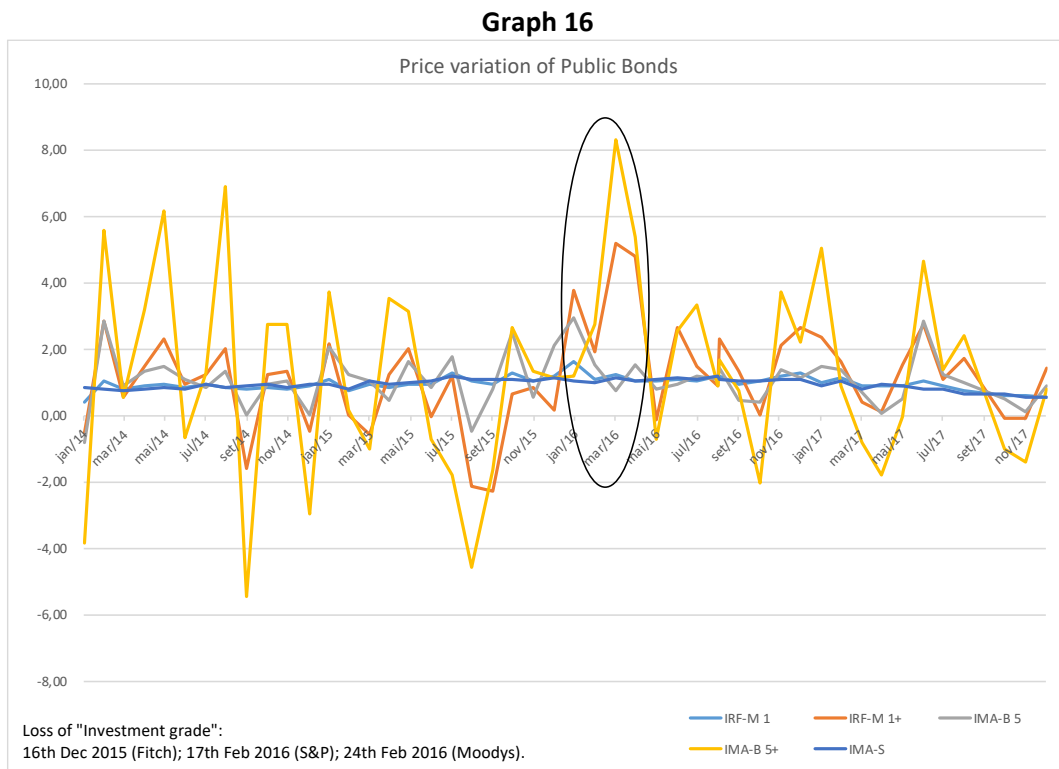
Graph 15



Source: Brazilian National Treasury and Central Bank.

If the LTN issuance rates at the auctions were not persistently affected during the downgrades with investment-grade loss, the same can be said with respect to the secondary market trading prices (graph 16). The ANBIMA (National Association of Financial and Capital Market Entities) indexes correspond to the price of a basket of securities traded in the secondary market: IMA-S corresponds to negotiated prices of LFTs; IMA-B 5 to the NTN-Bs with a maturity of up to 5 years; IMA-B 5+ to the NTN-B with a maturity higher than 5 years; IRF-M 1 to LTN with a maturity up to 1 year; and IRF-M 1+ to LTNs with a maturity greater than 1 year. Note that soon after the loss of investment grade, in December 2015 (circle), the prices of long-term bonds (IRF-M 1+

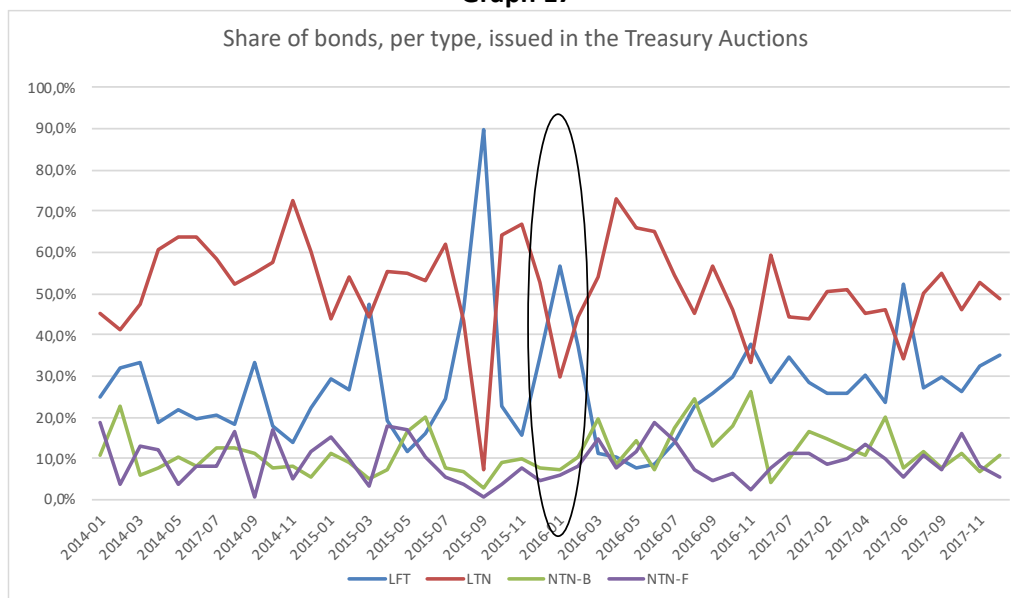
and IMA-B 5+) increased, which shows that there was no “run” from these bonds, instead, the demand increased. Prices of post-fixed and shorter bonds were, therefore, not affected. Note that IMA-S and IRF-M 1 remain almost stable.



Source: Anbima.

It is interesting to note that, while in the secondary market there seems to have been an increase for the demand of long term bonds, reflected in its higher price, there was a reduction of the issuance of these bonds in the primary market, and an increase in the issuance of LFTs (circle in Graph below). This shows that the Treasury preferred not to sell prefixed bonds at the rate the market wanted to pay and chose to sell post-fixed bonds instead.

Graph 17



Source: Brazilian National Treasury.

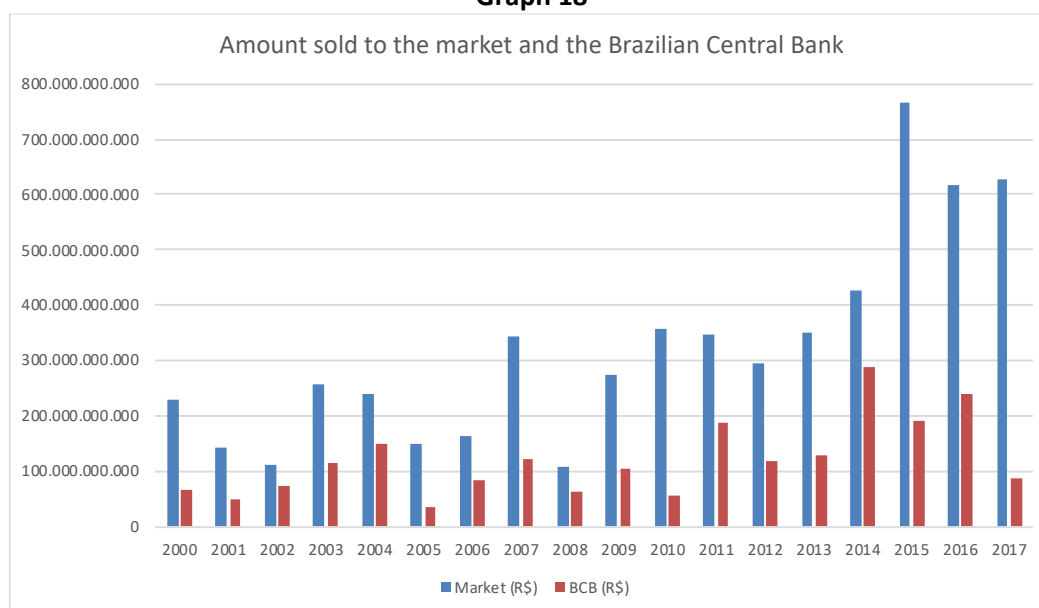
To sum up this section, during the most critical periods of financial instability when there were downgrades from international agencies (2002 and then 2015-16), we have shown that: i) in the primary auctions, issues of post-fixed rate bonds increased to the detriment of prefixed rate bonds; ii) short and medium term bonds (LFT and LTN) were also higher in relation to long term ones such as NTN-Bs; iii) the interest rates of the bonds sold in primary auctions oscillated, but not persistently; iv) prices in the secondary market showed there was no run from prefixed or long term bonds; iv) there were outflows of external capital to fixed income bonds (public and private), but the movement started before the downgrades, most likely related to a stronger perception of external instability with potential depreciation of the exchange rate; iv) the impact in the foreign holdings of public domestic bonds does not seem to reflect a run of those investors (selling in systemic movement).

3.3 National Treasury and Central Bank: fiscal results and repo operations

In this section we will analyze evidence of the relationship between the issuance of bonds by the BTN and the repo operations of the BCB. The next graph shows the volume of

bonds sold by the Treasury to the Brazilian Central Bank to roll over the public bonds in the Central Bank's portfolio (permission given by the Fiscal Responsibility Law, art. 39). These are the only issues made through public auctions to the Central Bank. It is indicative of the coordination between the two institutions as that, depending on the results of the auctions, the Central Bank needs to maintain its portfolio in order to be able to conduct open market operations and maintain the interest rate target.

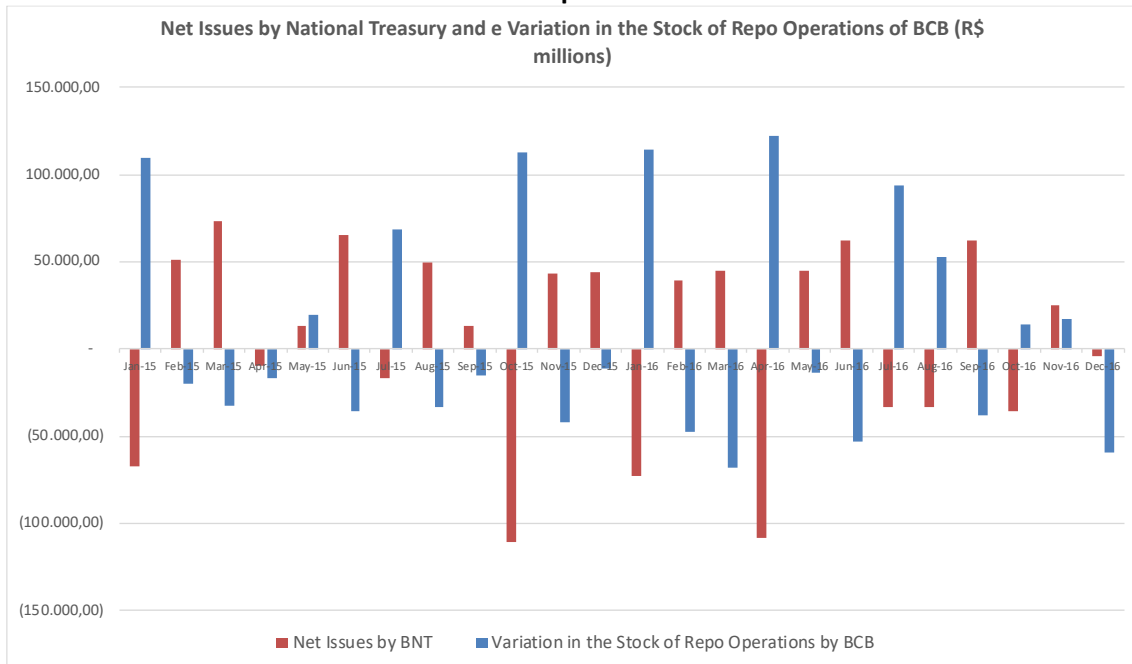
Graph 18



Source: Brazilian National Treasury.

An analysis focused on the relevant period of the downgrade with loss of the investment-grade rating, using monthly data, also provides insights about this issue. With the exception of April and May of 2015, and December 2016, net issues by the Treasury and repo operations by the Central bank have an inverse relation. When the net issuance of the BNT are positive (meaning that sales of bonds were higher than redemptions, thus draining liquidity from the financial system), the Central Bank did not act in the borrowing position within the secondary market. On the contrary, it assumed a selling position, reducing the repo operations. Alternatively, when the net issuance by the BNT was negative, meaning the purchase/redemptions of bonds were higher than sales, the BCB volume of repo operations offset the liquidity in the reserve system.

Graph 19



Source: Brazilian National Treasury and Central Bank.

These numbers seem to indicate that the Central Bank and Treasury coordinate their actions and, when the Treasury does not sell the securities in the primary auctions, the Central Bank compensates in the secondary market through repo operations to adjust the liquidity. The Treasury does not sell bonds if the rate demanded by the private sector is too high or divergent from expected. In fact, due to institutional rules, the Treasury always can choose not to sell bonds, for example, when it must accomplish the official schedule of auctions disclosed in the beginning of each year. However, even with this exception, Brazilian institutionality give some space for the Treasury to adopt the behavior mentioned before and, especially when the market is volatile, wait to sell the bonds in better moment and not be a “hostage” of the market.

4 Conclusion

In this paper we showed that first and foremost, the stock of Brazilian domestic federal public debt in Reais as a percentage of GDP does not influence the average cost of debt persistently. The average cost of debt closely follows the Selic, not only because of the direct effect of the LFTs but also because the Selic is a reference for the other rates, mainly due to the expected future interest rate effect signaled by monetary policy.

With regard to the primary auctions of BNT, the increase in the stock of debt does not necessarily coincide with an increase in the rates accepted by the Treasury. The volume of bonds sold in the auctions also does not reflect any difficult conditions to primary issues and debt rollover. The percentage of auctions with full sales in relation to the total volume offered by the BNT remained around 50% in the whole period of analysis, and the percentage of auctions with no sale of bonds was always low, less than 10%. Furthermore, the quantity of bonds in relation to the total offered by the Treasury was high through the whole period.

These indicators oscillated in moments of political uncertainty and volatility in the financial market, such as 2002 (Lula presidential election), 2008 (global financial crisis) and 2015-16 (domestic political crisis and downgrade with a loss of investment grade). During these periods, issues of post-fixed and short maturity bonds usually increased in detriment of the prefixed and long maturity bonds, and the interest rate registered in the auctions also increased. But, besides being expected as a rational decision of portfolio managers and positive in terms of financial costs to the Treasury, these effects were temporary. Even after the loss of investment grade, long-term rates were compatible with market expectations and there was no evidence of a running from public debt, including foreign investors.

Finally, we observed evidence of coordination between the Brazilian National Treasury and the Brazilian Central Bank regarding the issuance of bonds in the primary auctions and repurchase operations in the secondary market. If investors don't want to buy public bonds at the rate the Treasury wants to pay, the Treasury can choose not to sell the bonds and leave the banks with more reserves, which will be drained by the Central Bank by repo operations, ensuring the interest rate target.

We conclude that the market has no bargaining power to demand persistent risk premiums and threaten the ability of the Brazilian Government to spend in its own currency. As can be seen from the above analysis, there are no “bond vigilantes” in Brazil capable to prevent the use of fiscal policy and public debt in Reais to pursue full employment and economic development.

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