# Effect of the communication and clarity of the fiscal authority on market expectations:
## Evidence from the Brazilian economy

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## Resumo

Este estudo está relacionado à literatura sobre comunicação e clareza dos gestores de política econômica. A novidade desta análise diz respeito à investigação do efeito da comunicação e clareza da autoridade fiscal sobre as expectativas de mercado referentes à dívida pública. A partir da experiência brasileira, este artigo apresenta evidências empíricas com base na ideia de que para guiar as expectativas, a comunicação é essencial para a coodernação entre o gestor de política econômica e os participantes de mercado. Os resultados sugerem que as comunicações do Tesouro Nacional brasileiro sobre a política fiscal representam uma ferramenta importante para melhorar os efeitos do gerenciamento da dívida pública sobre as expectativas de mercado.

**Palavras-chave:** comunicação, clareza, expectativas, dívida pública, autoridade fiscal.

## Abstract

This study relates to the literature on the communication and clarity of the policymakers. The novelty concerns the investigation of the effect of the communication and clarity of the fiscal authority on market expectations on public debt. The article addresses empirical evidence, based on the Brazilian experience, regarding the idea that communication is essential for the coordination between the policymaker and the market participants in order to lead expectations. The findings suggest that the communications from the Brazilian National Treasury concerning fiscal policy represent an important tool to improve the effects of the management of the public debt on market expectations regarding public debt.

**Key words:** communication, clarity, expectations, public debt, fiscal authority.

**Área ANPEC: Área 5 -** Economia do Setor Público

**JEL classification:** H30, H63, D84.

## 1. Introduction

According to International Federal of Accounts, fiscal transparency is one of the main pillars of governance in the public sector (IFAC, 2011). In general, fiscal transparency increases the society's confidence in the fiscal management and, as a result, implies better fiscal decisions. As pointed out by IMF (http://www.fsb.org/2014/10/cos_070620/), fiscal transparency is critical for effective management and accountability. In this framework, information is essential because a bad quality of information leads to wrong interpretation by users thus causing innapropriate decisions. In brief, governamental transparency is an essential element in the implementation of fiscal policy (Bolívar, Galera, Muñoz, 2015).

The analysis regarding the relevance of communication as a tool for managing expectations is well known in the study of monetary policy.[1] As suggested by Guthrie and Wright (2000) several central banks make use of statements as policy instrument (open mouth operation). However, as pointed out by Jansen (2011), regular central bank communication in a nonaccessible manner is not sufficient to assure transparency. Hence, only a correct combination between transparency and communication would reduce the uncertainty on central bank's preferences, thereby improving private sector expectations. In short, clarity on communication is essential for the coordination between the policymaker and market participants as a way of diminishing asymmetric information.

Such as observed by Bolívar, Galera, Muñoz (2015), government financial sustainability can be affected by the level of understandability of information transparency. Therefore, based on the argument that sound private expectations on public debt sustainability is a precondition for the success of fiscal policies and that the readability of communications is potentially an important tool to drive expectations, we analyze the impact of communications and its quality on market expectations.

Statements may be considered as a coordination tool.[2] However, the success of a fiscal authority's communication for driving private expectations depends on the credibility of the statements (Eusepi and Preston, 2011). As pointed out by de Mendonça and Machado (2013), fiscal credibility is essential to stabilize expectations in order to mitigate the risk of insolvency. Fearful markets constrain the actions of fiscal authorities, thus it is crucial to manage expectations in order

[1] See, for example: Geraats (2002), Frenkel, Pierdzioch, and Stadtmann (2006), Gürkaynak, Sack, and Swanson (2005), Blinder *et. al* (2008), and Jansen (2011).
[2] See, for example: Sarno and Taylor (2001), Taylor (2004), and Beine, Jansen, and Lecourt (2009).

to convince markets that fiscal policies are sustainable (Karantounias, 2013).

Due to the fact that clarity is necessary to lessen difficulty of the private sector in interpreting the fiscal authority's message, such as in Jansen (2011), this paper focuses on readability. To illustrate how this works in practice, we provide an empirical analysis based on the Brazilian experience. The largest Latin American economy, in order to control the dynamic of public debt, adopted a strategy for lengthening and improving the composition of the domestic federal public debt since November 1999. Furthermore, as an important tool of communication between the policymaker and the private sector, the Brazilian National Treasury issues several daily releases (official notes of the Ministry of Finance) regarding fiscal policy. Hence, Brazil is a good laboratory to observe if the fiscal authority's communication improves the private expectations on public debt.

The remainder of this study is organized as follows: Section 2 presents the indices of communication and clarity regarding the Brazilian fiscal authority. Section 3 presents the methodology and data used in the study. Section 4 provides empirical evidence, through an econometric analysis, of the effect of communication and clarity on the public debt expectations and their volatility. Section 5 concludes the paper.

## 2. Fiscal indices of communication and clarity

The analysis on how communication of the fiscal authority affects private expectations is directly connected with the success of the announced strategy in the conduct of fiscal policy. In the case where the information available for the private sector is sufficient to make correct forecasts, there is no surprise on the dynamic of public debt. As pointed out by Missale, Giavazzi, and Benigno (2002), the reduction of asymmetric information diminishes the risk of refinancing the debt and thus it increases the expectation of the success of the fiscal policy. Therefore, the search for a sound fiscal policy which avoids the default risk depends on the combination of the correct strategy for managing public debt with the communication of next actions of the policymaker.

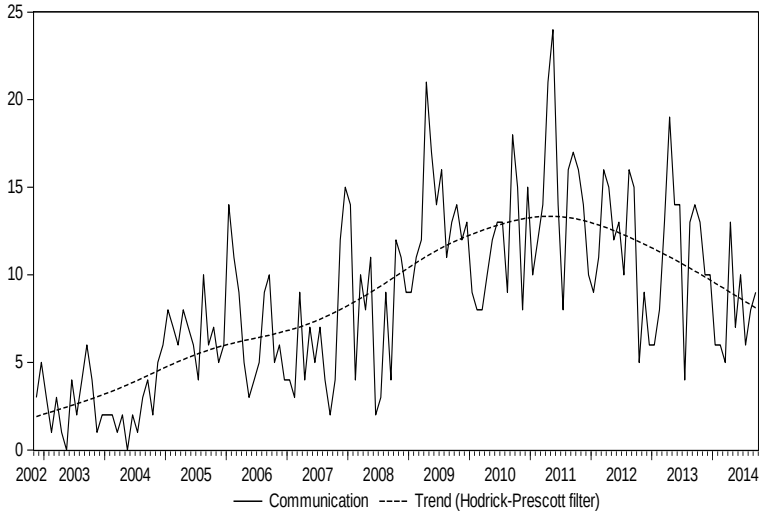
In order to measure the communication of fiscal authority we built an index taking into account the number of releases through official notes available from the website of Ministry of Finance (www.fazenda.gov.br). The index proposed in this paper uses a discrete and positive numerical scale in order that each release takes value equal +1. In a way of eliminating unnecessary information, we consider only releases concerning actions of fiscal policy. Therefore, regarding

content, for example, calls for contests are discarded. We aggregate the result per day and based on this we create a series that identifies the number of communications with monthly frequency. Figure 1a shows the behavior of the communication index (*COM*) over time. As we can see, the number of communications increased considerably between 2002 and 2011. It is noteworthy to observe that the top of the trend is the period 2009 to 2012 and it is a clear reflex of the subprime crisis.

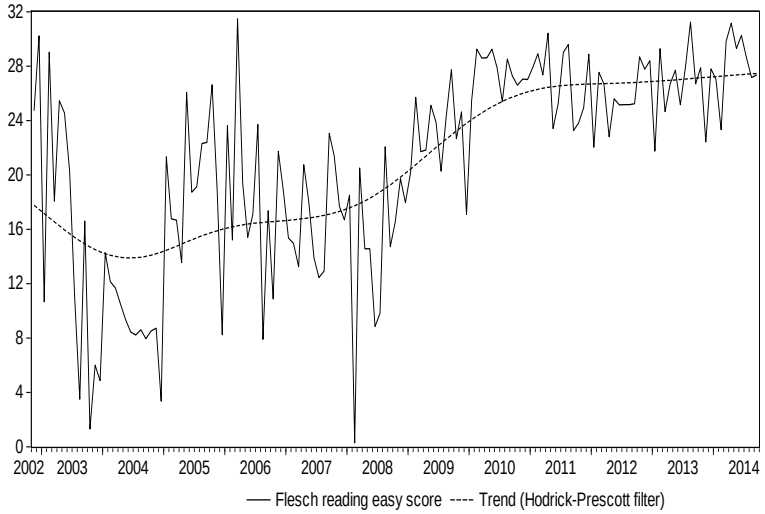
**Figure 1**

*Communication index, Flesch reading ease score, Flesch-Kincaid grade level*

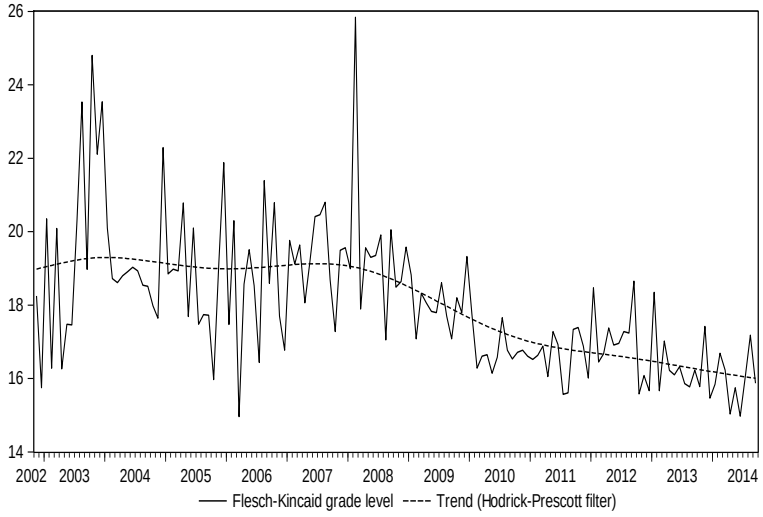
*1.a. Communication index*




*1.b. Flesch reading ease score*




*1.c. Flesch-Kincaid grade level*




It is possible that only the amount of the information available would not be sufficient to capture the real effect from the communication on expectations. As a consequence, it is also

necessary to consider indicators that can capture the quality of information. Since clarity is essential for transparency and the communications are made in written releases, readability is a key piece in this framework. We cannot assure, in the case of a text that is difficult to read, the content is understood. Hence, the idea of "open mouth operation" could be ineffective. In order to consider readability measures in the analysis, such as indicated by Jansen (2011), two well-known indices are used. The first is the Flesch reading ease score. According to Flesch (1948) a higher number of syllables per word, or a higher number of words per sentence, decreases the readability of a text. Based on this idea the Flesch reading ease score ($F$) is a result of:

(1) $F = 206.835 - 1.015 \times (\text{words/sentences}) - 84.6 \times (\text{syllables/words})$,

Where: $F > 70$ denotes a very easy text to read and $F < 30$ indicates a very difficult text to read.

In order to use the above-mentioned index, we take into consideration all releases of the Treasury regarding fiscal policy in each month. If the month under evaluation does not present a communication on fiscal policy we use the average of the results observed in the previous 12 months. Figure 1b presents the performance of Flesch reading ease score over time. There is no doubt that the releases from the Brazilian Treasury are not easy to read. Practically all time of the time the score is lower than 30, but there is a trend of this difficulty in reading is decreasing over time.

As pointed out by Jansen (2011) one drawback with the previous index is the scale because the interpretation is not clear for the interval between 30 and 70 ($30 < F < 70$). In order of surpassing this problem, Kincaid et al. (1975) included the number of years of education needed to comprehend a text. Therefore, although the Flesch-Kincaid grade level also considers the same core measures that are used in Flesch reading easy score (word length and sentence length), it has different weighting factors. As a consequence, the interpretation of this index is different from the previous because a greater score denotes a decrease in clarity (greater number of years of education needed to comprehend the text), and thus the results of the two tests correlate approximately inversely. The Flesch-Kincaid grade level is calculated as follows:

(2) $FK = 0.39 \times (\text{words/sentences}) + 11.8 \times (\text{syllables/words}) - 15.59$.

Figure 1c shows the Flesch-Kincaid grade level along time. In general, it is possible to see that there is an improvement over time. In other words, the trend reveals the clarity on fiscal communication is increasing.

## 3. Methodology and data

Limited to the availability of the information from the National Treasury, the period under analysis is from November of 2002 to September of 2014. Therefore, it is a period under inflation targeting (adopted in June of 1999) and after the implementation of a strategy for managing public debt with the objective of extending the average maturity and improving the public debt composition.

In a general way, the literature on public debt management presents, as a rule of thumb for improving the performance of fiscal policy, the increase in the average maturity and the partial indexation of the public debt.[3] Following these recommendations, the Brazilian National Treasury has adopted two main guidelines after 2001 (de Mendonça and Machado, 2013): (i) replaces bonds indexed to the interest rate and indexed to the BRL/dollar exchange rate with fixed rate bonds and inflation-linked bonds; and (ii) increases the average maturity of the public debt in order to reduce the refinancing risk. Therefore, the two main channels regarding the management of the public debt are: the channel of the indexation profile and the channel of the average maturity.

There is no doubt that most of the time there is a trend of increase in the average maturity of the public debt (figure 2) which, in turn, denotes a concern of the fiscal authority with this strategy of improving public debt management. In relation to the indexation of the public debt, we create an index to simplify the interpretation. Since, in general, increases in fixed rate bonds (*FIX_B*) and inflation-linked bonds (*INF_B*) represent improvements in public debt profile, whereas increases in bonds indexed to the interest rate (*INT_B*) and indexed to the BRL/dollar exchange rate (*EX_B*) indicate a deterioration of the public debt profile, the index is a result of the difference between these parts. Therefore, the index is calculated as:

(3) $INDEX = (FIX\_B + INF\_B) - (INT\_B + EX\_B)$.

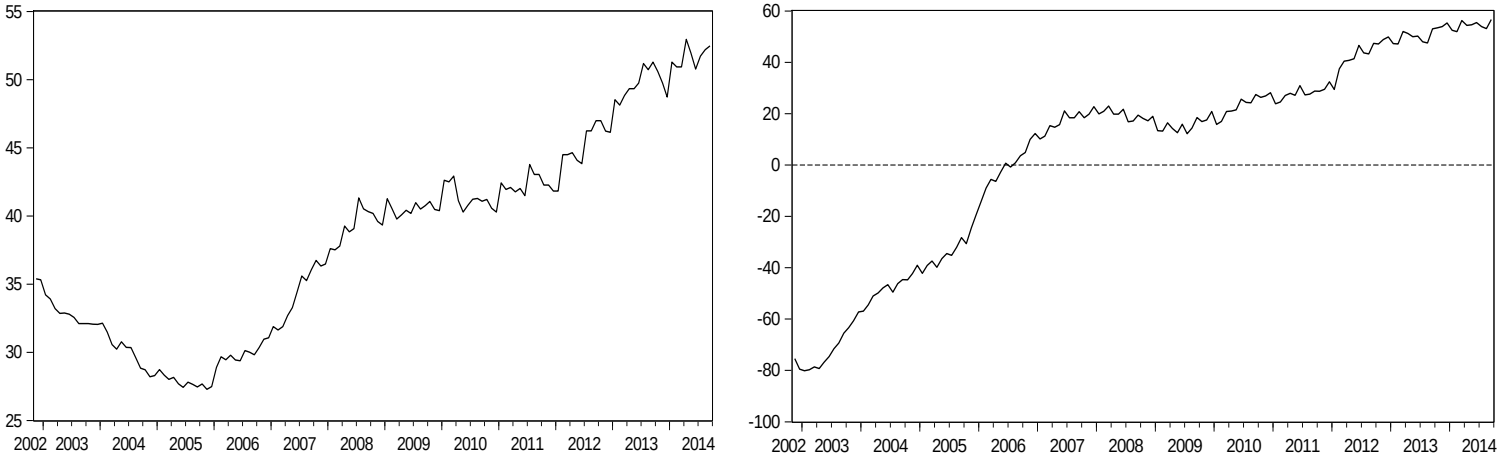
The interpretation of the *INDEX* is straightforward. When the *INDEX* is positive, it denotes a good quality of the indexation profile. On the other hand, when the *INDEX* is negative, it represents deterioration in the public debt profile. Figure 2 shows that in the second semester of 2006 the *INDEX* became positive and there is a trend toward improvement.

[3] See, de Mendonça and Machado (2013), Anderson, Silva, and Velandia-Rubiano (2010), Missale, Giavazzi, and Benigno (2002), Giavazzi and Pagano (1990), and Calvo and Guidotti (1990).

**Figure 2**

*Average maturity (months) and indexation of the public debt*

*Average maturity* *Indexation (INDEX)*




Taking into account the relevance of the indexation profile and the average maturity of the public debt and with the purpose of providing empirical evidence regarding the effect that communication and its clarity have on market expectations regarding public debt, we consider the following baseline models:[4]

(4) $E_t(DEBT_{t+12}) = \alpha_0 + \alpha_1 DEBT_{t-1} + \alpha_2 INDEX_{t-1} + \alpha_3 (INDEX \text{ x } \Delta Z)_{t-1} + \varepsilon_t$, and

(5) $E_t(DEBT_{t+12}) = \beta_0 + \beta_1 DEBT_{t-1} + \beta_2 \Delta AMD_{t-1} + \beta_3 (\Delta AMD \text{ x } \Delta Z)_{t-1} + \zeta_t$,

where: $\varepsilon_t, \zeta_t \sim N(0,\sigma^2)$; $E_t(DEBT_{t+12})$ - market expectations regarding public debt to GDP ratio for the next 12 months;[5] *DEBT* - is the public debt to GDP ratio; *INDEX* - measures the quality of the public debt indexation (indexation profile) – trend (Hodrick-Prescott filter); *AMD* – is the average maturity of the public debt (in months); *Z* – is a vector of explanatory variables regarding communication of fiscal policy and its clarity (*COM* , *F*, and *FK*); *INDEX* x $\Delta Z$ – is an interaction term between the indexation profile and the change of the communication/clarity of the fiscal policy; and *AMD* x *Z* – is an interaction term that is the average maturity of the public debt and the change of the communication/clarity of the fiscal policy.

The interaction terms in the equations above allow us to observe whether an increase in communication or in clarity would be able to amplify the effect of the effort of the fiscal authority to improve the indexation profile and to extend the average maturity on market expectations regarding public debt/GDP ratio. For example, considering equation 4 (the channel of the

[4] See table A.1 (appendix) for sources of data and description of the variables.
[5] All data is available from Central Bank of Brazil - Time Series Management System.

indexation profile), the effect of an improvement due to *COM* and *F* is given by $\alpha_2+\alpha_3 < \alpha_2$, while *FK* implies $\alpha_2+\alpha_3 > \alpha_2$. The channel of the average maturity retains the same idea for the coefficients $\beta_2$ and $\beta_3$.

As pointed out by Blinder et al. (2008) skillful communications can raise the signal-to-noise ratio and reduce financial market volatility. The basic idea is that when central bankers communicate clearly, financial markets have less difficulty in interpreting the information and thus there is less uncertainty (Jansen, 2011). Based on this idea we can analyze if the communication of the fiscal authority is sufficiently clear to affect the volatility in expectations of public debt. In short, the idea is straightforward, clarity from the fiscal authority can lead to less uncertainty, which implies lower volatility. Therefore, with the intention to analyze the effect from the communication and the clarity on the volatility of the public debt expectations we rewrite equations (4) and (5) as:

(6) $\sigma_t[E_t(DEBT_{t+12})] = \alpha_4 + \alpha_5 DEBT_{t-1} + \alpha_6 INDEX_{t-1} + \alpha_7(INDEX \text{ x } \Delta Z)_{t-1} + \vartheta_t$, and

(7) $\sigma_t[E_t(DEBT_{t+12})] = \beta_4 + \beta_5 DEBT_{t-1} + \beta_6 \Delta AMD_{t-1} + \beta_7(\Delta AMD \text{ x } \Delta Z)_{t-1} + \varsigma_t$,

where: $\vartheta_t$, $\varsigma_t \sim N(0,\sigma^2)$; $\sigma_t[E_t(DEBT_{t+12})]$ is the standard deviation of rolling window of twelve months ($j=12$) as follows: $\sigma_t\left[E_t\left(DEBT_{t+12}\right)\right]=\frac{1}{1-j}\sqrt{\sum_{k=1}^{j}\left(X_{t-k}-\bar{X}_{t-k}\right)^2}$, $X= E_t(DEBT_{t+12})$.

In order to estimate the equations 4 to 7 we use two methods: Ordinary Least Squares (OLS) and Generalized Method of Moments (GMM). The choice of these methods is because they allow one to see in a simple manner the statistical significance and the sign of each coefficient on each variable in the model. Therefore they represent a straightforward framework to observe the impact caused by communication and clarity.

Although OLS models are useful for our objective, in general, the main reason for the use of GMM in this study is due to the combination of the problem of heteroskedasticity, which is common in macroeconomic time series, with the possible risk of endogeneity captured by the expectations. As pointed out by Wooldridge (2001), in order to consider a more efficient GMM estimator than OLS, overriding restrictions need to be considered. Therefore, the J-statistic is presented for each model as a test of over-identifying moment conditions. Furthermore, besides the one-step estimations, we make estimations for two-step GMM estimators using Windmeijer (2005) correction to address small-sample downward biases on standard errors.[6]

[6] The period under consideration is from November of 2002 to September of 2014 (143 observations (monthly frequency). Tests regarding unit root are available upon request to the authors.

## 4. Empirical evidence

In general, from the channel of indexation profile, there are strong indications that communication and clarity of the fiscal authority are relevant to reduce expectation on the public debt level (see table 1). In relation to the effect of the communication (*INDEX* x $\Delta$*COM*) on the expectation of public debt, the findings (coefficients are negative and significant) confirm the assumption that an increase in the communication amplifies the effect of an improvement in the public debt profile. Concerning the effect of clarity on expectations of public debt the result also confirms the benefits. The coefficients on both indices (*INDEX* X $\Delta$*F* and *INDEX* X $\Delta$*FK*) have statistical significance and present signs in agreement with the theoretical perspective.

**Table 1**

*Public debt expectations - channel of the indexation profile*

| **Estimator** | **Model 1** | | | **Model 2** | | | **Model 3** | | |
|---|---|---|---|---|---|---|---|---|---|
| **Regressors** | **OLS** | **GMM1** | **GMM2** | **OLS** | **GMM1** | **GMM2** | **OLS** | **GMM1** | **GMM2** |
| ***Constant*** | 11.510 | 16.607*** | 23.123*** | 16.964** | 19.927*** | 23.827** | 21.733*** | 25.487*** | 29.954*** |
| | (7.309) | (5.990) | (7.593) | (6.520) | (4.917) | (9.899) | (6.714) | (5.281) | (10.461) |
| $DEBT_{t-1}$ | 0.717*** | 0.605*** | 0.461*** | 0.617*** | 0.551*** | 0.463** | 0.514*** | 0.429*** | 0.327 |
| | (0.165) | (0.135) | (0.171) | (0.148) | (0.112) | (0.227) | (0.153) | (0.119) | (0.240) |
| $INDEX_{t-1}$ | -0.053* | -0.086*** | -0.117*** | -0.086*** | -0.099*** | -0.116*** | -0.086*** | -0.103*** | -0.121*** |
| | (0.029) | (0.024) | (0.028) | (0.026) | (0.020) | (0.040) | (0.027) | (0.021) | (0.043) |
| $INDEX$ x $\Delta COM_{t-1}$ | -0.135** | -0.182*** | -0.182*** | | | | | | |
| | (0.065) | (0.050) | (0.069) | | | | | | |
| $INDEX$ x $\Delta F_{t-1}$ | | | | -0.190*** | -0.179*** | -0.176** | | | |
| | | | | (0.037) | (0.041) | (0.079) | | | |
| $INDEX$ x $\Delta FK_{t-1}$ | | | | | | | 1.299*** | 1.184*** | 1.100** |
| | | | | | | | (0.239) | (0.300) | (0.026) |
| ***Adj. $R^2$*** | 0.932 | 0.931 | 0.919 | 0.947 | 0.943 | 0.941 | 0.944 | 0.939 | 0.936 |
| ***F-statistic*** | 638.303 | | | 836.068 | | | 789.469 | | |
| ***P(F-statistic)*** | (0.000) | | | (0.000) | | | (0.000) | | |
| ***J-statistic*** | | 13.599 | 10.602 | | 15.238 | 14.969 | | 14.394 | 13.981 |
| ***P(J-statistic)*** | | (0.137) | (0.304) | | (0.124) | (0.133) | | (0.109) | (0.123) |
| ***Inst. rank*** | | 13 | 13 | | 14 | 14 | | 13 | 13 |

Note: Marginal significance levels: (***) denotes 0.01, (**) denotes 0.05, and (*) denotes 0.10. GMM1 – one-step GMM estimation - Robust (Newey-West) standard errors are in parentheses. GMM2 - two-step GMM estimation - Robust (Windmeijer) standard errors are in parentheses. P(J-statistic) report the respective p-valued of the J-test.

The estimations from the channel of the average maturity (table 2) indicate that only communication seems to be relevant for decreasing public debt expectations. In contrast to what is observed for the indexation profile, although the coefficients regarding clarity on the average maturity also suggest a decrease in public debt expectations, they are not significant. It is important to note that although the increase in public debt maturity is part of good practices for public debt management, this cannot be true in the case of developing economies like Brazil. Such as pointed out by de Mendonça and Machado (2012), it is possible that for implementing this strategy the government needs to pay high interest rates which in turn implies an increase in the service of the public debt. In brief, the non-significant effect of clarity can be a result of this channel not being sufficiently relevant for public debt expectations (coefficients on $\Delta AMD$ in the models 2 and 3 are not significant).

**Table 2**

*Public debt expectations - channel of the average maturity*

| **Estimator** | **Model 1** | | | **Model 2** | | | **Model 3** | | |
|---|---|---|---|---|---|---|---|---|---|
| **Regressors** | **OLS** | **GMM1** | **GMM2** | **OLS** | **GMM1** | **GMM2** | **OLS** | **GMM1** | **GMM2** |
| ***Constant*** | -0.382 | -3.852 | -4.371 | -0.828 | -2.590* | -2.994 | -0.279 | -0.882 | -1.324 |
| | (2.104) | (1.701) | (2.873) | (1.873) | (1.428) | (2.655) | (1.978) | (1.890) | (3.333) |
| $DEBT_{t-1}$ | 0.991*** | 1.079*** | 1.094*** | 1.002*** | 1.050*** | 1.062*** | 0.989*** | 1.011*** | 1.025*** |
| | (0.052) | (0.040) | (0.068) | (0.046) | (0.034) | (0.065) | (0.049) | (0.045) | (0.081) |
| $\Delta AMD_t$ | -0.446** | -1.087** | -1.296* | -0.125 | -0.583 | -0.374 | -0.417 | -0.756 | -0.847 |
| | (0.204) | (0.462) | (0.760) | (0.308) | (0.660) | (1.128) | (0.560) | (1.068) | (1.622) |
| $\Delta AMD$ x $\Delta COM_{t-1}$ | -3.451** | -19.776*** | -18.595** | | | | | | |
| | (1.431) | (4.856) | (8.869) | | | | | | |
| $\Delta AMD$ x $\Delta F_{t-1}$ | | | | -3.495 | -2.876 | -3.656 | | | |
| | | | | (2.268) | (4.931) | (8.957) | | | |
| $\Delta AMD$ x $\Delta FK_{t-1}$ | | | | | | | 0.977 | 12.308 | 3.993 |
| | | | | | | | (14.422) | (30.855) | (47.602) |
| ***Adj. $R^2$*** | 0.917 | 0.856 | 0.860 | 0.916 | 0.914 | 0.914 | 0.914 | 0.905 | 0.906 |
| ***F-statistic*** | 516.507 | | | 511.278 | | | 498.401 | | |
| ***P(F-statistic)*** | (0.000) | | | (0.000) | | | (0.000) | | |
| ***J-statistic*** | | 17.140 | 16.768 | | 17.086 | 17.222 | | 15.778 | 15.487 |
| ***P(J-statistic)*** | | (0.249) | (0.269) | | (0.314) | (0.306) | | (0.106) | (0.115) |
| ***Inst. rank*** | | 18 | 18 | | 19 | 19 | | 14 | 14 |

Note: Marginal significance levels: (***) denotes 0.01, (**) denotes 0.05, and (*) denotes 0.10. GMM1 – one-step GMM estimation - Robust (Newey-West) standard errors are in parentheses. GMM2 - two-step GMM estimation - Robust (Windmeijer) standard errors are in parentheses. P(J-statistic) report the respective p-valued of the J-test.

Regarding the results concerning volatility of the public debt expectations (see tables 3 and 4), it is observed that only in the case of the channel of the indexation profile is the effect caused from the communication of the fiscal authority relevant. In fact, the significant and positive coefficients on communication indicate that the expectations react to the releases from the National Treasury regarding fiscal policy. However, no model through the channels of indexation profile and average maturity of the public debt presented statistical significance in relation to the effect of the clarity on the volatility of the expectations. This result suggests that although the communications from the fiscal authority can affect the volatility of the expectations, clarity of these communications are not sufficient strongly to reduce the volatility.

**Table 3**

*Volatility of the public debt expectations - channel of the indexation profile*

| **Estimator** | **Model 1** | | | **Model 2** | | | **Model 3** | | |
|---|---|---|---|---|---|---|---|---|---|
| **Regressors** | **OLS** | **GMM1** | **GMM2** | **OLS** | **GMM1** | **GMM2** | **OLS** | **GMM1** | **GMM2** |
| ***Constant*** | -2.304 | -2.187 | -1.942 | -4.674 | -3.953 | -2.743 | -4.610 | -4.045 | -3.269 |
| | (3.841) | (3.077) | (5.794) | (4.042) | -3.366 | (6.475) | (3.689) | (3.309) | (5.857) |
| $DEBT_{t-1}$ | 0.084 | 0.081 | 0.075 | 0.134 | 0.116 | 0.086 | 0.133 | 0.118 | 0.098 |
| | (0.088) | (0.070) | (0.133) | (0.092) | -0.077 | (0.148) | (0.084) | (0.075) | (0.135) |
| $INDEX_{t-1}$ | 0.010 | 0.009 | 0.008 | 0.019 | 0.016 | 0.011 | 0.020 | 0.016 | 0.012 |
| | (0.016) | (0.013) | (0.329) | (0.017) | (0.015) | (0.028) | (0.017) | (0.014) | (0.027) |
| $INDEX \times \Delta COM_{t-1}$ | 0.064*** | 0.056*** | 0.053* | | | | | | |
| | (0.021) | (0.020) | (0.027) | | | | | | |
| $INDEX \times \Delta F_{t-1}$ | | | | 0.008 | 0.011 | 0.019 | | | |
| | | | | (0.035) | (0.033) | (0.054) | | | |
| $INDEX \times \Delta FK_{t-1}$ | | | | | | | 0.029 | 0.010 | -0.067 |
| | | | | | | | (0.321) | (0.271) | (0.463) |
| ***Adj. $R^2$*** | 0.200 | 0.196 | 0.191 | 0.117 | 0.104 | 0.068 | 0.116 | 0.103 | 0.070 |
| ***F-statistic*** | 11.860 | | | 6.787 | | | 6.736 | | |
| ***P(F-statistic)*** | (0.000) | | | (0.000) | | | (0.000) | | |
| ***J-statistic*** | | 7.799 | 7.938 | | 8.764 | 9.418 | | 9.069 | 9.900 |
| ***P(J-statistic)*** | | (0.555) | (0.540) | | (0.555) | (0.493) | | (0.431) | (0.359) |
| ***Inst. rank*** | | 13 | 13 | | 14 | 14 | | 13 | 13 |

Note: Marginal significance levels: (***) denotes 0.01, (**) denotes 0.05, and (*) denotes 0.10. GMM1 – one-step GMM estimation - Robust (Newey-West) standard errors are in parentheses. GMM2 - two-step GMM estimation - Robust (Windmeijer) standard errors are in parentheses. P(J-statistic) report the respective p-valued of the J-test.

**Table 4**

*Volatility of the public debt expectations - channel of the average maturity*

| **Estimator** | **Model 1** | | | **Model 2** | | | **Model 3** | | |
|---|---|---|---|---|---|---|---|---|---|
| **Regressors** | **OLS** | **GMM1** | **GMM2** | **OLS** | **GMM1** | **GMM2** | **OLS** | **GMM1** | **GMM2** |
| ***Constant*** | -0.383 | -0.086 | -0.194 | -0.497 | -0.290 | -0.215 | -0.491 | -0.503 | -0.479 |
| | (0.760) | (0.636) | (0.719) | (0.799) | (0.631) | (0.691) | (0.779) | (0.655) | (0.859) |
| $DEBT_{t-1}$ | 0.038* | 0.030* | 0.031* | 0.041* | 0.033** | 0.031* | 0.040** | 0.038** | 0.037* |
| | (0.019) | (0.015) | (0.018) | (0.020) | (0.016) | (0.017) | (0.020) | (0.017) | (0.022) |
| $\Delta AMD_t$ | 0.147 | 0.130 | 0.036 | 0.174 | 0.005 | 0.053 | 0.326 | 0.063 | 0.106 |
| | (0.097) | (0.167) | (0.154) | (0.140) | (0.220) | (0.228) | (0.278) | (0.290) | (0.515) |
| $\Delta AMD$ x $\Delta COM_{t-1}$ | 1.149 | 2.701 | 1.901 | | | | | | |
| | (0.697) | (2.239) | (2.160) | | | | | | |
| $\Delta AMD$ x $\Delta F_{t-1}$ | | | | -0.311 | -0.067 | -0.584 | | | |
| | | | | (0.646) | (1.600) | (1.929) | | | |
| $\Delta AMD$ x $\Delta FK_{t-1}$ | | | | | | | 6.105 | -1.397 | -0.804 |
| | | | | | | | (6.990) | (8.583) | (14.424) |
| ***Adj. $R^2$*** | 0.090 | 0.041 | 0.045 | 0.069 | 0.019 | 0.010 | 0.083 | 0.041 | 0.037 |
| ***F-statistic*** | 5.331 | | | 4.230 | | | 4.940 | | |
| ***P(F-statistic)*** | (0.002) | | | (0.007) | | | (0.003) | | |
| ***J-statistic*** | | 4.700 | 4.864 | | 4.826 | 4.605 | | 10.426 | 9.813 |
| ***P(J-statistic)*** | | (0.860) | (0.846) | | (0.849) | (0.867) | | (0.730) | (0.776) |
| ***Inst. rank*** | | 13 | 13 | | 13 | 13 | | 18 | 18 |

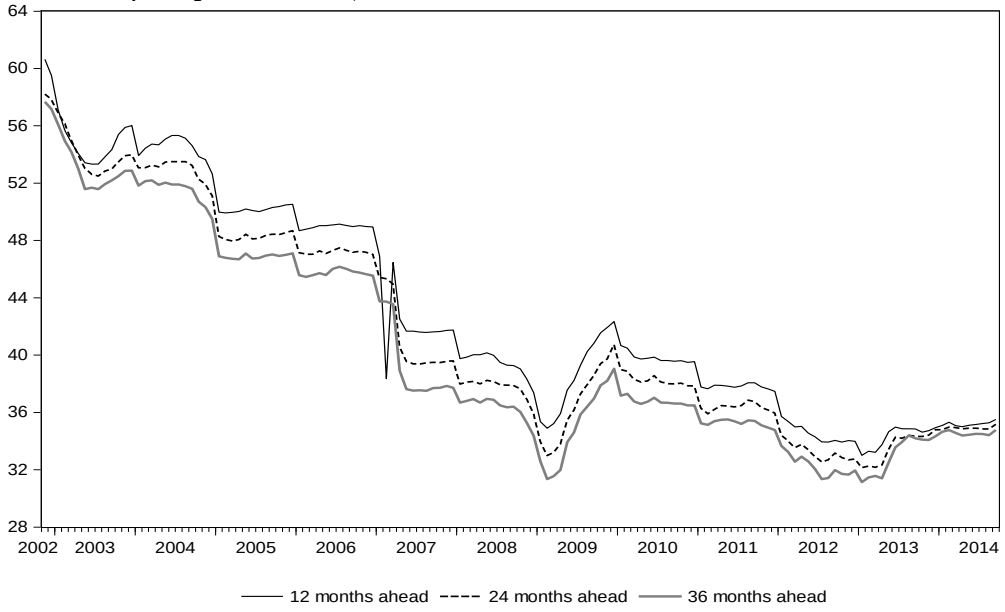
Note: Marginal significance levels: (***) denotes 0.01, (**) denotes 0.05, and (*) denotes 0.10. GMM1 – one-step GMM estimation - Robust (Newey-West) standard errors are in parentheses. GMM2 - two-step GMM estimation - Robust (Windmeijer) standard errors are in parentheses. P(J-statistic) report the respective p-valued of the J-test.

### 4.1. Different horizons for the expectations of the public debt

Since communication and clarity, especially through the channel of indexation profile, are relevant to decrease public debt expectations for the next 12 months, we extend our analysis providing new empirical evidence based on an increased horizon (24 months and 36 months ahead). In general, the expectations on the public debt present a downward trend along the period and the longer expectations are lower than shorter expectations (see figure 5).

**Figure 3**

*Expectations of the public debt (% GDP - 12 months, 24 months, and 36 months ahead)*




The main idea is to observe the power of communication and clarity in affecting longer horizons. With this intention, we perform this analysis taking into account the models that presented statistical significance for the effect of the communication/clarity on expectations in the previous section (see tables 1 to 4). Hence, the models selected are: (i) channel of the indexation profile: (public debt expectations – table 1) – models 1, 2, and 3; (volatility of the expectations – table 3) – model 1); and (ii) channel of the average maturity: (public debt expectations – table 2): model 1. The results are presented in table 5.

Such as observed in the previous section, the results suggest that communication and the clarity of the fiscal authority amplify the power of an improvement of the indexation profile on public debt expectations (see table 5). In other words, communication and clarity represent a tool, through the channel of the indexation profile, which is able to affect public debt expectations for different horizons.

Regarding the effect of the communication on the volatility of the public debt expectations with longer horizons, the results show that, independent of the horizon in consideration, the communication provokes a reaction in the volatility of the expectations for both channels of the indexation profile and of the average maturity (see tables 6 and 7). Therefore, it is an additional evidence that the market takes into account the information released by the government and that this information is used for building forecasts with different horizons.

**Table 5**

*Public debt expectations (h=24* and *h=36) - channel of the indexation profile*

| **Estimator** | **OLS** | | **GMM1** | | **GMM2** | | **OLS** | | **GMM1** | | **GMM2** | | **OLS** | | **GMM1** | | **GMM2** | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | **Model 1** | | **Model 1** | | **Model 1** | | **Model 2** | | **Model 2** | | **Model 2** | | **Model 3** | | **Model 3** | | **Model 3** | |
| **Regressors** | ***h=24*** | ***h=36*** | ***h=24*** | ***h=36*** | ***h=24*** | ***h=36*** | ***h=24*** | ***h=36*** | ***h=24*** | ***h=36*** | ***h=24*** | ***h=36*** | ***h=24*** | ***h=36*** | ***h=24*** | ***h=36*** | ***h=24*** | ***h=36*** |
| ***Constant*** | 7.49 | 6.71 | 7.20 | 8.75 | 13.88 | 16.67 | 16.52** | 18.40** | 14.88** | 17.22** | 14.59 | 17.16 | 19.95** | 21.18** | 18.43*** | 20.37*** | 17.72 | 19.87 |
| | (7.44) | (7.56) | (5.97) | (6.11) | (11.85) | (11.57) | (7.86) | (8.62) | (6.46) | (7.29) | (13.56) | (14.72) | (7.86) | (8.52) | (6.76) | (7.46) | (14.49) | (16.12) |
| ***DEBT$_{t-1}$*** | 0.77*** | 0.76*** | 0.78*** | 0.71*** | 0.63** | 0.53** | 0.59*** | 0.52*** | 0.63*** | 0.55*** | 0.64** | 0.55 | 0.52** | 0.46** | 0.55*** | 0.48*** | 0.57* | 0.49 |
| | (0.17) | (0.17) | (0.14) | (0.14) | (0.27) | (0.26) | (0.18) | (0.19) | (0.15) | (0.17) | (0.31) | (0.34) | (0.18) | (0.19) | (0.15) | (0.17) | (0.33) | (0.37) |
| ***INDEX$_{t-1}$*** | -0.04 | -0.04 | -0.04* | -0.05* | -0.07 | -0.08 | -0.09*** | -0.09*** | -0.08*** | -0.10*** | -0.09 | -0.10* | -0.08** | -0.09*** | -0.08*** | -0.09*** | -0.08 | -0.09 |
| | (0.03) | (0.03) | (0.03) | (0.03) | (0.05) | (0.05) | (0.03) | (0.03) | (0.03) | (0.03) | (0.06) | (0.06) | (0.03) | (0.03) | (0.03) | (0.03) | (0.06) | (0.07) |
| ***INDEX*x$\Delta$*COM$_{t-1}$*** | -0.23*** | -0.31*** | -0.27*** | -0.33*** | -0.26*** | -0.33*** | | | | | | | | | | | | |
| | (0.06) | (0.06) | (0.05) | (0.05) | (0.08) | (0.08) | | | | | | | | | | | | |
| ***INDEX* x $\Delta F_{t-1}$** | | | | | | | -0.14*** | -0.12*** | -0.13*** | -0.12*** | -0.13** | -0.12** | | | | | | |
| | | | | | | | (0.04) | (0.04) | (0.03) | (0.04) | (0.06) | (0.06) | | | | | | |
| ***INDEX* x $\Delta FK_{t-1}$** | | | | | | | | | | | | | 0.94*** | 0.76*** | 0.98*** | 0.88*** | 1.04*** | 0.93** |
| | | | | | | | | | | | | | (0.24) | (0.25) | (0.25) | (0.25) | (0.38) | (0.41) |
| ***Adj. $R^2$*** | 0.94 | 0.94 | 0.94 | 0.94 | 0.94 | 0.93 | 0.94 | 0.92 | 0.93 | 0.91 | 0.93 | 0.91 | 0.93 | 0.92 | 0.93 | 0.91 | 0.93 | 0.90 |
| ***F-statistic*** | 753.32 | 738.97 | | | | | 695.01 | 536.26 | | | | | 667.73 | 520.94 | | | | |
| ***P(F-stat.)*** | (0.00) | (0.00) | | | | | (0.00) | (0.00) | | | | | (0.00) | (0.00) | | | | |
| ***J-statistic*** | | | 17.90 | 17.58 | 16.96 | 16.01 | | | 14.28 | 13.38 | 14.15 | 13.42 | | | 13.73 | 13.38 | 13.38 | 13.50 |
| ***P(J-stat.)*** | | | (0.21) | (0.13) | (0.26) | (0.19) | | | (0.16) | (0.20) | (0.17) | (0.20) | | | (0.13) | (0.15) | (0.15) | (0.14) |
| ***Inst. rank*** | | | 18 | 16 | 18 | 16 | | | 14 | 14 | 14 | 14 | | | 13 | 13 | 13 | 13 |

Note: Marginal significance levels: (***) denotes 0.01, (**) denotes 0.05, and (*) denotes 0.10. GMM1 – one-step GMM estimation - Robust (Newey-West) standard errors are in parentheses. GMM2 - two-step GMM estimation - Robust (Windmeijer) standard errors are in parentheses. P(J-statistic) report the respective p-valued of the J-test. *h=24* is the horizon of 24 months ahead and *h=36* is the horizon of 36 months ahead.

## Table 6

*Volatility of the public debt expectations (h=24 and h=36) - channel of the indexation profile*

| **Estimator** | **OLS** | | **GMM1** | | **GMM2** | |
|---|---|---|---|---|---|---|
| | **Model 1** | | **Model 1** | | **Model 1** | |
| **Regressors** | ***h=24*** | ***h=36*** | ***h=24*** | ***h=36*** | ***h=24*** | ***h=36*** |
| ***Constant*** | 0.456 | -0.355 | 2.699 | 2.182 | -0.528 | -0.742 |
| | (3.593) | (3.871) | (2.589) | (2.603) | (3.660) | (4.044) |
| $DEBT_{t-1}$ | 0.020 | 0.037 | -0.035 | -0.025 | 0.040 | 0.043 |
| | (0.082) | (0.088) | (0.058) | (0.058) | (0.083) | (0.092) |
| $INDEX_{t-1}$ | 0.001 | 0.004 | -0.006 | -0.004 | 0.006 | 0.006 |
| | (0.015) | (0.016) | (0.012) | (0.012) | (0.016) | (0.017) |
| $INDEX \times \Delta COM_{t-1}$ | 0.060** | 0.048* | 0.060*** | 0.040* | 0.051* | 0.037 |
| | (0.024) | (0.027) | (0.021) | (0.023) | (0.030) | (0.031) |
| ***Adj. $R^2$*** | 0.110 | 0.075 | 0.049 | 0.001 | 0.103 | 0.061 |
| ***F-statistic*** | 6.401 | 4.536 | | | | |
| ***P(F-statistic)*** | (0.000) | (0.005) | | | | |
| ***J-statistic*** | | | 15.044 | 14.742 | 4.807 | 5.286 |
| ***P(J-statistic)*** | | | 0.448 | 0.470 | 0.988 | 0.981 |
| ***Inst. rank*** | | | 19 | 19 | 18 | 18 |

Note: Marginal significance levels: (***) denotes 0.01, (**) denotes 0.05, and (*) denotes 0.10. GMM1 – one-step GMM estimation - Robust (Newey-West) standard errors are in parentheses. GMM2- one-step GMM estimation - Robust (Windmeijer) standard errors are in parentheses. P(J-statistic) report the respective p-valued of the J-test. *h=24* is the horizon of 24 months ahead and *h=36* is the horizon of 36 months ahead.

## Table 7

*Public debt expectations (h=24* and *h=36) - channel of the average maturity*

| **Estimator** | **OLS** | | **GMM1** | | **GMM2** | |
|---|---|---|---|---|---|---|
| | **Model 1** | | **Model 1** | | **Model 1** | |
| **Regressors** | ***h=24*** | ***h=36*** | ***h=24*** | ***h=36*** | ***h=24*** | ***h=36*** |
| ***Constant*** | -1.192 | -1.327 | -4.401** | -5.203** | -4.974* | -5.793* |
| | (2.020) | (2.267) | (1.819) | (1.993) | (2.931) | (2.954) |
| $DEBT_{t-1}$ | 0.978*** | 0.953*** | 1.056** | 1.045*** | 1.071*** | 1.060*** |
| | (0.046) | (0.050) | (0.041) | (0.043) | (0.066) | (0.064) |
| $\Delta AMD_t$ | -0.469** | -0.510** | -0.879* | -0.838 | -1.035 | -0.985 |
| | (0.221) | (0.250) | (0.507) | (0.645) | (0.830) | (1.019) |
| $\Delta AMD \times \Delta COM_{t-1}$ | -4.114*** | -4.682*** | -20.759*** | -25.875*** | -18.694** | -22.153* |
| | (1.535) | (1.687) | (5.122) | (6.513) | (9.256) | (11.662) |
| ***Adj. $R^2$*** | 0.916 | 0.900 | 0.839 | 0.766 | 0.852 | 0.802 |
| ***F-statistic*** | 510.204 | 418.805 | | | | |
| ***P(F-statistic)*** | (0.000) | (0.000) | | | | |
| ***J-statistic*** | | | 15.256 | 13.424 | 14.885 | 13.051 |
| ***P(J-statistic)*** | | | (0.361) | (0.493) | (0.386) | (0.523) |
| ***Inst. rank*** | | | 18 | 18 | 18 | 18 |

Note: Marginal significance levels: (***) denotes 0.01, (**) denotes 0.05, and (*) denotes 0.10. GMM1 – one-step GMM estimation - Robust (Newey-West) standard errors are in parentheses. GMM2- one-step GMM estimation - Robust (Windmeijer) standard errors are in parentheses. P(J-statistic) report the respective p-valued of the J-test. *h=24* is the horizon of 24 months ahead and *h=36* is the horizon of 36 months ahead.

## 4.2. Robustness analysis

In order to check the previous results regarding the effects caused by communication and clarity from the fiscal authority on public debt expectations, a VAR was used. In this framework the variables are considered endogenous: $E(DEBT)$, *COM*, *F*, and *FK*. As usual, the analysis of a VAR is based on impulse response functions because they allow one to see the impulse on expectations of the public debt caused by shocks (or innovations) provoked by residual variables over time (Sims, 1980). As a manner of eliminating the problem of the ordering of variables in the VAR, the generalized impulse response function was selected in the decomposition method.[7]

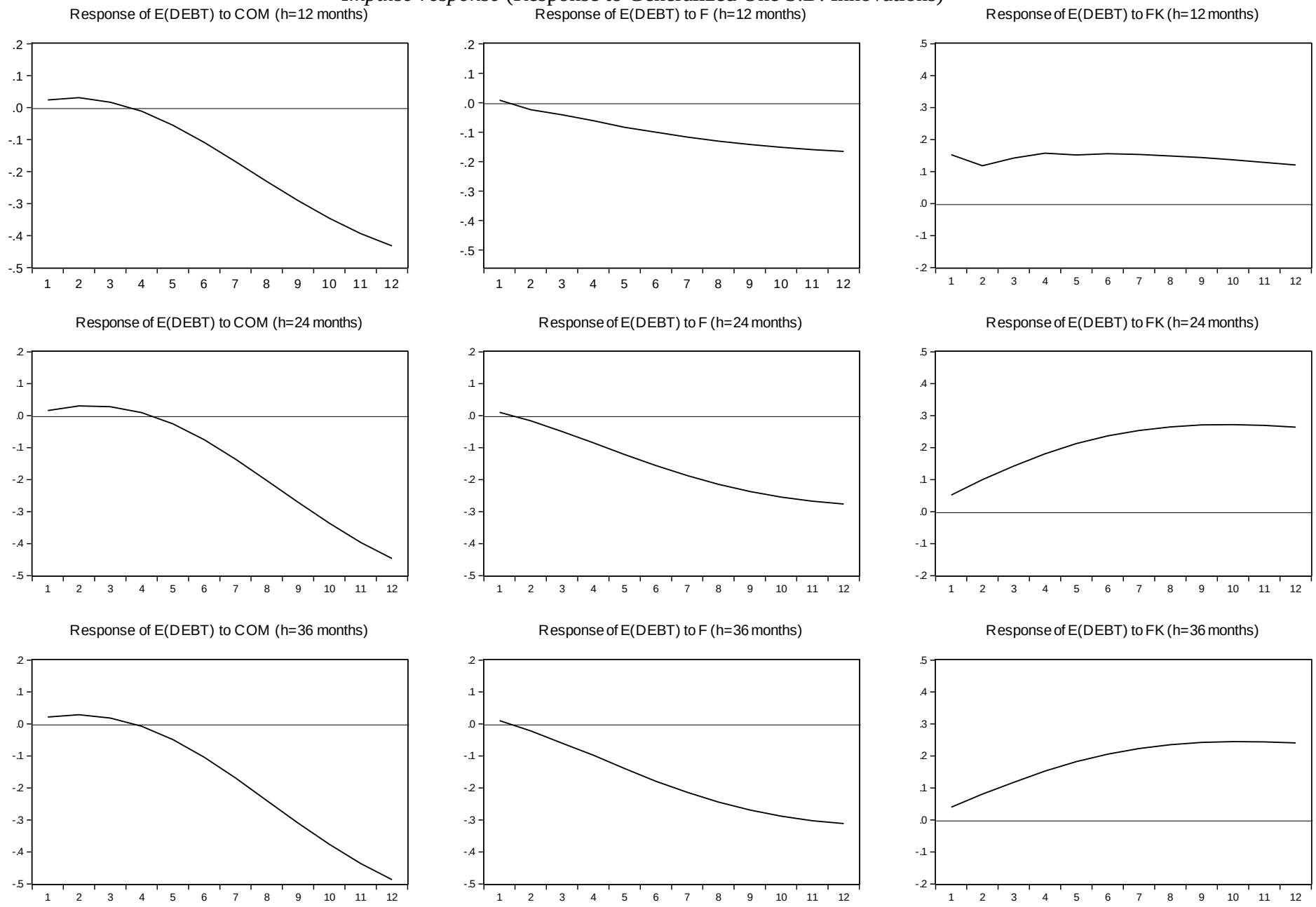
Figure 4 shows the results of the generalized impulse-response functions and are plotted for 12 months after the shock. The results denote that communication from fiscal authority may imply a decrease in expectations of public debt which persists over time. It is important to remember that an increase in *F* means an increase in the clarity while an increase in *FK* means a decrease in the clarity. Therefore, the results observed from both indices in the impulse-response graphs are in agreement with the idea that an increase in the clarity of the fiscal authority (that is, an increase in *F* or a decrease in *FK*) helps to reduce the expectations of an increase in the public debt.

In other words, independent of the horizon used for the expectations of public debt in the analysis (h=12 months, h=24 months, and h=36 months) the results indicate that an unexpected positive shock transmitted from communication and clarity implies a decrease in expectations of public debt which remains over time. In brief, the results from VAR confirm the previous empirical evidence that communication and clarity are important tools to guide expectations of public debt.

[7] Based on Schwarz and Hannan-Quinn criteria, the VAR order is 4. In addition, all roots have modulus less than one and lie inside the unit circle. All tests are available upon request to the authors.

**Figure 4**

*Impulse-response* (Response to Generalized One S.D. Innovations)



## 5. Conclusion

Nowadays, several international agencies (e.g. IMF, World Bank, IFAC) consider transparency and, in particular, information that is more understandable, as essential for the implementation with success of the fiscal policy. This paper amplifies the analysis on traditional tools used by government regarding fiscal transparency making use of a direct channel of government with citizens, that is, the information that is released by internet through official notes. In particular, we evaluate if this information is, in fact, understood by the market. The main result is that communication and clarity of the fiscal authority are relevant to lead expectations on public debt to a lower level.

Based on the communications through official notes from the Brazilian Ministry of Finance regarding fiscal policy, we investigate their effects on the public debt expectations and their volatility. With this purpose we considered the number of releases as a proxy of the communication and the quality of these releases from two readability measures (Flesch and Flesch-Kincaid) as proxies for the clarity of the fiscal authority. Taking into account the two main channels of the public debt management (indexation profile and average maturity) we analyzed the effect of communication and clarity on expectations (and volatility).

The results of the estimations indicate that although there exists statistical significance of the coefficients on communication in the case of the average maturity channel, the main channel in which communication and clarity can affect the public debt expectations is the indexation profile. Focusing on this channel we observe that both communication (number of releases) and clarity (quality of the information) are relevant to decrease the expectations of an increase in the public debt. Regarding the volatility of the expectations, although the coefficients on communication present statistical significance and thus indicate that the expectations react to the releases of the fiscal authority, we did not find evidence that the clarity is relevant to decrease the volatility of the public debt expectations.

In short, the results in this paper indicate that the communications from the Brazilian National Treasury concerning fiscal policy represent an important tool to improve the effects of the management of the public debt on market expectations regarding public debt. Therefore the search for an improvement in the communication of the fiscal authority (e.g., increasing clarity) to lead public debt expectations cannot be neglected. Moral of the story: when the government opens its mouth is necessary that it be careful with its words.

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## Appendix

**Table A.1**
*Sources of data and description of the variables*

| Variable name | Variable description | Data source |
|---|---|---|
| ***COM*** | Number of releases from the Brazilian National Treasury regarding fiscal policy. | Devised by authors, Ministry of Finance (www.fazenda.gov.br) |
| ***F*** | Flesch reading ease score on releases from the Brazilian National Treasury regarding fiscal policy (Hodrick-Prescott filter). | Devised by authors, Ministry of Finance (www.fazenda.gov.br) |
| ***FK*** | Flesch-Kincaid grade level on releases from the Brazilian National Treasury regarding fiscal policy (Hodrick-Prescott filter). | Devised by authors, Ministry of Finance (www.fazenda.gov.br) |
| ***INDEX*** | *INDEX* = (*FIX_B* + *INF_B*) – (*INT_B* + *EX_B*); Difference between the sum of the fixed rate bonds (*FIX_B*) and inflation-linked bonds (*INF_B*) and the sum of the bonds indexed to the interest rate (*INT_B*) and indexed to the BRL/dollar exchange rate (*EX_B*). | Devised by authors, CBB/TSMS (https://www3.bcb.gov.br/sgspub/) |
| ***E(DEBT)*** | Market expectations regarding public debt to GDP ratio. | CBB – TSMS (https://www3.bcb.gov.br/sgspub/) |
| ***DEBT*** | Public debt to GDP ratio - Net public debt (% GDP) - Total - Consolidated public sector | CBB – TSMS (https://www3.bcb.gov.br/sgspub/) |
| ***AMD*** | Average maturity of the public debt (in months) - Federal securities debt - National Treasury securities - Securities issued - medium term. | CBB – TSMS (https://www3.bcb.gov.br/sgspub/) |
| ***σ[E(DEBT)]*** | Standard deviation of rolling window of twelve months (*j=12)* of the market expectations regarding public debt to GDP ratio. | Devised by authors, CBB – TSMS (https://www3.bcb.gov.br/sgspub/) |

Note: CBB - Central Bank of Brazil; and TSMS - Time Series Management System.