

Differences in ratings of Brazilian corporate bonds: 2000 to 2007

Track 10. International finance, trade and policy issues

Abstract

This paper analyses the ratings differences in ratings of new issued corporate bonds in Brazil from 2000 to 2007 and its perception by investors. The main hypothesis is that investors are indifferent to the number of rating agencies or to their perceived quality. The variables considered are: rating, quality of agency, number of ratings, choice of index, maturity, country risk, basic interest rate, term-premium, the stock market index, and the foreign exchange rate. Two groups segregate the rating agencies: mandatory and non-mandatory. Multiple regressions were developed to explain the importance of the rating variables and environmental variables to explain the spread over treasury. Our conclusions indicate that the investors only take in account the rating agency quality or amount of ratings in cases of low credit quality. In the issues of better credit quality, quantity of agencies or their quality are indifferent for investors.

Keywords: Credit Ratings; Bondholder Value; Multiple Regression Analysis; Corporate Bond.

JEL classification: G12, G24.

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1. INTRODUCTION

Rating is an opinion on the credit worthiness of a financial obligation issued by an independent agency. Thus, independently of the classification agency, rating reflects judgments on the quality of credit of an entity, based on quantitative and qualitative analysis of the debt issuer performed by rating agencies. As an independent and objective opinion on credit risks, rating becomes a useful instrument for credit risk portfolio managers. Thus, it standardizes opinions related to different economic sectors, geographic regions or credit instruments. In such a way, besides providing the market with information that improves the investment decision, it is a parameter for the pricing of credit risk assets.

The importance of the research related to rating is to evidence that this independent qualification actually represents what is expected, an information concerning the credit quality of the debt issuer. The problem of the difference of classification among the agencies is important when considering the standardization of the ratings, as a response to market demand of rating similarities. Moreover, the possible existence of such differences can induce the issuers to search for better ratings. A research field then is related to the investors' behavior concerning rating differences or issues with more than one rating.

Thus, the research problem in present paper is: Are differences among ratings assigned by rating agencies to new issued corporate bonds in Brazil reflected in the prices (spread over treasury) of these instruments?

The objective is to evaluate if the issuers shop for ratings aiming to improve the grades attributed to them. This information is important for the investors who, in principle, do not distinguish an agency from another one, considering notes as similar and homogeneous and the different agencies as of the same quality of analysis. Thus, we analyze if the issuing prices reflect market perception of differences between ratings, using two hypotheses:

- Hypothesis 1: the number of agencies is irrelevant for pricing;
- Hypothesis 2: the quality of agencies is irrelevant for pricing.

The text is organized in five sections, including this introduction: a background with prior studies and relevant literature is followed by the methodological procedures showing the discussion of the sample and variables; then we present the data analysis and empirical results of multivariate techniques, and finally there are our conclusions.

2. THEORETICAL BACKGROUND

Brazilian capital market has already incorporated the concept of rating, referring to the classification of credit risk, widely used in the United States for years.

Turner (2002) points out that a key prerequisite for the development of a corporate bonds market is the existence of some form of independent evaluation of the credit risk. Rating refers to an opinion on the credit worthiness of a credit obligator, based on property methodologies developed by each rating agency.

According to Crouhy, Galai and Mark (2001) the process of rating developed by the agencies includes quantitative, qualitative and legal analyses. The first one is mainly based on financial reports of the firm, while the qualitative analysis is based on the quality of the management and includes a complete revision of the competitiveness of the firms, as well as industry growth and its vulnerability to the technological, regulatory changes and to labor relations.

As an independent and objective opinion on credit risks, the rating becomes a useful instrument for managers of portfolios with credit risk. As a universal measure, rating standardizes opinions involving different sectors of the economy, different geographic regions, different credit issuers, and different credit instruments. For Aguiar (1999), the equivalence of rating standards is maintained independently of country, sector or obligation type.

Fabozzi (2000) states that few investors make its own credit analyses, supporting their decisions on the opinions the rating agencies. The analysis of ratings history and its changes and defaults also provide a statistical data set that can be used to

model the future behavior of the price of the credit assets, improving the quality of decision.

Although there may have differences of opinions, the rating agencies fulfill the role of certifying the quality of the issue and the precision of the information of the issuing company, diminishing the uncertainty *ex-ante* of the investors and, consequently, improving the price analysis. Datta Iskandar-Datta, and Patel (1997) studied bonds' first issues in the United States and observed that the ratings work as a certification and mitigate the uncertainty *ex-ante* associated to initial offers. The same result related to uncertainty reduction concerning the insolvency risk and the *ex-ante* role of ratings was reported by Pottier and Sommer (1999).

This can be explained by the through-the-cycle factor of the performance of rating agencies. According to Amato and Furfine (2004), it is desirable to have a measure of credit risk that is not affected by cyclical fluctuations, consistent with the objective of long-term investment in corporate bonds. However, the investor seeks stability and promptness regarding to ratings which are conflicting objectives. The option is for stability, according to these authors.

Altman and Rijken (2005) show that the rating agencies are slow in adjusting its grades. Aiming rating stability, the agencies use the trough-the-cycle methodology which filters circumstantial components and focus the analysis on structural factors and long-term components of the default risk. Rating changes only occur because of alterations in permanent characteristics of the credit quality.

The same authors, in previous work (2004), already had detected that the rating migration policy of the rating agencies is characterized by two parameters: focus on the long-term horizon and extreme care in materialize rating changes. The consequence, according to Löffler (2002, 2005), is that the stability of ratings based on the through-the-cycle methodology is relatively high, and its power of default prediction is low.

The immediate reaction can be evaluated by the impact that alterations in the classifications bring to market prices. Studies show that the market precedes the announcements. In relation to the impact of information of ratings in the stock prices, Pinches and Singleton (1978) show that improvements (worsening) of rating are preceded by abnormally high returns (low), indicating that the impact in return is anticipated by market. They conclude that there is little informational content in rating changes for the market. Bissoondoyal-Bheenick (2004) evidences that alterations in the scales of rating does not bring impact in stock return, that is to say, the informational content of the change is already incorporated in prices. For Wakeman (1990), as well, the classification changes are foreseen by the bond markets, not bringing new information. Covitz and Harrison (2003) and Di Cesare (2006) also show that, in general, the market anticipates changes of rating.

The question of the differences on rating classification among the agencies is important in relation to the standardization of notes, in the view of market demand for grades similarity. On the other hand, such differences can induce the issuers to

search for better rating. Cantor and Packer (1994), however, understand that these divergences can be desirable, due to the fact that it promote a search for better knowledge related to the issuer.

Baker and Mansi (2002) analyze the rating industry under the view that bond issuers are “suppliers” and the investors, “customers”. The first ones seek to minimize its financing costs with the improvement of rating, and the last ones, to improve its evaluation of the issuer’s credit quality. From this difference in behavior it results that the issuers tend to get diverse opinions, trying to increase the probability of a more convenient classification. On the other hand, the investor takes in account one or two ratings, generally from the biggest agencies, searching for certification and evaluation with this information,. The authors also detach the perception of the investors that the ratings from Moody’s and S&P are more precise, at the same time that they consider that ratings do not reflect the current (dynamic) reality of the credit quality.

Cantor and Packer (1997) show that the search for a third rating is bigger among issuers more present in the market, concluding that there is little evidence that the search for the third rating aims to improve the classification by S&P or Moody’s, dominant at North American market, even with indications that FitchRatings grants higher ratings than the others two. Actually, their findings suggest that the differences of rating grades reflect differences on scale of measure of each agency. Kish, Hogan and Olson (1999) point out that there is not enough evidence that the market prices an agency differently than another one, when considering

S&P and Moody's. They signalize, however, for a market perception, that, when differences exist, ratings from Moody's contains more information than of the competitor. Güttler and Wahrenburg (2007) show that changes made by one agency are followed by the same movement by the other, with evidence of a 90 days serial correlation.

Jewell and Livingston (1999) examine rating differences among Fitch, S&P and Moody's, and also identify tendency of superiority (in terms of classification degree) in the ratings of Fitch, but without statistical significance. They show that the three agencies agree in the majority of the cases, and, when divergences occur between S&P and Moody's, the first ratings are higher, and Fitch ratings are higher than those from S&P or Moody's. In further work (2000), the authors achieve the same conclusions, adding that the firms that look for a third rating are those with higher ratings. Feinberg (2004) points out as well that ratings from Moody's and S&P are consistently lower than those from Fitch and Duff and Phelps.

Mählmann (2006) divides the rating agencies in two groups: the "mandatory" - S&P and Moody's - and the "third agency", Fitch. His study shows that the observed differences between ratings of the two groups are related to issuers seeking to improve their credit image with a third rating - from Fitch - that, according to the author, has lower standards in determining ratings. Cantor and Packer (1996) had already reported similar results; however, they credited it to a sample selection bias.

In Brazil, Sheng and Saito (2005) conclude that the origin of ratings, if Brazilian or international, is not relevant. Similar result was described by Sheng (2005), who suggests that the investors are not concerned about the nationality of rating, but with the rating difference among agencies.

3. METHODOLOGICAL PROCEDURES

Over the last years, the majority of public issues in Brazil was analyzed by independent agencies and received a rating¹, which represents their view of the issuers' credit worthiness. This opinion is dynamic, changing in relation to the perceived credit quality of the firm and consequent change of its rating. Therefore, the best moment of the trust worthiness of the opinion about an issuer is in the underwriting, strengthening the idea of working with data of primary market. We consider that this first rating related to the bond issuance efficiently captures most of the company's idiosyncratic characteristics.

The present work comprises the period from January 2000 to March 2007, and only indexed bonds are considered. The final sample has 206 cases, after exclusion of less representative indexing groups, leasing companies and convertible bonds. SND² databases provided all data, available at its internet site. International agencies Standard and Poors and Moody's are important players in the Brazilian market, present in 152 cases of our sample. Together with these international agencies, there are local ones, Atlantic Rating, Ausin Asis and SR Rating. Fitch Ratings is also present in Brazil, and have incorporated Atlantic Rating in 2003. After these agencies, two groups were formed: S&P and Moody's in the first one, and Fitch, Austin Asis and SR Rating, the second group. In line with Mählmann (2006), they were named "mandatory" and "third agency", respectively.

Of the total cases, 124 (60.2%) have only one rating, and, among these, 78 were rated by Moody's or S&P. There are 74 (35.9%) cases with two ratings; eight were not classified by Moody's or S&P and seven cases, by the two agencies. Figure 1 shows the distribution of the ratings in the sample. A concentration of ratings A is perceived (55.3%), followed of ratings AAA, AA, and BBB, with figures around 20%. The occurrence of ratings under investment grade (related to local environment) is low.

Figure 1 goes here

The underwriting process, generally on the basis of auctions, defines the issuing price. Spread is this price rate minus the treasury rate, based on prices of federal government bonds with same maturity and index (CDI³ or IGPM⁴). Issuing volume, measured relatively to the total outstanding of corporate bonds by the issuing period, controls for liquidity. Maturity is the proxy variable used to capture the effect of term prize.

The rating variable refers to independent opinions given by rating agencies, as referred. A numeric scale, with a range between 0.5 (the worse) and 10.0 (the best) represents these ratings, in line with methodology used by Amira (2004) and Gabbi and Sironi (2005). Dummy variables control the agencies groups (mandatory and third agency), the number of agencies, if one or more, and the indexing groups, CDI or IGPM.

The macroeconomic independent variables of the local market included in the model are: (1) the Selic rate, the one day financing rate of Brazilian government

bonds, related to the basic rate of economy; (2) the long-term (900 days) and short-term (30 days) premium of fixed rates; (3) the exchange rate real-dollar; (4) the stock index of the São Paulo Stock Exchange; and (5) Brazil risk, the difference between the EMBI-Br and US Treasury. In order to capture market environmental changes, we calculate the volatility the last three variables, using EWMA with a decay factor λ of 94%. The variable names and their meaning are depicted in Table 1.

Table 1 goes here

We use multiple regressions, calculated by ordinary least squares, to analyze the relation among variables, where the dependent variable is the spread-over-treasury (SPREAD) and the other variables cited are the independent ones. The data structure is of a pooled cross-section, obtained with the combination of different periods cross-sectional samples, as suggested by Wooldridge (2002).

The statistic significance of the coefficients will indicate the existence of differences on pricing accounted on rating agencies. Thus, if the variable related to the number of agencies (dNUMAG) or the variable related to mandatory agency (dAGENCY) are significant, one can conclude that the number of agencies, in the first case, or the quality of them, in the second, are relevant for pricing.

4. EMPIRICAL RESULTS

We first calculated a regression model with all the independent variables, and the variable SPREAD was the dependent, named Complete Regression, which results are on Table 2.

Table 2 goes here

The significant coefficients at a 5% level are those of variables RATSCALE, MATUR, ISSVOL, dIGPM and dCDI. Therefore, we calculated a new regression (Regression 1), considering only these variables. Table 3 shows these results. As expected, in Regression 1, variable NRATIG, related to credit risk, is relevant and negatively correlated to SPREAD, because the best the rating grade, smaller the spread over treasury required by investors. The VIF statistics, smaller than 10, shows absence of multicollinearity. The adjusted R^2 is 53.6% and F statistic (48.4) does not reject H_0 , indicating that the independent variables explain the dependent one.

Table 3 goes here

We calculated three other regressions (2 to 4), including variables DIFSCALE, dNUMAG and dAGENCY, with results, compared to those of Regression 1, are shown on Table 4. We didn't achieve any improvement of the results when including those variables and Akaike and Schwarz criteria indicate Regression 1 as more parsimonious.

Table 4 goes here

In order to understand these results, we divided the sample in two groups. The first one considers the cases with good ratings (A- and better) and included 159 cases and calculated the same four regressions as before. The results (Table 5) are the same as for the complete sample, where the coefficients for the variables related to quantity and quality of the rating agencies are not significant.

Table 5 goes here

Issues classified BBB+ or worse constitute the second group, with 47 cases. Again we obtained four regressions. The results in Table 6 show, differently from the other sub-sample, the importance of the quality and the quantity of ratings. In this group, according to Akaike and Schwarz criteria, the most parsimonious regression is Regression 3. In this model, the variable dAGENCY (that assumes value one when there is a mandatory agency – S&P or Moody's) is significant and with a negative coefficient, indicating that the investor will require a premium in the absence of one of these two rating agencies.

Table 6 goes here

5. CONCLUSIONS

The objective of this work is to investigate if the issuing companies seek improving its credit classification on the basis of a second rating or of a rating agency different than Moody's or S&P. The investors, in hypothesis, do not distinguish an agency from another, considering grades as similar and homogeneous and the diverse agencies as of the same quality of analysis. The research problem is if spreads observed in initial offerings reflects the differences of ratings that independent agencies attribute to corporate bonds issued in Brazil, considering the hypothesis that the number of agencies is irrelevant for pricing and that the quality of agencies is irrelevant for pricing.

Literature review shows that users are aware that a rating does not reflect the current credit quality. Their role is more related to an ex-ante certification, useful for decision making. It is also noted the investors' perception that ratings from Moody's and S&P are more precise than those from other agencies, although this difference, if not always, reflected in market prices.

Data consists of corporate bonds issued in Brazil from January 2000 to March 2007, not convertible, and indexed to DI or IGPM, and that has received the least one rating, with a total of 206 cases.

We calculate multiple regressions with spread-over-treasury as the dependent variable. When applied to the complete sample and to the sub-sample of better ratings, the variables related to the number of agencies or to the agency quality were not significant. It is then observed that this information is not relevant in

pricing corporate bonds in general. However, in the sub-sample of worse ratings, the variable related to mandatory agency (S&P or Moody's) is significant with negative coefficient, indicating that the investor will require a premium if these rating agencies are not evaluating the operation.

Thus, there are indications that the investors only take in account the quality of the rating agency or the number of ratings of a corporate bond initial offering on issues of lower credit quality. In the other cases, the number or to the quality of the rating agencies is indifferent.

REFERENCES

- Aguiar, C. (1999). Introdução aos ratings da Moody's. **Moody's Comentário Especial**, Moody's Investor Service, Global Credit Research. Retrieved September 22, 2003, from <http://www.moody's.com.br>.
- Altman, E. I., & Rijken, H. A. (2004). How rating agencies achieve rating stability. **Journal of Banking & Finance**, 28/11, 2679-2714.
- Altman, E. I., & Rijken, H. A. (2005). The impact of the rating agencies' through-the-cycle methodology on rating dynamics. **Economic Notes**, 34/2, 127-256.
- Amato, J. D., & Furfine, C. H. (2004). Are credit ratings procyclical? **Journal of Banking & Finance**, 28/11, 2641-2677.
- Amira, K. (2004). Determinants of sovereign Eurobonds yield spread. *Journal of Business*. **Finance & Accounting**, 31/5-6, 795-821.
- Baker, H., & Mansi, S. (2002). Assessing credit rating agencies by bond issuers and institutional investors. **Journal of Business Finance & Accounting**, 29/9, 1367-1398.
- Bissoondoyal-Bheenick, E. (2004). Rating timing differences between the two leading agencies: Standard and Poor's and Moody's. **Emerging Markets Review**, 5/3, 361-378.
- Cantor, R., & Packer F. (1994). The credit rating industry. **Quarterly Review of the Federal Reserve Bank of New York**, 19/2, 1-26.
- Cantor, R., & Packer, F. (1996). **Multiple ratings and credit standards: differences of opinion in the credit rating industry**. Federal Reserve Bank of New York, Research Paper number 9527. Retrieved April 8, 2007, from <http://www.newyorkfed.org>.

Cantor, R., & Packer, F. (1997). Differences of opinion and selection bias in the credit rating industry. **Journal of Banking & Finance**, 21/10, 1395-1417.

Covitz, D. M., & Harrison, P. (2003). **Testing conflicts of interest at bond rating agencies with market anticipation: Evidence that reputation incentives dominate**. Working paper, Federal Reserve. Retrieved October 6, 2005, from <http://www.federalreserve.gov>.

Crouhy, M., & Galai, D., & Mark, R. (2001). Prototype risk rating system. **Journal of Banking & Finance**, 25/1, 47-95.

Datta, S., & Iskandar-Datta, M., & Patel, A. (1997). The pricing of initial public offers of corporate straight debt. **The Journal of Finance**, 52/1, 379-396.

Di Cesare, A. (2006). Do market-based indicators anticipate rating agencies? Evidence for international banks. **Economic Notes**, 35/1, 121-150.

Fabozzi, F. J. (2007). **Bond markets, analysis and strategies**. 6th ed. Englewood Cliffs, NJ: Prentice Hall.

Feinberg M., & Shelor, R., & Jiang, J. (2004). The effect of solicitation and independence on corporate bond ratings. **Journal of Business Finance & Accounting**, 31(9 & 10), 1327-1353.

Gabbi, G., & Sironi, A. (2005). Which factors affect corporate bonds pricing? Empirical evidence from Eurobonds primary market spreads. **The European Journal of Finance**, 11/1, 59-74.

Güttler, A., & Wahrenburg, M. (2007). The adjustment of credit ratings in advance of defaults. **Journal of Banking & Finance**, 31/3, 751-767.

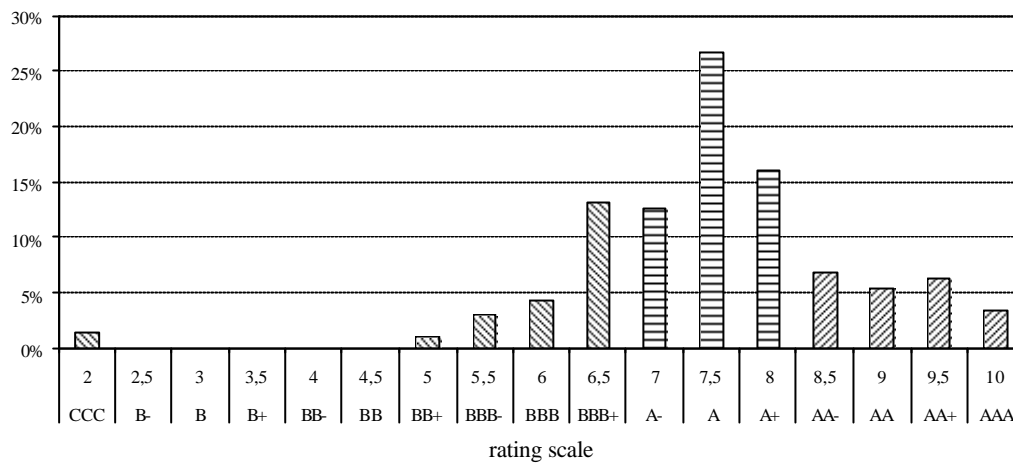
Jewell, J., & Livingston, M. (1999). A Comparison of bond ratings from Moody's, Standard and Poors and Fitch IBCA. **Financial Markets, Institutions & Instruments**, 8/4, 1-45

- Jewell, J., & Livingston, M. (2000). The impact of a third credit rating on the pricing of bonds. **The Journal of Fixed Income**, 10/3, 69-85.
- Kish, R. J., & Hogan, K. M., & Olson, G. (1999). Does the market perceive a difference in rating agencies? **Quarterly Review of Economics and Finance**, 39/3, 363-377.
- Löffler, G. (2002). An anatomy of rating through the cycle. **Journal of Banking & Finance**, 28/11, 695-720.
- Löffler, G. (2005). Avoiding the rating bounce: why rating agencies are slow to react to new information. **Journal of Economic Behavior & Organization**, 56/3, 365-381.
- Mählmann, T. (2006). **Do bond issuers shop for a better credit rating?** Working Paper, Department of Banking, University of Cologne. Retrieved April 14, 2007, from <http://www.wiso.uni-koeln.de>.
- Pinches, E. G., & Singleton, J. C. (1978). The adjustments of stock prices to bond rating changes. **The Journal of Finance**, 33/1, 29-44.
- Pottier, S. W., & Sommer, D. W. (1999). Property liability insurer financial strength ratings: Differences across rating agencies. **The Journal of Risk and Insurance**, 66/4, 621-642.
- Sheng, H. (2005). **Ensaio sobre emissões de corporate bonds debêntures no mercado brasileiro**. Ph.D. dissertation, EAESP-FGV, São Paulo, Brazil.
- Sheng, H., & Saito, R. (2005). Determinantes de spread das debêntures no mercado brasileiro. **Revista de Administração - USP**, 40/2, 193-205.
- Turner, P. (2002). **Bond markets in emerging economies: an overview of policy issues**. BIS Papers, n. 11. Retrieved June 27, 2005, from <http://www.bis.org>.

Wakeman, L. M. (1990). The real function of bond rating agencies. In: C. W. Smith (Ed), **The modern theory of corporate finance**, 2nd ed.,. New York: McGraw-Hill, 391-396.

Wooldridge, J. M. (2002). **Introductory Econometrics: a modern approach**. 2nd ed. New York: Thomson.

Figure 1
Distribution of Ratings among issued securities (January 2000 to March 2007)



Source: SND (*Sistema Nacional de Debêntures* - National Debentures System)

Table 1
Variables

Variable name	Meaning
SPREAD	spread over treasury
RATSCALE	rating scale
DIFSCALE	rating scale difference
MATUR	maturity
ISSVOL	issue volume
dAGENCY	if mandatory agency, equals 1
dNUMAG	if more than one agency, equals 1
dIGPM	index; if IGP-M, equals 1
dCDI	index; if CDI + spread, equals 1
SELIC	Selic rate
TERMPR	term premium
vIBOV	volatility of Bovespa Index
vDOL	volatility of exchange rate
vEMBI	volatility of Brazil risk (EMBI-Br – US Treasury)

Table 2
Complete Regression

Variables	Coefficients			t	p-value	Colinearity	
	Not standardized		Standardized			Tolerance	VIF
	B	Standard error	Beta				
Constant	3.131	0.878		3.565	0.000		
RATSCALE	-0.326	0.064	-0.300	-5.086	0.000	0.663	1.508
MATUR	-7.71E-02	.036	-0.123	-2.124	0.035	0.689	1.451
ISSVOL	22.442	9.187	0.134	2.443	0.015	0.763	1.310
dIGPM	2.427	0.192	0.757	12.608	0.000	0.641	1.561
dCDI	0.731	0.167	0.259	4.392	0.000	0.665	1.503
DIFSCALE	-1.58E-02	0.187	-0.006	-.084	0.933	0.513	1.948
dAGENCY	-7.96E-03	0.179	-0.003	-0.044	0.965	0.703	1.422
dNUMAG	-6.64E-02	0.208	-0.024	-0.319	0.750	0.420	2.380
SELIC	-1.495	4.047	-0.025	-0.369	0.712	0.493	2.029
TERMPR	-0.436	2.220	-0.016	-0.196	0.844	0.338	2.962
vIBOV	37.775	19.017	0.116	1.986	0.048	0.678	1.474
vDOL	-20.346	31.152	-0.048	-0.653	0.514	0.430	2.327
vEMBI	-3.351	15.160	-0.014	-0.221	0.825	0.614	1.629

Table 3
Regression 1 – coefficients significant at 5%

Variables	Coefficients			t	p-value	Colinearity	
	Not standardized		Standardized			Tolerance	VIF
	B	Standard error	Beta				
Constant	3.420	0.448		7.630	0.000		
RATSCALE	-0.352	0.058	-0.323	-6.085	0.000	0.802	1.246
MATUR	-0.067	0.031	-0.107	-2.140	0.034	0.903	1.107
ISSVOL	22.291	8.410	0.133	2.650	0.009	0.893	1.120
DIGPM	2.411	0.175	0.752	13.743	0.000	0.756	1.323
DCDI	0.699	0.157	0.247	4.449	0.000	0.733	1.363

Table 4
Regressions 1 to 4 – complete sample

Variable	Regression 1	Regression 2	Regression 3	Regression 4
C	(*) 3.420	(*) 3.421	(*) 3.422	(*) 3.422
standard error	0.531	0.573	0.563	0.572
RATSCALE	(*) -0.352	(*) -0.351	(*) -0.349	(*) -0.349
standard error	0.070	0.073	0.075	0.075
MATUR	(*) -0.067	(*) -0.068	(*) -0.068	(*) -0.068
standard error	0.033	0.033	0.033	0.034
ISSVOL	(*) 22.291	(*) 22.431	(*) 22.359	(*) 22.382
standard error	9.824	10.221	10.167	10.223
dIGPM	(*) 2.411	(*) 2.413	(*) 2.411	(*) 2.412
standard error	0.209	0.256	0.257	0.256
dCDI	(*) 0.699	(*) 0.699	(*) 0.701	(*) 0.701
standard error	0.128	0.146	0.148	0.149
DIFSCALE		0.002		-0.001
standard error		0.219		0.226
dNUMAG		-0.010		-0.001
standard error		0.171		0.179
dAGENCY			-0.029	-0.028
standard error			0.207	0.212
Adjusted R^2	0.536	0.531	0.534	0.529
Standard error	0.939	0.943	0.941	0.946
F-statistic	(*) 48.351	(*) 34.193	(*) 40.104	(*) 29.775
DW stat	1.620	1.621	1.621	1.620
Breusch-Godfrey Test	14.991	14.993	14.858	14.902
p-value BG-LM	0.059	0.059	0.062	0.061
ARCH-LM test	2.332	2.308	2.356	2.353
p-value ARCH-LM	0.127	0.129	0.125	0.125
Akaike info criterion	2.740	2.759	2.749	2.769
Schwarz criterion	2.837	2.888	2.862	2.914

(*) significant at 5%

Table 5
Regressions 1 to 4 – sub-sample: better ratings

Variable	Regression 1	Regression 2	Regression 3	Regression 4
C	(*) 3.039	(*) 3.010	(*) 3.072	(*) 3.059
standard error	0.634	0.638	0.635	0.637
RATSCALE	(*) -0.299	(*) -0.290	(*) -0.314	(*) -0.310
standard error	0.075	0.074	0.080	0.080
MATUR	(*) -0.084	(*) -0.089	(*) -0.082	(*) -0.088
standard error	0.040	0.042	0.041	0.042
ISSVOL	(*) 26.529	(*) 28.496	(*) 26.181	(*) 28.608
standard error	9.723	10.328	9.866	10.509
dIGPM	(*) 2.462	(*) 2.476	(*) 2.467	(*) 2.490
standard error	0.263	0.257	0.265	0.259
dCDI	(*) 0.579	(*) 0.584	(*) 0.577	(*) 0.583
standard error	0.131	0.134	0.131	0.134
DIFSCALE		0.115		0.122
standard error		0.208		0.209
dNUMAG		-0.166		-0.210
standard error		0.168		0.189
dAGENCY			0.111	0.155
standard error			0.208	0.222
Adjusted R^2	0.542	0.538	0.541	0.537
Standard error	0.938	0.942	0.940	0.943
F -statistic	(*) 38.456	(*) 27.323	(*) 31.976	(*) 23.936
DW stat	1.885	1.907	1.888	1.918
Breusch-Godfrey Test	11.754	0.346	12.111	12.605
p-value BG-LM	0.163	0.556	0.146	0.126
ARCH-LM test	0.370	5.963	0.291	0.080
p-value ARCH-LM	0.543	0.651	0.589	0.777
Akaike info criterion	2.747	2.768	2.757	2.776
Schwarz criterion	2.863	2.922	2.892	2.949

(*) t statistics significant at 5%

Table 6
Regressions 1 to 4 – sub-sample: worse ratings

Variável	Regression 1	Regression 2	Regression 3	Regression 4
C	(*) 3.464	(*) 3.356	(*) 3.515	(*) 3.367
standard error	0.872	0.884	0.840	0.805
RATSCALE	(*) -0.329	(*) -0.317	(*) -0.264	-0.215
standard error	0.124	0.128	0.124	0.122
MATUR	-0.037	-0.019	-0.053	-0.028
standard error	0.053	0.054	0.051	0.050
ISSVOL	-27.896	-29.259	-36.098	-43.211
standard error	28.936	29.062	28.156	26.877
dIGPM	(*) 2.283	(*) 2.207	(*) 2.405	2.303
standard error	0.521	0.537	0.505	0.490
dCDI	(#) 0.808	(#) 0.714	(#) 0.903	(#) 0.771
standard error	0.425	0.433	0.412	0.395
DIFSCALE		-0.645		(*) -1.143
standard error		0.491		0.477
dNUMAG		0.566		(*) 1.068
standard error		0.441		0.435
dAGENCY			(*) -0.621	(*) -0.936
standard error			0.303	0.312
Adjusted R^2	0.304	0.303	0.354	0.422
Standard error	0.938	0.939	0.904	0.855
F -statistic	(*) 5.017	(*) 3.858	(*) 5.206	(*) 5.194
DW stat	2.082	2.063	2.137	2.168
Breusch-Godfrey Test	7.256	8.487	12.173	12.610
p-value BG-LM	0.509	0.387	0.144	0.126
ARCH-LM test	0.345	0.476	0.678	0.579
p-value ARCH-LM	0.557	0.490	0.410	0.447
Akaike info criterion	2.829	2.866	2.772	2.696
Schwarz criterion	3.066	3.181	3.048	3.050

(*) t statistics significant at 5%; (#) t statistics significant at 10%

¹ The ratings are local, related to Brazilian environment, not comparable with a global rating.

² SND - *Sistema Nacional de Debêntures* (National Debentures System), for custody and control of securities issued by corporations.

³ CDI: inter-bank daily rate.

⁴ IGPM: *Índice Geral de Preços de Mercado* (General Price Index), inflation index calculated by IBRE-FGV (*Instituto Brasileiro de Economia*, Brazilian Institute of Economy, of Getúlio Vargas Foundation - FGV, Rio de Janeiro).