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Informational content of corporate ratings in a developing country: the case of Brazilian firms

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Abstract

A corporate rating is an opinion from a rating agency about the debt payment capacity and willingness to pay of a private issuer. In principle, ratings issued by a third party should be unbiased and provide private information on credit quality to the market. Yet many researchers argue that such ratings only reflect market information. The aim of this article is to evaluate the informational content of foreign currency non-bank corporate credit ratings in Brazil. This is an interesting case as an emerging economy with short rating experience. We employ two complementary methodologies. First, an ordered probit model on credit rating using firm level information is estimated to predict firm ratings. Second, an event study is conducted to assess the effect of credit rating changes on abnormal firm returns. If ratings do not carry new information, they should be predictable and should not generate abnormal returns. Our estimates suggest that (i) ratings are not easily predicted using firm data, although they seem very sensitive to aggregate economic changes; (ii) the rating changes do not influence firm stock returns.

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1. Introduction

Rating agencies have been an integral part of the international financial market. For the past 20 years, the Securities and Exchange Commission – SEC – has required a rating from debt issuers that trade in the U.S. market. Corporate ratings also grew in importance with the internationalization of financial markets starting in the 1990s. Ratings have been seen as a requirement for firms in developing countries and emerging markets.

A rating is referred to as "*...an opinion about an issuer's future capability, legal responsibility, and willingness to meet the payment of the principal and interest of a specific bond...*" (Moody´s, 2003, p.5). This rating is classified into short and long-term and domestic and foreign currency. It also targets the issuer and the issuance, since both may have different payment capacity over time. The issuer, in turn, may be a national or subnational government, or a firm. The governments receive sovereign ratings, and the firms, corporate ratings.

Rating agencies should be third parties in the borrower/lender relationship, independently and concisely assessing the real financial situation of the debt issuer using firms' private information. However, after the latest international financial crises, rating agencies have faced a barrage of criticism for their inability to predict forthcoming problems. In more detail, the criticisms are: first, the rating process is unclear to the market, raising questions as to what variables are actually relevant in this process (Ferri *et al*., 1999); second, that agencies lack motivation to pursue detailed information on debt issuers, given the high cost of new information, and the lack of legal and economic burden in case of a wrong rating (Partnoy, 2002).[1] They tend to follow only the systematic risk – that of the market – rather than the specific risk of the firm. In this case, the issued ratings are predictable, since they replicate market perceptions, having no additional informational content.

The aim of the paper is to provide evidence on whether corporate ratings have informational content beyond that already available in the market, based on the case of a developing country, Brazil. We advance on the literature using two complementary methodologies on the same ratings issuances.

First, if ratings provide only public information, they should be predictable in a regression model using the firms' financial indicators. The now canonical studies are Ederington (1985), for (U.S.) corporate ratings, and Cantor and Packer (1996), for sovereign ratings. For developing countries there are very few results. Ferri and Liu (2003) use a cross section of firms across the world in a linear model to predict firm average ratings, pooling developing and developed countries. We advance on this literature by using an ordered probit model. This model is better than a linear one, because it recognizes the ordinal nature of the ratings.

Second, if ratings provide the market with new information, their issuance should change the risk-return relationship between the firm and the market. In what follows, we perform an event

[1] More recently, regarding the subprime crises, while a US Congress panel blamed the rating agencies for triggering the crisis in 2007, theoretical analysis showed that the issuer pay model provides incentives for rating "inflation" (Bar-Isaac, and Shapiro, 2010).

study, evaluating if there is some correlation between a stock's beta and rating changes, according to Impson *et al*. (1992). If ratings bring new information to the market, rating changes will cause systematic changes in the risks of the firm.

The Brazilian case is an interesting one as it is one the ten largest economies in the world, and the sixth largest market capitalization in US dollars, according to the WorldBank´s World Development Indicators. It has the largest number of SEC filings among BRICS countries, with the exception of China. At the same time, its companies have only recently entered international equity markets. The first corporate rating issuance for a Brazilian company in the international market was in 1995.

Advancing the results, our rating prediction model reveals strong cyclical effects and partial predictive power, although it uses only a handful of financial indicators. The event study of rating changes and expected returns, measured by the equity beta structural breaks indicates that roughly 35% of the rating changes are associated with changes in expected returns, with most of these changes associated with first issuances of the ratings. Contrary to the literature, downgrades did not cause more rating changes than did upgrades, even though the proportions of changes are small. The results suggest low informational content of the ratings and the great influence of aggregate shocks on changes in the risk ratings in Brazil.

The paper is divided into two sections in addition to this introduction and the final comments. Section 2 presents the results of the ordered probit model on predicting ratings based on financial indicators, while the rating issuance and changes event study is presented in section 3.

2. Rating Analysis

The Brazilian firms selected for this study have corporate ratings issued by Moody's.[2] We select Moody´s for data access and rating coverage. We focus on non-bank ratings, as financial institutions have balance sheets specific patterns that make then incomparable with non-bank firms. Petrobras, Embratel, Vale (formerly CVRD) and AMBEV are non-bank Brazilian firms which have been rated the longest. The first to be rated was Petrobras, back in 1995.

Ratings are represented by symbols. These symbols are the same for debt issuers and issuances. The definitions of each symbol are similar to those indicating risks of default, that is, the likelihood of failure to pay the principal and debt interests. In other words, they show "(…) the ability of obligors to honor financial obligations with an original maturity (…)" (Moody´s, 2011). In addition, ratings can be understood as a protection in case of bankruptcy, reorganization and rearrangement of the firm, always complying with the law of bankruptcy or other laws of the country of domicile, which may affect the rights of creditors.

[2] The list of firms and their acronyms (and sector) is: Ambev, AMBV (beverages); Cesp, CESP (electricity generation and distribution); Cosan S.A., COSAN (sugan and ethanol); Cia. Siderúrgica Nacional, CSN (steel); Embraer, EMBA (aircrafts); Embratel, EMBT (telecom); Escelsa, ESCE (electricity generation and distribution); Gerdau, GERD (steel); Gol Linhas Aéreas, GOL (airlines); Ipiranga Cia de Petróleo, IPIR (oil and gas); Petrobras, PETR (oil and gas); Rede – Energia Elétrica, REDE (electricity generation and distribution); Sadia, SADI (food); Usiminas, USIM (steel); Vale, VALE (mining); Vigor, VIGO (food).

There is clear variation in ratings, either in their first issuance, or over time. We cover corporate rating in foreign currency changes from 1995, the date of the first rating for a Brazilian firm, until 2007, before the outset of the latest financial crisis in 2008-2009.

Table 1 – Brazilian non-banking firm corporate ratings in foreign currency – Moody´s

Issuances / firms	1	2	3	4	5	6	7	8	9	10	11	12
AMBV	B1 11/26/01	B1 conf 5/17/02	B2 8/12/02	B1 9/10/04	Ba3 10/13/05	Ba2 5/25/06	Ba2+out 8/1/06	Ba1 8/31/06	Ba1 +out 5/24/07	Baa3 8/23/07		
CESP	B3 3/16/06	B3 +out 8/1/06	B2 +out 8/4/06	Ba3 12/6/06								
COSAN	Ba3 11/17/05	Ba2 1/16/06										
CSN	B2 7/24/03	B1 11/24/03	Ba3 7/29/05	Ba2 10/17/05								
EMBA	Baa3 12/19/05											
EMBT	B2 11/18/03	B1 9/9/04	B1 +out 11/11/05	Ba3 3/15/06	Ba3 +out 9/4/07	Baa3 11/8/07	Baa3–ou 11/16/07					
ESCE	B1 7/10/97	B2 9/3/98	B2+out 8/28/00	B1 10/16/00	B2 8/30/02							
GERD	Ba1 9/2/05	Ba1 conf 9/27/07										
GOL	Ba2 3/21/06											
IPIR	B2 7/21/03	B1 9/9/04	Ba3 2/24/06									
PETR	B1 11/16/95	B2 9/3/98	B2+out 8/17/00	B1 10/16/00	B1+out 7/10/01	Ba1 9/18/01	Ba1conf 7/23/02	Ba2 8/13/02	Ba1 9/10/04	Baa2 10/13/05	Baa2+out 5/25/07	Baa1 8/23/07
REDE	B1 12/19/00	B2-out 11/7/02	Caa1 2/14/03									
SADI	Ba2 3/30/06											
USIM	B2 4/15/04	B2+out 7/7/05	Ba2 1/30/06	Ba1 7/19/07	Baa3 12/21/07							
VALE	Ba2 1/8/04	Ba1 9/10/04	Baa3 7/8/05	Baa3+ou 8/1/06	Baa3-out 8/11/06	Baa3+ou 10/9/06	Baa3 10/25/06					
VIGO	B2 2/1/07	B2+out 11/27/07										

Note: ratings scale from worst to best: Caa1 (Default grade); B3, B2, B1, Ba3, Ba2, Ba1 (Speculative); Baa3, Baa2, Baa1 (investment grade). +out: 'positive outlook'; -out:'negative outlook'; conf: 'confirmed'. Source: Moody´s

In order to identify which financial indicators determine the corporate ratings of the selected firms (see Table 1), the model is estimated using the ordered logit method. The ordered logit is the most adequate method when the dependent variable is ordinal (e.g., Greene, 2000). The estimation is done by Maximum Likelihood using Stata. The financial indicators come from quarterly balance sheets, available at the Economatica data provider.

Explanatory variable selection is based on an analysis of rating methodologies published by agencies, particularly Moody's (1999). Because many indicators listed by agencies have similar definitions and reflect the same financial position of a firm (such as liquidity), the most representative variables are selected in each set of variables, based on their correlation and explanatory power.

The initial set of financial indicators calculated were Retained Cash Flow/Total Debt (RCF/TD); Operating Cash Flow/Short-Term Debt (OCF/STD); Operating Cash Flow/Total Debt (OCF/TD); EBIT interest coverage (EBITic); Free Cash Flow/Total Debt (FCF/TD); EBITDA interest coverage (EBITDAic); Total Debt/EBITDA (TD/EBITDA), and EBITDA capital expenditures (EBITDA/CE). Due to their explanatory power, we used the following variables: Total Debt/EBITDA (TD/EBITDA), EBITDA interest coverage (EBITDAic) Operating Cash Flow/Short-Term Debt (OCF/STD), and Free Cash Flow/Total Debt (FCF/TD).

We develop three models to predict firm ratings over time and across firms: (1) a model with firm dummies and business cycle control, (2) a model with explanatory variables only, and (3) a model with dummies and explanatory variables. The first model, which is simpler, refers to a model with firm dummies and business cycle control. The firm's rating is predicted by its average rating, and a common rating shifter, following macroeconomic shocks. The second model, rather than focusing on the effect of the macro environment, considers data available from firm's indicators only. Finally, the third model includes the firm specific effects as in model (1), and explanatory variables from model (2). This third model considers that firms are qualitatively different in terms of characteristics, such as management style and reputation. At the same time, this third model incorporates the effect of changes in the indicators of each firm as relevant variables for rating changes. In this model, relative other than absolute increases in the indicators of each firm are important for the ratings. Macroeconomic shocks are relevant in this third model only to the extent that they effectively change the firms' indicators. This third model is more general than the previous ones, and we believe that it will better predict the ratings.

Table 2 compares the ratings firms received (except Gol, that only received one rating over the period under analysis and had no variation to be analyzed) with the ones predicted by the first model[3] that uses firm dummies and a time dummies to account for the business cycle. In a sense the model is overtly simple, as would predict the same rating for a given firm over time with common variations due to the business cycle. No firm specific time varying variables (financial indicators are used). Somewhat surprisingly, out of 280 observations, 54% of the predicted and received ratings were the same, mostly for speculative grade ratings, such as B1, Ba2 and Ba3,

[3] Actual coeficient estimates are available with the authors upon request. They are not included here to save space.

the most frequent ones. The results suggest that ratings issued by agencies include firms' specific information in the assessment, although the macro environment is very important to understand the rating changes over time.

Table 2 – Model with firm dummies and business cycle control

Received Ratings	Predicted Ratings									
	Caa1	B2	B1	Ba3	Ba2	Ba1	Baa3	Baa2	Baa1	Total
Caa1		2								2
B3		2								2
B2	9	31	21	1						62
B1		15	40		7					62
Ba3			13	2	16					31
Ba2			1	1	50	4				56
Ba1					12	17	6	1	1	37
Baa3					3	3	11	1	1	19
Baa2						3	4			7
Baa1							1	1		2
Total	9	50	75	4	88	27	22	3	2	280

	Observations	Mean	Standard Deviation
Hit rate:	280	0.5392857	0.4993467

Predicted ratings are chosen by the higher rating probability in the ordered logit model. HIT RATE is a binary variable that indicates whether a rating was correctly predicted. Explanatory variables are dummies for each firm and a time dummy for each quarter.

Table 3 – Model with explanatory variables only

Received Ratings	Predicted Ratings									
	Caa1	B2	B1	Ba3	Ba2	Ba1	Baa3	Baa2	Baa1	Total
Caa1		2								2
B3		2								2
B2		37	21		4					62
B1		45	17							62
Ba3		17	11		3					31
Ba2		23	21		3	4				56
Ba1		6	15		12	3			5	37
Baa3		5	13		1	3			1	19
Baa2		2	5			3				7
Baa1			2							2
Total	0	139	105	0	23	7	0	0	6	280

	Observations	Mean	Standard Deviation
Hit rate	280	0.2142857	0.4110606

Predicted ratings are chosen by the higher rating probability in the ordered logit model. HIT RATE is a binary variable that indicates whether a rating was correctly predicted. Explanatory variables include firm financial indicators only. Source: authors' estimates.

Table 3 considers the model with explanatory variables only. This means that the differences between firms (except those measured by economic and financial indicators) and business cycles are not taken into account. Comparing with the results of Table 6, we find that the financial and economic variables lead to a group of ratings B2, B1, Ba2 and Ba1. Firms' ratings Caa1 and B3, the lowest ones, were predicted as ratings B2 and B1. Several Ba3 ('uncertainty' in Moody´s view) ratings were predicted as B1 ('best high-risk obligations'). This model proved to be worse than the previous one, since the hit rate between the received and the predicted ratings was only 21%. This suggests that the firms' financial indicators are relatively assessed to evaluate ratings.

Table 4 – Model with firm dummies and explanatory variables

Received Ratings	Predicted Ratings									
	Caa1	B2	B1	Ba3	Ba2	Ba1	Baa3	Baa2	Baa1	Total
Caa1	2									2
B3	2									2
B2	34		18		10					62
B1	26		12		24					62
Ba3	17		8		6					31
Ba2	3		10		36	2			5	56
Ba1			2		9	26				37
Baa3			4			13	2			19
Baa2					7	3				7
Baa1					2					2
Total	84	0	54	0	94	41	2	0	5	280

	Observations	Mean	Standard Deviation
Hit rate	280	0.3928571	0.48926

Predicted ratings are chosen by the higher rating probability in the ordered logit model. HIT RATE is a binary variable that indicates whether a rating was correctly predicted. Explanatory variables include firm financial indicators and firm dummies. Source: authors' estimates.

In regard to the estimation of the third model (with firm dummies and explanatory variables), Table 4 shows the actual and predicted ratings. We see that received ratings B2, Ba3, and Baa2 were not predicted by the financial variables. Therefore, as in Table 2, but this time without the business cycle variable, the highest frequency predicted ratings are B2, B1, and Ba2. The most significant differences are in ratings B2 (with 62 quarters), and Ba2 (with 38 quarters). Ba2 was the rating predicted by the financial variables that were most present in the group of firms. The ratings related to the investment grade were barely issued and, in addition, they were not predicted by the selected variables. With this model, out of 280 observations, only 39% of the ratings were issued correctly. This result is better than that of model (2), but worse than that of the apparently simpler model (1).[4]

[4] In face of the results indicating a hit rate less than 50%, we question whether the models are robust by including only more homogeneous firms, rated over a longer period of time and with no extreme ratings (default rating or worst speculative grade). These firms also have less volatile indicators or whose values are not extreme. The firms selected for this second set of regressions were AMBEV, COSAN, CSN, EMBRATEL, ESCESA, IPIRANGA,

3. Event Study

As mentioned in the introduction, if ratings contain private information that is not available to the market, rating changes should shift the view of the market regarding the firm's profitability. Rather than investigating the effect of rating changes on firm equity returns, as in a usual event study (see, for instance, Campbell, Lo and Mackinlay, 1996), this study investigates whether rating changes alter the risk-return relationship with the market, as in Impson *et al* (1992).

The presence of abnormal returns as a result of corporate ratings issues is investigated using the Chow structural break (stability) test on a market model of the daily stock closings returns of the selected firms. Based on the F-statistic test results, we check whether the null hypothesis of no structural break will be accepted, considering significance levels of 1%, 5%, and 10%, under the alternative hypothesis of differences between the betas before and after the change in corporate rating.

Table 5 shows the p-values for the null hypothesis of no structural break. In general, rating changes do not cause changes in beta coefficients. Out of 68 rating changes, including first issuances, only 24 produced rating changes, or approximately 35% of the changes. Dividing the ratings into first issuances and changes, half of the first issuances (column 1) caused changes in beta coefficients. This seems to be the most relatively important moment, when ratings convey new information to the market. Rating changes, in turn, were divided into upgrades, downgrades and confirmations. In the case of upgrades, out of 39 occurrences, 13 caused rating changes, or 0.33. In the case of downgrades, out of 10 occurrences, two were associated with rating changes, or 0.20. As observed, upgrades would be more relevant than downgrades, even though a small portion of the occurrences was associated with changes in beta coefficients. There were only three confirmations, and a change in the beta coefficient in one of them. The absence of changes in beta coefficients when ratings change can be interpreted in two ways: either the ratings do not provide new information, or they only reflect changes in the idiosyncratic risk, which are not valued by the market, because they can be distributed in a well balanced portfolio (Abad-Romero and Robles-Fernandes, 2007).

It is worth noting that, in the previous section, aggregate shocks, associated with systemic risks, had great predictive power for ratings, confirming part of the results found here. Unlike previous results in the literature, though, downgrades did not cause more rating changes than did upgrades, as in Impson *et al*. (1992).

The results of each firm can be interpreted in different ways. Large firms such as Ambev, Petrobras, and Vale, have low beta sensitivity to rating changes. Conversely, firms such as

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PETROBRAS, REDE, USIMINAS, and VALE. The results, available with the authors upon request to save space, did not differ noticeably. In model (1), the hit rate changed from 50% to 57%. In model (2), we predicted 43.3% of the ratings correctly, 2 percentage points more than with the whole sample. Finally, in model (3), the proportion of predicted ratings matching those observed decreased from 39.3% to 34.6%.

CESP, CSN USIMINAS, and REDE Energia seem to be more sensitive to rating changes. These firms include firms with strong downgrades (REDE) and strong upgrades (USIMINAS), exhibiting no clear pattern.

In short, we observe low market sensitivity to rating changes, except for first issuances. This leads us to conclude that the ratings levels are already the result of the market consensus regarding the firm's payment capacity.

Table 5 – Structural break hypothesis test – corporate ratings changes in foreign currency

Issuances/firms		1	2	3	4	5	6	7	8	9	10	11	12
1	AMBV	0.7141	0.8787	0.8675	0.4846	0.0348	0.6252	0.0413	0.1966	0.4050	0.7528		
2	CESP	0.0252	0.0000	0.0000	0.7030								
3	COSAN	0.0034	0.2225										
4	CSN	0.1222	0.1391	0.0040	0.0024								
5	EMBA	0.0015											
6	EMBT	0.5046	0.2790	0.0427	0.0001	0.7800	0.4365	0.1243					
7	ESCE	0.8127	0.8087	0.3030	0.1038	0.5750							
8	GERD	0.0000	0.1060										
9	GOL	0.0022											
10	IPIR	0.0011	0.7865	0.6399									
11	PETR	0.2284	0.6546	0.0100	0.2653	0.2516	0.1346	0.0398	0.4790	0.3977	0.0039	0.3580	0.2623
12	REDE	0.1697	0.0225	0.0001									
13	SADI	0.0000											
14	USIM	0.0000	0.2245	0.5044	0.0037	0.0348							
15	VALE	0.7900	0.0077	0.6102	0.0636	0.3437	0.0836	0.1098					
16	VIGO	0.4139	0.2294										

Note: p-value for the null hypothesis of no change in a stock's beta for the period of the rating indicated by the issuance rate. For dates and ratings in each issuance, see table 1. Source: authors' calculations.

4. Final Remarks

Due to the new architecture of the international financial market and the growth of the capital market, ratings have become increasingly important, especially to firms and developing countries. Ratings play the role of conveying public and confidential information about debt issuers. By doing so, the market can positively take advantage of such information in the decision-making process. However, many market analysts and leaders of countries say that agencies have made many mistakes in recent years, more specifically; they have made crises last longer and failed to predict many of them.

From the perspective of rating agencies, the classification methodology uses objective and subjective information. However, their vagueness as to the actual variables analyzed and their importance is a market consensus. That is, market commentators argue that, despite being considered independent assessments of the actual financial condition of debt issuers, they tend to follow mostly market priced risk perceptions. For this reason, ratings carry no specific informational content.

In this study, we sought to answer whether the corporate ratings of the firms under analysis contained information besides that already available in the market. In order to do that, we used two complementary methodologies: a model for predicting ratings for all non-bank Brazilian firms with ratings in foreign currency, using the financial and economic indicators suggested by the rating agencies; and an event study, based on the firm's beta changes due to rating changes.

We observed that the selected financial variables (FCF/TD; OCF/STD; TD/EBITDA) only partially explain the ratings received by firms. Therefore, we can say that there is some informational content in the ratings in addition to that known by the market.

Another conclusion is that the macro environment significantly influences the ratings, because a relatively simple model with only aggregate information was able to predict more than half of the firm ratings. The correct hit rate of about 50% is similar to other models in the international literature (Ederington, 1985 and Kamstra *et al*., 2001).

In the case of the event study, about 35% of the rating changes are associated with changes in beta coefficients. These changes are concentrated in the first issuances of the ratings. The subsequent re-ratings events yielded a smaller proportion of changes on the stock's beta, around 25%. Contrary to the literature, downgrades did not cause more beta changes than did upgrades, even though the proportion of breaks is small as a whole.

Taken altogether, the results suggest a low informational content of the ratings and the great influence of aggregate shocks on changes in the risk ratings in Brazil. Certainly the evidence gathered here could be complemented with results for other countries. This is certainly a venue for further research.

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