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ANALYSIS OF THE RATING SIGNIFICANCE AND OTHER VARIABLES ON THE REMUNERATION OF THE BRAZILIAN DEBENTURES

ANÁLISE DA SIGNIFICÂNCIA DO RATING E OUTRAS VARIÁVEIS NA REMUNERAÇÃO DAS DEBÊNTURES BRASILEIRAS

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Érika Letícia de Assis Luiz [1]
Luiz Eduardo Gaio [2]
Marcelo Augusto Ambrozini [3]
Tabajara Pimenta Júnior [4]

ABSTRACT

This paper has two main aims: to conduct a survey of the main characteristics of debentures issued by Brazilian companies in the last ten years and check which variables influenced the determination of debenture coupons. In order to do so, the information of 1,520 debentures issued in Brazil from 2004 to 2013 was analyzed. The main findings of the exploratory study were that most of the debentures issued offered neither fixed nor floating charges; that the average security maturity was about six years; that almost all of the securities issued are not convertible into shares; and that the main destination for the funds raised was the lengthening of the company´s indebtedness profile. The analysis of the descriptive statistics of the regression model showed that the debentures linked to the Interbank Deposit paid the highest average yearly coupons (11%), presented the worst grades of credit ratings (ratings) and had the lowest average maturity (6.5 years). The regression model proposed presented better explanatory power for the coupons of the debentures linked to the IGPM, and for these debentures, the maturity and rating explanatory variables presented statistical significance.

Keywords: Debentures, Coupons, Ratings, Collars, Indexes.

1 MBA in Financial Management from FAAP. BS in Business Applied Mathematics from the University of São Paulo (USP) Manager Assistant at Banco Itaú. Ribeirão Preto, SP, Brazil. E-mail: erikaluiz24@hotmail.com ORCID: https://orcid.org/0000-0002-0489-7949
2 PhD in Business Administration from the University of São Paulo (USP). Assistant Professor at Applied Science Faculty, University of Campinas. Limeira-SP, Brazil. E-mail: luiz.gaio@ymail.com ORCID: https://orcid.org/0000-0003-3106-7649
3 PhD in Business Administration from the University of São Paulo (USP). Associate Professor at School of Economics, Business Administration and Accounting at Ribeirão Preto, University of São Paulo Ribeirão Preto-SP, Brazil. E-mail: marceloambrozini@yahoo.com.br
ORCID: https://orcid.org/0000-0003-0933-6064
4 PhD in Business Administration from the University of São Paulo (USP). Associate Professor at School of Economics, Business Administration and Accounting at Ribeirão Preto, University of São Paulo Ribeirão Preto-SP, Brazil. E-mail: taba.jr@usp.br
ORCID: https://orcid.org/0000-0001-5438-7800

RESUMO

Este trabalho possui dois objetivos principais: fazer um levantamento das principais características das debêntures emitidas pelas empresas brasileiras nos últimos dez anos e verificar quais foram as variáveis que influenciaram a determinação dos cupons das debêntures. Para isto, foram analisadas informações de 1.520 debêntures emitidas no Brasil nos anos de 2004 a 2013. As principais constatações do estudo exploratório foram que a maioria das debêntures emitidas não ofereceu garantias reais ou flutuantes; que a maturidade média dos títulos girou em torno de seis anos; que praticamente a totalidade dos títulos emitidos não são conversíveis em ações; e que a principal destinação para os recursos captados foi o alongamento do perfil do endividamento das empresas. A análise das estatísticas descritivas do modelo de regressão mostrou que as debêntures atreladas ao Depósito Interfinanceiro pagaram os maiores cupons anuais médios (11%), apresentaram as piores notas de classificação de crédito (ratings) e tiveram a menor maturidade média (6,5 anos). O modelo de regressão proposto apresentou melhor poder de explicação para os cupons das debêntures atreladas ao IGPM, sendo que para essas debêntures, as variáveis explicativas de maturidade e rating apresentaram significância estatística.

Palavras-chave: *Debêntures, Cupons, Ratings, Garantias, Indexadores.*

1. INTRODUCTION

In Brazil, the issuance of debentures is one of the most important and oldest fundraising way via fixed income securities. Debenture is a medium to long term debt instrument which gives their holders the right of credit against the issuing company.

The use of debentures has been an advantageous alternative for borrowers. The advantages with the issuance of debentures encompass, among others, the flexibility for establishing deadlines and conditions of payments and collars, which allows the disbursement to be carried out according to the company's cash flow generation capacity. The requirements of specific documents needed for the credit request in the funding lines of the *Banco Nacional de Desenvolvimento Econômico e Social* (BNDES), one of the main long-term financiers of Brazilian companies, may represent some kind of difficulty for some potential borrowers, despite presenting more attractive conditions in relation to the cost and terms, since it is a formentation bank. The BNDES, according to Torres Filho & Costa (2013), concentrates the majority of the long-term financing operations to industries and infrastructure projects in Brazil. Data of the *Banco Central do Brasil* show that, every year from 2009 to 2016, the BNDES alone was responsible for about 20% of the credit operations in the country and more than two thirds of the volume of credit for long-term financing (BNDES, 2017).

Important information on the main debenture characteristics can be found in the *Sistema Nacional de Debêntures* - National Debenture System - (SND). This system was created in 1988, aiming to ease and promote integration to the debenture market in Brazil. At that time, rules were created in order to improve the primary and secondary markets of fixed income securitites. In that period, there was, in the market, the predominance of debentures of state-owned enterprises. Nevertheless, the system was opened with the issuance registration of the *Companhia Vale do Rio Doce*, worth 300 million dollars. There was also the promulgation of the new Constitution and, in the following year, with the first direct elections for president, news came up in politics. The introduction of *Cruzado Novo* led to the deindexation of the economy and price and salary freeze. Due to that, the corporate bonds market was harmed in general, however, despite the downturn, the SND recorded an expressive secondary debenture market during the year.

In 1994, significant changes in the economic scenario were observed. The *Plano Real* marked the beginning of strengthening and development of the capital market, there was a significant growth of the number of debenture issuances, making it one of the main fundraising

tools. The growth of the debenture market reflected the increase of longer-term investments. According to the SND, in 1996, fundraising over R$ 8 billion via debentures was recorded.

The debenture market reached an expressive evolution during the last years. According to Bragança, Pessoa & Souza (2015), just from 2000 to 2013, the debenture market in Brazil grew 400%, considering the total value issued yearly. In a more recent period, from 2011 to 2016, the Federal Government encouraged the development of private domestic market of long-term financing for Brazilian companies acting in strategical sectors, with the promulgation of Law # 12,431/2011 which created the infrastructure/encouraged debentures. This debenture category has enjoyed reduced income tax rates and it has differentiated tax benefits for investors who live abroad and the ones who live in the country, and for investors who are individuals and legal entities. Moreover, the Brazilian capital market has developed, since the beginning of the 21st century, to an environment with greater corporate responsibility, with the dissemination of good corporate governance practices and the growing respect to the companies' stakeholders, as stated by Azevedo (2012).

The characteristics of the debentures issued are defined by the issuing company, and, it can even include provisions such as the profit share, convertibility and renegotiation. This financial tool for fundraising has been more and more used by companies of many different sectors of activity and intended to obtaining working capital, project financing, reduction of liabilities or infrastructure investment, among other objectives.

Due to the importance of long-term debentures financing for companies, two questions which guided this research, can be outlined like this: Which are the characteristics of the debentures issued by Brazilian companies in the last 10 years? And which variables influenced their rates of return (coupons)?

Regarding the debenture characteristics, the survey was carried out aiming to identify the number of issuing companies, the activity sector of these issuers, the number of issuances in each year, the types of debentures issued, the allocation of the funds raised, the collar types, the maturity date of the securities and the (risk) ratings given by the rating agencies.

To check with greater accuracy which variable influences the debentures coupons, a regression analysis was carried out considering as independent variables: (i) credit risk rating of issuance; (ii) redemption period of the principal amount (maturity) and (iii) collars offered by the debentures.

Based on this research problem, this study has, then, two main objectives: (i) carry out a survey of the main characteristics of the debentures issued by Brazilian companies in the last ten years and (ii) check which were the variables that influenced the determining of yields (coupons) of the debentures.

2. LITERATURE REVIEW

According to ANDIMA (2008), debenture is a security, in this case, a long-term debt bond, issued by corporations, which represents a fraction of a loan agreeded on between the issuing company and the buyers (bondholders represented by the trustee), and which gives their holders the right of credit against the issuer, under the conditions existing in the issuance indenture. The Law # 6,404/1976 (BRASIL, 1976) rules the issuance of debentures in Brazil, complemented by the CVM Instruction # 400/2003 (CVM, 2004). The *Comissão de Valores Mobiliários* - Securities and Exchange Commission - (CVM) is the securities market authority linked to the Ministry of Finance of Brazil which was established with the passing of the Brazilian Legislation Law 6,385/1976, whose responsibilities are to regulate and supervise the capital markets in the country.

The debentures represent an efficient long-term fundraising instrument for companies and it consists in the most used security in the Brazilian financial market (ANDIMA, 2008).

The CVM rule # 400 (CVM, 2004) establishes that the distribution of debentures can be either public or private. The public distribution is done by public company issuers, by means of the institutions that are part of the securities distribution system, being required the participation of a trustee, which is a financial institution that must represent the interests of the bondholder at the issuing company. In the private distribution, which can also be performed by a private company, the debentures are set to the shareholders themselves or to a group of specific investors, identified beforehand, and who have ties with the issuing company.

Since they are debt securities, the debentures are financial instruments of pre- or post-, fixed income, and they can offer different types of coupons, different maturities (always longer than one year), they can be registered or bearer, and they can be convertible into shares (ANDIMA, 2008). Regarding the collars offered by the debenture issuing company, they can be classified as: (i) fixed charge – movable property which can not be negotiated by the company; (ii) floating charge – privilege on some assets of the company, which can be negotiated by the issuing company; (iii) unsecured (naked) - no kind of guarantee is offered, the holders are treated like all the other creditors in case of liquidation, they have preference only on the shareholders; (iv) Subordinated – no kind of guarantee is offered, nevertheless, in case of liquidation, it has preference only upon the shareholders.

When a company decides to issue a debt security, either a debenture in the Brazilian market, or a bond in the international market, there is the need to hire an independent company (agency) which analyzes the credit conditions of the issuing company and gives a rating that classifies its insolvency risk. The rating of an issuance takes a fundamental role in determining the debt return, since, in theory, the return on security must be correlated to its risk. According to Brealey & Myers (1992), risk is a measure of the possibility (probability) of the return on the investment to be different than expected, which implies, at some level, the chance of losing, partly or totally, the capital invested. Thus, the investors would be inclined to take greater risks in face of the possibility of greater returns.

Concerned about checking whether the rating agencies really gave credit rating compatible with the financial status of the bond issuing company, Valle (2002a) analyzed the debt issuances carried out by the largest Brazilian, American and Canadian companies of the pulp and paper sector from 1991 to 1998. The author concluded that, first, the Brazilian companies which were studied paid, in order to raise funds in the international market, premiums equivalent to those of American and Canadian companies with low credit rating. Second, when the issuance within the same year were analyzed, for securities with similar structures, of the same niche market, from the same country and with companies of the same sector, the author determined a series of evidences that the fundraising of the same rating were priced in a very different way. Such a fact made the author direct a criticism to the rating agencies and it made him argue that the ratings given by the agencies are, many times, limited accurate and doubtful.

Nevertheless, in a subsequent study, Damasceno, Artes & Minardi (2008) determined that the credit rating agencies were not more severe in their analyses of Brazilian companies during the period from 2000 to 2005. Using the probit model for panel data, which allowed them to follow the progress of the credit rating in the course of time, they analyzed the credit ratings of 39 non-financial public companies at national level of long-term credit issued by Standard & Poor´s agency. Using data such as the company size and the presence in the stock exchange, along with accounting indicators of debt payment capacity, capital structure and profitability, the authors

did not find evidence that a company, with the same accounting indicators over time, have received a worse credit risk rating than the one given to it in previous years. This result suggests that the observed credit risk evaluation was coherent. It is worth to highlight that the authors of this study have analyzed the role of just one rating agency, making it impossible to expand their considerations to all the agencies. Moreover, methodological changes performed by the authors did not allow comparisons to previous studies carried out in this same line by Blume, Lim & MacKinlay (1998) and Jorion, Shi & Zhang (2005) for American companies.

The issue of allocation of credit ratings by rating agencies and its relationship to the accounting-financial variables of the issuing companies has been the object of several recent empirical studies. In that line, Valle (2002b) analyzed the fundraising conditions of 42 companies of 10 different countries from 1991 to 1998, totalling 178 debt securities insuance. The author compared the accounting indicators of the issuing companies with the credit ratings of Standard & Poor´s and Moody´s. The indicators analyzed were the return on investment, the financial cost coverage ratio, debt cost, company debt level, gross sales revenue and the cashflow risk indicator. The author concluded that all the five companies with the best accounting-financial indicators were the ones which raised funds with the lowest cost and that, the bad performance of Brazilian companies does not justify the high fundraising cost they had in the period, which were similar to the cost of the companies in a totally damaged financial condition.

In an empirical study developed aiming to check which restrictive provisions were required by the bondholders to reduce a possible conflict with the shareholders, Saito, Sheng & Bandeira (2007) analyzed 119 debenture indentures issued from 1998 to 2001 and 141 issued from 2002 to 2005 in Brazil. While comparing the results of the study carried out by these authors to the results reached before by Anderson (1999), a study which was performed during a period marked by a different economic context in Brazil, the results obtained showed that (i) there was a larger number of debentures issued without an indexation index to the inflation rate, but with floating interest rates; (ii) the issuance terms did not differ significantly; (iii) there were less restrictive provisions regarding the actions of distribution and additional funding and (iv) there were more restrictive provisions regarding the change of control and of non-establishment of real collars.

This result comparison is important since Anderson´s (1999) study pointed that, in Brazil, due to the economic volatility, the high transaction costs and the fragility of the institutions, the debentures were launched, mostly, with low remuneration indexed to inflation, mechanisms which offered regular opportunities of securities sales or renegotiation, and restrictive covenants to the innitiative of the issuer regarding investments, new loans and income distribution decisions. The most recent study revealed that the economic context made a difference in the set of characteristics of the debentures issued in the Brazilian market.

Despite representing an important fundraising source for non-financial companies, the lack of a secondary market for the negotiation of these securities in Brazil can be a limiting factor from an investor´s point of view. Godói, Yoshino & Oliveira (2008) attribute a key factor to the development of this secondary market to the correct treatment of risk credit of issuing companies. Aiming to contribute to the treatment of such risk, the authors proposed a methodology which allows to determine the magnitude of credit risk of a debenture portfolio. Based on Merton´s (1974) model for corporate bonus, which uses Black-Scholes´-formula, 32 Brazilian issuances in October, 2004 were evaluated. The authors presented an alternative risk measure which was more conservative than the one obtained with the value-at-risk model and proposed a methodoloy for obtaining an optimal debenture port-

folio composition corresponding to the efficient frontier, which minimizes the credit risk of debenture portfolio.

The lack of a secondary market of debenture negotiation in Brazil has instigated the investigation by some researchers. Securato (1998) assigns this liquidity problem in the debenture negotiation to the lack of standardization of this debt security.The debentures can have many differences in terms of redemption period, forms of remuneration, collars offered, classes (simple or convertible into shares), among others. Bearing this in mind, the author proposed the creation of a new debt security with the same objective of debentures, but with homogeneous characteristics. This standardized security would be called Corporate Bonus and would have part of the funds raised by the companies directed to an Investment Bank, which would be responsible for giving liquidity to the securities in the Stock Exchange.

Also regarding the secondary market of debentures in Brazil, or the lack of it, Gonçalves & Sheng (2010) developed a research aiming to price the liquidity premium required by investors in the negotiation of debentures in the secondary Brazilian market based on the daily yield of these securities. Using four liquidity proxies, which are: (i) issuance volume; (ii) issuance age; (iii) number of transactions a day and (iv) buy-sell spread, the authors built, for each proxy, daily portfolios in the period from May, 2004 to November, 2006, totalling 16,083 observations. The null hypothesis of the study that there is no liquidity premium embedded in the spreads of the debentures traded in the secondary Brazilian market was rejected for all the proxies analyzed. According to the liquidity proxy used, the liquidity premium in the debenture secondary market varied from 8 to 30 basis points.

The low number of business with corporate bonuses observed in the secondary National market may hamper the debentures pricing work in Brazil. Thus, the proposition of models which allow the accurate determination of the current price of debt securities of Brazilian companies can have great importance. Thus, Securato, Carrete & Securato Júnior (2006) adapted, to the Brazilian reality, the pricing methodology of corporate debt securities proposed by Barth, Landsman & Rendleman Júnior (2000), which is based on the binomial option pricing model, to price debentures and eurobonus, evaluating, as components, the early redemption provisions, convertibility into shares and subordination to others debts foreseen in the debenture indenture.

Another important component in the debt security pricing is liquidity. Studied by Amihud & Mendelson (1986), the effect of liquidity on the return on shares and bonds was confirmed in later studies. Such a fact led some researchers to propose the inclusion of liquidity in asset pricing models. Consequently, securities markets with low liquidity, such as the case of debentures in Brazil, tend to ward off investors who place importance on the frequency of securities transactions in secondary markets.

Considering the low liquidity of debentures in the capital market in Brazil, Sheng & Saito (2008) investigated the relationship existing between the debentures issuance characteristics in the country and their liquidity. Despite having the limitation, the fact of being unable to test several liquidity measures suggested by international empirical studies, due to the lack of transactions in the secondary Brazilian Market, the authors used four variables as liquidity proxy: number of days of transactions with the debenture (from its issuance to the moment of the study); total number of transactions in the period; accumulated average trading volume (since its issuance) divided by the issuance size; and the difference between the minimum and maximum prices. The authors analyzed 135 debenture issuances and concluded that only the issuance size and the activity sector of the issuer influenced all the liquidity measures.

Regarding the issuance price of debt securities, Paiva (2006) carried out a study aiming to identify which were the factors that influenced the prices of debenture issuance of Brazilian companies from 2000 to 2005. Based on a sample of 154 debenture registers, the author analyzed the price formation of debenture issuance from the price determining factors, measured by the spread in relation to the federal public securities of similar indexers and maturities. The author concluded that the variables regarding the credit risks of the issuing company and the securities remuneration indexer were the most relevant ones in determining the debenture spread. The bonds indexed by the IGPM tended to have higher remuneration and the investor to accept to length the terms for better credit-quality issuances.

In international literature, a wide study was carried out by Feldhütter, Hotchkiss & Karakas (2016). In this research, the authors analyzed the role of the control exerted by the creditor, via contractual convenats, in the premium of 2,020 bonds issued by 963 companies from June, 2002 to June, 2012. This premium was estimated as the difference between the bond price and an equivalent liability without the creditor´s control rights in the Credit Swap market (*Credit Default Swap* - CDS). The bonus rating was used as control variable in this study. The authors determined that the premium increased when the credit quality decreased at moments in which the companies went through events such as default, bankruptcy or breaches, specially for companies whose creditor exerts more control on the company.

In the same year, Derrien, Kecskés & Mansi (2016), analyzed the impact of information asymmetry on the issuance cost (return to creditors) of debt securities of 824 companies from 1994 to 2008. The results of this study showed that the analysts´coverage is an important factor for the reduction of information asymmetry. The authors verified that the loss of an analyst (due to the broker closing or merger) can make the cost of corporate debt to increase up to 25 basis-points. This percentage was statistically significant and it represented an increase of close to 7 million dollars in financial costs for a typical company in the sampling of this study. This determination was more significant for smaller companies with less analysts´coverage, greater leverage and shorter maturity terms of their liabilities.

In a more recent study, Cai (2017) compared the debt cost for corporate securities issued by foreign companies (Yankee bonds) and by American companies in the North-American market. The coupons of 2,445 Yankee bonds of 68 countries from 1991 to 2014 were analyzed. The main ascertainment of this research was that a better governance level of the country compensates the impact of asymmetrical information on the debt cost of the companies located in that country. It was observed that the Yankee bonds of companies settled in countries with greater protection and application of the Law presented a debt cost significantly lower than the securities of comparable American companies. Likewise, for foreign companies settled in countries with worse control on the auto-negociation, the debt cost was significantly higher, due to greater information asymmetry.

From the empirical-exploratory studies reviewed in this section, it is noticed that the studies were divided basically in four large interest areas in researches: (i) issues related to the credit risk rating, the role of the rating agencies and the fundraising cost of securities; (ii) issues related to the corporate governance and the costs regarding the conflict of agents between boldholders and shareholders; (iii) the hurdles for the development of the secondary market of debentures in Brazil and (iv) determining variables for debenture pricing. The aim of this study is related to this last field of study, since it intends to check which were the variables that influenced, the most, measurement of the yield offered by the debentures in Brazil from 2004 to 2013.

3. METHODOLY

According to this research objective, this study can be divided in two parts. The first one, which aims to conduct a survey of the characteristics of the debentures issued by Brazilian companies in the last ten years can be classified as an exploratory research. According to Gil (2002), exploratory research is the one which has the basic aim of giving better familiarity with the problem, in order to make it more explicit. Thus, the exploratory research is considered the first step of every scientific work, and it is preliminar to other kinds of research.

Still regarding the exploratory research, Gil (2002) states that it usually happens via a bibliographic research. In this case, the bibliographic research was performed in two parts. The first one to survey academic studies developed in Brazil on the theme at issue and the second survey, to collect the research data, was carried out at the SND website.

Thus, the source for obtaing data used in this research is classified as secondary and it was taken from the SND database, available at www.debentures.com.br. The SND is a system developed by the *Associação Brasileira das Entidades dos Mercados Financeiro e de Capitais* – Brazilian Association of Financial and Capital Markets Entities - (ANBIMA), settled in 2009 as a result of the joint of the *Associação Nacional dos Bancos de Investimento* – Investment Bank National Association - (ANBID) and the *Associação Nacional das Instituições do Mercado Financeiro* – Financial Market National Institution Association - (ANDIMA) aiming to electronically process the registration, the custody and the transactions with debentures in Brazil.

In the second part of this research, a multiple linear regression was carried out. In this respect, this study can be classified as a descriptive and causal research. According to Gil (2002), descriptive research is the one which aims to describe the characteristics of a certain phenomenon, establishing relationships between two or more variables. In this research, the relationships existing between the characteristics of debenture issuance and their remuneration will be checked.

On the other hand, the causal study, according to Hair Jr. et al. (2005, p. 89), is the one which tests whether an event causes another or not. For the authors, causality means that the change in a variable (cause) leads to a change in another variable (effect). In this study, the causes to be tested are changes in the credit rating grade, in the redemption period (maturity) and in the collars offered by the debentures, while the effect is the securities remuneration rate.

To Gujarati (2011, p. 39), the regression analysis deals with the study of a variable dependence (called dependent variable) in relation to one or more variables (called independent or explanatory variables), in order to estimate the medium value of the first one regarding known or fixed values of the second one. In this study, the dependent variable is the debenture coupon and the independent variables are rating, redemption period and the securities collars. The 01 expression which follows presents a functional form of the multiple linear regression model used in the research.

$$RENTAN_i = \alpha_1 + \alpha_2 MATUR + \alpha_3 RATCAT + \alpha_4 DGREAL + \alpha_5 DGFLUT + \alpha_6 DGQUIR + erro \quad (01)$$

According to the model above, the variables used in this study are defined as:

• RENTAN – Annual Profitability: debenture remuneration rate (coupon) expressed in percentage pegged to an index specified in the debenture indenture, such as the ID, IGPM or IPCA.

• MATUR – Maturity of the Debenture: expressed in years, it corresponds to the average redemption period of the securities principal.

• RATCAT – Categorized Rating: Value from 1 to 22, in which the maximum grade indicates that the debenture issued has a lower credit risk (see Table 5).

• DGREAL – Fixed Collar Dummy: binary variable which takes the value 1 when the debenture collar is fixed, and 0 when there is another type of collar.

• DGFLUT – Floating Collar Dummy: binary variable which takes value 1 when the debenture collar is floating, and 0 when there is another type of collar.

• DGQUIR – Unsecured Collar Dummy: binary variable which takes the value 1 when the debenture colalr is unsecured, and 0 when there is another type of collar.

To carry out the analysis of this econometric model, the E-Views 7 software was used. The data used in this study were collected at SND. Some data were neither disclosed for most of the debentures issued nor were available on the consultation date, such as rating. To solve such crucial matter for the development of the study, a detailed research was carried out at the websites of the risk rating agencies: Fitch Ratings, Standard & Poor's and Moody's.

Another necessary piece of information for carrying out this study was the rating categorization, in order to equate the grades disclosed in the debenture issuances performed by different agencies. This categorization was carried out following the model extracted from Amira (2004), Gabbi & Sironi (2005) and Paiva (2006). The categories are presented in Table 1. For regression, the lowest rating of each issuance was considered. For this analysis, information from 1,520 debentures issued from 2004 to 2013 were collected.

The database was built up from reliable data, and special care was required so that some information was dully clarified, such as rating assigned by the risk rating agencies. The database provided by the SND is not complete, and the rating found at the websites of the agencies was updated for the current date, being unable to know its value when a determined debenture was issued.

Table 1 – Rating categorization by 3 risk rating agencies

Austin/Atlantic	Fitch Rating	Standard & Poor's	Moody's	Categorização
AAA	AAA(bra)	brAAA	Aaa.br	22
AA+	AA+(bra)	brAA+	Aa1.br	21
AA	AA(bra)	brAA	Aa2.br	20
AA-	AA-(bra)	brAA-	Aa3.br	19
A+	A+(bra)	brA+	A1.br	18
A	A(bra)	brA	A2.br	17
A-	A-(bra)	brA-	A3.br	16
BBB+	BBB+(bra)	brBBB+	Baa1.br	15
BBB	BBB(bra)	brBBB	Baa2.br	14
BBB-	BBB-(bra)	brBBB-	Baa3.br	13
BB+	BB+(bra)	brBB+	Ba1.br	12
BB	BB(bra)	brBB	Ba2.br	11
BB-	BB-(bra)	brBB-	Ba3.br	10
B+	B+(bra)	brB+	B1.br	9
B	B(bra)	brB	B2.br	8
B-	B-(bra)	brB-	B3.br	7
CCC+	CCC+(bra)	brCCC+	Caa1.br	6
CCC	CCC(bra)	brCCC	Caa2.br	5

CCC-	CCC-(bra)	brCCC-	Caa3.br	4
CC	CC(bra)	brCC	Ca.br	3
C	C(bra)	brC	C.br	2
D	D(bra)	brD	D.br	1

Source: Adapted from Paiva (2006) and Amira (2004)

In this research, just the debentures which had remuneration pegged to the ID, IGP-M and IPCA were considered. Thus, this work´s final sample had 1,253 observations altogether. in which, 1,033 observations were pegged to the ID (82.4%), 42 to the IGP-M (3.4%) and 178 to the IPCA (14,2%).

To analyze the presence of multicollinearity in the regressions, the VIF values of the Variance Inflation Factor (VIF) for the regressions were estimated, as suggested by Kutner *et al.* (2004). The serial autocorrelation was tested by the DW Test proposed by Durbin & Watson (1971). And for the heteroskedasticity effect, the test proposed by White (1980) was used. Finally, the RESET test proposed by Ramsey (1969) was carried out as robustness test of the regression models.

4. RESULTS

In this section, the results of the explanatory research carried out aiming to describe the main characteristics of the debentures issued by Brazilian companies from 2004 to 2013, comprising a ten-year period, is presented first.

Information referring to the financial volume raised by Brazilian companies via the issuance of debentures from 2004 to 2013 compared to the volume of funds raised via share issuance in primary and secondary offers was collected. Table 2 presents these data in a year-to-year comparative manner.

Table 2 – Comparative of the volume raised in shares and debentures from 2004 to 2013

		PRIMARY		SECONDARY		TOTAL	
	Types of Offers	**Records**	**Volume raised (in R$)**	**Records**	**Volume raised (in R$)**	**Records**	**Volume raised (in R$)**
2004	**Shares**	9	4,522,552,764.89	12	4,682,650,177.38	21	9,205,202,942.27
	Debentures	38	9,614,451,500.00	0	-	38	9,614,451,500.00
2005	**Shares**	13	4,559,643,361.71	15	6,581,611,678.44	28	11,141,255,040.15
	Debentures	45	41,538,852,293.88	0	-	45	41,538,852,293.88
2006	**Shares**	29	14,212,632,881.23	30	12,771,278,339.25	59	26,983,911,220.48
	Debentures	47	69,464,083,040.20	0	-	47	69,464,083,040.20
2007	**Shares**	59	33,200,705,420.02	44	34,122,238,111.60	103	67,322,943,531.62
	Debentures	43	46,533,786,496.75	0	-	43	46,533,786,496.75
2008	**Shares**	9	32,148,102,600.43	4	1,855,893,276.00	13	34,003,995,876.43
	Debentures	25	37,458,538,000.00	0	-	25	37,458,538,000.00
2009	**Shares**	15	15,895,345,759.00	13	16,385,002,298.00	28	32,280,348,057.00
	Debentures	20	11,080,348,105.00	0	-	20	11,080,348,105.00

2010	Shares	23	145,208,531,033.85	11	6,799,036,009.50	34	152,007,567,043.35
	Debentures	19	15,634,956,000.00	0	-	19	15,634,956,000.00
2011	Shares	22	13,535,928,827.36	11	4,779,709,032.00	33	18,315,637,859.36
	Debentures	9	3,180,000,000.00	0	-	9	3,180,000,000.00
2012	Shares	10	7,364,983,976.05	6	1,523,279,337.50	16	8,888,263,313.55
	Debentures	21	50,047,485,000.00	0	-	21	50,047,485,000.00
2013	Shares	16	6,223,202,789.64	8	13,392,848,412.78	24	19,616,051,202.42
	Debentures	16	10,944,760,000.00	0	-	16	10,944,760,000.00
TOTAL	Shares	205	276,871,629,414.18	154	102,893,546,672.45	359	379,765,176,086.63
	Debentures	283	295,497,260,435.83	0	-	283	295,497,260,435.83

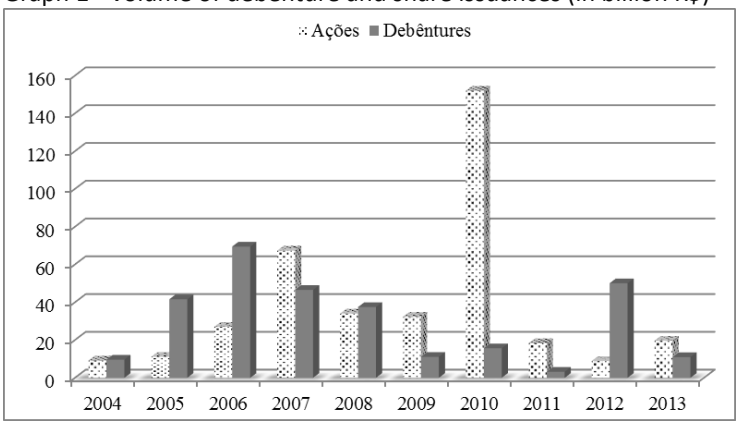
Source: Adapted from *Comissão de Valores Mobiliários* – Securities and Exchange Commission - (www.cvm.gov.br).

As it can be observed in Table 2, there was substantial variation in the issuance of debentures and shares over these ten years. In total, the issuance of debentures, in volume, was surpassed in 29%, with emphasis on 2007 and 2010, which registered the greatest share issuances in the period. 2007 recorded the largest number of records in the period analyzed, 103. This was an unusual year for the Brazilian economy, with 59 companies offering shares in the primary market and 44 companies offering shares in the secondary market. On the other hand, in 2010, the greatest volume of shares of the period was recorded; such a fact was due to the record issuance of shares of Petrobras worth R$ 110.57 billion – according to prospect of the company´s public offering.

The figures presented in Table 2 reflect faithfully the behavior of corporate fundraising before, during and after the 2008 financial crisis. Up to 2007, the gradual increase of fundraising via share issuance is obvious. In 2007, for instance, 103 public offerings of shares (POS) were recorded, which represented a total fundraising of more than 67 billion Reais. In the following year, which was marked by the bankruptcy of Lehman Brothers bank and the outbreak of the world financial crisis, only 13 POSs were recorded in Brazil, which represented a little over 34-billion-real fundraising for Brazilian companies. It is worth highlighting that the capital market close in that period was also followed by the bank credit market close, which hampered even more the fundraising for the corporate investments and marked the beginning of a long period of unemployment rise in Brazil.

Based on the information on Table 2, both Graph 1 and Table 3 were built in order to allow a better view of the evolution of total volume of the funds raised by Brazilian companies from 2004 to 2013 via the two types of the most significant transferable securities in Brazil and the series descriptive statistics.

Graph 1 - Volume of debenture and share issuances (in billion R$)



Source: Adapted from *Comissão de Valores Mobiliários* – Securities and Exchange Commission - (www.cvm.gov.br).

As it can be observed in Graph 1, the volume raised both by the issuance of debentures and the share offering fluctuated a lot in the last ten years, the debt issuance reached a peak in 2006 and the sales of shares reached a maximum volume in 2010. Regarding the issuance of debentures, it was observed that the volume more than quadrupled from 2004 to 2005, followed by a 16% rise in 2006, and then suffered a fall year after year, reaching the lowest level in 2011, and recovering in 2012.

The preference alternation for the fundraisig sources (debentures and shares) seen in Graph 1 can be, in parts, explained by the fluctuations in the basic interest rate of the Brazilian economy. In the early 2009, the SELIC (*Sistema Especial de Liquidação e Custódia* – Special System for Settlement and Custody) defined by the *Comitê de Políticas Monetárias* – Monetary Policy Committee - (COPOM) was at 8.75% a year. On 04/29/2010, the rate was increased to 9.50% a year. On 06/10/2010, the rate was increased again to 10.25% a year. Also in 2010, the SELIC was increased to 10.75% a year (07/22/2010). In the beginning of 2011, it was increased, again, to 11.25% a year and then to 11.75% (03/03/2011), followed by new rises, reaching 12.5% in July/2011. These increases in the basic interest rates of the Brazilian economy tend to increase the cost of opportunity of the investors in debentures, who start to claim higher yields to invest in corporate bonuses. At moments like that, the companies tend to opt for reducing their fundraising via debt issuance and prioritizing the share issuance, as seen in the data presented in Table 2 and Graph 1, complemented by Table 3.

Table 3 – Descriptive Statistics of the volume

	Debentures	**Shares**	
		Primary	**Secondary**
Average	R$ 29,549,726,043.58	R$ 27,687,162,941.42	R$ 10,289,354,667.25
Median	R$ 26,546,747,000.00	R$ 13,874,280,854.30	R$ 6,690,323,843.97
Maximum	R$ 69,464,083,040.20	R$ 145,208,531,033.85	R$ 34,122,238,111.60
Minimum	R$ 3,180,000,000.00	R$ 4,522,552,764.89	R$ 1,523,279,337.50
Standard deviation	R$ 22,315,221,292.51	R$ 42,593,181,902.50	R$ 9,761,605,563.34

Source: Adapted from *Comissão de Valores Mobiliários* – Securities and Exchange Commission - (www.cvm.gov.br).

The companies define the characteristics of the debentures issued, in this process they can also include specific provisions for the issuance of a determined debenture series, such as

profit participation, possibility of conversion into shares and renegotiations. These facilities make the debenture market more attractive, becoming one of the most used instruments for medium and long-term fundraising, and it is more and more present in several fields of activities of the Brazilian economy as illustrated in Table 4, which shows the percentage share of the sectors of activities in the volume of debentures registered at the CVM in this ten-year study.

Table 4 – Main activity sectors of issuing companies

Sector	Percentage	Sector	Percentage
Financial	17.53%	Construction Industry	5.34%
Electrical Power	15.28%	Sanitation	4.96%
IT and Telecommunications	11.93%	Retail Trade	3.06%
Transportation and Logistics	11.58%	Insurance Company	2.93%
Ventures and Shareholdings	8.97%	Others	18.43%

Source: Adapted from SND, 2014

The allocation of financial funds obtained by the issuing companies is illustrated in Table 5, and the purposes are different: lengthening of the indebteness profile, project implementation, investiment in infrastructure, raising working capital, among others.

Table 5 – Allocation of funds raised

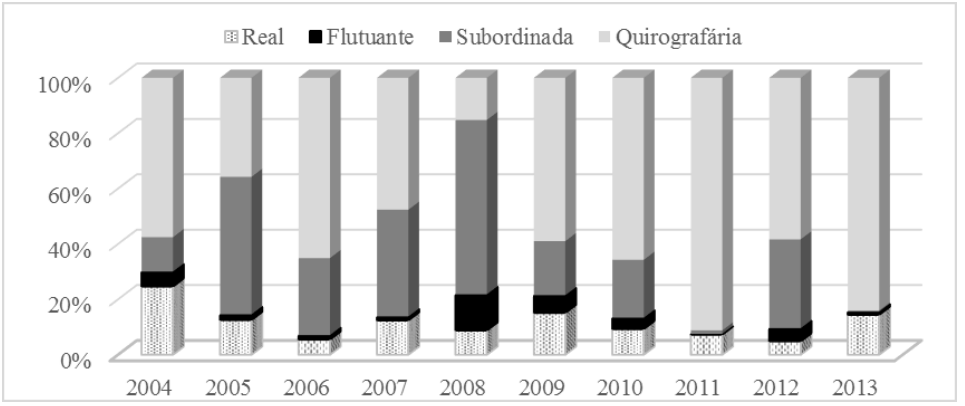
Lengthening of indebteness profile	28.66%
Working capital	15.41%
Decrease of liabilities	8.75%
Buyback or redemption of debentures of earlier issuance	7.84%
Investment or acquisition of equity holdings	7.32%
Acquisition of goods for leasing	6.65%
Other allocations	4.08%
Project implementation	1.83%
Investment in infrastructure	1.64%
Corporate restructuring, modernization and recovery	1.11%
Investment in assets	1.06%
Not disclosed	15.65%

Source: Adapted from SND.

As it can be observed in Table 5, if the three lines in common are added, namely, (1) “Lengthening of the indebteness profile – 28.66%”, (2) “Decrease of liabilities – 8.75%” and (3) “Buyback or Redemption of Debentures of Earlier Issuance – 7.84%”, almost half (45.25%) of the fundraising via debenture issuance by Brazilian companies had as allocation the decrease of debts. The remainder (54.75%) was allocated to several projects of corporate investment, both short-term (as working capital) and long-term (assets and restructurings).

Graph 2 shows the percentage share of each one of the collar types of the debentures issued by Brazilian companies from 2004 to 2013.

Graph 2 – Species of collars offered by the debentures issued in Brazil

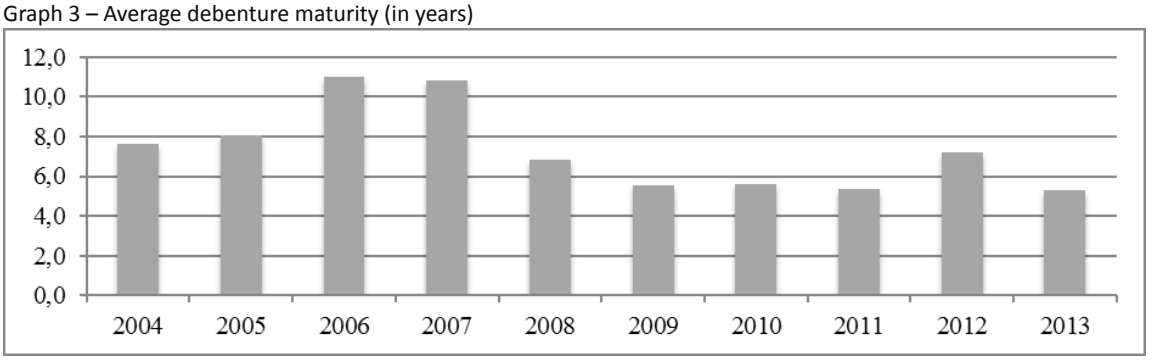


Source: Adapted from SND.

As it can be seen in Graph 2, only in 2005 and 2008, the volume of debentures with subordinated collars were higher than the other collars; in all the other years, which prevailed were the unsecured (naked) debentures. On the other hand, the debentures with floating charge and fixed charge represent the least proportion of collar types offered in the 10 years studied.

The average debenture principal redemption maturities, year after year, are represented in Graph 3 which shows the average maturity of the debentures in years.

Graph 3 – Average debenture maturity (in years)



Fonte: Adaptado de SND.

Graph 3 shows that the maturity of the debentures issued in Brazil was greater in the period before the 2008 crisis. The reduction of the maturity date the debentures after the beginning of the world financial crisis is due to the early redemptions carried out by Brazilian companies in the debentures issued mainly in 2008. Because of the crisis, the bank credit volume was decrease and the interest rates were raised. Over time, as the access to bank credit returned to the levels before the crisis, the companies began buying their debentures back, since the coupon rates were very high. These early redemptions explain the maturity decrease observed in 2009, 2010 and 2011.

Another important characteristic of the debenture is that they can be classified as ordinary or convertible into shares and the numbers issued in the last ten years are summarized in Table 6.

Table 6 – Class of the debentures issued in the last 10 years

	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	Total
Ordinary	45	58	69	77	38	112	196	213	359	345	1512
Convertible	2	0	0	2	2	1	0	0	0	1	8
Total	47	58	69	79	40	113	196	213	359	346	1520

Source: Adapted from SND, 2014

The data of Table 6 show that the majority of the debentures issued in Brazil in the last decade is ordinary, that is, the one in which the main value is given back to the bondholders on the securities maturity date. The number of issuances of debentures convertible into shares is minimal, representing less than 0.5% of the total issued in the last 10 years, demonstrating the preference for the issuance of ordinary shares by Brazilian companies.

4.2 Regression Analysis

Table 7 presents the descriptive statistics of the debenture series indexed to the ID.

Table7 – Descriptive Statistics of the variables selected – debentures indexed to the ID

	RENTAN	RATCAT	MATUR
Average	0.11	17.99	6.50
Median	0.11	18.00	5.07
Maximum	0.24	22.00	30.44
Minimum	0.06	1.00	-1.73
Standard Deviation	0.03	3.14	5.19

As it can be observed in Table 7, the average yield of the post-fixed debentures issued by Brazilian companies in this study´s period of analysis was, approximately, 11% a year (6% minimum yield and 24% maximum yield a year). The average categorized rating was 18 points and the average maturity was 6 and a half years.

Afterwards, a multiple regression was performed and the result is presented in Table 8. The result of the model proposed presents very low (8%) explanatory power (adjusted R-squared). In this model, it can be verified that the constant is statistically significant at 1% level and the “floating charge” control variable (DGFLUT) at 1% level. The rating test variable (RATCAT) was not statistically significant in this regression.

Table 8 – Result of the Multiple Regression– RENTAN debentures indexed to the ID

Variable	Coef.	T Stats	p-value	VIF
Constant	0.129	18.913	0.000	
MATUR	0.000	0.650	0.516	1.469
RATCAT	0.000	0.066	0.948	1.186
DGREAL	-0.028	-7.409	0.000	2.237
DGFLUT	-0.015	-2.642	0.008	1.401
DGQUIR	-0.024	-7.458	0.000	2.625
R-squared	0.084	Durbin Watson Stats		1.314
Adjusted R-squared	0.080	White Test (F Stats)		0.622
Observations	1033.000	White Test (p-value)		0.849
F Stats	18.924	RESET Test (F. Stats)		0.158
p-value	0.000	RESET Test (p-value)		0.691

The process was repeated for the debentures indexed to the IGP-M, and a descriptive analysis of the variables was performed, according to data presented in Table 9.

Table 9 – Descriptive Statistics of variables selected – Debentures indexed to the IGP-M

	RENTAN	RATCAT	MATUR
Average	0.07	18.21	6.72
Median	0.08	18.00	6.09
Maximum	0.12	22.00	14.75
Minimum	-0.01	13.00	1.44
Standard deviation	0.04	1.63	2.47

A comparative analysis between the results presented in Tables 7 and 9 shows that the average yields (11% a year) of the debentures indexed to the ID (Table 7) were higher than the average returns (7% a year) of the securities adjusted by the IGP-M (Table 9). As known, the ID is, historically, very close to the SELIC. Since the basic interest rate in Brazil (SELIC) was, in the ten-year period of this study, higher than the inflation rates measured by the IGP-M, the debentures pegged to the ID paid higher interest rates to the investors. Nevertheless, these results do not corroborate Paiva´s (2006) findings, who analyzed 154 Brazilian debenture registers issued from 2000 to 2005 and detected that the securities pegged to the IGP-M offered the bondholders greater return.

One of the factors which can explain high interest rates incurred by Brazilian companies when issuing debt comes from the widely known fact that Brazil has the highest real rates in the world. Nevertheless, other factors can contribute to that, such as, for instance, the information asymmetry of issuing companies, as highlighted by Derrien, Kecskés & Mansi (2016), the low level of control exerted by the creditor, as emphasized by Feldhütter, Hotchkiss & Karakas (2016) and the low level of corporate governance in the country, as Cai (2017) highlighted.

After that, the multiple regression was carried out and the result is presented in Table 10.

Table 10 – Multiple regression result – RENTAN debentures indexed to the IGP-M

Variable	Coef.	T Stats	p-value	VIF
Constant	0.303	5.018	0.000	
MATUR	-0.004	-1.874	0.069	1.032
RATCAT	-0.011	-3.526	0.001	1.045
DGREAL	-0.005	-0.213	0.833	5.564
DGFLUT				
DGQUIR	-0.002	-0.090	0.929	5.485
R-squared	0.331	Durbin Watson Stats		0.801
Adjusted R-squared	0.258	White Test (F Stats)		2.075
Observations	42	White Test (p-value)		0.059
F Stats	4.573	RESET Test (F Stats)		0.019
p-value	0.004	RESET Test (p-value)		0.892

On the other hand, the rating variable (RATCAT) turned up statistically significant at 1% level for the debentures which used the IGP-M as remuneration index, as well as the constant. Moreover, it presented the expected negative signal, since it is expected that the greater the rating assigned to the debenture, the lower the risk of default and, consequently, the coupon will also be lower. In this case, the statistical significance of the maturity variable was also verified. The significance of these variables corroborated the explanatory power of the regression model (R^2) to be greater: 33.2%.

The statistical significance of the dummy variables and the conflicting signals may have been influenced by the data sample containing a quite limited number of observations, only 42. Nevertheless, they can also be explained by the lack of contractual safeguard provisions which back up the investors, just as these characteristics may have been already considered in the rating calculation.

Finally, a descriptive analysis of the variables whose debentures were indexed to the IPCA was performed, as presented in Table 11.

Table 11 – Descriptive statistics of the variables selected – debentures indexed to the IPCA

	RENTAN	RATCAT	MATUR
Average	0.06	17.47	7.70
Median	0.06	18.00	7.10
Maximum	0.12	22.00	26.29
Minimum	0.00	8.00	2.03
Standard Deviation	0.03	2.80	3.59

Afterwards, the multiple regression was carried out and the result is presented in Table 12.

Table 12 – Multiple Regression Result – RENTAN - debentures indexed to the IPCA

Variable	Coef.	T Stats	p-value	VIF
Constant	-0.019	-0.775	0.439	
MATUR	0.001	1.728	0.086	1.150
RATCAT	0.000	0.119	0.905	1.037
DGREAL	0.071	3.544	0.001	20.981
DGFLUT	0.053	2.158	0.032	3.174
DGQUIR	0.064	3.190	0.002	22.065
R-squared	0.092	Durbin Watson Stats		1.799
Adjusted R-squared	0.065	White Test (F Stats)		0.794
Observations	175	White Test (p-value)		0.666
F Stats	3.419	RESET Test (F Stats)		3.217
p-value	0.006	RESET Test (p-value)		0.075

This regression reveals that, for this index, the explanatory power of this model was also low, 9.2%. The rating variable (RATCAT) did not present statistical significance. In this model, the only variables which really presented significance were the dummies, all of them being at the 5% level.

Regarding the Variance Inflation Factor (VIF) tests for the regressions, as suggested by Kutner *et. al.* (2004), the results did not evince multicollinearity. According to Kutner *et al.* (2004), if the values are higher than 10, there are strong evidences of multicollinearity. In this case, only two dummy variables of the regression of the debentures indexed to the IPCA had this effect. It happens because, mostly, these debentures have either fixed charge or are unsecured (naked). Nevertheless, it was chosen to allow the variables, since they did not commit the modeling.

The results of the DW test proposed by Durbin & Watson (1971) indicated, in the three cases, that it was not possible to evince the problems of serial correlation in the residuals. For the heteroskedasticity effect, proposed by White (1980), in the regression models of debentures indexed at the ID and IGP, the hypothesis of homokesdasticity was not rejected.

Finally, the RESET test proposed by Ramsey (1969) indicated that there was specification flaw of the models, since in all the cases the null hypothesis of bad specification was rejected at 5%.

5. CONCLUSIONS

This work sought to reach two objectives. The first one was to present an overview of the general characteristics of the debentures issued by Brazilian companies in the last ten years, such as the volume raised year after year, sectors of economic activity of the issuing companies, type of the debenture issued, redemption period, collars offered and the allocation of the funds raised. The second objective was to check which were the variables that influenced the yield rate of these securities, having the credit rating grade, maturity and collars offered analyzed.

The main findings of the exploratory study were that the debentures represent an important fundraising source for the Brazilian companies (whose total raised volume is close to the funding from shares); that the majority of the debentures issued did not offer fixed or floating charges; that the average maturity of the securities was about six years; that virtually the totality of the securities issued are not convertible into shares; and that the main allocation of funds raised was the lengthening of the companies´indebtedness profile.

The analysis of the regression model descriptive statistics showed that the debentures pegged to the Interbank Deposit paid the highest average yearly coupons (11%), presented the

worst credit rating grades and had the lowest average maturity (6.5 years). The debentures pegged to the IGPM presented the best ratings, while the securities pegged to the IPCA paid the lowest average yearly coupons (6%) and had the longest payment period (7.7 years). The regression model proposed presented better explanatory power for the coupons of the debentures pegged to the IGPM, and, for these debentures, the explanatory maturity variables and the rating presented statistical significance.

Nevertheless, the model proposed did not turn up to be consistent for the debentures indexed to the ID and IPCA. The variables analyzed were not statistically significant in order to explain the coupon rate; therefore, it was not possible to reach the same conclusions of Sheng & Saito (2008) as it was expected. At this point, it is worth highliting that the empirical findings of this exploratory research corroborate what had been pointed in a national study previously developed by Anderson (1999). For the author, the prevalence of issuance of post-fixed debentures, indexed sometimes by the ID, sometimes by the IGPM, sometimes by the IPCA, is due to some characteristics of the Brazilian economy, with emphasis to the high economic volatility, high transaction costs and the fragility of the national institutions.

Since the independent variables chosen for the regression model used in this research were not able to explain the remuneration rate of debt securities issued by the national companies in the last ten years, it is suggested that subsequent researches examine the other explanatory variables of the coupons of the debentures of Brazilian companies.

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Contribution	Author 1	Author 2	Author 3	Author 4
1. Definition of research problem	√		√	
2. Development of hypotheses or research questions (empirical studies)	√		√	
3. Development of theoretical propositions (theoretical work)	√			
4. Theoretical foundation / Literature review	√			
5. Definition of methodological procedures	√	√		
6. Data collection	√			
7. Statistical analysis	√	√		
8. Analysis and interpretation of data	√		√	
9. Critical revision of the manuscript				√
10. Manuscript writing	√	√	√	√
11. Other (please specify)				