



# Announcements of debenture issues and the impact on stock returns in Brazil (1989-2020): A bootstrap-based study

*Anuncios de emisiones de debentures y el impacto en la rentabilidad de las acciones en Brasil (1989-2020): un estudio basado en bootstrap*

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## Abstract

This study aims to evaluate the impact of announcements of debenture issues on the stock market of companies listed in the Brazilian stock exchange, [B]<sup>3</sup>. This study differs for three main reasons: the timeliness of the data (May 2020), which is configured as a natural contribution due to the temporal opportunity, the scope of the sample, and the methodology. From a large sample consisting of 723 debenture announcements that occurred between October 1989 and May 2020, abnormal returns (AR) and accumulated abnormal returns (AAR) were calculated, and the strategy adopted was the study of events based on Bootstrap. The results indicated that the market reacts negatively to announcements of debenture issues in two ways. The first was evidenced by the increased dispersion of returns, indicating an increased risk perception of issuing companies, and the second was evidenced by the AAR, which were negative after the announcement.

*JEL Code:* G10, G14, G32

*Keywords:* study of events; bootstrap; market efficiency; debentures; return on stock

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## Resumen

Este estudio tiene como objetivo evaluar el impacto de los anuncios de emisiones de debentures en el mercado de valores de las empresas que cotizan en la bolsa de valores de Brasil, [B]3. Este estudio se diferencia por tres razones principales: la oportunidad de los datos (mayo de 2020), que se configura como un aporte natural por la oportunidad temporal, el alcance de la muestra y la metodología. A partir de una amplia muestra compuesta por 723 anuncios de debentures ocurridos entre octubre de 1989 y mayo de 2020, se calcularon los retornos anormales (AR) y los retornos anormales acumulados (AAR), y la estrategia adoptada fue el estudio de eventos basado en Bootstrap. Los resultados indicaron que el mercado reacciona negativamente a los anuncios de emisiones de debentures de dos formas. El primero se evidenció por la mayor dispersión de los retornos, lo que indica una mayor percepción de riesgo de las empresas emisoras, y el segundo se evidenció por las AAR, las cuales fueron negativas luego del anuncio.

*Código JEL:* G10, G14, G32

*Palabras clave:* estudio de eventos; bootstrap, eficiencia del mercado; obligaciones; rentabilidad de las acciones

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## Introduction

Current financial theory suggests that companies should aim to maximize their value when making decisions regarding capital structure and capital budget. According to Ross et al. (2015), investment decisions and profit distribution (earnings) complete the triad of decision sets that characterize companies' financial management, and also maximize its value. For Brito et al. (2007), company financing is one of the most relevant themes in financial theory.

Decisions on how to finance a company lead to the formation of capital structure, which is the combination of long-term sources of funds (equity and third parties) equal to the volumes raised. This enables the existence and continuity of the company in carrying out its investment projects. However, the question is: What is the best way to finance a given company? We searched for a capital structure with the lowest possible cost that maximizes the value of the projects and the company.

Third-party capital has a lower cost than equity, because it is expressed as a relationship between legally paying the company's interest and principal obligations and generally relying on guarantees, while capital itself is a residual beneficiary of the company's cash flows. Thus, in principle, the greater the share of third-party capital in the company's financing, the lower is the weighted average cost of its capital structure. However, if the company's leverage rises significantly, its perceived market insolvency risk also increases, resulting in two important effects: (i) the rise in the cost of new loans, and (ii) an expectation of greater return from equity providers as a way of offsetting the greater risks assumed. Despite the apparent cancellation of movements in the costs of capital sources to determine a change in the weighted average cost of the company's capital structure, the effects are not linear but exponential.

This implies that it is possible to achieve minimum cost for the capital that finances the company, thus maximizing its value.

Given these considerations, the question now is: when publicly traded Brazilian companies raise funds from third parties by using the capital market and possibly changing their capital structure, will it affect their market value?

The consideration of companies to operate in the capital market is relevant to informational efficiency. The instrument that is most used by companies to raise long-term funds in the private debt market is debenture. It is a long-term debt security issued by corporations with authorization from the Securities and Exchange Commission (Comissão de Valores Mobiliários – CVM), a federal agency that regulates and supervises the Brazilian securities market. Debenture issues involve a wide disclosure of information to market participants about the company, its operations, and its securities. One evident hypothesis in this context is that the market would be able to price the impact of the issuance of debentures on the company's value, which would then be reflected in the price of the shares listed on the stock exchange. In other words, raising capital from third parties can change the company's capital structure, its cost, and its value, which would be reflected in the price of its shares. Any detection of a price change for debentures issues by the market has implications on the informational efficiency of the Brazilian capital market, more specifically on semi-strong informational efficiency, as proposed by Fama (1970).

According to the CVM (2019), the Brazilian private debt market has four main funding instruments: debentures, certificates of real estate receivables (certificados de recebíveis imobiliários - CRI), certificates of agribusiness receivables (certificados de recebíveis do agronegócio - CRA), and promissory notes. The first three instruments are used to raise long-term funds, aimed to finance projects that demand a large number of resources and longer terms, such as infrastructure. Promissory notes are short-term notes payable (valid up to one year) dedicated to raise short-term funds that finance the company's activities and support its working capital. All of them are also considered financial assets traded in the secondary market, representing alternatives for the composition of diversified investment portfolios for investors of all types.

The vast majority of publicly traded Brazilian companies make use of funds raised by third parties through debentures and promissory notes. However, the main source for the short-term funds has always been the so-called free credit, in which loans are contracted with banks. A very restricted group of companies issue CRI or CRA. Considering that the resources available for conventional loan operations (contracted debt) on a long-term basis are scarce and are generally offered by development banks, the debentures gain importance as a source of third-party funds in the composition of companies' capital structures. Figure 1 shows the growth in total annual volume raised by Brazilian companies, through the issuance of debentures from 2015 to 2019.

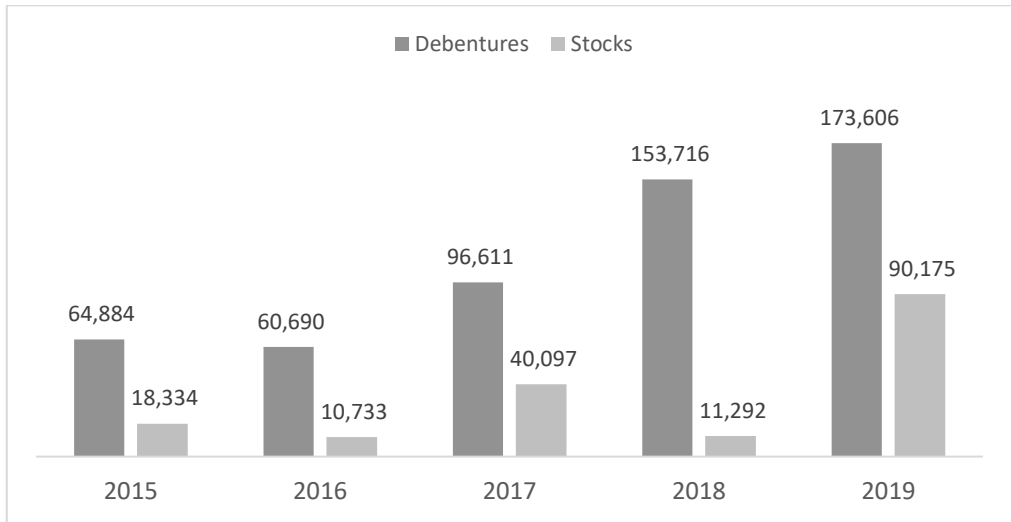


Figure 1. Total annual volume in issues of debentures and stock [R\$ million] (2015-2019).  
 Data source: Anbima (2020).

Figure 2 shows the average participation of each type of financial asset in the total volume of fixed income securities issued in the Brazilian capital market from 2011 to 2018, with debentures accounting for 62.8 % of the total volume of financial issues. This reinforces the importance of this study on the issuance of debentures in the Brazilian market.

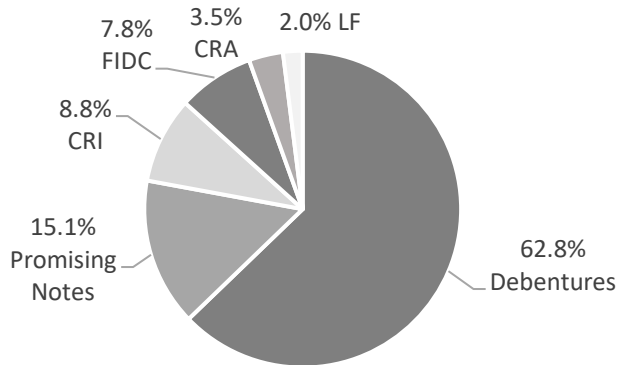


Figure 2. Average share of assets in the total annual volume of fixed income securities issued (2011 to 2018).  
 Data source: CVM (2019).

Given that debentures constitute majority of the total volume of financial issues, which publicly traded companies use to raise long-term funds in the Brazilian capital market environment, this study aims

to detect and measure the impact of the behavior of the returns from price variations of the companies' shares, caused by the issuance of debentures. For this purpose, the event study technique was applied to 723 debenture issues, between 1989 to 2020.

Other studies that contributed to the understanding of this question, such as those by Sanvicente (2001), Santos et al. (2006), Coelho (2008), Batista (2013), and Matsumoto et al. (2018) were carried out nationwide. However, other than the scarcity of literature that explores this field of knowledge, there were also only a few contributions made in the last decade. All previous studies used the event study technique, considering previous statistical distributions of data.

This study differs for three main reasons: the timeliness of the data (May 2020), which is configured as a natural contribution due to the temporal opportunity, the scope of the sample, with 723 out of 3,729 debenture issues on the Brazilian market registered in [B]3, referring to a period greater than 30 years, between 1989 and 2020, and the adoption of an investigation strategy/methodology using the Bootstrap-based event study technique, which provides greater robustness to the results instead of adopting previous statistical distributions. Based on this methodology, the return and risk of companies after the issuance of the debentures were evaluated.

The survey findings indicate that the market reacts negatively to announcements of debenture issues in two ways. First, there was an increased dispersion of returns, which may suggest an increased risk for debenture-issuing companies. Second, there were negative AR for this group of companies after the issuance of debentures. These results are important because they affect the return and risk assessment of debenture-issuing companies, thus affecting the resource allocation of investors. Furthermore, it is suggested that regulatory agents use this study to assess the impact of the regulatory and institutional environment on the return and risk of companies after the issuance of debentures.

The rest of this study is organized as follows: section 2 presents a theoretical review of the literature with emphasis on national and international studies, and the impact of the issuance of debentures on the return and risk of companies; section 3 describes the Bootstrap methodology, including the sample of the study, return and risk variables, and models used; section 4 discusses the results, the findings of the study and discussions of previous studies; and section 5 reports the conclusion and contribution of the study.

## **Theoretical review**

Many external factors affect the company's ability to choose financing sources, such as the supply of credit, level of interest rates, accessibility of the capital market, and variables of the economic environment (e.g., exchange rate, liquidity, foreign capital flows, risk country, etc.). In addition, there are several internal factors, such as business risk, company size, asset quality, degree of leverage, cost structure, and technological dominance. Therefore, it is difficult to achieve an ideal capital structure. Determining an ideal mix of a company's own resources and a third-party's resources is an ongoing pursuit.

Since the pioneering research of Durant (1952) and Modigliani and Miller (1958, 1963), several theories have been developed on what leads a company to build a certain capital structure. Harris and Raviv (1991) carried out a comprehensive survey in the early 1990s, which revealed theories based on different approaches: the tax benefit of indebtedness, the hierarchy of funding sources, the agency costs, the effect of asymmetric information, and the organizational and corporate control characteristics. To some degree, most of them agree that changes in capital structure can affect the company's value.

Assuming that the value of a company can be obtained as the sum of the present value of the future free cash flows (FCF) generated by the company, it is possible to increase the value of the company by reducing the interest discount rate of these FCF. Thus, it is also possible to increase the value of the company by reducing the weighted average cost of its capital structures. Durant (1952), who was the first to study capital structure in a more analytical way and who proposed the theory that would later become known as "Fundamentalist Theory," and Modigliani and Miller (1958 and 1963), believed that a change in the sources of capital could change the cost of the capital structure, and not a simple change in the proportions of equity and third-party capital in the capital structure. Later studies such as those by Baxter (1967), Miller (1977), and Myers and Majluf (1984), began to present arguments for the hypothesis that changing the proportions between equity and equity-financing third parties, not the costs of the sources, can reduce the weighted average cost of capital and, consequently, reduce the value of the company.

Durand (1952) proposed the theory that became later known as "Traditionalist Theory," which admitted that the company's ability to choose an optimal capital structure can maximize the company's value. Given that the company's value can be estimated based on the sum (of present value) of the FCF generated by the company, it is possible to increase its value by reducing the discount rate of FCF, a rate that depicts the opportunity cost of the capital being employed. Modigliani and Miller (1958) argued that the configuration of a company's capital structure would have an irrelevant impact on its value even in a perfect market environment and in the absence of taxes. In a later study, after criticisms from several researchers, Modigliani and Miller (1963) included taxes, but continued to defend the idea of the

irrelevance of capital structure on the company's value, since the income tax paid on the interest earned by the marginal investor would cancel the tax benefit obtained by the company.

Since the seminal studies of Durant (1952) and Modigliani and Miller (1958 and 1963), several other approaches and hypotheses have generated new theories regarding the capital structure of companies. Such that Harris and Raviv (1991) in the early 1990s analyzed more than 150 works on the topic and defined four categories to frame the contributions made until then. The four categories of theories on capital structure focus on: (i) agency costs, through the works of Myers (1977), Jensen (1986), and Stulz (1990), where capital structure is the result of factors linked to conflicts of interests between creditors and shareholders/managers, and between shareholders and managers of the company, (ii) information asymmetry, through the works of Ross (1977), Myers and Majluf (1984), and Myers (1984), where capital structure is the result of information asymmetry between internal economic agents (owner and managers) and external economic agents/organizations (creditors and other stakeholders); (iii) organizational characteristics, through the works of Titman (1984), Titman and Wessels (1988), and Balakrishnan and Fox (1993), where capital structure is defined as part of a marketing strategy or according to the characteristics of its products / inputs; and (iv) corporate control, through the works of Stulz (1988), and Harris and Haviv (1990), where capital structure is the result of the type of corporate control.

The "Signaling Theory" proposed by Leland and Pyle (1977), is one of the theories that has a greater significance in the investigation of this study. It is a premise of several models and theories in modern finance to assume that in the financial market, all participants have access to the same information. This is an ideal situation, in which information symmetry occurs. However, in the view of Leland and Pyle (1977), this does not happen in reality, instead what happens is a permanent state of information asymmetry.

Basic examples of information asymmetry in the financial market include: the observation that companies, when applying for loans from banks, are more aware of the guarantees they offer, or even the actual financial situation of the company, than banks, or in the case of investment initiatives, in which company managers have more privileged information regarding the projects, relative to potential market investors.

In this last example, according to Leland and Pyle (1977), since market investors cannot adequately assess the quality of companies' projects, they evaluate them by the average, and as a consequence: either lower-quality and higher-risk projects would benefit from this information asymmetry by obtaining resources at a lower cost, or higher quality and less risky projects would be hampered by obtaining higher cost financing. To avoid a further impact of the effects of this information asymmetry,

investors capture the necessary information signaled indirectly by companies. A signal regarding the quality of the projects is identified by observing the decisions about the capital structure of the companies.

For Ross (1977), market investors develop expectations about the future behavior of cash flow generated by companies. A change in the capital structure can modify these expectations because it can reposition a company's perceived risk level. New funds from third parties may also provide signals in both positive and negative directions.

If the company takes long-term resources, it not only shows that it has credit capacity, but also an elongated profile of indebtedness that has potential effect of financial leverage, which increases the return on equity to the same level. In addition, investors can also assess that the company is moving towards a capital structure closer to the ideal, which signals positive signs of indebtedness.

In contrast, if a company seeks financing through third-party capital, it can be interpreted as a lack of cash or a company's inability to finance itself, which signals a negative sign.

Thus, an investigation on the signaling of the issuance of new debts/debentures to the market, and its impact on the company's value occurs with the analysis of the issuance of debentures, or equivalent securities, in capital markets all over the world. In Brazil, the literature that reports the investigation of this relationship (debt issue x market value of the company) is scarce. Few studies have been published in this regard, but with inconclusive results, except for the boundary conditions of each investigation that presented contradictory results. Among these studies, those of Sanvicente (2001), Santos et al. (2006), Coelho (2008), Batista (2013), and Matsumoto et al. (2018) stood out.

Sanvicente (2001) considered the issuance of 55 debentures from 39 Brazilian companies, between January 1997 to June 2001, which were simple and convertible into stock. At the time of the study, since there were companies stock trading ordinary and preferred classes, Sanvicente (2001) considered one event for each type, which totaled an average of 60 events. Applying the event study technique, an event window was adopted for the calculation of the AAR, which is the interval between the registration of the issue and two months immediately prior. The results revealed the absence of statistically significant AR, which means that debenture issues did not influence changes in the company's market value.

Santos et al. (2006) considered not only the issuance of debentures but also other types of fundraising by third-party companies. The data analyzed in the study considered 48 issues, made by 40 issuing companies, between 1995 and 2005. To define the date of the event, the following were considered: the date of registration with the CVM of the issuance of the debentures, and the date of obtaining other types of long-term loans. The results of the study revealed that both events (issue of debentures and contracting of loans) affected prices, and consequently, the returns of companies' shares.



They also detected a positive reaction from the market in relation to the events, as reflected in the appreciation of the companies' shares. However, these results were not statistically significant.

In the study by Coelho (2008), data on 65 debenture issues made by 37 issuing companies from January 2002 to October 2007 were analyzed. The study considered debenture issues only from the companies belonging to the theoretical portfolios of the IBrX100 index (one of the main indexes of the Brazilian stock exchange) in that period. The results revealed evidence that the issuance of debentures affected the company's value. This effect was signaled by the detection of negative average AAR in the days close to the date of the event, which was considered as the issue registration date with the CVM. According to the Coelho (2008), the market's negative reaction may have been caused by an unfavorable signal given by the issuance of debentures. This means that the company signals an inability to finance itself with its own resources, resorting to raising funds from third parties to carry out its projects, consequently, increasing indebtedness.

Batista (2013) analyzed a sample of 255 debenture issues in the Brazilian capital market from 1995 to 2012. After applying the event study technique and adopting the issuance registration with the CVM as the event date, the results revealed that there was no impact of the issue on the company's market value, as reflected in changes in share prices.

Matsumoto et al. (2018) tested the hypothesis that the issuance of debentures should generate positive AR in the price variations of issuing companies' shares. The event study technique was used on data from 11 companies that issued debentures from January 2014 to June 2015. The date of the event was considered as the date of the announcement of the public distribution of the securities, and the analysis was conducted over 40 trading sessions before and after the event. The results confirmed this hypothesis. Positive AAR were statistically significant during the time window of analysis.

Konraht et al. (2020) tested the relationship between the percentage of direct participation in the company (control) and the leveraged debt cost of debenture issues in Brazil from 2011 to 2018. The results show that the concentration of direct control is relevant for debenture holders when pricing securities.

Jayarathne and Samarakoon (2020) tested the effects of listed firms' share prices on the Colombo stock exchange to the right issue announcements for 69 companies from 2012 to 2019, and concluded that the right issue announcements affected the stock prices. The observational findings indicated that the average AR are statistically significant at the right issue announcement day and the day before the event. The cumulative average AR are statistically significant at the right issue announcement dates.

Table 1 shows a summary of these studies published in Brazil over the last 20 years, which investigated the effects of the issue of debentures on the company's value.

Table 1  
 Summary of empirical works published in Brazil (2001-2020)

Article	Data	Results	Conclusion
Sanvicente (2001)	55 issues 39 companies 1997 to 2001	No abnormal returns were detected.	Debenture issues did not affect the company's value.
Santos et al. (2006)	48 issues 40 companies 1995 to 2005	Positive AR detected.	New long-term debt positively affected the company's value.
Coelho (2008)	65 issues 37 companies 2002 to 2007	Negative AR detected.	Debenture issues negatively affected the company's value.
Batista (2013)	255 issues 1995 to 2012	No AR were detected.	Debenture issues did not affect the company's value.
Matsumoto et al.(2018)	11 issues 11 companies 2014 to 2015	Positive AR detected.	Debenture issues positively affected the company's value.
Jayarathne and Samarakoon (2020)	69 companies 2012 to 2019	AR were statistically significant. The cumulative average AR were statistically significant.	The right issue announcements affected the stock prices.

As seen in Table 1, studies conducted in the context of the Brazilian capital market were not conclusive. In two of them, Sanvicente (2001) and Batista (2013), the results did not show the occurrence of AR through variations in stock prices when the debentures were issued by the companies. In two others, Santos et al. (2006) and Matsumoto et al. (2018), the results showed the occurrence of positive AR, with the issuance of debentures positively affected the value of the issuing companies. Only Coelho (2008) detected abnormal negative returns, revealing a negative relationship between new debt and the company's value.

Therefore, this study aims to answer the question: does the issue of debentures affect the market value of the issuing companies? The contribution of this study is intended to be broader than those of previous studies by using data from a larger number of issues, a sample of 723 issues from a population of 3,729 issues that occurred over a longer period of time, between 1989 to 2020 (31 years), and by using an innovative strategy of applying the event study technique based on Bootstrap. This gives greater robustness to the results and does not adopt previous statistical distributions.

In addition to detecting the occurrence of AR, this study also included the detection of variations in the dispersion of stock returns, which may signal variations in the perception of the risks of issuing

companies and investors. In this case, the study assessed the risk and return of companies after the issuance of debentures.

To answer the problem of the study, and based on the literature presented, two hypotheses were formulated. The analysis of these hypotheses was carried out based on the methodology presented in section 3.

Hypothesis 1 (H1): The issuance of debentures positively / negatively affects the return on shares of Brazilian companies.

Hypothesis 2 (H2): The issuance of debentures positively / negatively affects the risk of Brazilian companies' shares.

## **Methodology**

Matsumoto et al. (2018) suggested that the evolution of the study involves testing different dates or events other than what had been tested by previous authors. To address this indication, 3,729 debenture issues from Brazil were collected from the Bloomberg® database. Reinforcing the breadth of this study, it is worth mentioning that in the study by Matsumoto et al. (2018), only the issues that occurred under CVM instruction 400/03 were considered, while there were also issues that occurred under CVM instruction 476/09.

Starting from the first announcement that took place on January 10, 1989 and ending with an announcement made on May 5, 2020, only single issues were considered. Different series of issues with multiple issues were excluded, in which the issuance of a company that was carried out in three series was considered as a single event.

From this initial filter, 2,863 debenture issue announcements were obtained during this period. The next step was to select the 723 issues of debentures whose issuing companies had traded shares in [B]3, and had been evaluated based on the return on their traded shares during the observed period. For this reason, only listed companies were included in the sample, as shown in Table 2.

Table 2  
 Situation of the sample companies in [B]<sup>3</sup>

Situation in [B] <sup>3</sup> of the companies that issued debentures	Quantity
Active	723
Withdrawn	136
Acquired	240
Not listed	109
Private company	1 604
Postponed	2
Pending listing	7
Code changed	2
Price not available	38
Invalid code	2
<b>Total</b>	<b>2 863</b>

The results showed that private companies constitute majority of the shares of issues (1,604), which is an important information for the national credit market. This evidence indicates that the form of funding through debentures for private companies should be the main object of the study, even though there is a need to adapt the methodology with the unavailability of data regarding the company's share price. Table 3 shows the evolution of this form of financing.

Table 3  
 Annual evolution of the number of issues

Year	Quantity	Year	Quantity	Year	Quantity
1989	1	2000	8	2011	174
1990	6	2001	16	2012	254
1991	2	2002	12	2013	277
1992	2	2003	10	2014	290
1993	1	2004	24	2015	189
1994	5	2005	39	2016	149
1995	10	2006	46	2017	256
1996	9	2007	48	2018	321
1997	12	2008	33	2019	365
1998	11	2009	73	2020	73
1999	6	2010	141	Total	2 863

Initially, it can be seen that there was a significant increase in the number of debenture issues in the Brazilian market with the 31 years of data analyzed. During this period, there have been greater access to the debentures market, which coincides with the development of the Brazilian capital market.

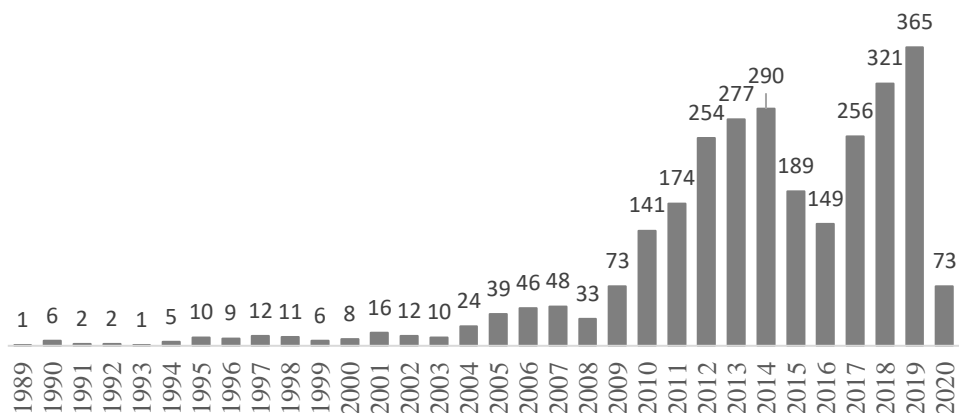


Figure 3. Evolution of the number of issues - October / 1989 - May / 2020.

In addition, Figure 3 highlights the effects of financial crises on the sample data used in this study. For example, in 2008, it can be assumed that the reduction in the number of issues was an effect of a period of financial crisis that interrupted an upward trend in the issuance of debentures. Also, in the years 2015 and 2016, there was a reduction in issues due to the Brazilian political scenario. For the year 2020, the partially analyzed data already reflected the crisis caused by the COVID-19 pandemic. It can be observed that a reduction in the number of issues in the primary debentures market is an effect of periods of crisis. This reduction in primary debentures market issues is associated with the fact that companies choose to wait for opportunities when there is a higher rate of stability to access the market or if the company does not have greater pressure for liquidity. What has been observed so far with the crisis that occurred in the year 2020 (COVID-19 pandemic) was an increase in the rates of debentures in the secondary market. This increase was associated with the number of redemptions in investment funds that had debentures in their portfolio, which led to an increase in the rates negotiated in the secondary market and a direct reflection on the rates of issues that occurred in the primary debentures market. Another fundamental point is the fact that, in times of greater uncertainty, investors opt for greater returns. This considers the risk associated with the crisis, and that most of the issues that occurred in the primary

debentures market in 2020 (until June 15, 2020) also occurred in the bilateral market, where there were no issues in the market, and the funds remained with the banks that coordinated the offer.

For data analysis, the daily closing prices of the shares of these companies were collected, and AR and AAR were calculated. The calculation of AR and AAR followed similar procedures adopted by Antônio et al. (2018), except that in this study, continuous feedback was used, in line with the study by Matsumoto et al. (2018), as shown in Equation 1:

$$R_{i,t} = \text{Ln} \left( \frac{P_{i,t}}{P_{i,t-1}} \right) \quad (1)$$

Where:

$R_{i,t}$  = continuous return of action  $i$  at time  $t$ ;

$P_{i,t}$  = closing price of share  $i$  at time  $t$ ;

$P_{i,t-1}$  = share price  $i$  in quarter  $t-1$ .

After individually calculating the returns for each share, AR were calculated as shown in Equation 2:

$$AR_{i,\tau} = \prod_{t=1}^{\tau} (1 + R_{i,t}) - \prod_{t=1}^{\tau} (1 + R_{Ibov,t}) \quad (2)$$

Where:

$AR_{i,\tau}$  = abnormal return of share  $i$  at time  $\tau$ ;

$R_{i,t}$  = return of share  $i$  at time  $t$ .

$R_{Ibov,t}$  = return on the market portfolio (Ibovespa) at time  $t$ .

Followed by the calculation of AAR, as shown in Equation 3 and 4:

$$AR = \sum_{t=0}^{\tau} AR_{i,\tau} \quad (3)$$

$$\overline{CAR} = \frac{\sum_{t=0}^{\tau} AR_{i,\tau}}{N} \quad (4)$$

Where:

$CAR$  = accumulated abnormal returns from share  $i$  at time  $\tau$ ; and

$AR_{i,\tau}$  = abnormal return of share  $i$  at time  $\tau$ ;

$N$  = number of shares included in the mean.

It is worth mentioning that the “eventstudies” package and the R software were used to conduct this study. The “eventstudies” package uses the methodology of Davison et al. (1986), where the study of events that were developed uses the method based on Bootstrap. As highlighted by Kramer (2001) and Antônio et al. (2018), this method has a better performance than traditional methods.

Based on this method, no previous statistical distribution was established, thus providing greater adherence to the analyzed samples. Bootstrap was initially reported by Efron (1979) as a more robust procedure that estimates the distribution of independent and identically-distributed data. This adaptation is important because the behavior of the return data does not present a normal characteristic. As highlighted earlier by Kothari and Warner (2007), the use of these studies provides important elements that make it possible to understand corporate policy decisions and companies’ reflexes on the behavior of stocks.

## Results

Table 4 shows the AAR in two event windows. Windows of ten (10) and fifteen (15) days were evaluated, before and after the event.

Table 4  
 Accumulated abnormal returns (AAR)

Dias em torno do evento	Janela de evento: 10 dias			Janela de evento: 15 dias		
	Nível de confiança			Nível de confiança		
	2.50%	Média	97.50%	2.50%	Média	97.50%
-15	-	-	-	0.00%	0.00%	0.00%
-14	-	-	-	-0.35%	-0.14%	0.09%
-13	-	-	-	-0.45%	-0.13%	0.19%
-12	-	-	-	-0.16%	0.18%	0.55%
-11	-	-	-	0.01%	0.44%	0.86%
-10	0.00%	0.00%	0.00%	-0.04%	0.41%	0.86%
-9	-0.28%	-0.07%	0.14%	-0.17%	0.34%	0.83%
-8	-0.47%	-0.19%	0.09%	-0.29%	0.24%	0.76%
-7	-0.71%	-0.37%	-0.01%	-0.53%	0.04%	0.59%

-6	-0.74%	-0.37%	0.01%	-0.54%	0.03%	0.60%
-5	-0.82%	-0.42%	0.02%	-0.61%	0.02%	0.61%
-4	-0.96%	-0.48%	0.00%	-0.70%	-0.03%	0.59%
-3	-1.04%	-0.52%	-0.01%	-0.72%	-0.07%	0.58%
-2	-0.98%	-0.45%	0.09%	-0.71%	-0.01%	0.64%
-1	-0.83%	-0.29%	0.27%	-0.56%	0.17%	0.83%
0	-0.99%	-0.43%	0.15%	-0.71%	0.01%	0.67%
1	-1.11%	-0.54%	0.10%	-0.81%	-0.09%	0.59%
2	-1.18%	-0.62%	0.02%	-0.93%	-0.17%	0.53%
3	-1.19%	-0.60%	0.03%	-0.95%	-0.14%	0.60%
4	-1.40%	-0.75%	-0.06%	-1.12%	-0.28%	0.48%
5	-1.40%	-0.72%	-0.02%	-1.20%	-0.26%	0.58%
6	-1.48%	-0.78%	-0.03%	-1.28%	-0.30%	0.55%
7	-1.73%	-0.97%	-0.19%	-1.48%	-0.50%	0.33%
8	-1.63%	-0.80%	0.03%	-1.34%	-0.35%	0.53%
9	-1.54%	-0.65%	0.23%	-1.19%	-0.22%	0.71%
10	-1.71%	-0.80%	0.13%	-1.40%	-0.36%	0.59%
11	-	-	-	-1.40%	-0.34%	0.67%
12	-	-	-	-1.37%	-0.32%	0.68%
13	-	-	-	-1.46%	-0.38%	0.67%
14	-	-	-	-1.63%	-0.53%	0.51%
15	-	-	-	-1.65%	-0.54%	0.49%

From the results reported in Table 4, Figures 4 and 5 were created to allow visualization of the behavior of AAR. In Figure 4, it is possible to verify the behavior of stock returns from a 10-day event window, before and after the event. It appears that, on average, the market reaction is negative.

It is also possible to identify an increase in the dispersion of returns and a decrease in AAR. This evidence indicates that, at the time of the announcement of the issuance of debentures, the market appears to incorporate a certain risk with the increase in dispersion and reduction in returns. These aspects can be explained by the fact that investors incorporate the increase in indebtedness in a negative way, given the possibility of increasing the company's financial risk with the increase in leverage due to the issuance of debentures.



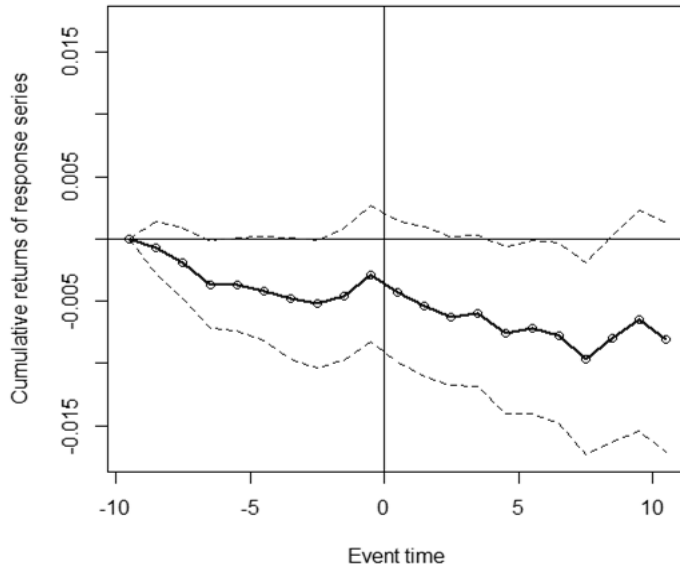


Figure 4. Accumulated abnormal returns with a 10-day window.

The results that were reported are different from those presented by Matsumoto et al. (2018). The divergence can be explained by the number of events that were analyzed, in which this study analyzed 723 announcements of debenture issues between 1989 and 2020, while Matsumoto et al. (2018) only studied 11 announcements between 2014 and 2015, which was a period of reduced offers due to the Brazilian political scenario. This study also seeks to reduce the effects of financial or political crises in the analysis of the data by increasing the number of data analyzed during a certain period, thus presenting a more comprehensive and reliable panorama of the behavior of the stock market in relation to the announcements of debenture issues.

Another point that is central to explaining the divergence in the results is the use of the Bootstrap method, in which previous distribution of the sample data was not considered. In addition, the evidence that were obtained is aligned with what was previously identified by Coelho (2008), whose study showed negative AR for the shares of companies that issued debentures.

When considering a 15-day event window, before and after the event, it is possible to identify that the AAR in the interval before the announcement are mostly positive, while the AAR in the interval after the announcement are mostly negative, with greater dispersion and negative returns. For Camargos and Barbosa (2003), choosing the event window adds a certain degree of arbitrariness since the event to be studied cannot be very long. However, the use of this 15-day event window was more aligned with the study developed by Antônio et al. (2018).

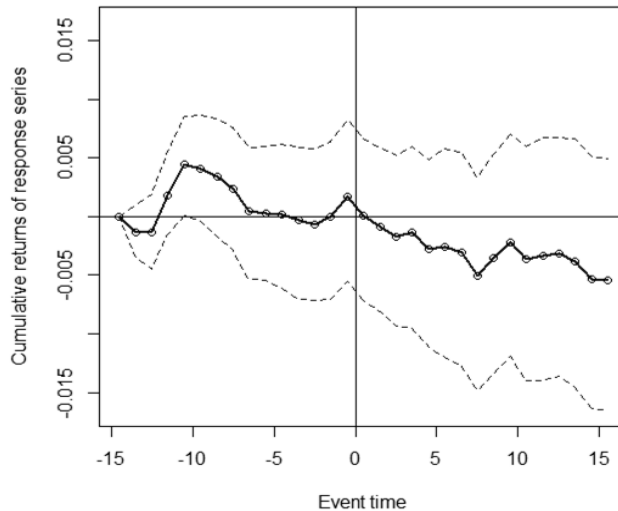


Figure 5. Accumulated abnormal returns with a 15-day window.

The results indicated an increased perception of risk and negative AR for the sample companies, after the issuance of debentures, which suggests a change in the risk-return ratio for issuing companies. These results are important because they affect the decision of the investors to allocate funds when companies issue debentures.

Therefore, this study contests the capital structure theory proposed by Modigliani and Miller (1958 and 1963) that the configuration of companies' financing has an irrelevant impact on the companies' market value, despite finding negative AAR after the issuance of debentures.

One of the main factors that can be cited for such relationship is breaking the assumption of the absence of market imperfections. In which case, previously mentioned studies of Myers (1977), Ross (1977), Jensen (1986), Stulz (1988), Stulz (1990), among others, have already debated the effects of market imperfections.

Furthermore, this study contributes to the literature developed by Fama (1970) on semi-strong informational efficiency for the Brazilian debenture market. When issuing debentures, companies go through a process of disclosing information to market participants, who are able to price the impact of

debentures on the weighted average cost of capital structure and calculate the effects on companies' share prices.

Furthermore, the results indicate that the regulatory and institutional environment are important factors in assessing companies' risk and return behavior, which may also be affected by future uncertainties regarding compliance with issuance parameters and regulations. It is suggested to further evaluate the study in different countries to assess whether the effects of regulatory and institutional environment in the Brazilian market is valid in other countries.

It is important to highlight that the results in this study have greater coverage due to longer observation period and the use of the Bootstrap method, which can provide greater security to investors and regulators for decision making.

## **Conclusions**

This study analyzed the effect of the announcements of debenture issues on stock returns of Brazilian companies listed in [B]<sup>3</sup>, using 723 announcements of debenture issues that occurred between October 1989 and May 2020.

With the completion of the study, the results indicated that the market reacted negatively to announcements of debenture issues in two ways. The first was evidenced by an increased dispersion of returns, indicating an increased risk perception of the issuing companies, and the second was evidenced by the AAR, which were negative after the announcement. It is worth mentioning that the increase in the dispersion of returns was also reported during the time of credit rating downgrades reported in the study developed by Antônio et al. (2018), which can be associated with the negative perception of these events.

These results are divergent from those previously presented by Sanvicente (2001) and Batista (2013), who did not detect statistically significant occurrence of AR; and Santos et al. (2006) and Matsumoto et al. (2018), who showed the occurrence of positive AR, positively affecting the value of the issuing companies, with the issuance of debentures. The results of this study are more aligned with what was reported by Coelho (2008), who also detected a negative reaction between stock returns and announcement of debenture issues. For Coelho (2008), the issue of debentures may signal unfavorable aspects to the market associated with the inability of companies to finance themselves through their own resources, and resort to the debentures market.

The main practical contribution of this study is centered on the fact that asset managers and investors have access to the average behavior of the AAR of the shares of companies that announced issuances of debentures in a given period. In addition, there is an increased dispersion of returns, which

alters the risk assessment of companies' assets, after the issuance of debentures. Thus, agents can execute allocation and investment strategies to issuing companies.

The results of this study are limited to the regulatory and institutional environment of the Brazilian stock market and the period between October 1989 and May 2020. The following can be considered for future study: (1) analysis on the determinants of debenture issues, and (2) evaluation of regulatory and institutional environment as relevant information for the assessment of risk and return of companies, after the issuance of debentures, and its validity in different countries.

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