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# Capital structure: the role of the funding sources on which Brazilian listed companies are based

**Wilson Tarantin Junior**
Universidade de São Paulo, Faculdade de Economia, Administração e Contabilidade de Ribeirão Preto, Departamento de Contabilidade, Ribeirão Preto, SP, Brasil

**Maurício Ribeiro do Valle**
Universidade de São Paulo, Faculdade de Economia, Administração e Contabilidade de Ribeirão Preto, Departamento de Contabilidade, Ribeirão Preto, SP, Brasil

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## ABSTRACT

This study evaluated the capital structure of Brazilian listed companies, within the period from 2005 to 2012, verifying the role of the funding sources on which such companies are based. To do this, the debt ratio in 3 different sources was evaluated: financial institutions, capital market, and sources with subsidized interest rates, the latter representing an institutional factor of the Brazilian economy. A sample of 95 companies was used, out of the 150 largest companies listed on the São Paulo Securities, Commodities, and Futures Exchange (BM&FBOVESPA). By using models with panel data, the results show that the funding sources impact on the companies' capital structure formation, influencing both in leverage and in debts maturity. Regarding leverage, companies that have a higher proportion of their funds raised in the capital market are more leveraged. The same is not true for companies that have a higher proportion of subsidized resources. Regarding debts maturity, resources of different maturities are obtained from different sources: the resources of lower maturities are obtained from financial institutions and the resources of higher maturities are obtained from the capital market and sources with subsidized interest rates – i.e. the Brazilian National Bank for Economic and Social Development (BNDES). Comparing the resources from the capital market to subsidized resources, it is concluded that the former have higher maturity. Such a result may be explained by the growth of the Brazilian capital market in recent years, since 2009, so that companies have been based on the capital market for their funding with higher maturity and on subsidized resources, from BNDES, for their funding with intermediate maturities.

**Keywords:** capital structure, funding sources, institutional factors, BNDES.

## 1 INTRODUCTION

Modigliani and Miller (1958; 1963) are the initial references to a large part of the studies that try to explain which are the determinants of companies' capital structure. The initial argument that the funding mode does not matter, i.e. it does not determine company's value, and the subsequent observation of the opposite, motivated the emergence of theories that have used elements of business reality to explore factors that might explain firms' funding.

"Nevertheless, financing clearly can matter. The chief reasons why it matters include taxes, differences in information and agency costs." (Myers, 2001, pp. 81-82). The reasons given by Myers (2001) are the bases of theories such as, for instance, trade-off, *pecking order* (Myers & Majluf, 1984), and *free cash flow* (Jensen, 1986).

Thus, empirically, scholars sought to explain the companies' funding structure primarily through their characteristics, such as size, profitability, tangibility, growth opportunities, risk, among others. Therefore, it was sought to verify which of these attributes were related to greater or lesser indebtedness or debts maturity (Titman & Wessels, 1988; Barclay & Smith Jr., 1995).

Such empirical analyzes have been expanded, and they started to explicitly consider how factors alien to the company could be a relevant determinant of capital structure. Thus, not only the companies' attributes would be responsible for their capital structure, and they came to be regarded as representative factors of the firms' demand for capital (Faulkender & Petersen, 2006), but also issues related to resources' providers and the institutional factors inherent to each economy.

Evaluating how the supply of resources impacts the firms' capital structure means verifying how the capital providers, such as financial institutions and the capital market, can exert influence on their capital structure. Thus, we seek to grasp which kinds of resources are offered in each market and which companies obtain their resources in each market (Faulkender & Petersen, 2006; Leary, 2009). When institutional factors are evaluated, the focus of analysis lies on checking how differences in the institutional training of countries can influence the funding structure of firms operating in each economy (Rajan & Zingales, 1995; Demirgüç-Kunt & Maksimovic, 1999; Booth, Varouj, Demirgüç-Kunt & Maksimovic, 2001; Fan, Titman & Twite, 2012).

Although institutional differences between countries are relevant to explain the various patterns in the companies' capital structure, studying institutional factors does not necessarily involve companies in different economies. Thus, "the review of institutions is important because they may affect the within-country cross-sectional correlation between leverage and factors such as firm profitability and firm size" (Rajan & Zingales, 1995, p. 1422).

In Brazil, there is an institutional factor closely related to the issue of supply of resources: capital sources with interest rates subsidized by government agencies, such as the Brazilian National Bank for Economic and Social Development (BNDES). Valle and Albanez (2012, p. 68) emphasize that in the Brazilian case the differential sources are:

> [...] the synthesis of the institutional element and resource supply with regard to the solution that the country and its institutions found to counteract the high interest rate level. If, on the one hand, the country conditions were a burden, on the other hand, its institutions withstood such a load.

Faced with evidence of the importance of issues related to resource availability and institutional factors in the companies' capital structure formation, this study aims to verify how the funding sources, on which the companies are based, explain the capital structure of Brazilian listed companies. To do this, we will analyze how proportions of loans raised from the financial institutions, sources with subsidized interest rates, the latter representing a Brazilian institutional factor, and the capital market may be relevant factors for explaining leverage and their debts maturity.

Capital structure studies with Brazilian companies evaluated them in in order to verify the impact of the characteristics of these companies on leverage and debt maturity (Albanez & Valle, 2009; Bastos & Nakamura, 2009; Terra, 2009; Nakamura, Jucá & Bastos, 2011; Correa, Basso & Nakamura, 2013). Companies were evaluated by incorporating institutional issues (Bastos, Nakamura & Basso, 2009; Albanez, Valle & Corrar, 2012; Bogéa Sobrinho, Sheng & Lora, 2012) and issues related to providers (Valle & Albanez, 2012; Póvoa & Nakamura, 2014).

Given the context of studying the Brazilian companies' capital structure, this article hopes to contribute by evaluating jointly the role of the subsidized resources and the resources from the capital market to form the capital structure of these companies. It is understood that this is still a gap to be addressed by the national literature and that the analysis period, as discussed below, favors such an examination.

Therefore, in order to delimit the study, the focus herein is not merely addressing the capital structure in Brazil, but rather evaluating how the Brazilian institutional issue pointed out, along with other funding sources, highlighting the capital market, may be relevant when explained.

## 2 THEORETICAL FRAMEWORK

A means by which the environment alien to the companies can exert influence on the firms' capital structure consists in the providers of resources. Diamond (1991b) and Rajan (1992) make available a theoretical analysis of the circumstances in which firms obtain their resources in the capital market or from financial institutions. The analyses are based on asymmetric information and agency problems derived from this asymmetry. The argument focuses on the fact that financial institutions collect private information about firms more effectively than capital market agents. The latter have access only to publicly available information, in turn, financial institutions, besides them, also collect information in their monitoring activity, as a way to alleviate moral hazard in their relationship with the company.

Diamond (1991b) argues that the reputation a firm builds over time, i.e. a reputation as a 'good payer,' replaces the need for monitoring. So, initially, firms raise funds through banks, and, later, when this reputation is built, raise them in the capital market. At this point, the firm has a high quality credit, which leads to lower cost of capital. Rajan (1992) argues that the information superiority of financial institutions may be used in a firm's reorganization function, preventing managers to engage in projects that do not add value. In turn, capital market agents have no control over managers/owners' decisions.

Empirically, Faulkender and Petersen (2006) point out that, when explaining the companies' capital structure only through its characteristics, it is implicitly assumed that the firm's leverage is quite a function of the firm's debt demand. The authors claim that, in determining leverage, it is worth evaluating issues related to the restrictions that firms have to obtain resources, incorporating the supply perspective.

To address the issue, Faulkender and Petersen (2006) analyze the access to funding sources by establishing differences between companies that had access to the capital market and those that did not have, the latter group representing the companies excluded from this kind of market due to a lenders' option. They conclude that, even controlling by means of the firms' characteristics, i.e. through attributes that represent their demand for debts, firms with access to the capital market were significantly more leveraged than those without such an access, corroborating the hypothesis proposed.

Leary (2009), in his analysis of how firms change their funding sources due to expansion and contraction in the availability of bank funds, shows that, when evaluating the movements between bank and non-bank debts after expanding the resources provided by banks, there is a pronounced increase in the use of bank resources by smaller firms, when compared to large firms. When there is a contraction in the availability of bank resources, there is a relative decline in the use of bank resources by smaller firms (Leary, 2009, p. 1170). Thus, the proportion of bank debts increases (decreases) for firms which are dependent on banks, when compared to firms with access to the capital market, after an expansion (contraction) in their availability.

Barclay and Smith Jr. (1995) state that issuing a debt in the capital market has a high fixed cost, and this fact generates economies of scale. In this way, smaller companies, given the lesser chance to take advantage of economies of scale, might take loan through banks with lower fixed costs, but also lower maturity than the capital market.

Rauh and Sufi (2010) go beyond the distinction between debt in the capital market and bank debt. In their study, the authors secrete the companies' debts according to their kind, their priority, and their source. They have found that firms use simultaneously different debts, depending on the attributes mentioned in their capital structure. Furthermore, they observe that, although firms do not change their total debt (leverage) often, they adjust their capital structure by changing the composition of their debts.

Thus, Rauh and Sufi (2010) show that even the most obvious correlations of leverage to the firms' characteristics change when considering the heterogeneity in debts composition. They argue that this could be explained by the differences in debts in relation to the priority of the firm's cash flows, the asymmetric information between investors and managers, and issues related to managerial incentives (Rauh & Sufi, 2010, p. 4255). Thus, the authors stress the significance of taking such heterogeneity into account in debts composition.

A second way through which the environment can influence the firms' capital structure consists in institutional issues. Booth et al. (2001), by analyzing companies' debt in developed and developing countries, observe the firms' characteristics that affect their indebtedness in developed countries are also significant in developing countries. However, they conclude that factors specific to each country are as important as the variables representing the firm's attributes to explain variations in total and long-term indebtedness of the companies analyzed.

Demirgüç-Kunt and Maksimovic (1999, p. 304), by evaluating how institutional differences between countries affect the debts maturity of companies in 30 countries (developed and developing), recognize that "Government subsidies affect financial structure decisions because implicit or explicit backing of corporations by the government may distort market incentives and permits some firms to obtain long-term loans on favorable terms."

In the Brazilian case, BNDES is regarded as a capital provider responsible for long-term capital supply in the country's economy. A striking feature of these re-

sources is that they have subsidized interest rates. "Over many decades, BNDES, in practice, was the only national institution that provided long-term funds to finance industry and infrastructure" (Giambiagi, Leal, Moreira & Faveret Filho, 2009, p. 274). Lazzarini, Musacchio, Bandeira-de-Melo and Marcon (2012, p. 3) report that, in 2010, BNDES' loans accounted for 21% of the total credit provided to the private sector and much of the long-term credit.

It is worth highlighting an issue that relates the subsidized loans to the capital market. Lazzarini et al. (2012, p. 2) argue that "without systematic micro-level evidence, we do not know whether development bank loans actually accomplish their objectives and what criteria they use to select their borrowers."

The issue is straightforward: subsidized loans may create distortions in the credit market as they charge rates below the usual market. In a context like this, the development of the Brazilian capital market may be impaired. "We do not, however, have information to measure other positive impacts these loans and investments may be generating or the distortions that subsidized loans generate in 28 the credit market" (Lazzarini et al., 2012, p. 27).

Through works that emphasize the role of supply (Faulkender & Petersen, 2006), institutional issues (Rajan & Zingales, 1995; Booth et al., 2001), and the resources at subsidized interest rates (Demirgüç-Kunt & Maksimovic, 1999; Giambiagi et al., 2009; Valle & Albanez, 2012; Lazzarini et al., 2012) in the capital structure formation, this article examines how the funding sources on which Brazilian listed companies are based, also a Brazilian institutional factor, may be relevant in shaping the structure of these companies.

## 3 RESEARCH METHOD

### 3.1 Sample

The sample of this study consists in 95 Brazilian listed companies. For selection, first we compiled a list of companies with shares traded on the BM&FBOVESPA, information available in the software Economática and in the active record in the Brazilian Securities and Exchange Commission (CVM), in 2012.

First, companies in the 'financial and others' sector were excluded. Then, we excluded companies from the sectors of electricity, water and sewage, gas, and telephone, according to the classification of the BM&FBOVESPA. The exclusion of these companies is justified by the fact that this study seeks to evaluate, among others, resources subsidized by government agencies, and taking into account the characteristic of the services provided, there might be a bias when studying such companies along with the others, due to a possible differential access of these companies to these resources. After these exclusions, the 150 largest companies in terms of total book assets for the year 2012. Out of these, there remained 95 companies in the sample, mainly due to the insufficient information in the notes on the other.

The sample covers the years from 2005 to 2012. The choice is justified because this is a period with considerable variations regarding the resources available, mainly resources from the capital market, given the enactment of Instruction CVM 476, on January 16, 2009. Based on the year 2009, a key year concerning the recent development of the Brazilian capital market, the sample period was selected having the 4 most recent years as a reference, given the availability of companies' annual financial statements, and the 4 years prior to 2009. Also, within this period, there was a considerable expansion of the annual disbursement of BNDES, in addition to the crisis of financial institutions, in late 2008, a fact which may have triggered changes in the resources provided by such institutions.

### 3.2 Variables

#### 3.2.1 Dependent variables.

The dependent variables in this study are representative of the firms' capital structure, i.e. the leverage and debt maturity.

Traditionally, a firm's leverage represents the relationship between its debts and its equity. However, according to Faulkender and Petersen (2006, p. 51), for measuring a firm's leverage the ratio between its total debt and total assets will be used, although it is usual that this relationship represents the firm's total debt. The authors evaluate firms' leverage both in financial terms and in market terms. Herein, total assets at market values will be calculated according to Rajan and Zingales (1995).

In this study, 'total debts' are loans and funding, debentures and financial market lease, current and noncurrent.

The companies' debt maturities will be measured by using the weighted average term of payment for such debts. Thus, the *proxy* is specified so that the debt settlement periods, in years, are weighted by the proportion of debt maturing in each year. Therefore, a measure of time in years is obtained, which represents the companies' debt maturity.

$$Average\,Term = \frac{(CURRENT\,DEBTS \times 1) + (2^{nd}\,YEAR \times 2) + (3^{th}\,YEAR \times 3) + (4^{th}\,YEAR \times 4) + (5^{th}\,YEAR \times 5)}{TOTAL\,DEBTS}$$

*Current debts* are those classified in the current liabilities in the financial statement; *2nd year* represents debt payments that will occur within 2 years; *3rd year* represents payments that will occur within 3 years; *4th year* represents payments that will occur within 4 years; and *5th year* represents payments that will occur within 5 years or more.

This classification is feasible, because notes in the companies' financial statements provide information about the payment schedule of its debts. Debts classified as non-current liabilities in the financial statement are, in the notes, dismembered according to their payments in subsequent years. The sum of these payments is equal to the balance shown in the balance sheet.

Overall, companies segregate the annual payment flows of their debts up to "5 years or more," from the financial statement date. In the absence of rather detailed information, debts maturing within "5 years or more" were weighted with the weight of 5 years in the calculation of weighted average term. Thus, the variable *mid-term* can vary from 1 to 5 years, so that, the closer to 5, the greater the maturity of companies' debt.

It is recognized that the decision to determine the debt maturing within "5 years or more" by considering weight in 5 years may cause a bias towards underestimating the actual maturity of companies' debts. However, the fact that the maturity measurement adopted here is closer to reality than that derived from the balance sheets is significant, i.e. short and long-term debt (current and non-current, respectively), usually adopted in studies on debts maturity.

### 3.2.2 Independent variables.

The independent variables used in this study are intended to explain the role of funding sources in the capital structure formation. To evaluate this influence, the strategy adopted was searching for the information related to debts in the companies' notes that make up this study sample.

The notes provide detailed information on the companies' funding. In general, there is a description of the way how these resources were raised or the kind of resource raised, on the remuneration of the resource, and on the indexer used in the operation. Therefore, the aggregate values shown in the balance sheet are detailed, enabling the classification companies' debt according to their provider.

The classification methodology of companies' debt was based on Valle and Albanez (2012), who classified them into groups representing the currency in which the debt was raised (domestic or foreign) and the type of credit line (market line or differential line). Thus, they create 4 independent variables representing the amount of debts classified into each group in relation to total debts.

Leary (2009), in one of his studies, uses as the dependent variable the percentage of long-term bank debts in relation to total long-term debts. Lazzarini et al. (2012) evaluate the variable "percentage of loans from BNDES in relation to total debts." These authors are based on the fact that the debt is indexed by the Brazilian Long-Term Interest Rate (TJLP) to identify when it is from BNDES. Valle and Albanez (2012) report that the "differential" indexers are the TJLP, the Reference Rate (TR), and others.

In this regard, 5 categories were created and, together, they account for the companies' debt funding, namely: a) debt in the capital market; b) debt with financial institutions; c) debt with subsidized interest rates; d) debt by financial leasing; and e) others.

Financial leasing was classified separately from liabilities to financial institutions, since not every lease is done by these institutions. The category 'others' was created, because there were some accounts in the notes that could not be classified in any of the categories, since the companies themselves classify values under the rubric 'others.'

Supply variables are specified so that the amount of debts classified into each category is divided by the company's total debts. Thus, the sum of the 5 categories for each company, in each year, must be equal to 1 (100 %). The interpretation of these variables is that the higher (lower) the proportion of a certain debt in the company's capital structure, more (less) it is based on the source of this debt for its funding.

It is believed that, specified this way, these variables have a higher information content than using *proxies*, as *dummies*, like in Faulkender and Petersen (2006), who use the fact that the company has or not the credit rating as a proxy for companies' access to the capital market.

### 3.2.3 Control variables.

The control variables taken into account to represent companies' demand for capital are: profitability, company size, growth opportunities, and tangibility. These are the variables having the most robust results in previous studies (Rajan & Zingales, 1995; Frank & Goyal, 2009). In addition to these, a variable representing the company's credit risk will be added.

Firms' profitability will be calculated by using the ratio between *Earnings Before Interest*, *Taxes*, *Depreciation, and Amortization* (EBITDA) and the company's total assets. EBITDA may be interpreted as a potential cash flow generation through the firm's operations. If divided by total assets, there is an operating return form.

The representation of company size will be provided through the natural logarithm of net operating revenue. The *market-to-book* ratio will represent growth opportunities. This is the ratio between assets' market value and assets' book value. The argument is that, although financial statements do not register growth opportunities, the market, when evaluating the company, considers these opportunities.

Tangibility will be operationalized as property in relation to total assets. It is a proxy representing the propor-

tion of assets that can be used as guarantee when contracting new debt. The proxy for credit risk will be the firm's unlevered beta. It represents the company's economic risk, i.e. its risk if not using debt in its capital structure.

### 3.3 Data Processing

In the processing of data, besides descriptive analyses, regression models with panel data will also be adopted. Thus, Hsiao (2006) points out that one advantage in using panel data is that, in addition to providing more accurate inferences about the model parameters, they contain information that allows controlling the effects of omitted variables, i.e. effects of variables the model lacks or variables that are not observed.

Also in line with Hsiao (2006, p. 9), the literature that uses panel data focuses on making inferences with structural parameters as a basis, representing impacts of the variables observed on the dependent variable. However, such inferences are made after controlling the impacts of incidental parameters, which represent the heterogeneity caused by omission of variables in the model.

Wooldridge (2006, p. 414) points out that it is possible to separate factors that are not observed, but having an impact on the dependent variables, in two types, the first representing factors that are constant over time and the second representing factors that vary over time. Thus, factors not observed that are constant over time are portrayed by a variable in the model, representing the heterogeneity not observed. In turn, factors not observed that change over time are represented by an error term, which "is often named idiosyncratic error or temporal variation error" (Wooldridge, 2006, p. 415).

Wooldridge (2006) states that 2 methods to estimate the models of effects not observed are the fixed effects estimator and the estimator of random effects. The adequacy of estimators is based on the fact that the variable representing the heterogeneity not observed is or is not correlated to the explanatory variables included in the model.

In a practical sense, Fávero (2013) states that it is crucial to characterize the database in a short or long panel, prior to the occurrence of modeling. A short panel occurs when the number of individuals is greater than the number of periods in the database. A long panel occurs in the opposite situation.

Fávero (2013) works out 6 models with different estimators, in the case of a short panel, such as the panel in this article: *Pooled Ordinary Least Squares* (POLS), with robust clustered standard errors, *between* estimator, fixed effects, fixed effects with robust clustered standard errors, random effects, and random effects with robust clustered standard errors.

Fávero (2013, p. 146) applies 3 tests to determine the models' suitability: the Breusch-Pagan's LM test, for the adequacy of the POLS model when compared to the random effects model; Chow's F-test for the adequacy of the POLS model in relation to the fixed effects model; finally, Hausman's test, for choosing between the fixed or random effects model.

The null hypothesis of the Breusch-Pagan's LM test is homoscedasticity. Thus, the rejection of the null hypothesis indicates that there is heteroscedasticity, leading to the adequacy of the random effects model, which uses more efficient estimators in this situation (*Generalized Least Squares*).

The null hypothesis of Chow's F-test is that the intercepts are the same for all companies in the sample. Rejecting the null hypothesis indicates there is adequacy of the fixed effects model. Wooldridge (2006, p. 445) states that "using fixed effects is the same as allowing a different intercept for each observation."

The null hypothesis in Hausman's test is that the estimates obtained by the fixed effects models and random effects did not differ significantly. If there is a significant difference, i.e. if the null hypothesis is rejected, the fixed effects model is appropriate.

## 4 ANALYSIS OF RESULTS

Table 1 shows the descriptive statistics of variables used in the study. The identification of 'study 1' points out that the study is conducted with variables calculated on market values and 'study 2' with variables calculated on book values.

The average company in study 1 shows a leverage of 23.13%, whereas in study 2 the average leverage is 29.07%. Thus, the difference, around 6%, may be regarded as relevant, justifying the study with variables calculated on market values and book values.

**Table 1** *Descriptive statistics*

| **Maturity** | | | | | |
|---|---|---|---|---|---|
| **Variable** | **N obs.** | **Minimum** | **Maximum** | **Average** | **Standard deviation** |
| **Average term** | 468 | 1.000 | 4.876 | 2.523 | 0.914 |
| **Market variables – Study 1** | | | | | |
| **Variable** | **N obs.** | **Minimum** | **Maximum** | **Average** | **Standard deviation** |
| **MarkLever** | 475 | 0.0001 | 0.6383 | 0.2313 | 0.1527 |
| **Size** | 480 | 8.6830 | 19.4552 | 14.5338 | 1.5370 |
| **Profitability** | 480 | -0.5105 | 0.3132 | 0.0742 | 0.0609 |
| **Tangibility** | 480 | 0.0016 | 1.1472 | 0.2458 | 0.2151 |
| **Risk** | 480 | -0.6837 | 2.5998 | 0.5927 | 0.5273 |
| **GO** | 480 | 0.4686 | 8.8883 | 1.6517 | 1.1853 |
| **Crisis** | 480 | 0.0000 | 1.0000 | 0.1500 | 0.3574 |
| **Accounting variables – Study 2** | | | | | |
| **Variable** | **N obs.** | **Minimum** | **Maximum** | **Average** | **Standard deviation** |
| **AccLever** | 478 | 0.0002 | 0.7557 | 0.2907 | 0.1578 |
| **Size** | 480 | 8.6830 | 19.4552 | 14.5338 | 1.5370 |
| **Profitability** | 480 | -0.3575 | 0.5542 | 0.1166 | 0.0981 |
| **Tangibility** | 480 | 0.0017 | 0.8464 | 0.3018 | 0.2052 |
| **Risk** | 480 | -0.6521 | 2.5998 | 0.5401 | 0.4943 |
| **GO** | 480 | 0.4686 | 8.8883 | 1.6517 | 1.1853 |
| **Crisis** | 480 | 0.0000 | 1.0000 | 0.1500 | 0.3574 |

Notes: mid-term – weighted average term of debt payments; study 1 – variables in market terms; study 2 – variables in accounting terms; size – logarithm of net operating revenues; profitability – EBITDA divided by total assets; tangibility – property divided by total assets; risk – unlevered beta; GO –growth opportunities measured by the ratio between assets' market value and assets' book value; 2009 crisis – dummy with value 1 in 2009 and 0 in the other years; N obs. – number of observations. The variables size, GO, and mid-term are not influenced by calculating on market value and book value, therefore, they have the same statistics for the 2 studies.

The weighted average term was 2.52 years. Given that this variable may take, in this study, values from 1 to 5 years, the average value may be regarded as low. Evidence of the absence of long-term funding to Brazilian companies.

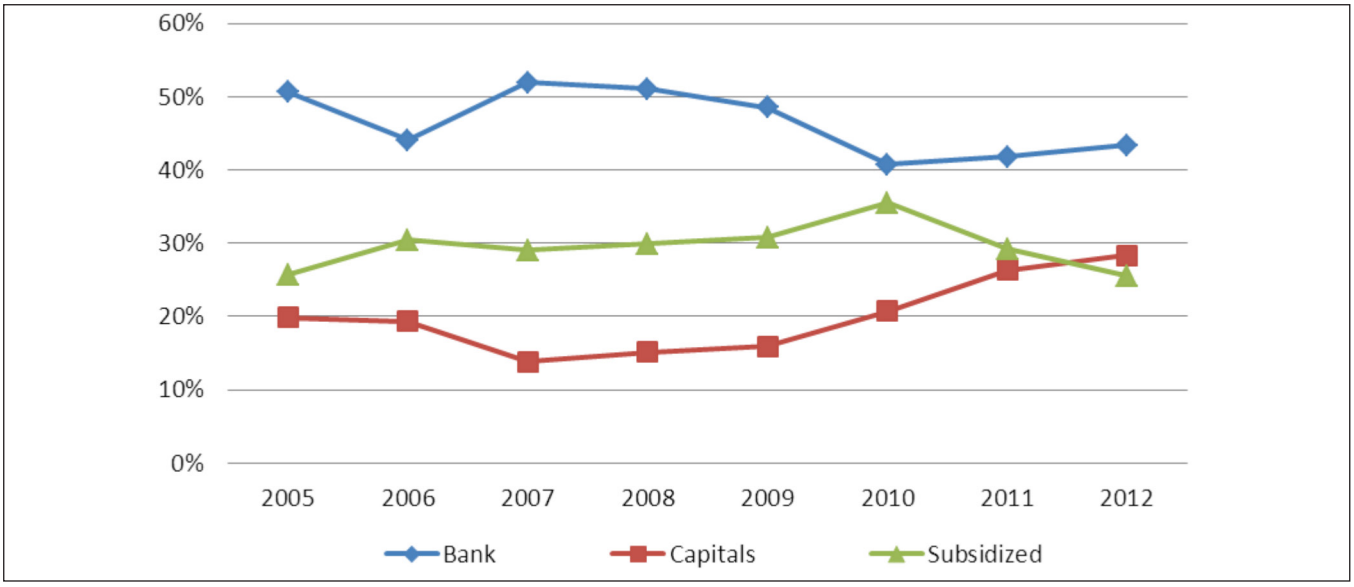
The variable crisis is a dummy with value 1 for the year 2009 and 0 for the others. Its function is verifying that the crisis of financial institutions, whose onset is usually indicated as the breakdown of the American bank Lehman Brothers, on September 15, 2008, caused changes to the capital structure of Brazilian listed companies. It is believed that, if there is any impact on the capital structure, this is realized after 2008, assuming the onset of the crisis might have been in the end of that year.

**Table 2** *Descriptive statistics: funding sources*

| **Funding sources** | | | | | |
|---|---|---|---|---|---|
| **Variable** | **N obs.** | **Minimum** | **Maximum** | **Average** | **Standard deviation** |
| **Bank** | 480 | 0.000 | 1.000 | 0.457 | 0.318 |
| **Capitals** | 480 | 0.000 | 0.998 | 0.208 | 0.262 |
| **Subs** | 480 | 0.000 | 1.000 | 0.298 | 0.289 |
| **Lease** | 480 | 0.000 | 0.963 | 0.019 | 0.088 |
| **Others** | 480 | -0.036 | 0.575 | 0.017 | 0.062 |

Notes: bank – amount of debt on financial institutions divided by total debts; capital – amount of debt in the capital market divided by total debts; subs – amount of debt with subsidized interest rates divided by total debts; others – amount of debts classified as others divided by total debt; N obs. – number of observations.

In relation to funding sources, we notice that the Brazilian listed companies still rely heavily on bank resources, with an average of 45.7% of the companies' debts within the study period. In Figure 1 there is a considerable drop in the share of banking resources in the years after 2009. As it may be inferred based on this figure, this drop is a result of increased participation of capital and subsidized market funds, in the same year, in the firms' capital structure.




Source: Prepared by the authors.

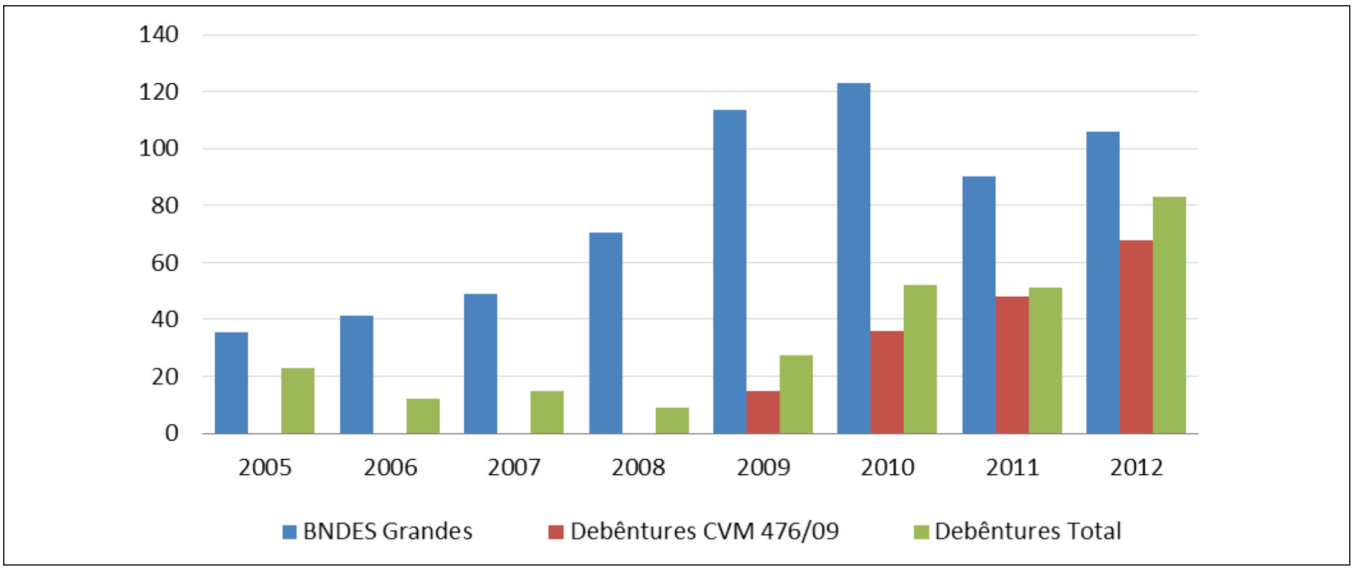
**Figure 1** *Participation of funding sources in the capital structure.*

The debt with subsidized interest rates is a relevant source of funds for the sampled companies, as it corresponds, on average, to 29.8% of the amount of corporate debts. Valle and Albanez (2012, p. 61) reported that funds from differential lines ranged from 32% to 37% of the sampled companies' funding, which covers the period from 1997 to 2006. Lazzarini et al. (2012, p. 13) report that firm mode of their sample has around 31% of its debt from BNDES.

The resources from the capital market represent, on average, 20.8% of the total debts, strongly influenced by the years after 2009. It is noteworthy that, in 2012, the proportion of capital market debts has exceeded the proportion of subsidized resources in firms' capital structure, perhaps an unprecedented fact.

Financial leasing and debts classified as 'others' together, represent, on average, only 3.6% of the amount of debts and, therefore, they are not expected to be relevant in order to explain leverage or maturity of corporate debt. For the variable 'others,' it is noticed that its minimum value is 3.6% negative. The negative value is justified, because some companies have classified derivative financial instruments, e.g. swaps, along with loans and funding.

Information in Figure 2 show that the changes in ownership of resources with subsidized interest rates and the capital market are motivated by the policies adopted by Brazilian economic agents. Figure 2 shows, in billion reais, the annual disbursement by BNDES to large companies and the amount issued in the primary market of debentures, excluding issuance by leasing companies.




Source: Prepared by the authors.

**Figure 2** *Disbursement of BNDES and primary market of debentures.*

Comparing the disbursement of BNDES to large companies to the proportion of subsidized debt, companies seem to respond to the policy adopted by this bank, since both curves show similar trends. A justification is the fact that they are subsidized resources, i.e. resources at a cost below the market lines. Thus, an increase in supply of this kind of resource allows companies to finance their new investments at lower costs or even enables companies to reduce their overall cost of capital.

In turn, information on the market of debentures provide evidence that may explain the reason for the rise in the share of capital market resources in recent years in the Brazilian listed companies' capital structure. Companies now issue debentures, taking advantage of the enactment of Instruction CVM 476, on January 16, 2009, which provides for public offerings of securities distributed with restricted efforts, prohibiting the public search for investors in this kind of issuance.

Based on Figure 2, still in 2009, only the amount issued under Instruction CVM 476/2009 was almost the same or greater than the total amount issued in each of the previous 3 years. In subsequent years, there is a clear increase in the amount issued under Instruction CVM 476/2009, accounting for much of the total number of debentures issued. Thus, we may infer, based on this information, that the enactment of Instruction CVM 476/2009 may have some participation in the recent development of the Brazilian capital market.

As observed on the CVM website: "the purpose of the CVM with the enactment of Instruction CVM 476/2009 is reducing the costs of public offerings, thus facilitating access of issuers to the capital market."

Table 3 displays the results of the regression models with panel data for the dependent variable leverage. The models differ due to the inclusion of independent variables and the specification of variables in market or accounting terms.

Initially, it is noticed that, together, the *p* value of the Breusch-Pagan's LM test, Chow's F-test, and Hausman's test indicate that the random effects model is appropriate at the 1% significance level. Therefore, the *p* value of the coefficients for the random effects model with robust clustered standard errors are shown in line with Fávero (2013). Wald's *p* value indicates that all models are significant at 1%.

**Table 3** *Regressions with panel data: leverage*

| **Leverage – Study 1 (at market values)** | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | **Companies** | | **Capitals** | | **Subs** | | **Capitals + subs** | |
| Variables | beta | *p* value | beta | *p* value | beta | *p* value | beta | *p* value |
| Constant | -0.120 | 0.322 | -0.088 | 0.463 | -0.101 | 0.420 | -0.081 | 0.511 |
| Size | 0.028 | 0.000 | 0.024 | 0.003 | 0.028 | 0.001 | 0.024 | 0.003 |
| Profitability | -0.368 | 0.005 | -0.371 | 0.004 | -0.358 | 0.009 | -0.366 | 0.006 |
| Tangibility | 0.249 | 0.000 | 0.271 | 0.000 | 0.250 | 0.000 | 0.270 | 0.000 |
| Risk | -0.017 | 0.035 | -0.014 | 0.077 | -0.019 | 0.027 | -0.015 | 0.071 |
| GO | -0.047 | 0.000 | -0.044 | 0.000 | -0.047 | 0.000 | -0.044 | 0.000 |
| 2009 crisis | -0.028 | 0.001 | -0.024 | 0.002 | -0.027 | 0.001 | -0.024 | 0.002 |
| **Capitals** | | | 0.092 | 0.000 | | | 0.086 | 0.001 |
| **Subsidized** | | | | | -0.041 | 0.154 | -0.021 | 0.464 |
| N obs. | 475 | | 475 | | 475 | | 475 | |
| Breusch-Pagan | 0.000 | | 0.000 | | 0.000 | | 0.000 | |
| Chow | 0.000 | | 0.000 | | 0.000 | | 0.000 | |
| Hausman | 0.060 | | 0.076 | | 0.085 | | 0.104 | |
| $R^2$ Overall | 0.302 | | 0.312 | | 0.307 | | 0.313 | |
| Wald | 0.000 | | 0.000 | | 0.000 | | 0.000 | |
| **Leverage – Study 2 (at book values)** | | | | | | | | |
| | **Companies** | | **Capitals** | | **Subs** | | **Capitals + Subs** | |
| Variables | beta | *p* value | beta | *p* value | beta | *p* value | beta | *p* value |
| Constant | -0.228 | 0.074 | -0.183 | 0.147 | -0.202 | 0.129 | -0.174 | 0.182 |
| Size | 0.042 | 0.000 | 0.035 | 0.000 | 0.041 | 0.000 | 0.035 | 0.000 |
| Profitability | -0.400 | 0.000 | -0.400 | 0.000 | -0.394 | 0.000 | -0.397 | 0.000 |
| Tangibility | 0.068 | 0.202 | 0.099 | 0.061 | 0.072 | 0.197 | 0.099 | 0.068 |
| Risk | -0.047 | 0.001 | -0.039 | 0.003 | -0.048 | 0.001 | -0.041 | 0.003 |
| GO | -0.023 | 0.000 | -0.020 | 0.000 | -0.024 | 0.000 | -0.020 | 0.000 |
| 2009 crisis | -0.005 | 0.638 | -0.000 | 0.960 | -0.003 | 0.716 | 0.000 | 0.986 |
| **Capitals** | | | 0.136 | 0.000 | | | 0.127 | 0.000 |
| **Subsidized** | | | | | -0.061 | 0.072 | -0.032 | 0.342 |
| N obs. | 478 | | 478 | | 478 | | 478 | |
| Breusch-Pagan | 0.000 | | 0.000 | | 0.000 | | 0.000 | |

(cont.)

| | | | | |
|---|---|---|---|---|
| Chow | 0.000 | 0.000 | 0.000 | 0.000 |
| Hausman | 0.070 | 0.159 | 0.091 | 0.195 |
| $R^2$ overall | 0.142 | 0.188 | 0.152 | 0.190 |
| Wald | 0.000 | 0.000 | 0.000 | 0.000 |

Notes: leverage – total debts divided by total assets; study 1 – variables specified in market terms; study 2 – variables specified in accounting terms; beta – coefficients of the variables; *p* value – *p* value of coefficients for the random effects model with robust clustered standard errors; N obs. – number of observations; Breusch-Pagan – *p* value of the Breusch-Pagan's LM test; Chow – *p* value of Chow's F-test; Hausman – *p* value of the Hausman's test; $R^2$ overall – general explanation coefficient of the random effects model with robust clustered standard errors; Wald – *p* value of Wald's statistics for the random effects model with robust clustered standard errors; size – logarithm of net operating revenue; profitability – EBITDA divided by total assets; tangibility – property divided by total assets; risk – unlevered beta; GO – growth opportunities measured by the ratio between assets' market value and assets' book value; 2009 crisis – dummy with value 1 in 2009 and 0 in the other years; capitals – the proportion of loans raised on the capital market; subsidized – proportion of debt with subsidized interest rates. The variables size and GO are not influenced by the calculation method at market values or book values.

Through the adequacy of the random effects model, it is possible to understand the effects not observed, constant in time, which also determine companies' leverage, they are not correlated to explanatory variables in the models. Wooldridge (2006, p. 433) argues that this is related to good controls in the equation. Hence, it is possible that the control variables adopted in this study, which are those with more robust results in previous studies, play a good role in explaining the firms' capital structure. Thus, the effects of variables omitted in this study are controlled so that they become part of the error term, and it is assumed they are not correlated to the explanatory variables (Hsiao, 2006, p. 12).

The coefficient for the variable size is positive and significant, indicating that larger firms tend to be more leveraged. Rajan and Zingales (1995) argue that larger firms are less likely to fail to pay their debts, so they might obtain under better conditions, given the lower default risk faced by lender. Titman and Wessels (1988) state that larger firms tend to be more diversified and less prone to the bankruptcy risk, something which could allow greater leverage in these companies.

The variable profitability showed up negative and significant, indicating that the most profitable firms are less leveraged. The sign for this variable is consistent with the *pecking order* theory (Myers & Majluf, 1984), since more profitable firms – by generating greater amount of resources internally, derived from their operations – might have less need to seek external funding, avoiding problems that arise from asymmetric information.

The variable tangibility indicates that the greatest proportion of assets that can be used as guarantee in contracting new loans, provides firms with greater leverage. Valle and Albanez (2012) explain the importance of tangible assets in the Brazilian case:

> Paradoxically, the combination of high interest rates in the period and a short-term portion of relevant funding could potentiate the risk of funding (such as liquidity risk and default). To mitigate these risks, it is known that a part of the Brazilian companies' funding was structured on pledges and mortgages. In addition to the natural requirement in some lines that transferred (mortgage and/or pledge in a series of lines from BNDES and pledge in Rural Credit operations), banks also required guarantees of actual assets in operations with their own resources (Valle & Albanez, 2012, p. 64).

The variable risk, negative and significant in the studies, points out that the riskiest firms are less leveraged, as expected. Based on the trade-off theory, riskier firms, i.e. those with the highest expected costs of financial difficulties, might take less advantage of the tax benefit arising from the addition of debts in their capital structure, therefore, they are less leveraged.

For the variable growth opportunities, the negative and significant relationship for the two studies indicates that the higher the firm's growth opportunities, the lower its leverage. From the perspective of Myers (1977), companies with greater growth opportunities could fund themselves primarily through stocks, avoiding the conflict between creditors and shareholders, i.e. the underinvestment issue. Analyzing through the eyes of Jensen (1986), companies with greater growth opportunities have less free cash flow for occasional discretionary use by a manager, as they would be using the cash flow to 'enjoy' such growth opportunities, thus there would be no need for debt to exert the control function.

The variable dummy for the crisis of financial institutions, worked on in the year 2009, showed a significant result in study 1, indicating that, in the year 2009, leverage in market values has been reduced. In study 2, the variable crisis is not significant.

Thus, it may be said that the result obtained for the variable crisis catches the effect of the increased market value of firms in 2009, instead of a drop in leverage motivated by an occasional reduction in the resources provided by financial institutions. The drop in the share of banking resources in the capital structure was minimal from 2008 to 2009, as shown in Figure 1.

In relation to the funding sources, the variable representing the capital market is positive and significant in both studies. This means that companies that rely more on the capital market, i.e. with a higher proportion of loans raised in this market, are more leveraged than the others, complementing the results of Faulkender and Petersen (2006), indicating that companies with access to the capital market are more leveraged than companies without access to this market.

Faulkender and Petersen (2006, p. 48) state that firms with access to the capital market may be leveraged having two channels as a basis – the first by having access to a greater amount of resources and, second, by having access to a cheaper resource. The argument may be justified so that firms with lower information asymmetry, with better reputation (Diamond, 1991b), and/or with less need for the reorganizer skills of the financial institutions (Rajan, 1992), obtain resources in the capital market.

The variable representing debt with subsidized interest rates was not significant to explain market leverage and only a minimal significance to explain book leverage, when added as a single offering variable. In this case, the variable has a negative sign. This indicates that companies relying more on debt with subsidized interest rates are not more leveraged than the others.

This result contrasts with Valle and Albanez (2012), where access to differential sources is positively and significantly correlated to firms' leverage. A possible explanation is that within the period evaluated by the authors (1997-2006) there was "a shy presence of long-term debts deriving from issuance of securities in the capital market" (Valle & Albanez, 2012, p. 64). Thus, it is possible that the growth of the Brazilian capital market, especially since 2009, according to the issuance of debentures under the Instruction CVM 476/2009, has caused some change in this regard, i.e. it is possible that companies, those with lower information asymmetry, started relying on the capital market, showing, therefore, higher leverage. Now, these companies have access to a greater amount of resources, which are cheaper.

**Table 4** *Regressions with panel data: weighted average term*

| **Weighted average term – Study 1 (at market value)** | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | **Companies** | | **Capitals** | | **Subs** | | **Capitals + subs** | |
| Variables | beta | *p* value | beta | *p* value | beta | *p* value | beta | *p* value |
| Constant | -0.452 | 0.463 | 0.033 | 0.955 | -0.682 | 0.264 | -0.310 | 0.581 |
| Size | 0.219 | 0.000 | 0.146 | 0.001 | 0.224 | 0.000 | 0.144 | 0.000 |
| Profitability | -0.959 | 0.071 | -1.077 | 0.039 | -1.028 | 0.051 | -1.213 | 0.022 |
| Tangibility | 0.463 | 0.126 | 0.873 | 0.001 | 0.441 | 0.120 | 0.919 | 0.000 |
| Risk | -0.044 | 0.377 | 0.005 | 0.911 | -0.020 | 0.661 | 0.055 | 0.254 |
| GO | -0.118 | 0.004 | -0.063 | 0.031 | -0.120 | 0.003 | -0.055 | 0.053 |
| 2009 crisis | -0.059 | 0.374 | 0.015 | 0.776 | -0.072 | 0.249 | 0.006 | 0.889 |
| **Capitals** | | | 1.522 | 0.000 | | | 1.774 | 0.000 |
| **Subsidized** | | | | | 0.553 | 0.012 | 0.928 | 0.000 |
| N obs. | 468 | | 468 | | 468 | | 468 | |
| Breusch-Pagan | 0.000 | | 0.000 | | 0.000 | | 0.000 | |
| Chow | 0.000 | | 0.000 | | 0.000 | | 0.000 | |
| Hausman | 0.210 | | 0.079 | | 0.101 | | 0.035 | |
| $R^2$ overall | 0.235 | | 0.413 | | 0.241 | | 0.481 | |
| Wald | 0.000 | | 0.000 | | 0.000 | | 0.000 | |
| Weighted average term – Study 2 (at book value) | | | | | | | | |
| | Companies | | Capitals | | Subs | | Capitals + subs | |
| Variables | beta | *p* value | beta | *p* value | beta | *p* value | beta | *p* value |
| Constant | -0.576 | 0.342 | -0.088 | 0.879 | -0.774 | 0.201 | -0.388 | 0.502 |
| Size | 0.224 | 0.000 | 0.150 | 0.000 | 0.228 | 0.000 | 0.147 | 0.000 |
| Profitability | -1.209 | 0.006 | -1.226 | 0.004 | -1.206 | 0.006 | -1.222 | 0.004 |
| Tangibility | 0.677 | 0.076 | 1.086 | 0.001 | 0.623 | 0.098 | 1.074 | 0.000 |
| Risk | -0.095 | 0.078 | -0.019 | 0.722 | -0.074 | 0.136 | 0.030 | 0.572 |
| GO | -0.086 | 0.036 | -0.047 | 0.134 | -0.087 | 0.029 | -0.040 | 0.164 |
| 2009 crisis | -0.074 | 0.253 | -0.008 | 0.881 | -0.082 | 0.177 | -0.013 | 0.787 |
| **Capitals** | | | 1.528 | 0.000 | | | 1.769 | 0.000 |
| **Subsidized** | | | | | 0.513 | 0.016 | 0.886 | 0.000 |
| N obs. | 468 | | 468 | | 468 | | 468 | |
| Breusch-Pagan | 0.000 | | 0.000 | | 0.000 | | 0.000 | |
| Chow | 0.000 | | 0.000 | | 0.000 | | 0.000 | |
| Hausman | 0.110 | | 0.233 | | 0.040 | | 0.133 | |
| $R^2$ overall | 0.268 | | 0.445 | | 0.271 | | 0.506 | |
| Wald | 0.000 | | 0.000 | | 0.000 | | 0.000 | |

Notes: weighted average term – weighted average maturity of debt payments (in years); study 1 – variables specified in market terms; study 2 – variables specified in accounting terms; beta – coefficients of the variables; *p* value – *p* value of the coefficients for the random effects model with robust clustered standard errors; N obs. – number of observations; Breusch-Pagan – *p* value of the Breusch-Pagan's LM test; Chow – *p* value of Chow's F-test; Hausman – *p* value of Hausman's test; $R^2$ overall – general explanation coefficient of the random effects model with robust clustered standard errors; Wald – *p* value of Wald's statistics for the random effects model with robust clustered standard errors; size – logarithm of net operating revenues; profitability – EBITDA divided by total assets; tangibility – property divided by total assets; risk – unlevered beta; GO – growth opportunities measured by the ratio between assets' market and book value; 2009 crisis – dummy with value 1 in 2009 and 0 in the other years; capitals – proportion of loans raised on the capital market; subsidized – proportion of debts with subsidized interest rates. The variables size and GO, plus the weighted average term, are not influenced by the calculation method at market values or book values.

Table 4 displays the results for the dependent variable weighted average term. All models are significant at 1%. It is noteworthy that $R^2$ in models having the variables of funding sources together – 48.1% in study 1 and 50.6% in study 2 –, considerably higher than $R^2$ in models having only the firms' variables, indicating the relevance of funding sources to explain maturity.

Firms' size shows up as a relevant characteristic in determining debt maturity, it is positive and significant at 1% in all models. Titman and Wessels (1988) argue that the fixed cost of raising new debts may be related to their maturity, so that long-term debts might have increased fixed costs. Thus, smaller firms would pay more for issuing long-term debts, since they would have less means of diluting this cost in the amount raised.

Profitability indicates that more profitable firms, because they have a greater amount of resources generated by their activities, seek less external funding, avoiding the problems arising from asymmetric information, in line with the pecking order theory. Since such companies do not need great amounts of external funding, they would have little opportunity to dilute the higher fixed costs associated with higher resources' maturities, therefore, obtaining at lower maturities.

The variable tangibility has become unstable in study 1, but significant in study 2. When it shows up as significant, indicates that companies with a higher proportion of tangible assets have higher maturity of their debts, confirming the role played by assets that can be used as guarantee in contracting new debts, especially long-term ones. Fan et al. (2012) point out that assets' tangibility was the most robust determinant of companies' debt maturity in their sample. It may be inferred, based on comparison between the models, that instability in the variable tangibility is related to the inclusion of the variable capital market, indicating a possible relationship between them.

Only in one model risk was statistically significant. Diamond (1991a) suggests that companies that obtain short-term debt are those with the highest credit ratings and those with lowest ratings. Companies that obtain long-term debt are those with intermediate credit rating. Thus, based on the pattern suggested by Diamond (1991a), it is possible that the proxy used in this study cannot identify the effect of credit risk on the firms' debt maturity. However, given the unavailability of information on credit ratings (like in Diamond, 1991a) for preparing this study, this is regarded as a limitation to deeper interpretation of the effect of the firm's credit risk in determining the maturity of its debts.

The variable growth opportunities is aligned with the argument that companies with greater growth opportunities lend in the short-term, in order to avoid or mitigate agency problems in the creditor-shareholder relationship (Myers, 1977).

The dummy for the crisis, in 2009, is not significant, therefore, it indicates that the crisis of financial institutions did not cause changes in the companies' debt maturity.

As highlighted, debt in the capital market shows up as a determinant of great relevance to explain the companies' debt maturity, given the gain in $R^2$ of models and the significance of their coefficients. Its coefficient indicates that firms with a higher proportion of loans raised in the capital market have a higher debt maturity than the others, in line with Barclay and Smith Jr. (1995).

The inclusion of the variable representing subsidized debt shows a positive and significant coefficient. Thus, it may be argued that companies with a higher proportion of debts with subsidized interest rates also have higher debt maturity than the others. This result was expected, given that BNDES is seen as the main provider of long-term funds in the Brazilian economy.

Taken together, the results point out that both the capital market resources and the subsidized resources have higher maturities. Thus, it is observed that the supply of short-term funds is made primarily by financial institutions, in line with Barclay and Smith Jr. (1995). Thus, the Brazilian companies' low debt maturity is justified, since, on average, they relied on 45.7% of their debts with resources from this provider within the period.

Extending the analysis of the model containing the variables of the capital market and subsidized debt together, it is observed that the coefficient of the variable capital market is greater than the coefficient of subsidized debt, both in study 1 and in study 2. Hypothetically, if two identical companies in terms of control variables were taken as a basis, however, one with 100% of its debts raised on the capital market and the other with 100% of its debts raised on subsidized sources, the model indicates that the company with debt in the capital market has a higher maturity of its debts than the company with subsidized debt.

As a possible explanation, it is worth resuming the context of the funding sources in recent years. In the years after 2009, due to the enactment of Instruction CVM 476/2009, the Brazilian capital market has undergone a significant expansion, based on the primary market of debentures. According to the results observed in the analysis of leveraging, it is possible that the companies have modified or have been modifying (given the recent episode), the role of funding sources in their capital structure composition, due to the greater expressiveness of the capital market. In the case of debt maturity, the growth of the Brazilian capital market may have triggered a search for funding with higher maturity in this market.

## 5 CONCLUSIONS

This study aimed to verify how the funding sources on which companies are based might be relevant in shaping the Brazilian listed companies' capital structure within the period from 2005 to 2012.

The results showed that the debt proportion in the capital markets is relevant in determining companies' leverage. Thus, companies with higher debt proportions in the capital markets are more leveraged than the others. In turn, the debt proportion with subsidized interest rates does not show up as relevant in order to enable greater leverage to companies, a result associated with the development of the Brazilian capital market, given the Instruction CVM 476/2009.

Regarding maturity, measured by the weighted average maturity of debt payments, it was found that both the capital market and the providers with subsidized interest rates are responsible for providing resources with higher maturity. Therefore, it may be concluded that resources from financial institutions are those with lower maturities, something which justifies the low maturity of companies' debts, since such companies were largely based on bank resources for their funding.

Extending the analysis, evidence that the resources from the capital market have a higher maturity when compared to subsidized resources were found. This is a surprising result, since subsidized resources are regarded as long-term resources available to Brazilian companies. This finding was justified the context of funding sources within the sample period as a basis, pointing out evidence that the growth of the Brazilian capital market, especially in the years after 2009, due to the enactment of Instruction CVM 476/2009, may have caused, or has been causing, modifications in the way how companies make up their capital structure. The results show that Brazilian companies are based on the capital markets for their funding with higher maturity and subsidized resources, from BNDES, to fund their mid-term maturities.

Giambiagi et al. (2009) point out that a 2008 document produced by the World Bank, raises the issue of a possible revaluation in the role played by BNDES, considering some development in the Brazilian capital market. This study shows evidence that there have been changes in the way how these providers impact the companies' capital structure. Further research, addressing information of the next few years, can approach this issue, by checking the joint evolution of resources provided by BNDES and the Brazilian capital market.

The study has its limitations: the largest companies listed on the BM&FBOVESPA were evaluated, so that the sample of this study has a bias towards large Brazilian companies. Companies that did not have enough information in their notes were not included in the analysis, so that perhaps there is a bias towards companies with less asymmetric information. Finally, the results are restricted to the companies operating in the sectors under analysis, since the sectors not covered in this study may have a differential relationship with subsidized providers.

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**Correspondence Address:**
**Wilson Tarantin Junior**
Faculdade de Economia, Administração e Contabilidade de Ribeirão Preto, Universidade de São Paulo
Avenida Bandeirantes, 3900 – CEP: 14040-905
Monte Alegre – Ribeirão Preto – SP
E-mail: wilsontarantin@yahoo.com.br