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Financing Decisions and Abnormal Returns: An Analysis of Brazilian Companies

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ABSTRACT

In this paper, we developed an approach for the empirical testing of the relationship between the financing choices of companies and the abnormal returns obtained by their shareholders. We innovate by incorporating controls on how this relationship is affected by the capabilities of each funding source, at different levels of returns, through quantile regression. The estimation of the model for a sample of Brazilian companies indicates the inexistence of a significant relationship between abnormal returns and debt issuance. The same occurs between abnormal returns and equity issuance, with one exception: when there is a deficit of internal financing that extrapolates the available safe debt and the abnormal returns are, at least, median, this relationship becomes significant and positive. Considered as a whole, the results suggest an indifference to the sources of funds used by the company. Among the contributions, we highlight the incorporation of the aforementioned controls, which bridges the gap identified in the literature relating business financial flows and stock returns.

KEYWORDS

Financing Decisions, Pecking Order Theory, Abnormal Returns, Test Methodology

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Decisões de Financiamento e Retornos Anormais: Uma Análise de Companhias Brasileiras

RESUMO

Apresenta-se, aqui, uma proposta de abordagem para o teste empírico da relação entre as escolhas de financiamento das empresas e os retornos anormais obtidos por seus acionistas. Inova-se com a incorporação de controles sobre como essa relação é afetada pelas capacidades de cada fonte de financiamento, em diferentes níveis de retornos, por meio de regressão quantílica. A estimação do modelo para uma amostra de empresas brasileiras indica a inexistência de relação significante entre retornos anormais e emissão de dívida. O mesmo ocorre entre retornos anormais e emissão de ações, com uma exceção: quando há déficit de financiamento interno que extrapola a dívida segura disponível e os retornos anormais são, ao menos, medianos, essa relação passa a ser significante e positiva. Analisados como um todo, os resultados sugerem certa indiferença às fontes de recursos utilizadas pela empresa. Destaca-se, dentre as contribuições, a incorporação dos controles aqui mencionados, que preenchem lacuna presente em análises que relacionam fluxos financeiros empresariais e retornos, na literatura revisada.

PALAVRAS-CHAVE

Decisões de Financiamento, *Pecking Order Theory,* Retornos Anormais, Metodologia de Teste

1. INTRODUCTION

The sequence of a company's financing choices defines its capital structure, but there is some controversy regarding the impact of such choices on the company's value and its repercussions for the returns obtained by its shareholders. Such controversy can be analyzed from two perspectives: the traditional analysis, defended by Durand (1952, 1959), which says that capital structure impacts the value of the company; and the one presented by Modigliani and Miller (1958, 1959), in which the capital structure is shown to be irrelevant to the value of the company—that would be driven only by the risk class to which it belongs (related to the nature of its business) and by the expectations about its cash flows.

In the view of the Pecking Order Theory (Myers & Majluf, 1984), or simply POT, the information asymmetries about the real opportunities and financial situations of companies induces a process of negative valuation of its financing through external funding sources. Among these external sources, equity issuance would be valued even more negatively compared to debt issuance. When acting for the benefit of shareholders, managers would take this into account and follow a pre-established hierarchy of sources, preferring the use of internal to external resources and, among these, the use of debt to equity.

The empirical tests that examine whether companies make their financing decisions following the POT face challenges, initially emphasized by Chirinko and Singha (2000), in their critics to the seminal study of Shyam-Sunder and Myers (1999). Similar challenges are faced by studies that seek to relate the valuation of a company's shares to a greater or lesser adherence to what is predicted by the POT. To a large extent, these challenges arise from the need to analyze, at the same time, the financing flows by source of funds, as well as the capacities of each of these sources, so that one can effectively confirm or refute the adherence of these flows to the theory. In addition, in the case of studies on the valuation of shares by the market, the need for a joint analysis of this valuation will be added.

Several authors have committed themselves to analyzing the relationship between the companies' financing choices and the returns obtained by shareholders, such as Fama and French (1998), with their approach to the spread between market value and book value; Vo and Ellis (2017), through the relationship between market-adjusted returns and a company's leverage; and D'Mello et al. (2018), who evaluated the marginal contribution to shareholder wealth of each additional dollar of debt, based on the analysis of the company's abnormal returns. When analyzing the aforementioned relationships from the POT perspective, however, an important gap can be identified: the absence of adequate controls for the company's financing capabilities, at the moment of decision making.

The relevance of these controls is recognized from the study of Lemmon and Zender (2010), who, when analyzing the adherence of companies' financing choices to the POT, identified that the market reaction to an eventual equity issuance is less unfavorable when the conditions for the company issuing debt are adverse. If the probability of a company being able to issue debt with a favorable rating is low, or, stated in other words, it would be hard for an eventual debt issuance to be considered safe for investors, its stock returns are less penalized by issuing equity.

What can be seen is that, although Fama and French (1998), Vo and Ellis (2017) and D'Mello et al. (2018), among others, were able to identify a negative relationship between indebtedness and returns obtained by shareholders on invested capital, such a relationship, from the point of view of the POT, should be analyzed in the light of the company's financing possibilities. Based on the POT, it is observed that, in the presence of good investment opportunities and insufficient internal resources for the company to finance them, the contracting of new debts should not be negatively valued by the market. If the capacity to issue safe debt, added to that of internal financing, are insufficient to finance these opportunities, even the equity issuance should not be negatively valued.

In a recent study, Rocha and Camargos (2023) analyze the adherence of Brazilian companies' financing choices to the POT, filling gaps commonly found in previous studies. To this end, financing decisions are analyzed through the relationship between the expected internal financing deficits (or surpluses) for a given period and the financial flows actually observed in external sources of funds, controlling for the expectation of deficit financed exclusively by debt, deficit financed by debt and equity, or surplus. The study demonstrates that, once these controls are incorporated, the financing decisions of publicly traded Brazilian companies appear to adhere to the POT. The authors do not analyze, however, if a company's adherence to the POT is related to the appreciation of its stocks.

This article aims to analyze the existence of a relationship between the returns provided by the shares of a company and its adherence to the POT. If investors perceive adherence to the POT as something favorable, positive relationships are expected between abnormal returns for shareholders and companies' financial slack, which helps to avoid missing out on good investment opportunities. Furthermore, it is expected that the relationships between these abnormal returns and the company's financing flows will depend on the capacities observed for each of its sources of funds. Based on the POT assumptions, debt issuance can be viewed positively in the presence of an internal financing deficit, and negatively, in the case of an internal surplus. Regarding the equity issuance, this would only be seen positively when the preferred sources of funds (internal and debt) are insufficient.

We carry out our analyses by studying the relationships between the abnormal returns for the shareholders in a given period and the variables associated with the company's financing, in the immediately previous period, controlling for the capacities of its sources of funds, in this previous period. Such capacities are determined from the company's financial statements, using concepts developed in Rocha and Camargos (2023) to estimate the safe debt and the company's financial slack. The relationships between abnormal returns and financing choices are studied using quantile regression, at different levels of abnormal returns, considering the possibilities available to the company when making these choices.

The quantile regression results for all quartiles of abnormal returns indicate the inexistence of a significant relationship between these returns and debt issuance, regardless of the sufficiency of each of the preferred sources of funds. The same fact occurs with equity issuance, with only one exception: when there is a deficit of internal financing that extrapolates the safe debt available to the company then there is a positive and significant relationship between equity issuance and abnormal returns, but only in the case of companies with median abnormal returns or in the upper quartile of abnormal returns.

The explanatory power of abnormal returns from financing choices is substantially low, however, even controlling for the company's financing capabilities. This refers to an indifference to the company's preferred sources of funds, suggesting that the capital structure, by itself, may not be so relevant to the determination of these returns, something more in line with the theory of capital structure irrelevance (Modigliani & Miller, 1958, 1959) than with the POT (Myers & Majluf, 1984).

We can highlight, among the contributions of this study, the proposition and application of an approach that enables us to analyze the relationship between the abnormal returns to shareholders and the financing choices of the companies, conditioned to the capacities of the sources of funds available for this purpose.

2. METHODOLOGY AND VARIABLES

In the present study, the abnormal returns to shareholders are calculated from the total returns obtained by them, TRS (Total Return to Shareholder), considering capital gains and free cash flows (dividends and other proceeds), adopting the formula presented in (1), proposed by Copeland et al. (2004).

$$TRS_1 = \frac{S_1 - S_0 + FCF_1}{S_0} \tag{1}$$

In equation (1), TRS is calculated from the difference between share prices at the end and beginning of the period (S_1 and S_0, respectively), representing the capital gain plus free cash flow (FCF*,* for Free Cash Flow) provided by the income arising from the receipt of earnings, during the period in question (FCF*1*).

The abnormal return is defined as shown in Equation (2).

$$AR_{\mathrm{i,t}} = TRS_{i,t} - R_{IBRX-100,t} \tag{2}$$

In equation (2), the abnormal return (Abnormal Return, or AR), obtained by holders of shares from the most traded class of company "i", in quarter "t", is calculated by subtracting the IBRX-100 index accumulated return from the TRS provided by this class of shares.

To explain the AR, variables similar to those used by D'Mello et al. (2018) are adopted, with some differences, explained from (3).

$$\begin{aligned}
\mathrm{AR}_{i,t} = {} & \alpha_{i,t} + \beta_1 \frac{\Delta LTD_{i,t-1}}{MV_{i,t-1}} + \beta_2 \frac{\Delta TSCC_{i,t-1}}{MV_{i,t-1}} + \beta_3 \frac{\Delta IBEF_{i,t-1}}{MV_{i,t-1}} + \beta_4 \frac{\Delta DIVPAID_{i,t-1}}{MV_{i,t-1}} + \\
& \beta_5 \frac{\Delta FINEXP_{i,t-1}}{MV_{i,t-1}} + \beta_6 \frac{\Delta NOA_{i,t-1}}{MV_{i,t-1}} + \beta_7 \frac{LTD_{i,t-1}}{MV_{i,t-1}} + \beta_8 \frac{FSLACK_{i,t}}{MV_{i,t-1}} + \beta_9 \frac{\Delta FSLACK_{i,t-1}}{MV_{i,t-1}} + \\
& \beta_{10}.DDE_{i,t-1}.\frac{\Delta LTD_{i,t-1}}{MV_{i,t-1}} + \beta_{11}.DDE_{i,t-1}.\frac{\Delta TSCC_{i,t-1}}{MV_{i,t-1}} + \beta_{12}.DDE_{i,t-1}.\frac{\Delta FSLACK_{i,t-1}}{MV_{i,t-1}} + \\
& \beta_{13}.SUR_{i,t-1}.\frac{\Delta LTD_{i,t-1}}{MV_{i,t-1}} + \beta_{14}.SUR_{i,t-1}.\frac{\Delta TSCC_{i,t-1}}{MV_{i,t-1}} + \beta_{15}.SUR_{i,t-1}.\frac{\Delta FSLACK_{i,t-1}}{MV_{i,t-1}} + \varepsilon_{i,t}
\end{aligned} \tag{3}$$

Among the similarities shown in (3) with the model of D'Mello et al. (2018) are the adoption, as explanatory variables, of long-term debt (LTD, from Long-Term Debt), of its variation (ΔLTD), equity issuance (ΔTSCC, from Total Stockholders Capital Contribution), the variation in financial expenses (ΔFINEXP, from Financial Expenses), the variation in dividends paid (ΔDIVPAID, from Dividend Paid) and the variation in profits before extraordinary items , shown here before financial expenses and after taxes (ΔIBEF, from Income Before Extraordinary Items and Financial Expenses). The variation in net operating assets (NOA, or Net Operating Assets), or ΔNOA, is substituted for the variation in total assets net of cash, which was used by the authors. NOA is obtained as the sum of the net working capital assets with the net non-current operating assets, as in Rocha and Camargos (2023) and Papanastasopoulos et al. (2011). The value for the net working capital assets is obtained by subtracting the non-financial portion of current liabilities from the non-financial portion of current assets. The net non-current operating assets are valued by subtracting the non-financial portion of non-current liabilities from non-current assets. The variation in net operating assets (ΔNOA) represents, therefore, the investment (or disinvestment) made in the company's operation, in a given period, discounting the part financed by operating liabilities.

Rather than using, as shown in (3), the cash variable (and its variation), the variables FSLACK (Financial Slack) and ΔFSLACK are incorporated as representatives of the company's financial slack and variations in this financial slack. Also incorporated are two dummy variables (SUR and DDE), used to characterize, respectively, whether the company presented, in "t-1", a surplus of internal financing or an internal deficit in such an amount that would exhaust its safe debt and require equity issuance for its financing. FSLACK, SUR and DDE will be discussed in more detail later.

In line with what D'Mello et al. (2018) explain, all explanatory variables are divided, as seen in (3), by the market value of the company's shares. Nonetheless, contrary to the authors mentioned above, who adopt annual and contemporary data to the abnormal returns (also annual), in this study, financial data from the previous quarter ("t-1") were adopted to explain the abnormal returns in a given quarter ("t"). Here, the financing or investment financial flows (ΔLTD, ΔTSCC, ΔNOA and ΔFSLACK) are analyzed as they occurred in quarter "t-1", and the other flows (ΔIBEF, ΔDIVPAID and ΔFINEXP) are analyzed in order to consider the variation between two consecutive twelve-month moving windows, ended in the quarters "t-1" and "t-2". In the latter case, the twelve-month moving windows are chosen to prevent any seasonality from compromising the quarterly analysis. Lastly, in view of the unavailability at the adopted data sources, the variations in the amounts spent on research and development were not incorporated.

The first adaptation of the model from D'Mello et al. (2018) which was adopted by this study refers to the variables used to analyze the company's financial situation (liquidity and indebtedness). Instead of cash and debt positions, the concept of financial slack is adopted, as originally proposed by Myers and Majluf (1984) and Myers (1984) and later operationalized by the variable FSLACK (Financial Slack), in Rocha and Camargos (2023). The FSLACK in a given quarter "t" comprises, here, the sum of the net liquid balance NLB (current financial assets minus current financial liabilities), at the end of quarter "t-1", with the safe debt SDEBT subject to issuance by the company, during quarter "t". Data from the end of quarter "t-1" are used to calculate NLB, SDEBT and FSLACK at the beginning of the quarter "t".

SDEBT is equal to zero for companies identified as insolvent by a predictive model and, for solvent companies, it is estimated from the difference between the 90th percentile of the net debt to EBITDA (ND/EBITDA) and net debt to total assets (ND/TA) of solvent companies in the same sector, and these same indicators, for the company itself, at the end of period "t-1". Equations (4) and (5) allow the calculation, respectively, of SDEBT and FSLACK. More details on this approach to the calculation of SDEBT and FSLACK can be found in its original proposition, by Rocha and Camargos (2023).

$$SDEBT_{i,t} = max\{0, min[(ND/TA_{P90,s,t-1} - ND/TA_{i,t-1}).TA_{i,t-1}, (ND/EBITDA_{P90,s,t-1} - ND/EBITDA_{i,t-1}).EBITDA_{i,t-1}]\} \quad (4)$$

$$FSLACK_{i,t} = NLB_{i,t-1} + SDEBT_{i,t} \quad (5)$$

The second adaptation in the structure of the model of D'Mello et al. (2018) refers to the incorporation, in (3), of interaction terms (represented by *dummy* variables) which allow differentiating the relationship between certain variables and the abnormal returns, depending on whether the company has a deficit (reference level) or a surplus of internal financing (*dummy*

SUR = *1*); and, in the case of deficit, whether the company has the ability to fully finance this deficit with new debt (reference level) or, due to the amount of internal deficit, debt financing and equity issuance are both required (*dummy* DDE = 1).

The internal financing deficit is evaluated using equations (6), (7) and (8).

$$DEF_{i,t-1} = \Delta NOA_{i,t-1} + NLB_{i,t-1} - IF_{i,t-1} \quad (6)$$

$$IF_{i,t-1} = NLB_{i,t-2} + SF_{i,t-1} \quad (7)$$

$$SF_{i,t-1} = IBE_{i,t-1} + DISCOP_{i,t-1} + PPESLG_{i,t-1} - DIVPAID_{i,t-1} \quad (8)$$

The ex-post deficit (DEF) of the quarter prior to the analyzed returns depends on the investment made in the company's net operating assets (ΔNOA), on the net liquid balance NLB at the end of the period, and on the internal resources available for financing (IF, from Internal Funds). In turn, IF depend on the cash balance at the end of the immediately preceding quarter ("t-2", in this case) and on the self-financing flow (SF) provided by the company's operations. And, finally, SF is calculated, *ex-post*, by subtracting the dividends paid (DIVPAID) from the income before extraordinary items IBE, adjusted by income and non-cash items related to discontinued operations and the sale of assets (Discontinued Operations, or DISCOP; and Property, Plant and Equipment Sales Loss/Gain, or PPESLG, respectively).

From DEF and SDEBT, the DDE and SUR dummies are evaluated, *ex-post*, from what is seen in (9), with all variables taken with index "t-1", suppressed for better visualization.

$$\begin{gathered} If\ DEF \leq 0,\ then\ DDE = 0\ and\ SUR = 1; \\ If\ DEF > 0\ and\ DEF > SDEBT,\ then\ DDE = 1\ and\ SUR = 0; \\ else\ DDE = 0\ and\ SUR = 0 \end{gathered} \quad (9)$$

It should be noted that, in 9, the internal financing deficit is compared in "t-1" (quarter prior to the analysis of abnormal returns) with the safe debt available to the company, SDEBT, also in "t-1" . Therefore, the estimation of SDEBT follows equation (4), substituting "t-1" for "t", resulting in an additional lag for all time indexes.

From these definitions and equation (3), the empirically tested hypotheses were:

- **H1:** Investors will interpret debt issuance negatively, when the company is able to finance itself from internal resources. From (3), a negative value is expected for β13 and for (β1+ β13). Regarding β1, β10 and (β1+ β10), associated with the issuance of debt when it is necessary, it is understood that they may assume non-significant values (indicating the lack of relationship with abnormal returns), or even positive, depending on of how the market perceives the investment choices made by the company.
- **H2:** Investors will interpret equity issuance negatively, when the company is able to finance itself by internal resources or by issuing safe debt. From (3), a negative value is expected for β2 and for (β2+ β14). Regarding β11 and (β2+ β11), associated with the equity issuance when it is necessary, it is understood that they can assume non-significant values (not related to abnormal returns), or even positive, depending on how the market perceives the investment choices made by the company.

- **H3:** Investors will have a positive interpretation regarding the preservation of financial slack by companies, to avoid losing investment opportunities or having their returns reduced due to the need to issue equity. For the same reason, an increase in this financial slack will also be interpreted positively, whenever the company is able to finance its investments with internal resources or safe debt. However, when the company must finance itself through equity issuance, it is expected that a reduction (and not an increase) in this financial slack will be appreciated. Based on what can be seen in (3), positive values are expected for $\beta 8$, $\beta 9$ and ($\beta 9+ \beta 15$) and a negative value is expected for ($\beta 9+ \beta 12$).

The confirmation of hypotheses H1, H2, and H3 would corroborate the POT assumptions, in the sense that investors interpret the financing choices of companies as signs of their future opportunities and also in the sense that there is a financing hierarchy that favors more positive interpretations about those choices.

3. DATA AND ECONOMETRIC MODEL

Quarterly financial data were calculated or obtained from the database of Economatica, for further analysis. The period of analysis begins in December 2010, when the national accounting standards were harmonized with the IFRS - International Financial Reporting Standards, going until September 2020.

Initially, the following observations were excluded from the sample: (i) from companies in the financial sector; (ii) from holding companies; (iii) with inconsistencies in financial statements' items of interest; (iv) with total assets, consolidated shareholders' equity, shareholders' equity or net sales revenue less than or equal to zero; (v) whose absolute value of net cash flow from operating activities is less than one currency unit; (vi) in which the market value (hereafter MV), the equity book value and the total debt to total assets ratio are not finite and positive; (vii) from penny stocks or stocks with trades in less then 95% of the trading days, within the quarter of interest.

Then, the explanatory variables were divided by the MV of the shares of each company, excluding the observations in which the ratio between the book value of equity and MV was greater than ten (i.e., with a price-to-book raito P/B less than 0.10). Finally, observations with variables showing an absolute value greater than ten times the MV were rated implausible, probably due to errors introduced or enhanced by the crossing of accounting and market data and excluded. The final database is composed of variables with complete quarterly data, consolidated in an unbalanced data panel, with 3,331 observations from 183 companies, over a period of 38 quarters.

In order to enable the analysis of their capacity to issue safe debt, the companies were grouped into five sectors: i) trade, leasing, logistics and airlines; ii) construction, real estate and shopping malls; iii) industry and agricultural business; iv) utilities, telecommunications, mining, oil, gas and other concessions; and v) other services. This grouping is based on the NAICS Levels I and II classifications, considering the similarities between the sectors.

Two models are estimated, for comparative analysis of the results. The main model has already been explained in detail, from equation (3). The second model, presented in (10), is closer to the original model of D'Mello et al. (2018), changed only where necessary to use the available data and offer better comparisons with the main model.

$$AR = \gamma_0 + \gamma_1 \frac{\Delta LTD_{i,t-1}}{MV_{i,t-1}} + \gamma_2 \frac{\Delta C_{i,t-1}}{MV_{i,t-1}} + \gamma_3 \frac{\Delta IBEF_{i,t-1}}{MV_{i,t-1}} + \gamma_4 \frac{\Delta TANCFA_{i,t-1}}{MV_{i,t-1}} + \gamma_5 \frac{\Delta FINEXP_{i,t-1}}{MV_{i,t-1}} + \gamma_6 \frac{\Delta DIVPAID_{i,t-1}}{MV_{i,t-1}} + \gamma_7 \frac{C_{i,t-1}}{MV_{i,t-1}} + \gamma_8 \frac{LTD_{i,t-1}}{MV_{i,t-1}} + \gamma_9 \frac{\Delta TSCC_{i,t-1}}{MV_{i,t-1}} + \, + \varepsilon_{i,t} \tag{10}$$

The variables C and ΔC have, here, the same interpretation given by the original authors, representing current financial assets and their variation. ΔTANCFA is total assets, net of current financial assets C, with the same interpretation of ΔAT given by the original authors, renamed just so it would not be confused with total assets. ΔIBEF means earnings before extraordinary items and interest (in this case, financial expenses, here represented by FINEXP). In the original equation, profit is represented by ΔE and includes adjustments for deferred taxes and tax credits that are not made here. The other variables follow the definitions from model (3).

Due to the expectation that companies with different levels of return to shareholders can have their financing choices valued by the market in a differentiated manner, the quantile regression technique (Koenker & Hallock, 2001) was chosen to estimate of the equations, in three levels of the AR distribution, the taus (quantiles) $\tau = 0.25$, $\tau = 0.50$ and $\tau = 0.75$. Therefore, it is possible not only to analyze the relationships between the variables around a central position (median) of the dependent variable, but also at other points of its conditional distribution.

In addition to the quantile regression with pooled data (cross-section perspective), the results from panel data analysis are also presented, purging from the coefficients their correlated random effects, through variables that concentrate the unobserved effects, in each quantile (Bache et al., 2013). The estimated models are represented, in a simplified way, by (11) and (12).

$$q(\mathrm{X}, \mathrm{S}, \tau) = \mathrm{X}^T \beta(\tau) + \mathrm{S}^T \pi(\tau) \tag{11}$$

$$Y = q(\mathrm{X}, \mathrm{S}, \mathrm{U}) \tag{12}$$

By excluding S (which represents the average correlated effects) from (11) and (12), the representation of the cross-section quantile regression is obtained, which allows evaluating the marginal effects of X on Y, from the β coefficients, for each quantile τ (level U). The quantile regression also allows the evaluation of scale and location effects introduced by the interaction between continuous and categorical explanatory variables (or *dummies*), making it possible to analyze, for each quantile of the conditional distribution of AR, its relationship with the explanatory variables.

In the correlated random effects model (Bache et al., 2013), the coefficients π represent, in each quantile τ, the random effects correlated to the continuous independent variables, for each model. Once the estimations are carried out, the β coefficients can be interpreted as the marginal effects that configure the relationship between the regressors and the abnormal AR return, after purging the correlated effects associated with the π coefficients. Therefore, a difference is expected between the β coefficients of the cross-section quantile regression and the same coefficients, in the quantile regression with correlated random effects, unless the unobserved effects related to the regressors are not relevant.

Observations identified as, simultaneously, univariate outliers (1% and 99% percentiles of variables) and multivariate outliers (observations with zero weight in robust regression estimation) were excluded. A robust estimation was made, for the purpose of identifying outliers, in one step, an "S" estimation with nonsingular sampling, more suitable in the presence of categorical variables (Koller & Stahel, 2017). For more details on this approach to the identification of multivariate outliers, see Adams et al. (2019) and Rousseeuw and Hubert (2018). After excluding the observations considered, at the same time, univariate and multivariate outliers, an unbalanced panel with 3,176 observations was obtained.

Considering the multiplicity of factors involved and using the results of the robust regression, the models were evaluated in relation to the multicollinearity, from the generalized inflation factors (GVIF, for Generalized Variance Inflation Factors) of their variables (Fox & Monette, 1992), with all of them presenting a GVIF of less than 5. All the variables initially considered for the models were kept in them.

Finally, the Shapiro and Wilk normality test (Royston, 1982; Shapiro & Wilk, 1965) was applied, with its results signaling with the non-normality of the distribution of all involved variables. Therefore, an option was made for the use of measures and methods that do not adopt the normality of the data as a prerequisite for obtaining satisfactory and unbiased results.

4. RESULTS AND DISCUSSION

Tables 1 and 2 show the comparisons between the medians of variables of interest for different groups of observations. In these tables, the variables calculations are lagged one quarter, with respect to the quarter for which the abnormal return AR is calculated, and they are divided by the market value of the company's shares (MV), at the end of the period to which they refer. To identify the significance of the difference between the medians compared, the Kruskal-Wallis (Hollander et al., 2013) and Dunn (1964) tests were used.

In Table 1, the observations are grouped according to the financing profile (FP) in which the company fits: SUR (internal financing surplus), DD (internal financing deficit, entirely financeable by safe debt) and DDE (internal financing deficit that exceeds safe debt and, therefore, requires the issuance of debt and equity for its financing).

It is worth noting that, for 8 out of 17 variables, there was a significant difference of at least 1% between the medians of all comparison pairs of groups with different FP: SIZE, SDEBT, FSLACK, ΔCFA, ΔFSLACK, ΔTANCFA, ΔLTD and ΔFINEXP . Additionally, two other aspects are highlighted.

The first is the apparent coherence of variations in long-term debt (ΔLTD), considering what would be expected from the POT (Myers, 1984; Myers & Majluf, 1984): in median terms, there is a reduction in the presence of internal financing surplus (SUR), an increase when debt issuing is needed (DD) and an even greater increase when the size of the deficit requires debt and equity issuance (DDE). This last point reinforces the thesis that companies issue equity only after the exhaustion of preferred sources of funds (internal and debt). Equity issuance ΔTSCC, in turn, has null medians in all FP, being not null only in higher percentiles of its distribution, which would also be in line with the POT.

A second aspect is the statistical indifference between the median AR abnormal returns obtained by companies classified as SUR, DD, or DDE. As an isolated factor, the company's inability to finance itself, or to finance itself only from the financial slack available (internal plus safe debt) does not seem to influence abnormal returns. This suggests that the hypothesis of irrelevance of the capital structure to the value of the company (Modigliani & Miller, 1958, 1959) is valid, or that the quarterly period of accumulation of returns is insufficient to perceive the valuation of the adopted long-term financing policies.

Table 1
Variables of interest medians, by FP.

Variable	FP			Lowest Sig. For The Dif. Between Groups
	SUR	*DD*	*DDE*	
SIZE	15.41	15.59	15.86	**
AR	-0.6%	0.1%	-0.7%	ns
CFA	0.162	0.161	0.199	ns
NLB	0.040	0.066	0.034	ns
SDEBT	0.166	0.243	0.000	****
FSLACK	0.216	0.301	0.087	****
LTD	0.328	0.322	0.608	ns
ΔCFA	-0.009	0.008	0.023	***
ΔFSLACK	-0.019	0.012	0.058	****
ΔNOA	0.006	0.021	0.026	ns
ΔTANCFA	0.009	0.026	0.038	**
ΔLTD	-0.013	0.017	0.061	****
ΔTSCC	0.000	0.000	0.000	ns
ΔNREV	0.009	0.011	0.019	ns
ΔIBEF	0.000	0.000	0.000	ns
ΔDIVPAID	0.000	0.000	0.000	ns
ΔFINEXP	0.000	0.001	0.003	***

Notes: **** $p < 0.0001$; *** $p < 0.001$; ** $p < 0.01$; * $p < 0.05$; ns: not significant.
Source: Prepared by the authors.

In Table 2, the medians of the same variables of Table 1 are presented. However, they are grouped by their AR quartile. It is worth noting here that, with the obvious exception of AR itself, all other variables present AR quartile pairs in which their medians do not differ, and, for 7 of the 17 variables (SIZE, ΔNOA, ΔTANCFA, ΔLTD, ΔTSCC, ΔDIVPAID and ΔFINEXP), their medians do not differ between any pairs of AR quartiles that can be assessed.

However, comparing the extreme quartiles (Q1 and Q4) of AR, significant differences (at least at 5%) are observed for NLB, SDEBT, FSLACK, ΔCFA, and ΔFSLACK. The same occurs with changes in net sales revenue (ΔNREV) and in post-tax (before financial expenses) profitability (ΔIBEF) provided by the company's operation. The values associated with these variables are substantially higher in Q4, which has a median abnormal return for shareholders of 17.55%, than in Q1, which has a median abnormal return for shareholders of -16.1%.

It is coherent that greater abnormal returns are preceded by greater growth in sales and in the results of the operation, by the expectations of future cash generation that this growth brings, and this is observed, in Table 2, from the comparison between their medians, in the upper and lower quartiles from AR. It is also observed that higher abnormal returns are preceded by greater financial slack and a greater growth of this slack, comparing the medians of NLB, SDEBT, FSLACK, ΔCFA and ΔFSLACK, in the upper and lower quartiles of AR. This corroborates the POT hypothesis of positive valuation, by investors, of the presence of financial slack, to avoid that good investment opportunities are lost, or that they are deployed at a higher cost, due to the adverse selection associated with equity issuance.

Table 2
Variables of interest medians, by AR quartile.

Variable	AR Quartile				Lowest Sig. For The Dif. Between Groups
	Q1	Q2	Q3	Q4	
SIZE	15.449	15.556	15.555	15.523	ns
AR	-16.1%	-4.9%	4.0%	17.5%	****
CFA	0.172	0.144	0.170	0.179	ns
NLB	0.041	0.042	0.048	0.062	ns
SDEBT	0.143	0.175	0.153	0.174	ns
FSLACK	0.201	0.239	0.237	0.253	ns
LTD	0.412	0.326	0.367	0.355	ns
ΔCFA	-0.003	0.001	0.001	0.005	ns
ΔFSLACK	-0.012	-0.001	0.002	0.012	ns
ΔNOA	0.013	0.014	0.013	0.014	ns
ΔTANCFA	0.015	0.015	0.019	0.021	ns
ΔLTD	0.000	0.000	0.000	0.000	ns
ΔTSCC	0.000	0.000	0.000	0.000	ns
ΔNREV	0.008	0.009	0.012	0.017	ns
ΔIBEF	-0.001	0.001	0.003	0.004	ns
ΔDIVPAID	0.000	0.000	0.000	0.000	ns
ΔFINEXP	0.001	0.001	0.001	0.001	ns

Notes: **** $p < 0.0001$; *** $p < 0.001$; ** $p < 0.01$; * $p < 0.05$; ns: not significant.
Source: Prepared by the authors.

To better understand the relationship between abnormal returns AR and their possible determinants, we proceed to the analysis of quantile regressions. Table 3 presents the estimation results for the model designed to control for the company's financial situation, using categorical variables, according to equation 3, and for the model that is more similar to the original of D'Mello et al. (2018), according to equation 10. For both models, the coefficients of the cross-section (CS) and correlated random effects (CREM) quantile regressions are displayed. The table is complemented by comparisons between the cross-section models, based on the Akaike information criteria – AIC (Akaike, 1974), the Bayesian criterion – BIC (Schwarz, 1978) and the R1 criterion (Koenker & Machado, 1999).

The assumptions contained in H1 suggest, in the model of equation 3, negative values for the coefficient associated with the interaction ΔLTD:SUR (β13) and for the sum of this coefficient with that associated with ΔLTD (β1). Furthermore, they suggest that the coefficients associated with ΔLTD and with the interaction ΔLTD:DDE can assume negative, positive, or even non-significant values, depending on how the market perceives the company's investment choices. What is observed, in the estimation of equation 3, is the non-significance of these coefficients. As the reference level for estimating the model and the level at which the *dummy* DDE = 1 consider that debt issuance was necessary, due to insufficient internal resources, the results for ΔLTD and for ΔLTD:DDE corroborate H1. The results obtained for the model of equation 10, which does not adopt sufficiency controls for each source of funds, also indicate that the relationship between ΔLTD and AR is not significant.

Table 3
CS and CREM quantile regressions, for different quantiles/taus.

Regression	Variable	Equation 3 Model			Equation 10 Model		
		tau 0.25	tau 0.50	tau 0.75	tau 0.25	tau 0.50	tau 0.75
CS	ΔLTD	-0.05	-0.12	-0.10	0.02	0.02	0.00
CREM	ΔLTD	-0.04	-0.12	-0.06	0.02	0.01	0.00
CREM	m.ΔLTD	0.06	0.17	0.13	0.11	0.32	0.35
CS	ΔLTD:DDE	0.11	0.16	0.06			
CREM	ΔLTD:DDE	0.07	0.14	0.01			
CS	ΔLTD:SUR	0.07	0.16	0.14			
CREM	ΔLTD:SUR	0.04	0.14	0.08			
CS	LTD	-0.02 **	0.00	0.01	-0.02 **	-0.02	-0.01
CREM	LTD	0.00	0.02	0.04**	-0.02*	-0.01	0.00
CREM	m.LTD	-0.03**	-0.04**	-0.05***	0.00	0.00	-0.02
CS	ΔTSCC	-0.06	-0.12 *	-0.18	-0.07	-0.01	0.07
CREM	ΔTSCC	-0.06	-0.12	-0.19	-0.06	0.02	0.09
CREM	m.ΔTSCC	0.01	0.13	0.23	0.03	-0.02	0.14
CS	ΔTSCC:DDE	0.18	0.33 **	0.50 **			
CREM	ΔTSCC:DDE	0.18	0.32*	0.45**			
CS	ΔTSCC:SUR	0.35 *	0.13	0.43 *			
CREM	ΔTSCC:SUR	0.24	0.25	0.44			
CS	FSLACK	0.01 *	0.02 **	0.03 ***			
CREM	FSLACK	0.02	0.02	0.04***			
CREM	m.FSLACK	0.00	-0.01	0.00			
CS	ΔFSLACK	0.07 *	0.08 ***	0.08			
CREM	ΔFSLACK	0.05*	0.07**	0.07			
CREM	m.ΔFSLACK	0.28*	0.14	0.09			
CS	ΔFSLACK:DDE	-0.09 *	-0.09 *	-0.09			
CREM	ΔFSLACK:DDE	-0.05	-0.11**	-0.09			
CS	ΔFSLACK:SUR	-0.09 **	-0.09 **	-0.07			
CREM	ΔFSLACK:SUR	-0.06*	-0.09**	-0.07			
CS	ΔCFA				0.02	0.07	0.06
CREM	ΔCFA				-0.01	0.02	0.00
CREM	m.ΔCFA				0.47*	0.15	0.30
CS	CFA				0.01	0.03	0.04 *
CREM	CFA				0.06**	0.10***	0.12***
CREM	m.CFA				-0.10***	-0.12***	-0.12**
CS	ΔTANCFA				0.04 *	0.07 **	0.11 ***
CREM	ΔTANCFA				0.04*	0.07**	0.10**
CREM	m.ΔTANCFA				-0.04	-0.22	-0.13
CS	ΔNOA	0.03	0.01	0.03			
CREM	ΔNOA	0.04	0.01	0.03			
CREM	m.ΔNOA	0.06	0.00	0.05			
CS	ΔIBEF	0.32 ***	0.26 ***	0.16 *	0.31 ***	0.25 ***	0.21 ***

Table 3
Cont.

Regression	Variable	Equation 3 Model			Equation 10 Model		
		tau 0.25	tau 0.50	tau 0.75	tau 0.25	tau 0.50	tau 0.75
CREM	ΔIBEF	0.31***	0.23**	0.16*	0.27***	0.29***	0.27***
CREM	m.ΔIBEF	0.07	0.16	0.01	0.08	0.19	0.15
CS	ΔDIVPAID	0.00	0.00	0.20	0.00	0.06	0.00
CREM	ΔDIVPAID	0.03	0.07	0.21	0.02	0.14	0.16
CREM	m.ΔDIVPAID	-2.21*	-0.71	-0.26	-0.94	-1.08	0.72
CS	ΔFINEXP	-0.24 ***	-0.16	-0.04	-0.24 ***	-0.20 *	-0.19 *
CREM	ΔFINEXP	-0.17*	-0.19	-0.15	-0.24**	-0.29**	-0.27**
CREM	m.ΔFINEXP	-0.18	0.28	0.26	-0.45	0.23	0.36
CS	Intercepto	-0.08 ***	0.00	0.09 ***	-0.09 ***	-0.01	0.09 ***
CREM	Intercepto	-0.08***	0.00	0.10***	-0.08***	0.01	0.10***
CS	DDE	-0.01	-0.01	0.00			
CREM	DDE	-0.01	0.00	0.00			
CS	SUR	-0.01	-0.01	0.00			
CREM	SUR	-0.01	0.00	0.00			
Observations		3,176	3,176	3,176	3,176	3,176	3,176
Quantile/tau		0.25	0.50	0.75	0.25	0.50	0.75
R1		0.02	0.02	0.02	0.02	0.01	0.01
AIC		-2,696.41	-2,824.46	-2,175.90	-2,680.23	-2,801.27	-2,155.86
BIC		-2,587.26	-2,715.32	-2,066.76	-2,619.60	-2,740.63	-2,095.22

Notes: Regressions estimated with R packages quantreg (Koenker, 2021) e rqpd (Koenker & Bache, 2011).
Settings: seed = 1234; bootstrap method = "wxy", repetitions = 1,000.
*** $p < 0.001$; ** $p < 0.01$; * $p < 0.05$. Analyses consider a minimum significance of 5% (*).
Source: Prepared by the authors.

These results differ from the findings of D'Mello et al. (2018), Vo and Ellis (2017) and Fama and French (1998), who identify a significant and negative relationship between abnormal returns and the variation of long-term debt. As the two models studied here showed non-significant relationships, this divergence cannot be attributed to the controls proposed in the model of equation 3. A possible explanation, from the perspective of the POT, would be an indifference of investors regarding the use of internal resources or the issuance of safe debt, as long as the company's financial slack (FSLACK) was preserved. This aspect will be revisited when analyzing the results, in the light of hypothesis H3.

The second hypothesis (H2) indicates a negative interpretation of equity issuance, when the company is able to finance itself using internal resources or safe debt. If equity issuance is necessary, its interpretation could be negative or positive, depending on how the market perceives the company's investment choices. For the model of equation 3, around the median of AR, the coefficient of the variable ΔTSCC is negative in the cross-section regression, but it loses significance, although preserving its value, when considering the average random effects correlated to ΔTSCC. In the presence of divergence between the coefficients resulting from the CS and CREM estimates, as in ΔTSCC, preference is given to the latter, which excludes the average effects correlated to the explanatory variables, allowing a better analysis of the marginal effects of changes in these variables. With this option made, both the coefficient of ΔTSCC and the coefficient of the interaction ΔTSCC:SUR are not significant, contradicting part of what was predicted in H2.

It is observed that the coefficients associated with ΔTSCC are also not significant in the model of equation 10, which seeks to replicate, with adaptations, the approach of D'Mello et al. (2018). In the original study of these authors, they identified a significant and positive coefficient relating equity issuance to abnormal returns.

Moving on to the analysis of the valuation of equity issuance when it is necessary (DDE = 1), it is observed that the interaction coefficient ΔTSCC:DDE is significant and positive, for the median and the upper quartile of the abnormal returns, both in the CS regression and in the CREM regression. This result corroborates hypothesis H2, with regard to equity issuing not being interpreted negatively, when necessary. Furthermore, if we adopt the abnormal return level (quartile) as a proxy for the market's perception of the company's future prospects, including its investments, the results also provide support for the hypothesis that, in the presence of a positive perception of these prospects and when other sources of funds are unavailable, equity issuance would be interpreted positively. Overall, we have that hypothesis H2 is partially corroborated.

Hypothesis H3 predicts that investors will positively interpret the presence and increase of financial slack on the part of companies, to avoid losing investment opportunities or having their returns reduced due to the need to issue equity. For the coefficient of the variable FSLACK (β8, in equation 3), a positive value is expected (positive appreciation of the "balance" of financial slack). When analyzing the CREM regression, a positive coefficient associated with FSLACK is observed, but only for the upper quartile of the distribution of abnormal returns, with the coefficient not being significant for the lower quartiles. A possible explanation for this would be the appreciation of FSLACK, by investors, only for those companies that offer abnormal returns that are above the median, enabling them to maintain greater financial slack for new investments.

Hypothesis H3 predicts positive values for the coefficient of the variable ΔFSLACK (β9, in equation 3) and for the sum of this coefficient with that of the interaction ΔFSLACK:SUR (β9+ β15, in equation 3). In fact, a positive coefficient associated with an increase in financial slack is observed, in the presence of internal financing deficit, entirely financeable by safe debt (see CREM:ΔFSLACK), in median terms and for the lower quartile of the distribution of abnormal returns. This coefficient is no longer significant, however, for the upper quartile of this distribution.

The value assumed by the coefficient of ΔFSLACK in the case of internal financing surplus (β9+ β15, in equation 3) becomes negative, in median terms, and for the lower quartile, differently from what was predicted in H3, and the coefficients involved are not significant for the upper quartile of AR. A possible explanation, in line with that given for the coefficient of the FSLACK variable, would be for investors to positively interpret an increase in financial slack when debt issuance is needed (for example, with the company issuing debt in a lower proportion than other companies from its sector, preserving SDEBT), but negatively when there is a surplus of internal financing, at least for those companies that present abnormal returns in line with or below the median of the distribution of abnormal returns.

Hypothesis H3 also predicts a negative value for the coefficient associated with the variation in financial slack when the company has to issue equity to finance itself. Thus, it predicts that the sum of the coefficients of ΔFSLACK and ΔFSLACK:DDE (β9+ β12, in equation 3) has a negative value. From the CREM regression, it can be seen that the ΔFSLACK:DDE coefficient is significant only around the median, and that, in this case, its sum with the ΔFSLACK coefficient results in a negative value, as expected (-0.04). At the other quartiles, this interaction term is not significant, so it is not possible to state if there is any difference in the valuation of increases in financial slack, with respect to the reference level. Overall, mixed results are observed for hypothesis H3, depending on the quartile of abnormal returns under analysis.

Regarding the research hypotheses, the results were mixed, as already detailed for each case, sometimes corroborating, sometimes contradicting what was predicted, based on the POT. The results seem to depend not only on controls related to funding capabilities, but also on the level of abnormal returns, and are not as uniform as expected. It is understood, therefore, that it is not possible to conclude, from these results, by the adherence of the investors' reaction, measured from the abnormal stock returns, to what the theory predicts.

5. FINAL REMARKS

In this study, adaptations were proposed to the model adopted by D'Mello et al. (2018), to test whether the abnormal returns obtained by shareholders follow what is predicted by the POT, regarding the valuation of companies' financing choices. The suggested approach differs from the original one by controlling for the company's financing capabilities, by the operationalization of the concepts of safe debt and financial slack, and by analyzing the relationships at different levels of returns, using quantile regression.

The proposed approach was applied to a sample of publicly traded Brazilian companies, with mixed results, regarding what could be predicted from the POT. It is noteworthy, among these results, that the adherence to the POT of the valuations of equity issues, of the financial slack and of the variation in the financial slack proved to be dependent on the level of abnormal returns and that no significant relationship could be identified between the variations in the long-term gross debt and abnormal shareholder returns. These results, together with the low explanatory power of the estimated models, suggest that the capital structure, by itself, may not be so relevant for the determination of these returns, something more in line with Modigliani and Miller (1958, 1959) than adherent to the POT (Myers & Majluf, 1984).

Despite these mixed results, the applied approach made it possible to advance in the understanding of the differences in the studied relationships, depending on the level of abnormal return and on the company's financing capabilities, as intended. The testing approach that is proposed here can provide relevant information for a better understanding of the financing dynamics of publicly traded companies and its repercussions on their stock returns.

A limitation for the results achieved is the low explanatory power of the estimates, despite the significance of several of the coefficients involved. The replication of the proposed approach with other samples, especially from other markets and with a greater number of observations, can help in its refinement and provide further advances, being a suggestion for future research.

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AUTHOR'S CONTRIBUTION

CR: leadership contribution in the attributions of conceptualization, data curation, formal analysis, investigation, methodology, resources, software, presentation and writing of the original; equal contribution to project management, supervision, validation, and manuscript revisions. **MC:** supporting contribution in the attributions of conceptualization, formal analysis, investigation, methodology, resources, presentation and writing of the original; equal contribution in project management, supervision, validation, and manuscript revisions.

CONFLICTS OF INTEREST

The authors declare that there are no conflicts of interest in relation to this research and this article.

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