Determinants of the Capital Structure of Companies Listed on the Stock Exchanges of Argentina, Brazil and Chile: An Empirical Analysis of the Period from 2007 to 2016

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Abstract

The present investigation refers to the determinants of the capital structure, using the technique of multiple regression through Panel Data of open capital companies in the stock exchanges of Argentina, Brazil and Chile, in order to know the behavior of determinants of the capital structure in relation to Trade-Off Theory (TOT) and Pecking Order Theory (POT). The POT offers the existence of a hierarchy in the use of sources of resources, while the TOT considers the existence of a target capital structure that would be pursued by the company. Sixteen accounting variables were used, in which five are dependent (related to indebtedness) and eleven are independent variables (explaining the determinants of the capital structure). It is observed that, with the use of the Panel Data, the determinants that seem to influence in a more accentuated way the levels of debt of the companies are: current liquidity, tangibility, return to shareholders, return of assets, sales growth, asset growth, market-to-book and business risk measured by the volatility of benefits. Suggestions for future research include the use of Panel Data to analyze other factors that may influence indebtedness, mainly taxes and dividends, as well as a deeper analysis of factors that may influence the speed of adjustment towards the supposed objective level.

Keywords: Trade-Off Theory, Pecking Order Theory, debt, determinants of the capital structure, analysis of multiple linear regression

1. Introduction

The innumerable research done to try to exhaust the issue of capital structure is endless, and, due to some variables, this issue will always be in evidence. That is, the ways of data collection and independent variables will be chosen according to an econometric model, the econometric tools used, the types of companies, the legal characteristics of the accounting-financial field, among others.

In addition, in competitive and fine markets, it is possible to identify different forms of leverage and corporate strategies. So, "how do companies choose their capital structure?" (Myers, 1984). Very little is known about the capital structure, and it is not known how companies choose debts and equity.

1.1 Justification

The way managers combine sources of financing is an important decision for the company's financial and strategic context. The capital structure refers to the way in which companies use the sources of origin, whether their own or those of third parties, to apply in equity assets and in activities that demand them.

The choice of the best combination of the sources of capital structure resources is still a recurring theme in finance. Studies on the effects of financial leverage on decisions to better allocate resources in organizations historically contributed to the advancement of theoretical discussions (Camilo, Xavier, De Mello, & Marcon, 2010, p. 110).

Among the issues addressed by the theory of corporate finance, the part related to the capital structure is one of

the most complex and controversial. Despite having a series of theoretical and empirical research, this issue does not have a prompt and unanimous response on what is the best or most appropriate capital structure for an organization (Myers, 1984; Bradley, Jarrell, & Kim, 1984; Titman & Wessels, 1988), and for one person.

In addition, inquiries related to the choice of financing - indebtedness versus equity - have gained importance for management strategy research. In a short space of time, there was a significant increase in the attention devoted to the management strategy literature on financial aspects (Sandberg, Lewellen, & Stakey, 1987; Kochhar, 1997).

From the article by Modigliani and Miller (1958), researchers analyze the factors that affect the capital structure of companies (Chen & Zhao, 2006; Myers, 1977; Titman & Wessels, 1988). In a world without disagreements, the capital structure is irrelevant to the conception of the company's value and, therefore, there should be no preference for a certain type of capital structure (Modigliani & Miller, 1958). However, in the real world, each company can opt for a different degree of leverage (Choi, Saito, & Silva, 2015).

Therefore, the rationale for this study is to evaluate the capital structure of the companies listed on the stock exchanges of Argentina, Brazil and Chile, in the period from 2007 to 2016.

1.2 Research Problem, Objectives and Hypothesis

The observation of the identified elements, constant in the theories that debate about capital structure and the investigated authors, allows to formulate the following research problem: How is the behavior of the determinants of the capital structure of companies listed on the stock exchanges of values from Argentina, Brazil and Chile, on the prism of financial theories of pecking order and trade-off, in the period from 2007 to 2016?

The general objective of this research is to compare the behavior of determinant variables of the capital structure of companies listed in the stock exchanges of Argentina, Brazil and Chile, considering the specific factors of the companies. In this way, the institutional aspects (number of employees and open units) and economic aspects (market niche, actions in internal and external markets) will not be evaluated; the analysis will be limited, just, to the specific factors of the company.

To better outline the study, some specific objectives were scored, as follows:

a)   Test the relationship of the independent variables with some types of indebtedness in Argentine, Brazilian and Chilean stock market companies;

b)   Select the independent variables to be approved in the study;

c)   Analyze the behavior of variables of the determinants of the capital structure of companies listed on the stock exchanges of Argentina, Brazil and Chile, under the theories of capital structure: Trade-off and Pecking Order.

The formulation of the hypotheses of this research was based on the theoretical reference, through the reading of empirical studies already carried out. To start, Booth et al. (2001) and Bastos and Nakamura (2009) empirically distinguished that the hypotheses between theoretical currents have proved a difficult task. In many situations, the behavior of one variable can be explained by one theory, pray by another. In addition, theoretical currents are conflicting in seeking explanations for the behavior of some variables.

A fundamental issue faced when conducting business evaluations is: At what level of detail will the evaluation be? On the one hand, adding more details would allow analysts the opportunity to use more information to make better forecasts on each item. On the other hand, it would be necessary to generate more inputs, raising the potential for errors to occur on each one (Damodaran, 2007).

For Myers and Majluf (1984), Myers (1984) and Nakamura et al. (2007), the pecking order theory proposes the use of indebtedness to finance assets and actions in new opportunities for organizational growth, in which managers end up in the hierarchy of resources to place bets on growth opportunities. In this condition, it is possible to expect the most profitable companies to be less indebted. Ross (1977) and, Harris and Raviv (1991) argues that the relationship between profitability and level of indebtedness is positive. On the other hand, in the literature, there is the counterpoint of Brito, Corrar, and Batistella (2007), who mention that profitability is not decisive for the capital structure of organizations.

Through this discussion, it was possible to construct two hypotheses, one related to the return of shareholders and the other to the return of company assets. They are:

Hypothesis 1: The relationship between return to shareholders and indebtedness indicators is negative.

Hypothesis 2: The relationship between asset return and debt indicators is negative.

However, in the vision of Myers and Majluf (1984), companies use their assets as a guarantee of indebtedness

when they judge that there is a need for investments in various opportunities. Thus, they hinder risky strategies used by shareholders who tend to get wealth from their creditors. Brito, Corrar and Batistella (2007) affirm that there is a negative relationship between the composition of assets and total indebtedness. Therefore, the following hypothesis is proposed:

Hypothesis 3: The relationship between asset growth and indebtedness indicators is positive.

Another aspect that led to the construction of another hypothesis was the fact that, in previous studies, companies with growth potential tend to have greater flexibility to invest, increasing the indebtedness of organizations, which points to a negative relationship between growth and indebtedness (Kayo & Famá 1997; Gaud, Jani, Hoesli, & Bender, 2005). In another conception, Brito, Corrar, and Batistella (2007) found a positive connection of growth in relation to total long-term indebtedness, there being no relation to short-term indebtedness. Gomes and Leal (2001) point to a positive relationship between the level of growth and the indebtedness of companies, as the companies that grow more demand more resources to better manage these opportunities, and seek these resources outside the company. Therefore, it is split for the following hypothesis:

Hypothesis 4: The relationship between sales growth and indebtedness indicators is negative.

For Titman and Wessels (1988), tangible assets help companies to expand their indebtedness indicators, in which they offer as payment guarantees. The logic for this type of thinking is that the guarantee, in return for the debt, minimizes the theory of agency and problems of conflicts between creditors and shareholders, owners, managers of business organizations. Thus, according to Myers and Majluf (1984), that minimizes risky strategies of the owners with the interest of appropriating creditors' wealth. Therefore, another hypothesis arises:

Hypothesis 5: The relationship between tangibility of assets and debt indicators is positive.

Bastos, Nakamura, and Basso (2009) and Correa, Basso, and Nakamura (2013) found strong influence of the variable that deals with the current liquidity index, the result of which was a negative relationship between liquidity and indebtedness, confirming the theory hypothesis of pecking order. Thus, the hypothesis for this variable is:

Hypothesis 6: The relationship between current liquidity and debt indicators is negative.

The trade-off theory presents a positive relationship between the level of payment of taxes and the level of indebtedness. Correa, Basso, and Nakamura (2013) and Bastos, Nakamura, and Basso (2009) found different evidence to this assumption of the theory, in which the relationship between the payment of income tax is negative to total indebtedness, to the value of market and short and long term financial. With this, it is expected that the hypothesis to be presented is:

Hypothesis 7: The relationship between the level of income tax payment and indebtedness indicators is negative.

2. Literature Review

2.1 Evolution of Capital Structure Theories

From these studies on capital structure, a long discussion was established, that is, many works were carried out and other theories were elaborated in the attempt to explain what determines the use of own or third-party capital by companies, in addition to the ideal mix between funding sources.

In addition to the works that are concerned with discussing the differences and testing the theories developed by M&M and the traditionalists, there is a class of authors who prioritized the discussion of bankruptcy costs and their influence on the definition of the structure of business capital.

2.2 Trade-Off Theory (TOT)

The trade-off theory (TOT) is based on fiscal economies related to the use of debts and expected bankruptcy costs, derived from excess indebtedness. It was from the combination of these two factors that what came to be called "trade-off theory" was established (Nakamura, Martin, & Kayo, 2004; Nakamura et al., 2007).

According to this theory, companies have an objective level of debt to adjust gradually over time. Thus, the more lucrative the company, the more taxable benefits she has to protect, then, the greater the use of debt as a source of financing. This occurs due to the tax benefit obtained through this form of collection.

2.3 Pecking Order Theory (POT)

Pecking order theory (POT) was recommended by Donaldson (1961), who perceived, in the management of large companies, the predilection of internally generated resources to finance their activities with external

resources. On these ideas of Donaldson (1961), Myers (1984) and Myers and Majluf (1984) formally point to the hierarchy of preferences, indicated in table 1.

Table 1. Order of preference in the use of resources

PREFERENCE	DESCRIPTION
First	Use internally generated financial resources (retained benefits).
Second	Capture third party resources (loans, financing, issuance of debentures) and adjust dividend policies.
Third	Issuance of new shares.

Source: Adapted by Myers (1984) and Myers and Majluf (1984).

2.4 Optimal Capital Structure

Research on the capital structure of companies is considered the most important in the area of Finance. Various theoretical approaches have been discussed and tested in the financial literature.

According to Perobelli and Famá (2003), in relation to the methodological elegance of the works related to the subject, the verification of the existence of an optimal structure, to be pursued by companies, was never achieved. Parallel to this discussion, new theories emerged that sought to explain the choice of capital structure by companies based on certain attributes. The discussion, therefore, migrated from a single structure to the most appropriate structure to each company profile. Some relevant works in this line were those developed by Remmers et al. (1974); Toy et al. (1974); Scott and Martin (1975); Stonehill et al. (1975); Ferri and Jones (1979); DeAngelo and Masulis (1980); Bradley, Jarrel and Kim (1984); Myers and Majluf (1984); Myers (1984); Lumby (1991); Thies and Klock (1992); Balakrishnan and Fox (1993); Allen (1995) and Rajan and Zingales (1995). (Perobelli & Famá, 2003), Zavala and Salgado (2019), Ramos Júnior, Santos, Gaio, Stefanelli, and Passos (2019), Mendonça, Martins, and Terra (2019), Mamede, Jardim, Nakamura, Jones, and Nakamura (2019), Demirgüç-Kunt, Peria and Tressel (2020).

3. Method

The present empirical research completed, as methodological features, the following steps: period of analysis and accounting-financial data; method, methodological approach, nature and research strategies; and analysis, diversification and variable tools.

3.1 Period of Analysis and Accounting-Financial Data

This research proposal covers the period from 2007 to 2016, whose data were extracted from the Economic system, especially from the balance sheets and the statements as results of the years, related to the open capital companies listed in the scholarships of Argentina , Brazil and Chile, the annual financial statements closed in December of each year being considered, with a duration of ten years for the analysis.

The classification of companies in sectors was also extracted from the Economática data bank, and the sample was composed of those Argentine, Brazilian and Chilean non-financial companies. The choice of annual accounting-financial reports was given in relation to the seasonality of some companies.

3.1.1 Variables

All variables, dependent and independent, used in the performance of econometric tests were defined based on the theoretical reference. Data on the specific factors of the companies were collected directly from the Economica software, in the fourth quarter of 2018, which provides both accounting and market data. Therefore, it is primary data. These data include the economic-financial variables of open companies. The quarterly data come from equity balances, income statements for the year and market information available in the database itself.

The variables that make up this study are presented in Tables 2 and 3, which state their names, acronyms and calculation formulas:

Table 2. Dependent variables

Research Variable	Initials	Formula
Total indebtedness	ET	Current liabilities + Non-current liabilities
		Total active
Short term indebtedness	ECP	Current liabilities
		Total active
Long-term indebtedness	ELP	Non-current liabilities
		Total active
Short-term burdensome financial indebtedness	EOCP	Debentures and short-term financing
		Assets at book value
Onerous debt finance long term	EOLP	Debentures and long-term financing
		Assets at book value

Source: Prepared by the author.

The dependent variables presented in Table 2 represent the indebtedness indicators and were used in the panel data regression models in the execution of this study. They were based on readings from previous research.

Table 3. Independent variables

Research Variable	Initials	Formula
Current liquidity	LC	Current assets
		Current liabilities
Tangibility	TANG	Active fixed assets + Inventories
		Total active
Return to investors	ROE	Net profit
		Net worth
Return on investment	ROA	EBIT
		Total active
Sales growth	CVD	Net income $_t$ (–)Net income $_{t-1}$
		Net income $_{t-1}$
Asset growth	CAT	Total active $_t$ (–)Total active $_{t-1}$
		Total active $_{t-1}$
Level of payment of income tax	IR	Value of income tax
		EBIT
Fiscal Economy	EF	(Depreciation + Amortization)
		EBITDA
Profitability	PROF	EBITDA
		Total active
Growth expected by the market value differential	MTB	Market value of assets
		Book value of assets
Business risk measured by profit volatility	RSK	(Standard deviation EBIT - Media)
		Net operating income

Source: Prepared by the author.

The market value of the asset was calculated in accordance with Rajan and Zingales (1995), where the market value of the asset is (almost) equal to the asset minus the net asset book value. The market value of the net worth was obtained from the Economic system, being equal to the price of the closing of the action times the total shares of the company.

The data of these independent variables were extracted from the balance sheets and income statements of the periods under study, from January 2007 to December 2016, with annual periodicity of the Economica software.

3.1.2 Analysis Tools

Four tools were used for the analysis of this study. The first is the descriptive analysis of the data by means of the average and the standard deviation of each dependent and independent variable of each country (Brazil, Argentina and Chile). The second is Pearson's correlation, whose idea is to evaluate the existence or not of correlation between two variables. If there is a high correlation between two variables (from 0.7 or 70%), it

means that these variables are influencing the final result of the model. Correlation values may vary between -1 and +1 (correlation between -100% and + 100%).

For example, when analyzing the correlation between total indebtedness and current liquidity of the three countries (Brazil, Argentina and Chile, or according to the panels in Table 2, A, B and C, respectively), it is possible to observe a negative correlation between the two on-screen variables in the three countries: 53% in Brazil, 49.3% in Argentina and 15.6% in Chile, all at the 1% level of significance. This means that there is no high correlation between the two variables in the three countries, not influencing the final result of the model for this type of indebtedness.

The third data analysis tool is the Variance Inflation Factor (VIF). The use of the VIF is to know if there are multicollinearity problems. This tool varies between 0 and 1, promoting the idea that, if it is greater than 1, there is multicollinearity. Finally, the fourth tool is the regression of panel data and test derivatives (from F de Chow, Hausman and LM from Breusch-Pagan).

According to Wooldridge (2006), the use of the panel data regression technique allows to accompany an individual or groups of individuals over time, that is, in the case of a company, it is possible to accompany the variation of certain variables in different periods of time, thus carrying out the analysis that combines time series and cutting data with some relevance (Terra, 2002).

Bowman (1980) perceived a very large difference in bad specification when he worked with a cross-correlation between accounting and market data, believing that with the accounting data that bad specification is much smaller. Therefore, Nakamura et al. (2007) and Terra (2002) reinforce another methodological contribution in the use of this technique: avoid problems of specification of the econometric model, which eliminates the effects of the omitted variables, even if they have not been observed.

Three types of tests were performed using panel data regression: (1) the Chow F test assesses the adequacy of the panel test for the variables presented; (2) Hausman's evaluates the fixed and random variables of the test; and (3) that of LM of Breusch-Pagan serves to validate the test.

At the base of the panel are the values of R2, which is the square of Pearson's correlation and adjusted R2, called R2a, which presents the correlation adjustment for the number of samples used in the analysis (Johnson & Wichern, 1998). It is observed that the values decrease slightly according to the adjustments, confirming the need for this calculation. Therefore, it is possible to observe that the explanatory power of the total indebtedness variable for Brazil was 79.5%; for Argentina, 72.7%; and for Chile, 17.5%. This means that the more elaborate model has more explanation with the data of Brazilian companies, followed by Argentine companies and, with some distance, from Chilean companies.

From this stage, the panel data regression offers a wide possibility of analysis of various factors in the econometric analysis and converges with the advantages presented above.

3.1.3 Econometric Models

The application of the econometric models was made from this general equation:

$$E_{it} = \beta_0 + \beta_{1i} LC\_{it} + \beta_{2it} TANG_{it} + \beta_{3it} ROE_{it} + \beta_{4it} ROA_{it} + \beta_{5it} CVD_{it} + \beta_{6it} CAT_{it} + \beta_{7it} IR_{it} + \beta_{8it} EF_{it} + \beta_{9it} MTB_{it} + \beta_{10it} RSK_{it} + \mu_{it}$$

Equation (1)

Each study variable is represented by the respective acronyms:

Ei: represents the dependent variables that deal with the indebtedness of companies;

LC_it: represents the independent variable of current liquidity;

TANGIT: represents the independent tangibility variable;

ROEit: represents the independent variable of return to shareholders;

ROAit: represents the independent variable of return on investment;

CVDit: represents the independent variable of sales growth;

CATIT: represents the independent variable of asset growth;

IRit: represents the independent variable of income tax payment level;

EFIT: represents the independent fiscal economy variable;

MTBit: represents the independent market-to-book variable;

RSKit: represents the independent business risk variable;

$_{it}$: represents that the variables are used for all proposed linear multiple regression models of panel data: POLS, Fixed effects and Random effects;

t: represents the time.

4. Results

This chapter will present and analyze the results obtained in this investigation.

The first step, described in section 4.1, sought to examine the relationship between historical market values and the capital structure of Argentine, Brazilian and Chilean companies, in order to identify the behavior of the average level of indebtedness and standard deviation of the variables studied between 2007 and 2016.

The second step, described in section 4.2, sought to test the intensity and the sense of the relationships between the variables by means of Pearson's correlation coefficient, together with the Variance Inflation Factor, to identify possible multicollinearity problems.

Finally, section 4.3 presents the summary of the main results found in this study.

4.1 Descriptive Statistics of the Variables

Table 4 presents the average level of indebtedness and the standard deviation of the variables studied, between 2007 and 2016, in the three countries analyzed.

Table 4. Descriptive statistics of variables

Variables	Brasil		Argentina		Chile	
	Average	Average Standard Deviation	Average	Average Standard Deviation	Average	Average Standard Deviation
Panel A - Dependent Variables						
ET	0,540	0,187	0,536	0,187	0,385	0,175
ECP	0,232	0,120	0,339	0,169	0,161	0,094
ELP	0,308	0,160	0,197	0,157	0,224	0,141
EOCP	0,079	0,067	0,045	0,050	0,023	0,031
EOLP	0,194	0,140	0,018	0,026	0,109	0,136
Panel B - Independent Variables						
LC	2,003	1,578	1,339	0,711	4,204	31,613
TANG	0,352	0,246	0,543	0,237	0,488	0,257
ROE	0,054	0,617	0,038	0,449	0,082	0,206
ROA	0,078	0,109	0,092	0,091	0,074	0,127
CVD	0,230	1,794	0,720	8,132	49,572	1440,375
CAT	0,158	0,807	0,479	5,444	11,979	393,817
IR	0,026	0,277	0,411	1,710	0,132	1,414
ECND	1,080	17,679	1,186	8,665	0,513	3,531
MTB	268,908	3.467,92	0,490	0,707	0,726	1,276
PLD	-0,753	19,023	0,008	0,548	-13,334	95,079

Source: Research data.

Ps.: (*) higher averages; (**) lower averages.

The data in panel A reveal, on average, in the period from 2007 to 2016, between Argentina, Brazil and Chile, the following results, in relation to the characteristics of indebtedness (dependent variables) in those countries:

- Brazil has the highest average in total indebtedness, making up 54% of its sources of resources; on the other hand, Chile has the lowest average, around 38.5%;

- The country with the highest average short-term debt is Argentina, with 33.9%; Chile has the lowest average short-term debt, around 16%;

- For long-term, onerous short-term and long-term borrowings, Brazil has the highest averages, with 30.8%, 7.9% and 19.4%, respectively; Argentina has the lowest average long-term and long-term borrowings, with 19.7% and 1.8%, respectively; Chile marked presence with the lowest average only in short-term burdensome indebtedness, with 2.3%.

Regarding the behavior of independent variables, in which they represent the determining variables of the capital structure, the results reported in panel B of table 4 were:

- Most of the lower averages were for Brazilian companies (in Tangibility, ROA, Sales and Asset Growth, Income Tax Payment Level), while in Argentina, companies have the highest averages of determining variables of the capital structure (Tangibility, ROA, Income Tax Payment Level, Fiscal Economy and Business Risk); Chilean companies have four variables that determine the capital structure with the highest averages (Current Liquidity, ROE, Sales and Asset Growth);

- Current Liquidity, which translates as the capacity that companies have in liquidating their short-term debts using short-term assets, had greater prominence in Chile, totaling, on average, 4.2, that is, for each unit Monetary short-term debt (obligations), companies, on average, have four units to withdraw these debts (economically, assets and rights activated);

- Companies in Argentina aim to have 54% of tangible assets, that is, more than in Chile and, especially, in Brazil, whose Tangibility indicator is the lowest (35%);

- Regarding the indicators of return to partners and entrepreneurship, Chilean companies had a higher average with the ROE of 8.2%, and Argentine companies averaged 9.2% with the ROA; Brazilian companies have an average very similar to Chilean companies, with the lowest averages, respectively, 7.8% and 7.4%;

- If the Chilean companies had the highest averages with Sales Growth and Asset Growth, the Brazilian companies presented the lowest averages in these areas, with 23% and 15.8%, respectively;

- Regarding taxes, Argentine companies have the highest averages with the variables Income Tax Payment Level and Fiscal Economy (respectively, 41% and 118%); Brazilian companies presented an average of 2.6% for the first variable (the lowest average) and Chilean companies, 51% for the second variable (the lowest average);

- For the market-to-book variable, the companies with the highest averages were the Brazilian ones, followed by the Chilean and Argentine companies. Brazilian companies are perceived to have higher market values than Chilean and Argentine companies;

- The companies with the lowest business risks are Chilean companies, although with a very small average; Argentine companies have the highest averages in this regard.

It should be noted that Brazil went through a political and economic crisis in 2015 and 2016, with a negative GDP variation, being 3.77% and 3.59%, respectively.

4.2 Relationship between the Variables

Before presenting and evaluating panel data, the advantages of this method should be clarified. The data, as seen in Table 4, is in a cross-section and, in the econometric literature, they are known as panel data, or also as longitudinal data. As an advantage, according to the simple calculation of Pearson's correlation, they allow the evaluation of the data between them, in addition to the influence of their relationships for the final result of the analysis, since it allows the evaluation of the explanatory variables on the dependent variable along of the period studied (Wooldridge, 2010).

Therefore, Table 5 presents the relationship between the 15 variables and their correlations for each country analyzed in the research (Brazil, Argentina and Chile). Wooldridge (2010) also comments on the advantage of using this method to observe possible omitted variables. So, this preliminary analysis, before the final evaluation, aims to present these possible variables and thus increase the accuracy of the analysis, as Cameron and Trividi (2005) did.

It is observed that the degree of freedom changes from one variable to another, as some variables have a 0.05 degree of freedom, or 95% assertiveness. This variation is a consequence of the analyzed data and this factor is indicated as advantageous by Brooks (2008), which indicates that the data are not fixed, that is, they can vary over time and according to other factors. Still, the author indicates the need to combine this data with the estimation time, thus varying the degree of freedom and minimizing the omitted variables of the analysis, cited above.

The panel data presented in Table 5 offers a relationship between several data on different lines, the first line is the constants. These constants are different for each country evaluated and for each factor of each country, for example, the gap begins with accounting indebtedness, where the ET constant is 0.637 for Brazil, 0.920 for Argentina and 0.322 for Chile; all with the same degree of freedom of 0.01. That is, for each ET factor the percentage of Brazil is 63.7%, Argentina 92% and Chile only 32.2%.

The Breusch-Pagan, F de Chow and Hausman tests were performed on the variables dependent on total indebtedness, short-term indebtedness and long-term indebtedness. Only the Hausman test in Chile had random effects, and in Brazil and Argentina had fixed effects.

Next, the tests by Breusch-Pagan, F de Chow and Hausman were performed on the dependent variables of onerous financial indebtedness in the short and long term. All countries maintained the same effects in the respective variables.

The panel data show positive and negative correlations, some significant and others so small that they approach zero, indicating the lack of correlation. For this investigation, the highest negative values are indicated as more significant, since they indicate the inverse correlation between the results.

At the base of the panel are the values of R^2, which is the square of Pearson's correlation and adjusted R^2, called R^2a, which presents the correlation adjustment for the number of samples used in the Johnson and Wichern analysis (1998). It is noted that the value of ET for Brazil and Argentina shows a strong correlation, close to 75%, while for Chile the correlation is weak (17.5%).

Thus, panel data offers a wide possibility of analysis of various factors in the econometric analysis, which converges with the advantages presented above.

Table 5. Pearson correlation and variance inflation factor test

Variables	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)	(15)	VIF	
Panel A – Brazil																	
ET (1)	1	0,532**	0,773**	0,405**	0,574**	-0,530**	0,056*	-0,163**	-0,063**	-0,049*	0,009	-0,027	0,010	0,071**	0,196**		
ECP (2)		1	-0,126**	0,553**	-0,118**	-0,365**	0,035	-0,142**	0,057**	-0,034	-0,004	-0,021	-0,002	0,027	0,101**		
ELP (3)			1	0,060**	0,761**	-0,347**	0,039	-0,085**	-0,117**	-0,032	0,014	-0,016	0,014	0,063**	0,154**		
ECPF (4)				1	0,171**	-0,285**	0,164**	-0,194**	-0,134**	-0,040	-0,057**	-0,054*	0,007	-0,015	0,083**		
ELPF (5)					1	-0,230**	0,030	-0,019	-0,023	-0,023	-0,033	-0,017	-0,009	0,006	0,080**		
LC (6)						1	-0,109**	0,051*	-0,052*	0,101**	0,055*	0,167**	-0,013	-0,047*	-0,047*	0,937	1,067
TANG (7)							1	-0,047*	-0,050*	-0,006	-0,023	-0,054*	0,055*	-0,014	0,059**	0,977	1,023
ROE (8)								1	0,440**	0,040	0,108**	0,025	0,004	0,022	-0,006	0,794	1,259
ROA (9)									1	0,009	0,061**	-0,002	0,000	0,000	-0,026	0,797	1,255
CRESCDV (10)										1	0,299**	-0,008	-0,006	0,011	0,011	0,903	1,108
CRESCAT (11)											1	-0,011	-0,012	-0,007	0,016	0,900	1,111
NPGIR (12)												1	0,002	-0,007	0,004	0,968	1,033
ECND (13)													1	0,004	0,003	0,997	1,003
MTB (14)														1	0,003	0,996	1,004
PLD (15)															1	0,993	1,007
Panel B – Argentina																	
ET (1)	1	0,615**	0,533**	0,010	-0,072	-0,493**	-0,207**	-0,332**	-0,164**	-0,027	-0,067	0,005	-0,010	-0,160**	0,064		
ECP (2)		1	-0,340**	0,223**	-0,106*	-0,303**	-0,271**	-0,156**	-0,033	-0,073	-0,085*	0,072	-0,004	-0,062	0,049		
ELP (3)			1	-0,227**	0,027	-0,262**	0,044	-0,229**	-0,159**	0,046	0,011	-0,071	-0,008	-0,124**	0,023		
ECPF (4)				1	0,386**	-0,083	0,064	-0,063	-0,011	0,032	0,044	0,080	0,044	0,072	-0,038		
ELPF (5)					1	0,107*	0,076	0,115**	0,078	0,177**	0,069	-0,045	-0,051	0,126**	0,064		
LC (6)						1	-0,201**	0,167**	0,141**	0,108*	0,048	-0,013	-0,027	0,222**	-0,022	0,891	1,122
TANG (7)							1	-0,078	-0,144**	-0,081	-0,015	-0,092*	-0,011	-0,114**	-0,080	0,917	1,090
ROE (8)								1	0,477**	0,022	0,028	-0,023	-0,003	0,099*	-0,041	0,758	1,320
ROA (9)									1	0,073	0,030	-0,057	-0,082	0,088*	-0,146**	0,731	1,367
CRESCDV (10)										1	0,453**	-0,007	-0,009	-0,001	-0,010	0,781	1,280
CRESCAT (11)											1	-0,015	-0,008	-0,040	-0,009	0,792	1,263
NPGIR (12)												1	0,295**	0,004	0,025	0,902	1,109
ECND (13)													1	-0,036	-0,001	0,905	1,105
MTB (14)														1	-0,037	0,937	1,067
PLD (15)															1	0,965	1,036
Variables	**(1)**	**(2)**	**(3)**	**(4)**	**(5)**	**(6)**	**(7)**	**(8)**	**(9)**	**(10)**	**(11)**	**(12)**	**(13)**	**(14)**	**(15)**	**VIF**	
Panel C – Chile																	
ET (1)	1	0,593**	0,844**	0,328**	0,550**	-0,156**	0,405**	-0,078**	0,015	0,007	-0,011	-0,060*	0,073**	-0,113**	0,232**		
ECP (2)		1	0,069*	0,316**	0,051	-0,130**	0,139**	0,065*	0,150**	-0,013	-0,020	-0,037	0,064*	0,031	0,193**		
ELP (3)			1	0,196**	0,648**	-0,106**	0,409**	-0,140**	-0,080**	0,018	-0,001	-0,050	0,048	-0,161**	0,159**		
ECPF (4)				1	0,509**	-0,060*	0,127**	-0,044	-0,032	-0,026	-0,023	-0,007	-0,016	-0,076**	0,085**		
ELPF (5)					1	-0,049	0,217**	-0,117**	-0,082**	-0,028	-0,024	-0,074**	0,045	-0,105**	0,069*		
LC (6)						1	-0,139**	-0,217**	-0,117**	-0,003	-0,002	-0,005	-0,012	-0,009	-0,223**	0,869	1,151
TANG (7)							1	0,020	0,071*	0,037	0,043	0,015	0,056*	0,073**	0,244**	0,915	1,093
ROE (8)								1	0,809**	-0,006	-0,005	0,207**	-0,096*	0,415**	0,102**	0,275	3,632
ROA (9)									1	-0,002	-0,006	0,013	-0,015	0,499**	0,236**	0,258	3,879
CRESCDV (10)										1	0,141**	0,005	0,016	-0,011	0,004	0,978	1,022
CRESCAT (11)											1	0,001	-0,014	0,004	0,978	1,022	
NPGIR (12)												1	-0,522**	0,014	0,010	0,647	1,545
ECND (13)													1	-0,021	0,020	0,721	1,388
MTB (14)														1	-0,014	0,727	1,376
PLD (15)															1	0,806	1,241

Source: Prepared by the author (research data).

Ps.: (*) The correlation is significant at the 0.05 level; (**) The correlation is significant at the 0.01 level.

Based on the findings in Table 5, Pearson's correlation between the variables presupposes the existence of a relationship between the determining factors of the capital structure and the levels of accounting and financial indebtedness. For Brazilian companies, only the Fiscal Economy (ECND) variable did not show significant correlation for the levels of accounting and financial indebtedness. On the other hand, for the Argentine companies, three indicators did not present a significant correlation with the levels of indebtedness, they are: the Level of Income Tax Payment (NPGIR), Fiscal Economy (ECND) and Business Risk Measured by the Volatility of Benefits (PLD). Finally, for Chilean companies, the variables Growth of Sales (CVD) and Growth of Assets (CAT) did not expose a significant correlation with any level of indebtedness.

The results of the Pearson correlation show that there is no high degree of correlation between the levels of

accounting and financial indebtedness and the determining factors of the capital structure (correlation greater than 85%), indicating that there are no high multicollinearity problems that may affect the results of the panel data regression model with the variables used. In addition, the VIF values shown in Table 5 also indicate the absence of multicollinearity, since the highest VIF value found was 3,879, and only VIF values greater than 10 indicate multicollinearity problems among the variables (Gujarati & Porter, 2011). In this way, the determinants of the capital structure selected in this study are able to explain the levels of indebtedness of the companies listed on stock exchanges in Brazil, Argentina and Chile.

For the realization of panel data regression, according to Fávero et al. (2009, p. 383), "some tests are used to define the best panel data model (POLS, fixed effects or random effects)". Thus, it was carried out: the Chow F test, to verify if the intercept is the same (POLS) or different (fixed effects) for all the croos-sections; the Breusch-Pagan LM test, to find out if the variance of the residues that reflect the individual differences is equal (POLS) or different (random effects) from zero; and the Hausman test, to compare the results of the fixed effects model with that of random effects (Fávero et al., 2009). The tables with the results of these three tests are presented in the appendices of this research. Table 6 shows the results of the panel data regression.

Table 6. Panel data regression results

Panel A - Accounting Indebtedness

Variables	ET			ECP			ELP		
	Brazil	Argentina	Chile	Brazil	Argentina	Chile	Brazil	Argentina	Chile
Constant	0,637*	0,920*	0,322*	0,288*	0,689*	0,125*	0,349	0,246*	0,213*
LC	-0,037*	-0,124*	-6,39E-04*	-0,032*	-0,134*	-3,55E-04*	-0,005*	0,001	-2,89E-04*
TANG	-0,057*	-0,397*	0,155*	0,003	-0,350*	0,078*	-0,060*	-0,041	0,053*
ROE	-0,022*	-0,073*	-0,085*	-0,026*	-0,056*	-0,017	0,004	-0,019	-0,062*
ROA	-0,03	-0,172**	-0,033	0,102*	0,052	0,031	-0,132*	-0,212*	-0,091*
CVD	-4,73E-04	1,49E-03**	-2,23E-06	0,002*	-3,93E-04	-2,23E-06**	-0,003*	1,85E-03*	-2,74E-08
CAT	0,007*	-1,32E-03	-8,1E-06	0,005*	-3,72E-04	-9,37E-08	0,002	-8,93E-04	-7,49E-06
IR	0,01	6,40E-04	-0,002	0,005	1,36E-03	-0,001	0,005	-1,21E-03	-0,001
ECND	-9,49E-05	-1,32E-04	-1,09E-03	-1,13E-04	-2,28E-04	3,14E-04	1,78E-05	6,16E-05	-1,50E-03
MTB	2,32E-06*	0,032*	-0,0002	6,71E-07	0,034*	8,42E-04	1,65E-06**	-0,004	1,69E-03
PLD	1,74E-05	0,014	2,46E-04*	1,22E-04	0,001	1,55E-04*	-1,04E-04	0,011	1,02E-04*
R²	0,818	0,763	0,181	0,815	0,802	0,729	0,790	0,067	0,850
R² Tight	0,795	0,727	0,175	0,791	0,772	0,692	0,763	0,049	0,829

Panel B - Financial indebtedness

Variables	ECPF			ELPF		
	Brazil	Argentina	Chile	Brazil	Argentina	Chile
Constant	0,125	0,090*	0,052*	0,222	0,034*	0,242*
LC	-0,018*	-0,038*	-4,04E-05	-0,001	-0,007*	-2,17E-04**
TANG	-0,015**	0,015	-0,051	-0,046*	-0,014	-0,241*
ROE	-0,007*	0,005	-0,009	0,003	0,003	-0,066**
ROA	-0,058*	-0,056**	-0,017	-0,103*	0,032	-0,086
CDV	4,38E-04	-5,83E-05	-6,38E-07	-0,001	6,19E-04*	-3,15E-06
CAT	-0,002	2,86E-04	-4,37E-07	-0,006*	-4,05E-05	-6,88E-06
NPGIR	0,006	1,47E-03	-0,001	0,001	-5,97E-05	-0,005
ECND	-8,38E-05	1,43E-04	-1,43E-04	-4,58E-05	-7,70E-05	-5,95E-04
MTB	-1,86E-07	0,002	-2,11E-03	-3,39E-07	-0,005**	1,33E-05
PLD	6,51E-05	-0,004	3,13E-05*	-1,47E-04	0,006*	9,72E-05**
R²	0,696	0,626	0,323	0,774	0,774	0,479
R² Tight	0,656	0,568	0,230	0,745	0,745	0,407

Source: Prepared by the author (research data).

Ps.: (*) The correlation is significant at the 0.01 level; (**) The correlation is significant at the 0.05 level.

Table 6 shows the determinants that most strongly influence the levels of indebtedness of companies. They are: Current Liquidity (LC), Tangibility (TANG), Return to Shareholders (ROE), Return of Assets (ROA), Sales Growth (CRESCDV), Growth of Assets (CRESCAT), Market-To- Book (MTB) and Business Risk Measured by Volatility of Benefits (PLD). This is close to the results obtained in other research in the area, such as Delcoure (2007), Nakamura et al. (2007), Bastos, Nakamura, and Basso (2009), Bastos and Nakamura (2009), Nunkoo and Boateng (2010), Correa, Basso, and Nakamura (2013) and Póvoa and Nakamura (2015). The analysis of the results is presented in the next section.

The variables of Return to Shareholders (ROE) and Return of Assets (ROA) indicated a negative relationship for the levels of accounting and financial indebtedness. However, only Brazilian companies presented a positive relationship between ROA and short-term indebtedness. These results strongly confirm the H1 hypothesis, that the relationship between return to shareholders and debt indicators is negative, and

H2, that the relationship between return on assets and debt indicators is negative. Similar results are verified in the investigations of Delcoure (2007), Nakamura et al. (2007), Bastos, Nakamura, and Basso (2009), Bastos and Nakamura (2009) and Correa, Basso and Nakamura (2013), in addition to confirming the theory of pecking order.

This negative relationship is due to the fact that internally generated funds from Brazilian, Argentine and Chilean companies do not need to rely so much on external financing, since they use accumulated internal funds from past earnings (Myers, 1984). For Correa, Basso and Nakamura (2013), profitable companies use the resources generated internally to finance the investments of the companies, then third-party resources would be used, through indebtedness, and the last option would be the issuance of new shares.

According to the theory of pecking order, "[...] companies with higher growth rates, which demand more resources than they can generate, would tend to look outside the company for those resources necessary for expansion" (Correa, Basso, & Nakamura, 2013, p. 110), that is, there should be a positive relationship between growth and debt levels. However, growth opportunities can be seen as intangible assets, thus, "[...] the use of debts would be limited for those companies, which suggests that growing companies should be less indebted" (Correa, Basso, & Nakamura, 2013, p. 110), that is, there would be a negative relationship, corroborating with the trade-off theory. Thus, hypothesis H3, that the relationship between asset growth and debt indicators is positive, is confirmed for total and short-term indebtedness for Brazilian companies. For the H4 hypothesis, that the relationship between sales growth and indebtedness indicators is negative, short-term indebtedness was found in Chilean companies and long-term in Brazilian companies. The findings were also found in the studies of Bastos, Nakamura, and Basso (2009) and Bastos and Nakamura (2009).

The results for the Market-to-Book (MTB) variable, in relation to the levels of indebtedness, were positively significant for Brazilian companies, positively and negatively significant for Argentine companies and not significant for Chilean companies. The negative relationship was also found by the studies of Nakamura et al. (2007) and Nunkoo and Boateng (2010). In addition, the positive and negative relationship was presented by the investigations of Bastos, Nakamura, and Basso (2009) and Bastos and Nakamura (2009). For the pecking order theory, a positive and negative signal is expected for the relationship between MTB and indebtedness (Bastos & Nakamura, 2009). This ambiguous relationship, according to Bastos, Nakamura, and Basso (2009, p. 69), occurs because companies with higher MTBs "[...] need funds that are often not sufficiently generated by retained benefits or, then, they may have a higher return, depending, therefore, on less debt".

In relation to Tangibility (TANG), there was a negative and significant relationship with the levels of accounting and financial indebtedness for Brazilian and Argentine companies, corroborating the theory of pecking order and rejecting the H5 hypothesis for these two countries. This finding reflects that the managers of Brazilian and Argentine companies, when the composition of tangible assets exerts a strong influence, seek to issue less external debts, as they are less prone to problems of asymmetric information (Myers, 1984).

For Chilean companies, the relationship between Tangibility (TANG) and accounting indebtedness was positive, and for financial indebtedness it was negative, corroborating the theory of trade-off and pecking order, respectively. The findings for the accounting indebtedness allow to accept the H5, of which the relation between tangibility of the assets and the indicators of indebtedness is positive. The studies by Delcoure (2007) and Nunkoo and Boateng (2010) also found a positive relationship. Thus, Chilean companies with high levels of tangibility assume relatively more debts, since tangible assets end up helping companies to incur debts (Titman & Wessels, 1988), as they are less prone to delinquency (Rajan & Zingales, 1995).

The Current Liquidity Index (LC) presented a negative relationship for the indebtedness levels of the three countries analyzed, supporting the hypothesis regarding the pecking order theory. Given these results, it can be affirmed that Brazilian, Argentine and Chilean companies that have better liquidity are less prone to the use of external financing. The findings induce the acceptance of the H6 hypothesis, that the relationship between current liquidity and debt indicators is negative. This result goes against the findings of Nakamura et al. (2007), Bastos and Nakamura (2009), Bastos, Nakamura, and Basso (2009) and Póvoa and Nakamura (2015). Thus, managers of companies with greater liquidity prefer to transform company assets into internal financing, as they are less expensive (Myers & Rajan, 1998), due to the greater financial slack in the

retention of internally generated funds (Ozkan, 2001).

Finally, some relevant variables lack empirical confirmations, such as the Income Tax Payment Level (NPGIR) and the Fiscal Economy (ECND). These variables, according to trade-off theory, should present significant results, however, for this study, they were unfinished.

5. Discussion

The capital structure issue has been thoroughly investigated over more than sixty years, and seems far from exhausted. To define a time base, in the last ten years, research related to the capital structure is broadening the perspectives of new research areas and deepening issues that seemed to be on the edges of exhaustion. Two important works in this regard are: Lemmon, Roberts, and Zender (2008) and Frank and Goyal (2009), which review aspects related to capital structure determinants. It is perceived that, in fact, there is a consensus regarding the determinants of capital structure, together with the question that the two main theories of capital structure (trade-off theory and pecking order theory) are not antagonistic, as the initial works, but complementary, suppose, and this new vision has been defended by various authors in recent years.

This research sought to analyze some determinants of the level of indebtedness of open capital companies in the stock exchanges of Argentina, Brazil and Chile, in the light of the two main theories on the subject. The analyzes were carried out based on data obtained from the financial statements of the open capital companies in the stock exchanges of these countries, in the period from 2007 to 2016. Static and dynamic tests were performed using the panel data model.

In the last 50 years, various works on capital structure have been done around the world, which made this issue become challenging and instigating, once there was not yet a concrete certainty about the explanation of debt indebtedness. Business. This study sought to investigate, then, the determinants of the capital structure of companies belonging to three countries in South America: Argentina, Brazil and Chile. That is, countries that are among the largest economies in the region, despite being emerging countries, guided by an economic ascent from the mid-1990s and with different realities.

Thus, this research analyzed the influence of specific factors of the company that can be decisive in the choice of capital structure, composed of eleven independent variables (Current Liquidity, Tangibility, Return to Investors, Return of assets, Growth of assets sales, Asset Growth, Income Tax payment level, Fiscal Economy, Profitability, Expected Growth by the Market Value Differential and Business Risk Measured by the Volatility of Benefits), explained by the two relevant theoretical trends in terms of volume of theoretical or empirical works: trade-off theory and pecking order.

With respect to the dependent variables (degree of indebtedness), it was objectified in this study to expand the concept of indebtedness based on the choice of five ways of considering the degree of indebtedness, deepening the understanding of the relationship between specific debt factors of the company and the capital structure of the companies. Thus, the dependent variables were chosen: Total indebtedness, Short-term indebtedness, Long-term indebtedness, Short-term burdensome financial indebtedness and Long-term burdensome financial indebtedness. This spectrum of measures takes into account the type and term of indebtedness, allowing a deeper investigation that can reach relevant or innovative conclusions.

The data analyzed reveal that, in the period from 2007 to 2016, among those countries, Brazil is the one with the highest level of total indebtedness, both accounting and financial. For short-term financial indebtedness, Chile has the lowest level, and for the long-term, Argentina predominates. Regarding accounting indebtedness, there is a predominance of long-term debts, with the exception of Argentina, in which the short-term one predominates. Finally, for burdensome financial indebtedness, there is a predominance of expensive long-term debts, except for Argentina, where short-term ones predominate.

It is observed that, with the use of the Panel Data, the determinants that seem to influence the levels of indebtedness of the companies more strongly are: Current Liquidity (LC), Tangibility (TANG), Return to Shareholders (ROE), Return of Assets (ROA), Sales Growth (CRESCDV), Asset Growth (CRESCAT), Market-to-Book (MTB) and Business Risk Measured by Volatility of Benefits (PLD). This conclusion is close to the results obtained by researchers in the area, such as Delcoure (2007), Nakamura et al. (2007), Bastos, Nakamura, and Basso (2009), Bastos and Nakamura (2009), Nunkoo and Boateng (2010), Correa, Basso, and Nakamura (2013) and Póvoa and Nakamura (2015).

In the present investigation, some relevant independent variables lack empirical confirmations, such as the Income Tax Payment Level (NPGIR) and the Fiscal Economy (ECND). These variables, according to the Trade Off Theory, should present significant results, however, for this study, they were presented inconclusive. It may be that due to the application of these Income Tax Payment Level (NPGIR) and Fiscal Economy (ECND) variables they are applied in developing economies and also that they suffered some decelerations in the period analyzed from 2007 to 2016.

The limitations of this research, as in the others, should be commented to improve further future research, which may deviate from these limitations. First, the limitation was of an econometric order. Panel data can generate several estimation and inference problems, based on cross section data (heterocedasticity) and time series (autocorrelation). Data in static panel were used in this study, which do not allow analyzing the dynamics of debt adjustment over time in view of a supposed metal capital structure.

As for the methods used, dynamic panel data can be used, which may present new evidence, such as the speed of adjustment of the level of accentuation towards an optimal capital structure goal, and if such speed is influenced by macroeconomic and institutional issues . Suggestions for future research, therefore, cover the use of Panel Data to analyze other factors that may influence indebtedness, mainly taxes and dividends, as well as a deeper analysis of factors that may influence the speed of adjustment. towards the target level.

The comparison of results between the various studies that address the capital structure of companies demonstrates the use of a great diversity of proxies, with the intention of measuring certain indicators. Thus, future work could also find out if the proxies used in the main studies really measure what they intend to measure.

Finally, future research could address the influence of the cost of capital in the composition of the debt matrix of the companies listed on the stock exchanges of Argentina, Brazil and Chile.

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