FINANCING STRUCTURE OF PORTUGUESE START-UPs

Liliana Raquel R. Silva *, Luís M. P. Gomes **

* Corresponding author. Polytechnic of Porto, Portugal, School of Accounting and Administration of Porto, Portugal
** Polytechnic of Porto; School of Accounting and Administration of Porto, and Centre for Organisational and Social Studies of P.Porto (CEOS.PP), Portugal

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Abstract

The context where the companies operate has become more challenging given the binomial competitiveness and financial crisis. Market imbalances are an opportunity to explore creative solutions that characterize Start-Ups' profiles. However, its innovative character carries risks that determine major funding difficulties.
This way this article aims to investigate the influence of a set of variables in the composition of the financial structure of Portuguese Start-Ups. The methodology used is based on a cross-sectional data, integrating multivariate regressions (Logit, Tobit, and OLS), enriched by panel data analysis. The results show that company's size, assets structure and legal form are statistically relevant.

Keywords: Start-Up, Innovation; Financing Forms, Crossection Data, Panel Data, Multivariate Models

1. INTRODUCTION

The way that businesses are financed represents a theme with great interest for scientific research. Several studies point out that the lack or insufficiency of financial resources promote business failures. The constraints that organizations face, given the effects of the financial crisis, made the conditions of access to credit even more challenging.

In the case of Start-Ups businesses, financial capital is a crucial resource for their development. However, the risk of their underlying activities makes the process of obtaining funds very complex, in a way that it may jeopardize the entrepreneurial success.

Considering the presented problem, which is also a motivation for our study, the analysis of a set of variables on the financing of the Start-Ups and determine the financing structure of these companies in the Portuguese market was defined as the main objective of this article.

The data used has considered the responses to a survey carried out between the last quarter of 2014 and the first quarter of 2015 to 70 Portuguese Start-Ups with less than seven years and with the respective financial statements available on the SABI database.

The methodology considered two phases. The first stage was based on the Cassar's work (2004) for the Australian market and included a sectional data analysis, integrating a set of multivariate models (Logit, Tobit and OLS) to investigate the relevance of independent variables: size, company's intentions and growth opportunities, legal form, profile and background of entrepreneurs. The second phase comprised a panel data analysis to enrich and complement the empirical research.

This way, the organization of the paper is structured into four sections. Section 2 presents the literature review, with a special focus on the framework of Start-Ups and the description of the most relevant international evidence. Section 3 presents the methodology, sample, data, variables and research hypotheses. In section 4 we present the results and the discussion of the chosen models. Finally, in section 5 are presented the conclusions, as well as the limitations, of the study and the future research proposals.

2. LITERATURE REVIEW

2.1. Start-up concept

The authors Berkowitz and Cooper (1997) argue that the appearance of the Start-Ups has played a very important role in the success of economies in

transition, as they constitute a source of employment, new ideas, and innovation (Acs & Audresctch, 1990; Dejardin, 1999). This means that these companies are the key to economic growth in the long term (Romer, 1986). For this reason, there have been multiple studies which main purpose is to characterize Start-Ups.

Therefore, to fit this terminology, Start Ups companies must meet a set of characteristics that distinguish them from the others. For Gitahy (2010), the true essence of a Start-Up is based on the fact that their business model, is repeatable and scalable, with ability to grow under an uncertain economic scenario. The author also states that as a result of these factors the entities can place their products /services in different markets without changing substantially their business model.

However, the Start-Up terminology is no consensus at all. Stel & Storey (2004), for example, suggest that the innovation of this new companies is not as frequent as expected.

Likewise, the definition of the period in which an entity can be called as Start Up has been subject of contention. Despite of the fact that the weight of this criteria may vary from author to author, Robinson & McDougall (2001) argue that, on average, it should include the first six years of operation.

As a result of its unique features, Start-Ups face higher obstacles and constraints, when compared to established companies (Huyghebaert & Gucht, 2004). The authors Gruber (2004) and Sarkar (2007) point out that the main justification of this proposition comes from the surrounding environment, marked by the novelty and uncertainty. This condition also justifies the lack of historical background and/or operating of Start-Ups (Huyghebaert & Gucht, 2004).

On the other hand, Franck & Huyghebaert (2010), Stankevičienė and Žinytė (2011) consider that the lack of assets (used as collateral) and high ex-ante risk, coupled with the lack of recognition and information asymmetry, are the arguments used by the most lenders to justify their reticent position on the time to provide funding.

2.2. International empirical evidence

Usually, the literature on the capital structure of small and medium enterprises and Start-Ups begin with the definition of the theory of Modigliani & Miller (1958). However, the most recent work emphasizes that the propositions of this theory are insufficient to explain the capital structure, because financial markets are imperfect. Therefore, Lopez-Garcia & Mira Sogorb-authors (2008) argue that the Trade-Off Theory and Pecking-Order Theory are more appropriate to be applied in this context.

The Trade-Off Theory suggests the existence of an optimal capital structure for each company. Thus, it states that there must be a balance in the company's exposure to debt costs (Modigliani & Miller, 1963; DeAngelo & Masulis, 1980). Therefore, management must replace debt for equity or equity for debt until the company's value is maximized.

The Pecking-Order Theory postulates that there is no great ratio of debt. Which means that companies adjust their financial decisions by information asymmetry problems (Myers, 1984; Myers & Majluf, 1984).

Once defined the most common theories, empirical studies have tried to prove its principles by selecting a set of variables. Many authors suggest that the variable size of the company is related to the level of debt. Berger and Udell (1998) and Cassar (2004) found that smaller companies face difficulties in processing information asymmetries between lenders and investors. So, smaller Start-Ups face more obstacles, because the financial costs work in scale, i.e., the relevance of direct bankruptcy costs decrease as the size of the company increases (Titman & Wessels, 1988; Cassar, 2004). Following these arguments, studies made by Fama and French (2002), Cassar & Holmes (2003) and Sogorb-Mira (2005) found a positive relationship between company's size and the level of debt. However, the results presented by Heyman, Deloof & Ooghe (2008) reported mixed evidence.

Another variable often used in the context of the Start-Ups capital structure are intentions and growth opportunities coveted by these companies. The work of the authors, Michaelas, Chittenden & Poutziouris (1999) shows a positive relationship between growth opportunities and debt when Start-Ups choose this type of resource. The authors explain this relationship arguing that the companies choose a type of financing that accompanies their capital needs, in order to face their development expectations. Also, the research carried out by Cassar (2004) points out that external or bank financing are related to growth. In contrast, Heyman et. al. (2008) argued that growth bears no relation with the debt maturity.

Understanding the influence of the composition of assets in Start-Ups' capital structure has also been the subject of research. The authors Harris & Raviv (1991) and Titman & Wessels (1988) argue that tangible and higher durability of assets, provides a greater liquidation value. According to the authors Rajan & Zingales (1995), fixed assets influence the level of the companies' bankruptcy costs, because they retain a certain value and, in case of insolvency, they may be sold to accomplish certain commitments. Following the guidelines of the Trade-Off Theory, the higher the proportion of fixed assets, the higher the level of debt, because the bankruptcy costs are lower. In this register, the authors Myers, 1977, Harris & Raviv (1990) and Heyman et al. (2008) justify that Start-Ups with a high proportion of fixed assets have an easier access to funding, since these assets can be used as collateral.

The work of Nofsinger and Wang (2011) examines the determinants of the initial financing of Start-Ups in 27 countries, considering new products, new technologies, entrepreneurs experience, GDP and size of the company. The empirical results obtained showed that institutional investors consider the experience of entrepreneurs at the time of funding. On the other hand, informal investors evaluate personal characteristics and skills, given its relationship with the entrepreneurs.

Similarly, recent studies developed by GEM (2012) show that, typically, entrepreneurs hold a set of distinct powers, such as training, professional experience, motivation and personal characteristics. The combined effect of these factors provides a cumulative know-how which tends to facilitate the desired financing (Duarte & Hope, 2012; Elston &

Audretsch, 2010; GEM 2012; Nanda 2009; Sarkar, 2007). Specifically, Storey (1994) and Bates (1997) highlight that the level of experience and training of entrepreneurs give good signals of human resources for lending entities.

Regarding the gender of those responsible for the business, Cassar (2004) and Coleman & Cohn (2000) conclude that variable also influences the capital structure and debt through discrimination.

In addition to the variables mentioned, legal form has also been considered in some articles to understand its influence on the choice of financing arrangements and the interpretation of the investors. Storey (1994) considers that the choice of legal form of an entity involves tax criteria, audit costs and provision of public information. Considering this, the author concludes that the banks understand the merger as a positive sign that demonstrates the credibility of the organization. In the same line, Coleman & Cohn (2000) closely analyzed the relationship between legal form and level of indebtedness, they have also found a positive relationship between the two.

3. METHODOLOGY

3.1. Data and sample

In the absence of a direct method that allows the identification of all Start-Up company's operating in Portugal, we chose a focus strategy by raising the potential population on the incubators and technology parks websites. The information collected showed a population of 1658 companies. However, the specific nature of Start-Ups required the application of a set of screening techniques, in order to select enterprises that actually would fit the concept. These techniques minimize the distortion and the bias of the results, in order to maximize the reliability of research.

Through the contacts made, we rejected information from companies aged more than seven years, (with the year 2014 as the time limit). This criterion intended to reject entities that were already established on the market. In addition, we have removed entities belonging to business groups or whose activities were not innovative. The application of these criteria was due to the unknown nature of the "shareholders" and the intention to avoid problems associated with the origin (domestic or foreign) funding.

The combined application of the mentioned criteria reduced the final sample to 923 Start-Ups eligible for this study. Given the cooperation of only 70 companies in the survey, the representative sample of the work was 7.6%.

Considering the objective, the empirical study continued with sectional data models that included the incorporation of information of 42, 33 and 29 companies for the overall period (2008-2013) and the sub-periods 2010-2013 and 2011-2013 respectively. The inclusion of sub-periods allows the identification of possible changes in the variables over time. Intending to complement the analysis, the empirical study continued with a panel data modeling. The contribution of this additional analysis stems from the significant number of companies and the period of time, which allowed 171 total observations. However, the application of

the selection criteria reconfigured the data in one unbalanced panel for a sample of 121 observations.

To ensure the integration of data in empirical models and maximizing the reliability of the results, we used the database of Bureau Van Dijk's Sabi ("SABI") to ratify any distortions in the responses to surveys.

3.2. Methods

In order to gather additional information about Start-Ups and to deduce their receptivity to this study, a survey was prepared. In this instrument, questions related to the company's characteristics, innovation, growth opportunities, forms of financing, background and profile of entrepreneurs were included.

To test the relationship between the dependent variables and the respective independent variables, censored regression models "Tobit" were develope. The use of this model type is justified because a great fraction of dependent variables has nulls values. Moreover, these models incorporate both the effects of the decision to use a particular form of financing at the expense of others and the proportion of funding used.

Given the complete understanding of the determinants of financing Start-Ups, "Logit" and "OLS" regressions were also performed. "Logit" regressions allow us to determine the influence of the independent variables used in a form of funding, while "OLS" regressions explain the proportion of funding used.

Finally, the empirical study continued with a panel data modeling. This estimation methods combine time series and sectional data, allowing the researcher to obtain more information with greater variability, less collinearity between variables, more degrees of freedom and greater efficiency in the estimation.

The modeling process was developed using free statistical software "R" (version 3.2.0).

3.3. Variables and research hypotheses

3.3.1. Dependent variables

From the sample and the data presented in the previous section, in Table 1 are identified and described in the dependent variables used to represent the financing structure of the Start-Ups businesses:

Table 1. Identification and description of the dependent variables

Dependent Variables		Description
Leverage	L	Total of Debt /Total Assets.
Outside Financing	OF	Total of external resources of Debt/ Total Assets.
Long Term Leverage	LTL	Debt (with maturity greater than 12 months) / Total
Bank Financing	BF	Bank Debt / Total Assets

The variable Leverage was defined by the ratio of total debt to the total of assets. Once the debt components are very heterogeneous, it was also set a Long-Term Leverage variable which includes the

debt with maturity greater than 12 months (Cassar, 2004).

The integration of variable Outside Financing is crucial to understand the financial structure, because it provides an alternative measure to the debt variables, delimiting the existence of agency problems and information asymmetry of conflicts between domestic and external investors (Cassar, 2004). This variable covers all forms of financing from external investors, with the exception of forms from individual investors and/or companies in a particular relationship situation with the Start-Ups.

The variable Bank Financing was included in this research, because it is the most traditional form of financing used by companies.

3.3.2. Independent variables

- **Size**

The inclusion of this variable derives from the perception of its influence in the choice of financing and investors' verdict. The enterprise's dimension follows the criteria set by the European Commission (2006) listed in Table 2:

Table 2. Size of enterprises due to turnover and number of effective

Company Category	Staff Headcount	Turnover		Balance Sheet Total
Medium-Size	<250	≤ €50.000.000	>	≤ €43.000.000
Small	<50	≤ €10.000.000		≤ €10.000.000
Micro	<10	≤ €2.000.000		≤ €2.000.000

Source: European Commission (2006)

For data integration in empirical models, this variable was considered in terms of the natural logarithm (Ln) of total assets.

Previous empirical studies support the existence of a positive relationship between company's size and leverage, long-term leverage, outside financing and bank financing (Frank & Goyal, 2003; Cassar, 2004). In this context, the empirical study aims to test the following hypothesis:

H1: The size of Portuguese Start-Ups is positively related to leverage, long-term leverage, outside financing and bank financing.

- **Asset Structure**

Given the conditions that characterize the Start-Ups, namely the lack of historical background and the lack of viable alternatives for investors to reduce financial risk, this variable can be decisive in choosing between the available funding options.

The literature suggests a strong relationship between assets structure and capital structure (Cassar, 2004), this way this empirical study aims to test the following hypothesis:

H2: The structure of assets of Portuguese Start-Ups is positively related to leverage, long-term leverage, outside financing and bank financing.

- **Legal Form**

Regarding the introduction of Legal Form, this variable was included in order to understand its effects and the influence that it presents in the use of certain financing forms.

Several authors argue that the choice of the legal form requires the balance between tax credibility and audit costs. Following the procedure of other works, the variable was coded by "1" in case the company has taken the form of public limited company and "0" in other cases. In this context, the empirical study aims to test the following hypothesis:

H3: The incorporation of Portuguese Start-Ups into a Limited Company is positively related to leverage, external financing and bank financing.

- **Intent and Growth Opportunities**

Despite of the mixed empirical evidence, Cassar (2004) argues that the opportunities and growth intentions influence agency costs, as well as financing options (Michaelas et. al. (1999)

We analyze the variable under a dichotomous view (0 or 1), being assigned the value "1" before an affirmative answer to the question: "Over the next 3 years, do you perspective business growth?". In this context, the empirical study aims to test the following hypothesis:

H4: Intentions and growth opportunities for Portuguese Start-Ups are positively related to leverage, long-term leverage, outside financing and bank financing.

- **Profile and Background of Entrepreneurs**

Given the crucial role that entrepreneurs play in the design of the business, it is important to examine how their characteristics (gender, education and experience) provide some predictive power to explain the structure of the capital and the financing of new companies.

Gender criteria and the level of education were analyzed through two dummy variables, represented by "1" if the entrepreneur is a male or if he has a university degree, respectively, and "0" in the opposite case. The professional experience of the entrepreneur was measured by the average number of years of inclusion in the labor market. In this context, the empirical study aims to test the following hypothesis:

H5: The profile and background of entrepreneurs influence the capital structure of Portuguese Start-Ups.

H5 a): The professional experience of the entrepreneur is positively related to the use of leverage, long-term leverage, outside financing and bank financing.

H5 b): Portuguese Start-Ups made by male entrepreneurs are prevalent forms of leverage, long-term leverage, outside financing and bank financing.

H5 c): The level of education of the entrepreneurs is positively related to leverage, long-term leverage, outside financing and bank financing.

In Table 3 there is a summary of the expected relationship between the independent variables with the different types of funding (dependent variables) and the measures used for its analysis.

Table 3. Variables, description, hypothesis testing and expected relationship

Independent Variables		Description	Hypothesis	Expected Relationship
Size	**S**	Natural Logarithm (LN) of total Assets	**H1**	**Positive(+)**
Asset Structure	**AS**	Noncurrent Assets /Total Assets.	**H2**	**Positive(+)**
Legal Form	**LF**	*Dummy* Variable: • "1" if the company is a Limited Company; • "0"otherwise.	**H3**	**Positive(+)**
Intent and Growth Opportunities	**IGO**	*Dummy* Variable: • "1" if the company shows intents for growth; • "0" otherwise.	**H4**	**Positive(+)**
Professional Experience	**PE**	Number of years in the work market	**H5**	**Positive(+)**
Gender	**G**	*Dummy* Variable: • "1" if the entrepreneur is male; • "0"otherwise.	**H5**	**Positive(+)**
Education Level	**EL**	*Dummy* Variable: • "1" if the entrepreneur has higher education; • "0" otherwise.	**H5**	**Positive(+)**

4. RESULTS AND DISCUSSION

4.1.1. *Descriptive statistics*

The descriptive statistics analysis is presented in Table 4 and shows that Portuguese Start-Ups assume an average debt level close to 49%. The power of long term debt represents 4.4% of total assets. This result converges with the evidence that entrepreneurs prefer short-term debt.

The average of 33.6% level that our study has for outside financing is inconsistent with the problems of information asymmetries (between creditors and investors) in smaller companies, reported by Berger and Udell (1998) in the American landscape.

Table 4. Descriptive statistics of the variables under study

	Minimum	*25%*	*Mean*	*75%*	*Maximum*	*S.D*	*Asymmetry*	*Kurtosis*
L	.032	0.223	.488	0.784	.927	.308	-.106	-1.440
OF	0.00	0.081	.336	0.492	.942	.291	.660	-.577
LTL	0.00	0.000	.044	0.000	.498	.124	2.894	7.490
BF	0.00	0.000	.029	0.000	.498	.110	3.808	14.009
S	7.974	8.908	9.466	12.661	10.301	1.226	.8389	.2903
AS	0.00	0.000	.192	0.206	.859	.282	1.548	.927
LF	0.00	1.000	.103	1.000	1	.309	2.748	5.961
IGO	0.00	0.000	.965	0.000	1	.185	-5.385	29
PE	0.00	0.000	7.172	1.000	16	4.318	.205	-.685
G	0.00	7.000	.689	10.000	1	.470	-.865	-1.349
EL	0.00	1.000	.931	1.000	1	.257	-3.590	11.695

Table 5 shows the intensity of association between pairs of variables to explain the causal relationships and any multicollinearity problems (Gujarati, 1995; Maroco, 2007).

Table 5: Matrix of correlations between the independent variables

	S	*AS*	*IGO*	*LF*	*G*	*PE*	*EL*
S	1.000						
AS	0.2121	1.000					
IGO	0.0363	0.0713	1.000				
FL	0.5021**	-0.0615	0.0642	1.000			
G	0.4081*	0.3879*	-0.1268	-0.0169	1.000		
PE	-0.1439	0.2066	-0.0369	-0.0672	0.1151	1.000	
EL	-0.0348	0.1470	-0.0514	0.0925	-0.1826	-0.2776	1.000

**. Significant at 0,01. *. Significant at 0,05.

In general, the independent variables exhibit a weak correlation (less than 0.2) and no statistical significance. Noteworthy are only three exceptions: one with the most significant correlation between size and legal form; and two less significant correlations between the variables size and gender and between asset structure and gender of entrepreneurs.

Still, none of the correlations exceeds 0.75, so they do not rise multicollinearity issues that could make the analysis confused and meaningless.

4.1.2. *Sectionals data modeling*

The starting point of the research was to reference - as stated above - the study by Cassar (2004), whose

models were specified as the presentation of Table 6.

Table 6. Analytical expressions of replicated models

	Leverage	Outside Financing	Long Term	Bank Financing
OLS Regressions				
$y = \beta_0 + \beta_1 S + \beta_2 AS + \beta_3 LF + \beta_4 IOG + \beta_5 PE + \beta_6 G + \beta_7 EL + u_i$				
Logit Regressions				
$y = F(\beta_0 + \beta_1 S + \beta_2 AS + \beta_3 LF + \beta_4 IOG + \beta_5 PE + \beta_6 G + \beta_7 EL + u_i)$				
Tobit Regressions				
$y = \beta_0 + \beta_1 S + \beta_2 AS + \beta_3 LF + \beta_4 IOG + \beta_5 PE + \beta_6 G + \beta_7 EL + u_i$				

Were:

β = coefficient to estimate
x_1 = variable company's Size (S)
x_2 = variable Assets Structure (AS)
x_3 = variable Legal Form (LF)
x_4 = variable Intentions and Growth Opportunities (IGO)
x_5 = variable Professional Experience (PE)
x_6 = variable Gender (G)
x_7 = variable Education Level (EL)
u_i − represents the errors or residues

The empirical study of this article continued with a modeling process that incorporated all possible combinations from the independent variables for 42, 33 and 29 companies in the periods 2008-2013, 2010-2013 and 2011-2013 respectively. Under this procedure were tested for each dependent variable 128[1] combinations that have identified the models with the variables that best explain the financing of Portuguese Start-Ups.

Table 7 presents the best OLS structures chosen from the adjusted coefficients set for the models used in three periods of times.

The results for the period 2008-2013 show a marginal increase in businesses sizes which implies an increase of 9.6% on leverage. In addition, this result (statistical significant at the level of α = 5%) confirms the hypothesis number 1. For the periods 2010-2013 and 2011-2013 the conclusions remain uniform.

The results also show a positive relationship between the assets structure of these companies and indebtedness, confirming the hypothesis number 2, although the results are only statistically significant in the case of outside financing (OE).

In contrast, the legal form "S.A." implies a decrease on average of more than 50% in leverage and outside financing in all periods. This behavior its statistically relevant leading to the rejection of hypothesis number 3.

The best-calculated structures did not include the variable intention and growth opportunities or the education of the entrepreneurs, so it was not possible to test the hypothesis 4 or 5c), respectively. Furthermore, it was also not possible to test the hypothesis 5a), because of the erratic behavior of the sign of the variable experience and the lack of statistical significance of the estimation. However,

the results show a negative and statistically significant relationship between the variable gender and the variable outside financing, justifying the rejection of the hypothesis 5b).

The models for variables leverage and outside financing to meet the usual level (α = 5%) test requirements F Snedecor and ensure the overall statistical significance of the explanatory variables. Once proven this requirement, it was performed the Breusch Pagan test, whose results rejected the presence of heteroscedasticity. Finally, we proceeded to Durbin-Watson test to detect the autocorrelation of the waste and the Breusch- Godfrey test. Both results indicated that the residues are not autocorrelated.

Overall, for the leverage models the adjusted determination coefficients are between 12.1% and 22%, and between 34.8% and 40.6% for outside financing models.

As for long-term leverage and bank financing selected models, the lack of statistical significance of the set of explanatory variables is demonstrated by the results of the F Snedecor test.

Notwithstanding the previously mentioned constraints, the structure of the OLS model remains uniform for the various periods of time considered.

Table 8 presents the best structures of Logit regressions validated by the Log Likelihood test. This test intends to verify the absence of faults, and the p-value level below 0.05, with this test we can conclude that at least one of the model variables is not zero.

The result of this modeling typology also shows that the best structures did not include the variable education level to explain the forms of financing investigated. In addition, there was a higher number of variables excluded when compared with OLS regression.

Despite of the exclusions, long-term leverage remained explained with statistical significance in the periods of 2010-2013 and 2011-2013 by the variable assets structure, experience and gender of the entrepreneurs. For the period of 2010-2013, this model highlights that the increase in one year of professional experience of the entrepreneurs, decreases on average the probability of using long-term debt by 72.6% (i.e, odds ratio = $e^{-.0320}$). It is also important to emphasize that when the Start-Up is designed by a male entrepreneur it also decreases, on average, the probability of using Long Term Leverage by 4.5% (ie, odds ratio = $e^{-3.107}$).

Table 9 presents the best structures of Tobit regressions selected from the various combinations, in the order of the Log Likelihood test. Following this test, we determine the overall significance of the best models with Wald test (evaluated in terms of distribution Chi Square).

The results obtained demonstrate that Tobit structure models remained, generally, the completeness of the explanatory variables over the three periods considered in the analysis.

4.2. Panel data modeling

As happened in sectional data modeling, the data panel was preceded by the correlation analysis between the explanatory variables shown in Table 10.

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[1] The number of combinations obtained as result of the calculation 2^7, where 7 is the total number of explanatory variables.

Table 7. OLS coefficients to the adopted models

	Time Period 2008-2013				Time Period 2010-2013				Time Period 2011-2013			
	L	**OF**	**LTL**	**BF**	**L**	**OF**	**LTL**	**BF**	**L**	**OF**	**LTL**	**BF**
Constant	-0.451	-0.821*	0.037	0.007	0.597	-1.024 *	0.094	0.008	-0.470	-1.082*	0.080	0.009
	(0.402)	(0.363)	(0.032)	(0.017)	(0.431)	(0.382)	(0.040)	(0.021)	(0.468)	(0.428)	(0.045)	(0.024)
S	0.095*	0.128**			0.114*	0.153**			0.104*	0.159**		
	(0.041)	(0.038)			(0.044)	(0.041)			(0.048)	(0.047)		
AS		0.340*		0.072		0.285.		0.086		0.339.		0.101
		(0.162)		(0.052)		(0.151)		(0.064)		(0.171)		(0.072)
LF	-0.50*	-0.471**			-0.58**	-0.525**			-0.58**	-0.53**		
	(0.195)	(0.172)			(0.188)	(0.165)			(0.192)	(0.173)		
IOG												
PE			0.001				-0.006				-0.005	
			(0.038)				(0.004)				(0.005)	
G		-0.172*				-0.212*				-0.219*		
		(0.091)				(0.093)				(0.112)		
EL												
N	42	42	42	42	33	33	33	33	29	29	29	29
R²	0.164	0.412	5.7e⁻⁰⁵	0.045	0.269	0.480	0.056	0.055	0.273	0.447	0.030	0.06
Adjusted R²	0.121	0.348	-0.024	0.021	0.220	0.406	0.026	0.025	0.217	0.355	-0.005	0.03
F Snedecor	4.308*	6.489***	0.002	1.917	5.531**	6.483***	1.864	1.833	4.896*	4.856**	0.860	1.967
Breusch Pagan	1.529	1.906	0.507	27.395	0.680	2.476	2.920	18.783	0.8015	3.009	1.9	16.951
DW	1.953	2.201	2.167	2.140	2.124	1.829	2.171	2.133	2.204	2.035	2.181	2.2424

*. Significant at 0.1 / * Significant at 0.05 / ** Significant at 0.01 / *** Significant at 0.001.*

Table 8. Logit coefficients for the adopted model

	Time Period 2008-2013				Time Period 2010-2013				Time Period 2011-2013			
	L	**OF**	**LTL**	**BF**	**L**	**OF**	**LTL**	**BF**	**L**	**OF**	**LTL**	**BF**
Constant	-1095.8	3.170	-0.336	-19.57		-3.847	1.899	.19.57	$2.557e^{-1}$	-4.874	1.662	-19.57
	(5.061)	(4297.10)	(0.585)	(3104.42)		(4739.035)	(1.196)	(3400.72)	$(3.275e^{-05})$	(5138.182)	(1.194)	(3584.67)
S	117.0	1.968			$-3.132e^{-07}$	2.855			$-4.148e^{-12}$	0.300		
	(53979.5)	(1.235)			$(3.112e^{-04})$	(1.767)			$(3.327e^{-03})$	(0.214)		
AS						4.656*					4.817.	
						(2.253)					(2.563)	
LF		11.255										
		(8568.976)										
IOG	184.4											
	(80913.1)											
PE							-0.320*				-0.337*	
							(0.149)				(0.170)	
G		-19.393	-1.273.	17.37		-20.290	-3.107*	17.21		-20.604	-3.081*	17.37
		(4297.096)	(0.763)	(3104.42)		(4739.013)	(1.296)	(3400.72)		(5138.153)	(1.523)	(3584.67)
EL												
N *Log Likelihood*	42	42	42	42	33	33	33	33	29	29	29	29
	$-4.85e^{-06}$***	-8.955***	-21.67***	-9.752***	$-2.60e^{-10}$***	-5.588***	-13.4***	-6.795***	-2.287***	-4.048***	-10.7***	-6.502***
McFadden Pseudo R²	0.999	0.318	0.060	0.097	0.999	0.447	0.303	0.066	0.999	0.443	0.329	0.138
x^2	9.451**	8.426*	2.771.	2.109	3.760	8.989*	11.733**	1.499	0	6.458*	10.568**	1.552

*. Significant at 0.1 / * Significant at 0.05 / ** Significant at 0.01 / *** Significant at 0.001.*

Table 9. Tobit coefficients for the adopted models

	Time Period 2008-2013				Time Period 2010-2013				Tme Period 2011-2013			
	c	OF	LTL	BF	L	OF	LTL	BF	L	OF	LTL	BF
Constant	-0.094	-1.032*	-1.814	-11.976	-0.204	-1.178*	-0.730	-10.488	0.122	-1.244*	-2.302	-9.441
	(0.468)	(0.470)	(776.602)	(1658.281)	(0.609)	(0.560)	(811.126)	(1314.276)	(0.601)	(0.574)	(1251.401)	(1.774)
S	0.077.	0.146***	0.027	0.182	0.108*	0.169***		0.074	0.010	0.016***		-0.013
	(0.043)	(0.041)	(0.061)	(0.227)	(0.047)	(0.043)		(0.307)	(0.060)	(0.004)		(0.030)
AS	0.151	0.390*	0.251	0.159	0.012	0.329.	0.536.	0.519	0.086	0.354*	0.568	0.049
	(0.180)	(0.167)	(0.239)	(0.547)	(0.186)	(0.170)	(0.307)	(0.957)	(0.201)	(0.180)	(0.373)	(0.096)
LF	-0.448*	-0.496**	-0.098	-3.148	-0.541**	-0.535**	-0.139	-3.337	-0.556**	-0.552***	-0.108	-3.087
	(0.193)	(0.178)	(0.246)	(1557.78)	(0.184)	(0.167)	(0.272)	(1.217)	(0.185)	(0.167)	(0.288)	(1.707)
IOG		0.064	1.477	3.101	-0.306	0.060	1.158	2.866	-0.286	0.076	1.290	2.883
		(0.167)	(706.602)	(1008.225)	(0.259)	(0.235)	(811.816)	(809.4)	(0.259)	(0.233)	(985.437)	(1.053)
PE		-0.001	-0.013	0.029	-0.009	-0.005	-0.053	-0.021	0.008	-0.003	-0.046	-0.036
		(0.007)	(0.012)	(0.037)	(0.102)	(0.011)	(0.027)	(0.087)	(0.012)	(0.011)	(0.029)	(0.086)
G	-0.047	-0.206*	-0.172	3.565	-0.023	-0.249**	-0.274	3.098	-0.017	-0.240*	-0.33	3.197
	(0.101)	(0.096)	(0.144)	(862.991)	(0.102)	(0.094)	(0.179)	(695.494)	(0.124)	(0.114)	(0.259)	(9.838)
EL	-0.198	-0.004	-0.042	2.644	-0.095	-0.003	-0.226	2.896	-0.136	0.023	1.148	2.818
	(0.175)	(0.162)	(0.249)	(994.826)	(0.176)	(0.161)	(0.316)	(768.797)	(0.204)	(0.185)	(771.691)	(1.034)
N *Log Likelihood*	42	42	42	42	33	33	33	33	29	29	29	29
	-8.047	-5.994	13.605	-7.052	-1.038	-0.316	-8.577	-6.903	-0.638	0.618	-7.715	-5.725
McFadden Pseudo R^2	0.386	0.655	0.154	0.296	0.865	0.972	0.344	0.201	0.902	0.926	0.326	0.222
$\mathcal{X}^2$	11.46*	29.31***	2.636	1.177	16.47**	30.87***	4.607	0.403	14.65*	23.93***	3.348	0.33

*. Significant at 0.1 / * Significant at 0.05 / ** Significant at 0.01 / *** Significant at 0.001.*

Table 10. Matrix of correlations between the independent variables (panel data)

	S	AS	LF	IGO	PE	G	EL
S	1						
AS	,118	1					
LF	,086	-.108	1				
IGO	-,031	.062	.065	1			
PE	,083	.076	-.044	-.374**	1		
G	,017	.030	-.066	-.148	-.002	1	
EL	,019	-.288**	.052	-.065	-.278**	.251**	1

*. Significant at 0.1/ * Significant at 0.05 / ** Significant at 0.01 / *** Significant at 0.001.*

The results support the absence of multicollinearity problems, as explanatory variables are not strongly correlated. The most significant value (-37.4%) is inversely related to variable intentions and growth opportunities and experience. The characteristic of this relationship suggests that less experienced entrepreneurs aspire to grow more often.

The empirical study continued with the multiple combinations of the independent variables for 121 observations in the period of 2008-2013. Econometric regressions carried out in the Wooldridge (2002) requirements; allow us to identify the best structures of explanatory variables of Portuguese Start-Ups.

As for the models on the proportion of funding (OLS), it was found that the Lagrange Multiplier test rejected the null hypothesis, which shows us that temporal effects and the specific effects of the entities must be considered. Given the presence of these effects, the conclusion is that the panel is preferable to the pooled modeling.

The application of the Hausman test recommended models for leverage and outside financing random effects estimation, while the long-term leverage and bank financing should be estimated by fixed effects.

In this type of models (OLS), the quality was measured by the coefficient of R2 adjusted. Among the (lower) results, it is highlighted that 27.2% of the proportion of outside financing is explained by the variable size, asset structure, legal form, professional experience, gender and education level.

As for the Logit and Tobit models, the Hausman test is impractical, because the option for fixed effects omitted variables that remain unchanged over time (e.g, legal form, intentions and growth opportunities, professional experience, gender and education level) and their standard deviations remain high. To overcome this constraint, the Logit and Tobit models were estimated by random effects. Then we proceeded to the Log Likelihood function to identify the best-associated structures.

Contrary to the sectional data verified, the structures of the Logit and Tobit models in panel data cover almost all the explanatory variables.

The results show that the company's size is statistically significant in all models studied. The structures of the Logit models indicate that a marginal increase (1%) of this explanatory variable causes an increased probability of 5.0% (ie, odds ratio = $e^{1.608}$) in long-term leverage and 2.71% (ie, odds ratio = $e^{0.997}$) for bank financing and 6.17% (ie, odds ratio = $e^{1.820}$) for outside financing.

Table 11. OLS, Logit and Tobit coefficients to the adopted models (panel data)

	L			OF			LTL			BF		
	OLS	*Logit*	*Tobit*	*OLS*	*Logit*	*Tobit*	*OLS*	*Logit*	*Tobit*	*OLS*	*Logit*	*Tobit*
Constant	0.374	14.71	0.504*	-0.216	18.224	-0.287		-9.327	-0.128***		-68.802	-1.033
	(0.311)	(176.0)	(0.248)	(0.243)	(1826.531)	(0.295)		(5.993)	(0.009)		(1678.802)	(0.190)
S	0.025		0.013***	0.054**	1.608*	0.069***	0.044*	0.997*	0.008***	0.034*	1.820*	0.011
	(0.024)		(0.017)	(0.019)	(0.634)	(0.018)	(0.020)	(0.440)	(0.034)	(0.016)	(0.816)	(0.018)
AS	0.202.	31.02	0.288*	0.495***	8.574	0.553***	0.107	1.099	0.221***	0.012	0.301	
	(0.116)	(24.26)	(0.114)	(0.111)	(5.922)	(0.136)	(0.077)	(1.579)	(0.206)	(0.058)	(2.214)	
LF	-0.337*	-20.23	-0.313*	-0.374**	-3.457	-0.423		-2741	-0.059***		-27.103	-1.225
	(0.130)	(15.36)	(0.145)	(0.119)	(3.533)	(0.379)		(2.422)	(0.034)		(2269.929)	(0.145)
IOG	-0.052	18.98	-0.124		0.7110	0.008		-0.503	-0.035***		0.125	0.257
	(0.144)	(153.6)	(0.102)		(1.991)	(0.104)		(1.955)	(0.006)		(2.257)	(0.423)
PE	-0.002	0.282	-0.004	-0.010*		- 0.012*		-0.063			-0.032	-0.0008
	(0.006)	0.254	(0.004)	(0.005)		(0.005)		(0.101)			(0.115)	(0.034)
G	0.039	-17.50	0.025	-0.072	-18.209	-0.009		-0.923	-0.033		26.651	0.409
	(0.083)	(171.6)	(0.068)	(0.070)	(1264.078)	(0.064)		(1.446)	(0.172)		(1181.109)	(0.206)
EL	-0.139		-0.105	0.091	-14.282	-0.086		-1.402			20.371	0.537
	(0.159)		(0.153)	(0.139)	(1332.263)	(0.190)		(1.561)			(1192.899)	(0.295)
N	121	121	121	121	121	121	121	121	121	121	121	121
Log Likelihood		-2.895	-12.622		-17.339	-24.205		-64.990	-38.593		-44.819	-26.972
McFadden Pseudo R²			0.377			0.493			0.100			0.045
R²	0.188			0.272			0.138			0.096		
Adjusted R²	0.176			0.256			0.079			0.054		
F Snedecor	3.481**			7.099***			2.445*			3.045*		
Breusch Pagan	4.644			4.927			34.624			79.06942		
Breusch-Godfrey/Wooldridge	No autocorrelation			No autocorrelation			No autocorrelation			No autocorrelation		

Notes: Standard errors are in parentheses
   *. Significant at 0.1 / * Significant at 0.05 / ** Significant at 0.01 / *** Significant at 0.001*

5. CONCLUSIONS

The Start-Up terminology is no consensus in the scientific community, because of the particularities that characterize this type of companies. For example, uncertainty and innovation conditions determine that these entities encounter unique challenges. In this context, the empirical research studied the influence of a set of variables in the composition of the financial structure of the Portuguese Start-Ups between 2008 and 2013.

The comparison of results obtained from cross-sectional and panel data analysis shows that the most statistically significant coefficients are associated with the explanatory variables size, asset structure and legal form. The positive signs of the first two variables agree with the Pecking Order and Trade Off theories, and converge with the conclusions presented by Myers (1977), Titman & Wessels (1988), Harris & Raviv (1990), Harris & Raviv (1991), Rajan & Zingales (1995), Fame & French (2002), Cassar and Holmes (2003), Frank & Goyal (2003), Cassar (2004), Sogorb-Mira (2005) and Heyman et al. (2008). However, the negative signs of variable legal form suggest an inverse relationship with the various forms of financing, contradicting the hypothesis 3, initially formulated.

Empirical evidence also suggests that the foreign investors and the banks prefer a business Start-Up with growth aspirations. However, with respect to the variable long-term leverage hypothesis, 4 is only partially satisfied since the consideration of the heterogeneity of companies - the modeling of panel data – reflects a results orientation contrary to modeling sectional data.

As for the characteristics of entrepreneurs, the behavior is different and subject to the dependent variable in the analysis, the disturbing confirmation of hypotheses 5 established. However, the results show that institutional investors consider the experience of the entrepreneurs at the time of grant funding. Unlike in Cassar (2004), the study identified an opposite relationship between the number of

years in the labor market and the external financing. Empirical evidence also suggests an aversion to granting financing by banking institutions to female entrepreneurs, as reported by Storey (1994), Coleman & Cohn (2000) and Cassar (2004). Regarding the level of education, it appears that the most qualified entrepreneurs opt for alternative resources, diverging from the study of Storey (1994), in particular for bank financing.

The main differences between the results of the empirical studies presented here and Cassar's article (2004), which we considered as a reference, may be justified by different economic contexts. Specifically, the analysis developed in a period marked by the international financial crisis, which in Portugal was characterized by low levels of consumption, the credit crunch and troubled conditions in the labor market. The modeling sectional data showed that explanatory variables in the different regressions are not homogeneous, proving that the economic situation in Portugal is different from the Australian reality. The contribution of panel data analysis allowed the explanation of the capital structure of Portuguese Start-Ups through the reconciliation of several years and various entities.

Often, researchers do not have enough resources to collect and analyze data, facing some limitations (Hill & Hill, 2000). The main limitation of this work is related to the identification of the Portuguese Start-Ups, and is based on the fact that not all the information collected on websites was updated and the search criteria did not allow the gathering of all the information.

As future research proposals, we suggest the replication of this study on businesses Start-Ups located in the Iberian market and with a larger time horizon of analysis. The main goal is to understand the evolution of these companies, given their dynamism. Moreover, still, we suggest the development of different models with new explanatory variables, such as innovation, entrepreneurship, and the impact of the tax system.

REFERENCES

1. Bădulescu, D. (2010). SMEs financing: The extent of need and the responses of different credit structures. *Theoretical & Applied Economics, 17(7),* 25-36. Retrieved from the World Wide Web: http://store.ectap.ro/articole/481.pdf.
2. Berger, A., & Udell, G. (1998). The economics of small business finance: The roles of private equity and debt markets in the financial growth cycle. *Journal of Banking and Finance, 22(6-8),* 613-673. https://doi.org/10.1016/S0378-4266(98)00038-7
3. Berkowitz,D., & Cooper, D. (1998). Start Up and Transition. Working Paper. The Davidson Institute of Working Papers Series, Michigan. Retrieved from the World Wide Web: http://wdi.umich.edu/files/publications/workingpapers/wp84.pdf.
4. Cassar, G. (2004). The financing of business Start-Ups. *Journal of Business Venturing, 19(2),* 261-283. https://doi.org/10.1016/S0883-9026(03)000 29-6
5. Cassar, G., & Holmes, S. (2003). Capital structure and financing of SMEs: Australian evidence. *Accounting and Finance, 43,* 123-147. https://doi.org/10.1111/1467-629X.t01-1-00085
6. Coleman, S., & Cohn, R. (2000). Small firms use of financial leverage: Evidence from the 1993
national survey of small business finances. Journal of Business and Entrepreneurship, 12(3):81-98. Retrieved from the World Wide Web: https://www.questia.com/library/journal/1P3-1395197641/small-firms-use-of-financial-leverage-evidence-from
7. Comissão Europeia (2006). A nova definição de PME. Guia do Utilizador e modelo de declaração. European Comission. Web Site. Retrieved from the World Wide Web : http://ec.europa.eu/enterprise/policies/sme/files/sme_definition/sme_user_guide_pt.pdf
8. DeAngelo, H., & Masulis, R. W. (1980). Optimal capital structure under corporate and personal taxation. Journal of Financial Economic, 8(1): 3-29. https://doi.org/10.1016/0304-405X(80)90019-7
9. Duarte, C., & Esperança J. (2012). Empreendedorismo e planeamento financeiro: transformar oportunidades em negócios: Criar micro, pequenas e médias empresas. Lisboa: Edições Sílabo.
10. Elston, J., & Audretsch, D. (2010). Risk attitudes, weakth and scources of entrepreneurial start-up capital. *Journal of Economic Behavior &*

Organization, 76, 82-89. https://doi.org/10.1016/j.jebo.2010.02.014

11. Fama, E. F., & French, R. R. (2002). Testing trade-off and pecking order predictions about dividends and debt. *Review of Financial Studies, 15(1),* 1-33. https://doi.org/10.1093/rfs/15.1.1

12. Franck, T., & Huyghebaert ,N. (2010). Determinants of capital structure in business start-ups: The role of nonfinancial stakeholder relationship costs. *Journal of Financial Research, 33(4),* 487-517. https://doi.org/10.1111/j.1475-6803.2010.01280.x 8

13. Frank, M., & Goyal, V.K.. (2003). Testing the pecking order theory of capital structure. *Journal of Financial Economics, 67,* 217-248. https://doi.org/10.1016/S0304-405X(02)00252-0

14. GEM Portugal. (2012). GEM Portugal- Estudo sobre o Empreendedorismo. Global Entrepreneurship Monitor. Web Site. Retrieved from the World Wide Web: http://web.spi.pt/GEMportugal2012/files/GEM_PORTUGAL_2012.pdf.

15. Gitahy, Y. (2010). O que é uma startup?. Exame.Com.Web Site. Retrieved from the World Wide Web: http://exame.abril.com.br/pme/noticias/o-que-e-uma-startup?page=2.

16. Gruber, M.(2004). Marketing in new ventures: Theory and empirical evidence. *Schmalenbach Business Review, 56(2),* 164-199. Retrieved from the World Wide Web: http://business.dirkjanswa german.nl/static/files/MBI/Module%206/READING S_Gruber_SBR_2004.pdf.

17. Harris, M., & Raviv, A. (1990), Capital structure and the informational role of debt. *The Journal of Finance, 45(2),* 321-349. https://doi.org/10.1111/j.1540-6261.1990.tb03693.x 1

18. Harris, M., & Raviv, A. (1991). The theory of capital structure. *The Journal of Finance, 46(1),* 297-355. https://doi.org/10.1111/j.1540-6261.1991.tb037 53.x 11

19. Heyman, D., Deloof, M., & Oeghe, H. (2008). The financial structure of private held Belgian firms. *Small Business Economics, 30,* 301-313. https://doi.org/10.1007/s11187-006-9031-0

20. Hill, M., & Hill, A. (2000). Investigação por questionário.Lisboa: Edições Sílabo.

21. Huyghebaert, N., & Gucht, M. (2004). Incumbent strategic behavior in financial markets and the exit of entrepreneurial start-ups. *Strategic Management Journal, 25(7),* 669-688. https://doi.org/10.1002/ smj.415

22. López-Garcia, J., & Sogorb-Mira, F. (2008). Testing trade-off and pecking order theories financing SMEs. Small Business Economics, 31:117-136. https://doi.org/10.1007/s11187-007-9088-4

23. Maroco, J. (2007). Análise Estatística com utilização do SPSS. Lisboa: Edições Sílabo, Lda.

24. Michaelas, N., Chittenden, F., & Poutzioris, P. (1999). Financial policy and capital structure choice in U.K. SMEs: Empirical evidence from a company panel data. Small Business Economics, 12(2), 133-130. https://doi.org/10.1023/A:10080 10724051

25. Modigliani, F., & Miller, M.H (1958). The cost of capital corporation finance and the theory of investment. *American Economic Review, 48(3),* 261-297.

26. Modigliani, F., & Miller, M.H (1963). Corporate income taxes and the cost of capital: A correction. *American Economic Review, 53(3),* 433-443.

27. Myers, S. C. (1977). Determinants of corporate borrowing. *Journal of Financial Economics, 5,* 147-175. https://doi.org/10.1016/0304-405X(77)9001 5-0

28. Myers, S. C. (1984). The capital structure puzzle. *Journal of Finance, 39(3),* 575-592. https://doi.org/10.3386/w1393

29. Myers, S. C., & Majluf, N. S. (1984). Corporate financing and investment decisions when firms have information that investor do not have. *Journal of Financial Economics, 13,* 187-221. https://doi.org/10.3386/w1396

30. Nanda, R. (2009). Entrepreneurship and the discipline of external finance. Working Paper. Harvard Business School, EUA. Retrieved from the World Wide Web: http://www.hbs.edu/faculty/Publication%20Files/11-098.pdf

31. Nofsinger, J., & Wang, W. (2011). Determinants of start-up firm external financing worldwide. *Journal of Banking & Finance, 35,* 2282-2294. https://doi.org/10.1016/j.jbankfin.2011.01.024

32. Rajan, R. G., & Zingales, L. (1995). What Do We Know about Capital Structure? Some evidence from international data. *Journal of finance, 50 (5),* 1421-1460. https://doi.org/10.1111/j.1540-6261. 1995.tb05184.x

33. Robinson, K., & McDougall, P. (2001). Entry barrier and new venture performance: A comparison of universal and contingency approach. *Strategic Management Journal, 22,* 659-685. https://doi.org/10.1002/smj.186

34. Romer, P. (1986). Increasing returns and long-run growth. *Journal of Political Economy, 94,* 1002-1037. https://doi.org/10.1086/261420

35. Sarkar, S. (2007). Empreendedorismo e Inovação. Lisboa: Escolar Editora.

36. Sogorb-Mira, F. (2005). How SME uniqueness affects capital structure: Evidence from a 1994-1998 Spanish data panel. *Small Business Economics, 25(5),* 447-457. https://doi.org/10.1007/s11187-004-6486-8

37. Stankevičienė, J., & Žinytė, S. (2011). Valuation model of new start-up companies: Lithuanian case. *Business: Theory and Practice, 12(4),* 379-389. Retrieved from the World Wide Web: http://www.btp.vgtu.lt/index.php/btp/article/view/btp.2011.3 9.

38. Stel, J., & Storey, D. (2004). The link between firm births and job creation: Is there an Upas tree effect?. *Regional Studies, 38,* 893-909. https://doi.org/10.1080/0034340042000280929

39. Storey, D. J. (1994). Understanding the small business sector.Hampshire: Cengage Learning EMEA.

40. Titman, S., & Wessels, R. (1988). The determinants of capital structure choice. *Journal of Finance 46(1),* 297-355. https://doi.org/10.1111/j.1540-6261.1988.tb02585.x