



Instituto Superior de Economia e Gestão

UNIVERSIDADE TÉCNICA DE LISBOA

DESDE 1911

MESTRADO EM FINANÇAS

TRABALHO FINAL DE MESTRADO DISSERTAÇÃO

DETERMINANTS OF START-UPS CAPITAL STRUCTURE

ELAINE JANINE MARTINS DE LIMA

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ORIENTAÇÃO:

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Abstract

The objective of this paper is to analyze the most relevant determinants of new ventures initial capital structure, by developing an empirical study. Capital Structure has been one of the most controversial issues in financial literature during the past years. Although exists an enormous amount of empirical and theoretical studies on this topic, there is no agreement in choosing the optimal capital structure. Much of the existing research focuses on established firms, neglecting the field of entrepreneurial finance. Only recently, in the late 90s, the studies on capital structure were extended to start-ups and small firms. Concerning this, by combining Portuguese firm-level financial data with the matched employer-employee database, that contains unique and detailed information about the start-ups during the period 2004 to 2009, the influence of factors such as size, asset structure, growth orientation and owners' characteristics on start-ups initial capital structure were examined. The results support the hypotheses that size and asset structure have a positive impact on start-ups initial capital structure, while growth have a negative relation. These results are also consistent with the pecking order theory that incorporates information asymmetries issues and the trade-off theory with the agency problems. The level of significance and impact of owners' characteristics such as industry experience, regional experience, entrepreneurial experience, education, age and gender on start-ups initial capital structure varies widely, not providing consistent results.

JEL classification: G32, L26, M13.

Keywords: Capital Structure; Start-ups; New Ventures; Financing; Entrepreneurship.

Resumo

O objetivo deste trabalho é analisar os determinantes mais relevantes da estrutura de capital inicial de novas empresas, através do desenvolvimento de um estudo empírico. A estrutura de capital tem sido a ser um dos temas mais controversos na literatura financeira. Embora haja uma grande quantidade de estudos empíricos e teóricos sobre este tema, não há ainda acordo na escolha da estrutura ótima de capital. Grande parte dos estudos concentra-se em empresas estabelecidas, negligenciando o tema das novas empresas. Recentemente, final dos anos 90, estudos sobre a estrutura de capital começaram a abordar o tema start-ups e pequenas empresas. Neste sentido, combinando dados financeiros de empresas e dados do fundador, que contêm informações detalhadas sobre as start-ups Portuguesas ao longo do período 2004 a 2009, a influência de fatores como o tamanho, a estrutura de ativos, o crescimento e as características dos fundadores na estrutura de capital inicial de start-ups foram analisadas. Os resultados confirmam a hipótese de que o tamanho e a estrutura de ativos têm um impacto positivo sobre a estrutura de capital das start-ups, enquanto que o crescimento tem uma relação negativa. Esses resultados são consistentes com a teoria do pecking order que refere os problemas de assimetria de informação e a teoria do trade-off que refere os problemas de agência. O nível de significância e o impacto das características dos fundadores, nomeadamente a experiência no setor, regional e empresarial, educação, idade e género na estrutura de capital inicial das start-ups varia muito, não fornecendo resultados consistentes.

Classificação JEL: G32, L26, M13.

Palavras-chave: Estrutura de Capital; Start-ups; Novas Empresas; Financiamento; Empreendedorismo.

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All errors remain our own. Views expressed are those of the author and do not necessarily reflect those of any branch or agency of the Government of Portugal.

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1. Introduction

Financial capital is one of the most important resources required by a start-up to initiate its activity and subsequently operate (Korosteleva and Mickiewicz, 2011). Funding is essential for planning and forecasting cash flows (Shinohara, 2003), especially for start-ups that struggle to survive with very low income in their first few years and are at the stage of introducing new products in the market (Ortqvist, Masli, Rahman and Selvarajah, 2006). Start-ups can raise a variety of instruments to finance their activities; the combination of these sources of funding is usually referred as capital structure (Myers, 2001).

Capital structure has been the object of many studies in the last 50 years. It first started with Modigliani and Miller's publications in 1958¹ and 1963² (Rajan and Zingales, 1995). Since then, several authors have conducted studies in order to identify potential determinants of the capital structure and develop theories on firm's leverage behavior (Eriotis, Vasiliou and Ventoura-Neokosmidi, 2007). However, most of previous studies focused on large and established firms, neglecting the field of entrepreneurial finance (Huyghebaert and Van de Gucht, 2007). Only recently, in the late 90s, these studies on capital structure were extended to start-ups and small firms.

The composition of the capital structure can be affected by internal and by external factors. Nevertheless, the impact of external variables on the capital structure is less studied (Duan, Chik and Liu, 2012). For start-ups, internal characteristics such as size,

¹ Modigliani and Miller (1958) proved that the choice between debt and equity financing has no material effects on the value of the firm or on the cost or availability of capital. They assumed perfect and capital frictionless markets, in which financial innovation.

² Modigliani and Miller (1963) introduced corporate tax into their previous model, and obtained a revised conclusion that the increase of debt level can increase the value of the firm.

growth perspectives and assets tangibility are the main determinants of the capital structure (Cassar, 2004; Ortqvist et al., 2006).

The ways in which an established firm obtains funding differs significantly from business start-ups (Fluck et al., 1998). Several aspects of start-ups funding are unique compared to larger and established firms (Ang, 1991; Cassar, 2004). In the early years of operation, they introduce new products with very little proven know-how (Ortqvist et al., 2006); they have no financial or operating history and hence no credible reputation; they also face a high failure risk (Cassar, 2004; Huyghebaert and Van de Gucht, 2007). Consequently, start-ups are a high risk investment to lenders (Ortqvist et al., 2006) creating a huge disadvantage to them when it comes to raising funding. Previous literature suggests that start-ups face high credit constraints (Robb and Robinson, 2010) so, initially they will derive their sources of funding mostly from insiders, such as owners' savings, business associates, loans from family and friends (Ortqvist et al., 2006); financing through external sources will arise later (Fluck, Holtz-Eakin and Rosen, 1998).

This empirical study aims to identify the typical start-ups initial capital structure. More specifically, identify the type of financing instruments new ventures use and its determinants. With such knowledge, this study will have important implications for both firms' founders and managers, who will be able to understand which funding strategies are available and which one suit best a specific start-up. Also, it will provide insights on alternative funding strategies. For policy makers, this study intends to provide new knowledge to define better policies and funding programs for start-ups.

We intend to demonstrate empirically the most relevant determinants of new ventures capital structure, and analyze if our empirical results corroborates existing empirical and theoretical literature on capital structure. For such purpose, we combine firm-level financial data, from the Simplified Corporate Information, with the matched employer-employee database, “Quadros de Pessoal”, between the years 2004 and 2009. This mach provided us detailed year-end financial information and a wide-ranging of start-up’s characteristics.

Most of the results confirm some of our hypothesis and are consistent with previous empirical studies. Size and asset tangibility are significant and positively related to the start-ups initial capital structure; and growth, contrary to our expectations, is a significant and negative related to the start-ups capital structure. We argue that this relation can be explain by the fact that start-up firms that are growing have more recourses (derived from sales growth) to finance themselves, consistent with the pecking order theory. We find that a 10-fold increase in the size of the firm corresponds to a 4.4 percent increase on the leverage of start-ups; a 10 percent increase in the assets tangibility corresponds to approximately 46 percent increase in leverage; and an additional increase in growth rate decreases the start-ups leverage ratio in 1.2 percent. Owner characteristics such industry experience, regional experience, entrepreneurial experience, education, age and gender provided limited or no explanatory power in explaining the capital structure of start-ups firms.

The remaining sections of this study are structured as follows. In the following section we present a detailed literature review on start-ups financing, theories of capital structure and empirical evidence on determinants of capital structure. Section 3 presents

the theory and hypothesis that will be tested. Section 4 introduces the data and presents some descriptive statistics for the variables. The methodological approach and results are described in section 5. And finally, in section 6, the concluding remarks follow.

2. Literature Review

Studies on capital structure attempt to explain the mix of securities and funding sources used by firms to finance their activities (Myers, 2001). The search for models of capital structure presents a great ground for research in finance (Kimura, 2006). Although theoretical and empirical research suggests that there is an optimal capital structure, previous approaches do not specify a methodology that financial managers can use in order to achieve an optimal debt level (Eriotis et al. 2007). In practice companies usually take moderate amounts of debt and, this amount varies according to the economic sector due to its specificities (Gomes, Baptista, Pinto and Lea, 2006).

In this section, we summarize the main theories and empirical work on the determinants of capital structure. We will start by analyzing the start-ups funding sources, then the theories of capital structure and how they are related to new ventures and finally we analyze the main empirical evidence on capital structure determinants.

2.1. Start-ups Financing and Its Importance

Generally, firms have two funding sources that they can use to develop and finance their activities: debt and/or equity³. Debt is capital that has been loaned by other parties and must be repaid (Coleman, 2008); its most commonly raised through short and long-term bank loans, leasing, bond loans and, sometimes, project finance (Mota, Barroso, Nunes and Ferreira, 2006; Soares, Moreira, Pinho and Couto, 2008). Equity is a permanent source of capital, which represents the investment made by owners or shareholders (Coleman, 2008); it can be obtained from current shareholders through share capital,

³ For detailed information about the main instruments of funding available to firms in general, see: Mota et al. (2006) and Soares et al. (2008).

capital increases and retained earnings (retention of profits generated by the firm to finance the business; also called self-financing) or through the private equity market, new investors, such as venture capitalists or angels investors (Mota et al., 2006 and Soares et al., 2008). There are also financing instruments that blend characteristics of both debt and equity, called hybrid instruments (Soares et al., 2008). The most common form of a hybrid instrument is the convertible bond but, there are also preferred shares without voting rights and subordinated debt.

The ways in which established firms obtain funding differ significantly from business start-ups (Fluck et al., 1998). New ventures have particular aspects that make their financing choices unique (Ang, 1991; Cassar 2004). In the early years of operation, they introduce new products with very little proven know-how (Ortqvist et al., 2006); they lack financial/operating history and credible reputation; and they face a high failure risk. Besides, their newness and scale make some financing options unavailable (Cassar, 2004; Huyghebaert and Van de Gucht, 2007).

Given these issues, the debt and equity categorization becomes blurred for start-ups and consequently previous studies proposed an alternative framework, the internal and external capital framework (Myers, 1984; Myers, 2001)⁴. Internal capital is the amount of capital provided by the founders in the form of debt or equity; for example it includes the capital⁵ and retained earnings (equity), or shareholder's loans (debt). External financing sources are obtained from other entities such as venture capitalists, private firms and angel investors (equity) or leasing entities and banks (debt).

⁴ See also Ang, 1991; Cassar, 2004; Fluck et al., 1998; Huyghebaert and Van de Gucht, 2007; Nofsinger and Wang, 2011.

⁵ Provided by entrepreneurs own savings and personal borrowings, friends and family and business associates.

The most common problem for start-ups is raising sufficient funding to enable them to launch and operate businesses successfully (Korosteleva and Mickiewicz, 2011). Being a high risk investment to lenders (Ortqvist et al., 2006), start-ups have more difficulties in raising financial capital compared to large established enterprises, a less variety of instruments and less access to external debt (Cassar, 2004; Huyghebaert and Van de Gucht, 2007). Therefore, start-ups have to depend heavily on internal funding or external equity. As the ventures grow, they have more financing source options (Ortqvist et al., 2006).

The typical start-up raises funding in different stages (Walker, 1989; Denis, 2004; Nofsinger and Wang, 2011). In the earliest stages, much of the capital is obtained from insiders through informal channels⁶, more specifically through the entrepreneurs' own funds and informal investors such as family members, acquaintances of the entrepreneur and business associates (Ang, 1991; Ortqvist et al., 2006). In fact, Fluck et al. (1998) find that internal funding is critical for new ventures in their early years of operation. After reaching a peak, the proportion of insider finance declines, and the fraction of external financing rises. However, internal capital is insufficient to finance start-ups operations thus, external funding is used to deal with additional financing needs. Firms usually rely on trade credit⁷ and bank credit as major sources of debt in earlier stages (Walker 1989; Fluck et al. 1998) and angel investors and venture capitalists as equity sources (Wong, 2002)⁸. Bhaird and Lucey (2006) also find that over time, new firms

⁶ Informal financial markets are credit channels not regulated or monitored by the banking authorities (Timberg and Ayiar, 1984).

⁷ Trade credit is the process of buying equipment and supplies on account (without paying cash), paying the supplier at a later date. Is an important source of finance for firms, especially when firms find it difficult to obtain external funding (Ferrando and Mulier, 2013).

⁸ Business Angel's typically invest when the start-up is less than one year old. While venture capitalists, due to the greater degree of uncertainty and the need for control, invest later (Wong, 2002).

rely increasingly on retained profits and short term debt financing for their investment needs.

There is a widely held view that start-ups face credit constraints⁹, and that the inability to access formal credit markets drives many firms to pursue financing from informal channels to finance their activity (Robb and Robinson, 2010). Berger and Udell (1998) argue that because small businesses are more likely to suffer from information asymmetry¹⁰ and agency problems¹¹, they are particularly constrained in their capacity to obtain external finance. And so, the firm will not be able to borrow enough capital at reasonable rates (Peterson and Rajan, 1994). To exceed the constraints in acquiring financial capital start-ups can use bootstrapping methods¹² as a reactionary measure (Ebben, 2009). In a more recent study, Robb and Robinson (2010) find empirical evidence against the financial constraints view; informal credit channels are not a major funding source for start-ups; newly founded firms depend heavily on external debt financing. The reliance on formal credit channels over personal credit cards and informal lending holds true even for the smallest firms at the earliest stages of founding. Owner-backed bank loans and business credit cards are the primary source of financing during a firm's first year, although informal investors are still playing an important role.

⁹ The lack of financial resources limits a firm performance and growth (Cassar, 2004; Ebben, 2009) and firms with low or negative growth rates are more likely to fail (La Rocca et al., 2010).

¹⁰ Information asymmetry is when one party (firm managers/founders) has more or better information about the firm than the other (capital providers); it can lead to adverse selection and moral hazard problems. Adverse selection occurs when, because of the information asymmetry, investors choose bad firms to invest over good ones. Moral hazard problems happen when the firms' managers, knowing the potential costs or burdens, choose riskier investments because the costs that could incur will not be supported them, but by the investors that provided capital. See, Peterson and Rajan (1994).

¹¹ Agency problems arise when the agents (managers and/or equity-holders) who are supposed to make decisions that would best serve the principals (debt-holders) are motivated by self-interest, and the agents own best interests may differ from the principals' best interests.

¹² For detailed information about bootstrap financing in small firms, see Ebben (2009). Bootstrapping are methods for obtaining resources that collectively reduce the need for outside financing. Some of the most common methods are factoring, trade credit, joint-utilization of resources with other firms, delaying payments, owner-provided funding.

Two of the most important sources of outside equity are angel investors and venture capitalists (Wong, 2002). Angel investors are professional investors who have large individual wealth and specialize in investing profitable and risky start-ups in their initial phase (Wong, 2002). Venture capitalists play a similar but more active role than angels in the companies in which they invest, providing mentoring, strategic advice, marketing and human resources assistance (Denis, 2004), coaching them through the early part of their lives (Davila, Foster and Gupta, 2003)¹³. Sometimes the firm's owners offer some resistance to angels and venture capitalists on early stages. Bhaird and Lucey (2006) find that almost three quarters of the small business founders wish to retain the majority of the business shareholding. Entrepreneurs tend to highly value the private benefits of control that are the prestige and ownership status (Huyghebaert and Van de Gucht, 2007)¹⁴. But, without significant assets or profits to use as collateral to loans they have to seek capital from private equity markets (Cosh, Cumming and Hughes, 2009).

2.2. Theories of the Capital Structure

Several theories attempt to explain the financing decisions of firms. Each one emphasizes certain costs and benefits of alternative financing strategies (Myers, 2001). Firms with an appropriate combination of the financing sources can set a minimum value for the total cost of capital¹⁵ (Harris and Raviv, 1991).

¹³ Venture capitalists sometimes use staged capital infusions as a mechanism to control agency costs and information asymmetry issues (Ang, 1991; Wong 2002).

¹⁴ When they have to turn to external sources of financing, their preference is for debt rather than equity, because debt does not require them to give up ownership or control of the firm, especially if they are confident about the prospects of their firm (Coleman, 2008).

¹⁵ In finance, the cost of capital is defined as the rate of interest of the firm's financial instruments, both debt and equity (Soares et al., 2008). The shareholder's (capital providers) require a rate of return so that they can provide their funds to the firm. See Arditti (1973) and Modigliani and Miller (1958).

Although most of the capital structure theories target established firms, some of them are applied to start-ups. The theories that can be applied to start-ups are: the life cycle, pecking order and the trade-off theories. There are other theories that have been studied, regarding established firms, such as the market timing theory¹⁶, product/input market interactions¹⁷ and corporate control considerations¹⁸.

2.2.1. The Life Cycle Theory

The life cycle theory holds that firms go through different stages during their life cycle and that for each stage different capital requirement is needed (Timmons, 1994). Firms are viewed through a financial growth cycle paradigm in which different capital structures are optimal at different points in their life cycle (Berger and Udell, 1998). Walker (1989) provide empirical support, firms change their capital structure at every stage of their development.

Over time, as the business develops and expand, start-ups need additional capital infusions (Nofsinger and Wang, 2011). As they grow, they will gain access to intermediated finance on equity (such as angel investors or venture capital) and debt (banks and finance companies) and eventually they may gain access to public equity and debt markets (Berger and Udell, 1998). Fluck et al. (1998) observed that for start-ups, during the early stages of the life cycle, the proportion of financing from insiders

¹⁶ Practice of issuing shares at high prices and repurchasing at low prices. The intention is to exploit temporary fluctuations in the cost of equity relative to the cost of other forms of capital (Baker and Wurger, 2002).

¹⁷ Models involving product or input characteristics have focused on the effect of capital structure on the future availability of products, parts and service, product quality, and the bargaining game between management and input suppliers. Firms that produce products that are unique or require service and/or parts and firms for which a reputation for producing high quality products is important may be expected to have less debt (Harris and Raviv, 1991).

¹⁸ This theory is related to takeover contests. This theory includes short-term changes in capital structure taken in response to imminent takeover threats. Takeover targets will increase their debt levels on average, and this will be accompanied by a positive stock price reaction (Harris and Raviv, 1991).

rises, while the proportion from external financing decreases. After reaching a peak, as the firm grows, these patterns reverse.

2.2.2. The Pecking Order Theory

The pecking order theory (Myers, 1984; Myers and Majluf, 1984) rests on the principle that firms' capital structure is defined to diminish inefficiencies caused by information asymmetry. Insiders have information about the firm that outsiders do not necessarily have so, the greater the exposure to the risk associated with the information asymmetries the higher is the return demanded by each financing source (Wittenberg-Moerman, 2009). The information asymmetry between the lenders and the managers explains why financing sources should be hierarchized; Firms first finance their investments internally (retained earnings/self-financing), if external funding is required, the preference goes to borrowing (rely on emissions of short-term debt over long-term debt) rather than issuing equity (Harris and haviv, 1991). Equity is a more expensive instrument of financing than debt (Mota et al., 2006).

Several studies conclude that the pecking order theory is also applicable to start-ups¹⁹. Given their limited historical/operating data, start-ups have high levels of information asymmetry (Cassar, 2004; Huyghebaert and Van de Gucht, 2007) creating difficulties in obtaining external finance. To reduce the information asymmetry, investors evaluate the quality of the business proposal and the ability of the entrepreneur (Nofsinger and Wang, 2011). Banks can reduce their exposure to information asymmetry by financing a smaller portion of debt and limiting loan size (Huyghebaert and Gucht, 2007). Venture capitalists also can overcome their information asymmetry by scrutinizing intensively

¹⁹ See Berger and Udell (1998); Lucey and Bhaird (2006); Coleman (2008); Cosh et al. (2009); Robb and Robinson (2010); Nofsinger and Wang (2011).

before providing capital and monitoring afterwards by using staged capital infusions²⁰ (Gompers and Lerner, 2001).

2.2.3. The Trade-off Theory

According to the trade-off theory (Jensen and Meckling, 1976; DeAngelo and Masulis, 1980), the optimal capital structure is defined by balancing the costs (agency and bankruptcy costs) with the benefits of having debt. Bankruptcy and agency costs increase the cost of debt while, tax regimes provide an incentive for debt use due to the tax deductibility of the interests (Oliveira, Tabak, Resende and Cajueiro, 2012).

Agency costs are caused by agency problems (Myers, 1977). Consequently debt holders incorporate costly monitoring devices or contractual covenants into debt agreements to restrict and monitor firms' behavior (Cassar, 2004). All these contracting mechanisms effectively increase the cost of capital offered to the firm. Bankruptcy costs are the costs incurred by the firm when the perceived probability that the firm will default is greater than zero (Cassar, 2004). The higher probability of bankruptcy, higher is the cost of financing.

Huyghebaert and Van de Gucht (2007) argues that since failure risk tends to be higher for start-ups the trade-off theory is applicable to them; On the other hand, ownership is highly concentrated in the hands of the entrepreneurs so agency costs of equity are trivial, making this theory not too important for start-ups. Cassar (2004) find evidence that the determinants of capital structure in start-ups is consistent with this theory; suggesting banks rely upon the contracting mechanisms (fixed assets of the firm) in their financing of start-up firms to minimize such costs.

²⁰ Meting out financing over discrete stages over time.

2.3. Determinants of Capital Structure: Empirical evidence

Another stream of research evaluates which factors are related to the firm's capital structure. In this section, we review the main research on capital structure determinants.

Table 1 presents a summary of the capital structure's determinants.

The most common tested variables are size, asset tangibility, growth, profitability, industry sector and firm age. Owner characteristics also, have been extensively studied in the case of start-ups and small business; once these types of firms have highly concentrated ownership (Huyghebaert and Van de Gucht, 2007). Nevertheless, other factors such as non-debt tax shields, business risk, credit history, uniqueness, volatility of earnings, economic conditions have been studied to determine their influence on debt and equity choice.

Size is one of the most common tested variables. Normally measured by sales or total assets this factor shows positive relation with leverage and long-term leverage either for established, small and medium or start-ups firms²¹. The larger the company the greater is level of indebtedness, Chen, Lensink and Sterken (1998) argues that this relation can be explained by the fact that information asymmetries is less severe for larger firms than for smaller firms. Smaller firms may find it relatively more costly to resolve informational asymmetries with lenders and financiers, leading them to being offered less capital or offered capital at higher rates, discouraging the use of outside financing (Cassar, 2004). Also, relatively large firms tend to be more diversified and less prone to bankruptcy, causing them to have more access to funding, suggesting that large firms should be more highly leveraged (Titman and Wessels, 1988). Regarding the short-term

²¹ See Ferri and Jones, 1979; Chen et al., 1998; Cassar 2004; Ortqvist et al. 2006; Coleman 2008.

debt there is evidence of a negative relation (Titman and Wessels, 1988; Michaelas, Chittenden and Poutziouris, 1999), suggesting that smaller firms tend to use more short-term debt. Michaelas et al. (1999) argue that smaller firms face high transactions costs when they issue long-term debt, and as a result they have to rely more heavily on short term finance.

The type of assets, its tangibility, also affects the financing options of a firm (Titman and Wessels, 1988). Asset tangibility is a very important issue for obtaining funding; assets can be used as collateral for debt finance because it helps to alleviate the problem of asymmetric information (Coleman, 2008, Cosh et al., 2009; Bhaird and Lucey, 2006); specially for start-ups, that suffer from larger asymmetric problems (Cassar, 2004). Therefore, firms with higher liquidation value, e.g., those with higher tangible assets have easier access to finance (Harris and Raviv, 1991); firm's tangible assets are the most widely accepted sources of bank borrowing or for raising secured debt (Chen et al., 1998). Consistent with these theoretical arguments, the empirical evidence suggests a positive relationship between asset structure and leverage²², especially on long term debts.

Growth has been studied in different ways²³. Some studies analyze growth opportunities while others study the past growth. Either way, the empirical evidence investigating growth and financing linkages is inconclusive. This determinant has shown, in some cases, a positive impact on the corporation's financial leverage but its significance is still unclear. For start-ups, both Cassar (2004) and Ortqvist et al. (2006) find mixed empirical evidences. But, Cassar (2004) argues that credit institutions wishes to

²² See Chen et al., 1998; Michaelas et al., 1999; Cassar, 2004; Ortqvist et al. 2006; Coleman, 2008.

²³ See Chen et al., 1998; Michaelas et al., 1999; Jorge and Armanda, 200; Cassar and Holmes, 2003; Cassar, 2004.

establish credit relationships as early as possible with start-ups firms that are more likely to grow. Additionally, Titman and Wessels (1988) considers that growth opportunities are capital assets that, although it cannot be collateralized they add value to the firm increasing the debt capacity.

Several authors have appealed to the pecking order theory, where the retained profits are firstly used to finance the business (self-financing), to justify a negative relationship between profitability and leverage²⁴; firms with a high profit rate, *ceteris paribus*, maintain a relatively lower debt ratio because of the ability to finance themselves from internally generated funds (Michaelas et al., 1999; Barbosa and Moraes, 2003; Coleman, 2008). Thus, the most profitable a firm is the less debt it has. Ortqvist et al. (2006) consider that these arguments can also be applied to start-up firms.

Several authors include industry dummies²⁵ to proxy for business risk. Firms in the same industry generally have similar financial structures because of their similar characteristics, such as regulation, technology, liquidity requirements, type of collateral intrinsic in assets, profitability and growth rates (Barbosa and Moraes, 2004; Gomes et al, 2006). Most of the empirical evidence has shown that although the industry sector is linked to a firm's leverage, it's not a significant variable.

Firm age negatively affects the amount of debt in the capital structure²⁶. Coleman (2008) justifies this relation by arguing that younger firms that are still growing have a greater demand for capital than more mature firms. Petersen and Rajan (1994) considers

²⁴ See Chen et al., 1998; Michaelas et al., 1999; Cassar and Holmes, 2003; Barbosa and Moraes, 2004.

²⁵ See Ferri and Jones, 1979; Titman and Wessels, 1988; Jorge and Armanda, 2001; Barbosa and Moraes, 2004.

²⁶ See Michaelas et al., 1999; Barbosa and Moraes, 2004; Coleman, 2008.

that older firms can finance through retained earnings while younger firms are externally financed.

More recently, studies on small business and new ventures has focused on the entrepreneur's characteristics²⁷. Small and start-ups firms have highly concentrated ownership (Huyghebaert and Van de Gucht, 2007) and major decisions regarding the firms financing strategies are made through the owners, so firm owners' characteristics may provide some additional predictive power in explaining significant effects on financing decisions (Cassar, 2004). The most common variables tested are entrepreneur's risk tolerance, wealth, credit history, experience, education and gender. These variables do not have much significance as determinants of capital structure.

Not all studies obtain the same result, because of the differences on time and spatial horizon, economic environment, tax and accounting system, type of firm/business, market and methodology²⁸.

²⁷ See Barbosa and Moraes, 2004; Cassar, 2004; Coleman 2008.

²⁸ Regarding the methodology, most studies have used a linear approach. Column (3) of Table 1 shows the methodological approach used in each study.

3. Theory and Hypothesis

The capital structure of a firm is determined by various external and internal factors (Duan et al., 2012). External factors are the macroeconomics conditions of a country, such gross domestic product, interest rates level, lending policy, taxation policy, inflation, capital market conditions. These factors cannot be influenced by the manager; instead the manager has to adjust the proportion of debt and equity according to the macroeconomic context. Internal factors includes individual firm's characteristics that can be industry specific, for example, the seasonality of sales, business risk, or internal characteristics, such as: size, asset composition, profitability, age, management style/attitude. This section presents how some individual firm characteristics can affect the initial capital structure of start-ups.

Financial capital is an indispensable resource required by new ventures to initiate their business and finance their activities. As firms that have entered the market recently and with no operation history they can be constrained in their capacity to obtain capital from external sources. Large established firms have more access to financial instruments than start-ups because asymmetric information's issues and agency problems are less severe for them (Berger and Udell, 1998). The more information investors/lenders have about the firm, more and less costly capital they will offer. In fact, Robb and Robinson (2010) find empirical evidence that start-ups with lower asymmetric information problems enjoy more ready access to external capital sources, in particular, external credit funding. Another issue is the mortality rate; empirical evidence suggests that large businesses tend to fail less often than small businesses, if discontinuance of

management is used as definition of failure (Watson and Everett, 1996)²⁹. In fact, according to Van de Ven, Hudson and Schroeder (1984) the life expectancy of new organizations is very short, 54 percent of all new businesses survive one and a half year and one quarter survives 6 years, causing even more reluctance to invest in small firms.

Hypothesis 1: The size of start-up is likely to affect the initial capital structure.

Capital providers can overcome some of asymmetry problems by, along with other contracting mechanisms (as stage capital infusions or financing smaller portion of debt), demand assets to use as collateral. Lenders might require firm borrowers to commit their assets to secure for loans. So, firms with little tangible assets to use as collateral will find more difficulties in raising capital, once the greater liquidation value of the asset the easier is the access to finance (Harris and Haviv, 1991). Start-ups do not offer other options as examining current and future profitability and the use of relationship financing for financiers to reduce financial risk through, so asset structure should be a significant effect on firm financing in the early stages of the business (Cassar, 2004).

Hypothesis 2: Start-up asset tangibility is likely to affect the initial capital structure.

Investing on growing business can be seen as a faster way to recover investment. Additionally, if the firm is growing is because is less prone to fail, making the investors and lenders to perceive investing on growing start-ups as an attractive investment, causing the firm to gain more access to external funding sources (Ortqvist et al., 2006). Also, a higher growth rate implies a higher demand for funds and, consequently a

²⁹ Conversely, Watson and Everett (1996) find evidence that the failure rate is higher for large businesses when bankruptcy is used as the definition and, for all definitions of failure, as businesses progress from their first five years of life to their second five years of life and beyond.

greater need for capital in the future. And, if the firm is more likely to need capital in the future, credit institutions want to establish credit relationships as early as possible with start-ups that are more likely to grow. By establishing these relationships as early as possible, there is greater potential benefit for the firm both in terms of access and cost of future outside financing (Cassar, 2004).

Hypothesis 3: Future start-up's growth is positively related to initial capital structure.

Human capital³⁰ attributes such education, experience, knowledge, and skills have been argued to be a critical resource for success in entrepreneurial firms (Becker, 1962). The human capital increases owners' capabilities of discovering and exploiting business opportunities, helps owners to acquire resources such as financial and physical capital (Unger, Rauch, Frese and Rosenbusch, 2011). Earlier we stated that ownership is highly concentrated in start-ups and the major decisions regarding the firms financing strategies are made through the owners, providing them with great power over the firm, making the human capital an important issue for financing in start-up firms. In fact, Zacharakis and Meyer (2000) stated that firm investors such venture capitalists, frequently use management skills and experience as selection criteria for financing new ventures. To reduce the information asymmetry, investors evaluate not only the quality of the business proposal but also the ability of the entrepreneur (Nofsinger and Wang, 2011). Also, several studies tie human capital variables with external financial capital (Barbosa and Moraes, 2004).

³⁰ Skills and knowledge that individuals acquire through investments in schooling, on-the-job training, and other types of experience (Unger et al., 2011).

Hypothesis 4: Owners experience, education, age and/or gender can significantly influence the initial capital structure and financing of start-ups firms.

4. Data and Descriptive Statistics

4.1 Data

The data for our empirical analysis resulted from the combination of the matched employer-employee database (QP - “Quadros de Pessoal”) with financial data, from the Simplified Corporate Information (SCIE).

QP is mandatory survey submitted annually to the Portuguese Ministry of Employment and Social Security; it includes information on virtually every Portuguese private firm since the year of 1986, covering information on more than 220,000 firms and 2,000,000 individuals per year. As individuals and firms are matched by a unique identifier, the database makes possible to match venture with their respective founders. At a firm level the database contains information: year of creation, location, size and industry. For the founders, the following data is available: gender, age and education. This data allow us to trace the founder’s entire career history.

The previous database lacks financial information; therefore we merge it with the SCIE. This latter database collects year-end accounting information from 2004 to 2009 on private firms and self-employed individuals in Portugal, allowing us to gather comprehensive information not only on firms’ initial capital structure but also other financial characteristics of the start-ups. The SCIE is also a mandatory survey that results from institutional assistance among the Portuguese Ministry of Justice, Ministry of Finance and Public Administration, National Institute of Statistics (INE) and Portuguese Central Bank. The match combination between SCIE and QP was provided by the INE.

4.2. Sample

The initial sample for this study is obtained from the QP. We start by selecting all start-ups established between 2004 and 2009 and their founders. Then, we restrict our sample to founders with age between 20 and 60 and, finally exclude the firms for which we could not identify at least one founder or its background history. Next we merge the sample from the QP with the SCIE data and removed all firms we could not find the entire financial data for this study. We end up with a sample of 33,730 new firms founded by 48,762 entrepreneurs for the period between 2004 and 2009.

4.3. Descriptive Statistics

The descriptive statistics of our sample are provided in **Table 2**.

The start-ups in our data are, naturally, very small firms. They employ about four employees and are founded usually by only one entrepreneur. The average financial capital³¹ is € 65,649.62.

We find that, on average, 74 percent of the new ventures financing comes from internal sources, confirming the importance of insider financing on the start-ups first operation year, as stated for Fluck et al. (1998). On the other hand, the remaining 26 percent are from external sources. Leasing seems to be an important source of finance, representing, on average, 13 percent of the financial capital. Bank loans represents on average 12 percent of the financial capital being that 8.5 percent are from short-term loans and only 3.5 percent from long-term loans, evidencing the difficulty that start-ups have in achieving long-term financing.

³¹ Financial Capital is defined as the amount of internal and external capital that a startup was able to raise.

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The founders are on average 35 years old (most of the founders, about 40 percent, are between 30 and 39 years old, 29 percent of the founders are between 20 and 29 years old, 22 percent are between 40 and 49 years old and the remaining 9 percent are between 50 and 60 years old), of which 67 percent are men and 33 percent women. Regarding the nationality, 90 percent of the firm founders have Portuguese nationality and 10 percent are foreign. About 76 percent of the founders are not graduated, being that, 11 percent are very low educated, 36 percent are low educated and 29 percent are medium educated. For the remaining 24 percent that are educated, 24 percent are from the business and administration area, 20 percent are from engineering and 12 percent are from healthcare. Finally, regarding previous working experience, 27 percent have previous working experience in the same industry, 45 percent have previous regional experience and 68 percent of founders have some sort of previous entrepreneurial experience.

5. Empirical Methodology and Results

In this section, we evaluate the main determinants of the start-ups initial financing structure.

We test the theoretical relation between the capital structure and characteristics of the firm using the following regression:

$$Y_{jyi} = \alpha_i + \theta_y + \beta_1 Z_j + \beta_2 X_j + \varepsilon_{jyi}$$

where j refers to a start-up firm, y refers to entry year and i for industry.

We analyze five different dependent variables, Y , to test our hypothesis: Debt-to-Financial Capital ratio (Leverage), External Capital-to-Financial Capital ratio, Long-term Bank Loans-to-Financial Capital ratio, Short-term Bank loans-to-Financial Capital ratio and Leasing-to-Financial Capital ratio. Leverage is our main dependent variable. **Table 3** provides a description of all the variables used as the dependent variables. Although some previous studies have been able to use the market price and book values to measure the variables, data limitation confines us to measure these ratios only in book values.

Our variables of interest, independent variables, include the characteristics of the new firms and the founder's human capital. The vector Z_j includes start-ups characteristics, namely size (logarithm number of the initial number of employees), tangibility of assets (non-current assets of the firm divided by the total assets of the firm) and future growth (difference between logarithm of sales in year two and logarithm of current sales). **Table 4** presents the statistics of the start-ups characteristics; X_j is a vector of owner characteristics, including industry experience (dummy variable, equals to one if the

founder has previous working experience in the same industry and zero otherwise), regional experience (dummy variable, equals to one if the founder has previously worked in the same municipality and zero otherwise), entrepreneurial experience (dummy variable, equals to one if the founder has previous experience in founding new ventures and zero otherwise), education (dummy variable, equals to one if the founder is graduated), gender (dummy variable, equals one for women and zero for man) and a categorical age variable (*Age20-29* coded one for founders with age between 20 and 29; *Age30-39* coded one for founders with age between 30 and 39; *Age40-49* coded one for individuals with age between 40 and 49 and; *Age50-60* coded one for individuals with age between 50 and 60). **Table 5** presents the statistics for the owners' characteristics. We control for industry (two-digit industry code) and year time effects by including a set of dummies.

Consistent with previous literature (see **Table 1**, 3rd column), the method of estimation used is that of OLS (Ordinary Least Squares). We also conducted a Tobit analysis by setting the lower limit of observed values in zero. Additionally, all the estimates do not include growth as independent variable, as this information is not available for all start-ups of the sample. On the regressions that include growth as independent variable, the sample reduces to 15,634 observations.

Finally, taking into account the hypotheses formulated earlier we expect a positive impact from size, asset tangibility and growth on the capital structure measures.

5.1. Leverage

The results of the OLS and Tobit analyses for the impact of start-ups characteristics on leverage are presented in **Table 6**.

Most of the independent variables are significant for the start-ups leverage. The OLS estimates emphasize the positive impact of size, a 10-fold increase in the size of the firm, *ceteris paribus*, corresponds approximately to a 4.4 percent increase on the leverage of the sample. Assets tangibility also have a positive impact on leverage, a 10 percent increase in the assets tangibility, *ceteris paribus*, corresponds approximately to a 46 percent increase in leverage. Owners experiences are significant variables, if the founders have previous industry, regional or entrepreneurial experience, *ceteris paribus*, the firms leverage ratio decrease 1.7 percent, increase 1 and 4.9 percent, respectively. Founders aged between 30 and 39 years affects positively, in 1.1 percent the start-ups leverage, at 5 percent significance. Education and gender of the founders does not appear to have influence on the start-ups leverage.

By including the variable growth on the OLS regression, most of the previous tested variables maintained a similar impact on leverage. But, growth, contrary to our expectations appears to have a negative influence on leverage; an additional increase in growth rate, *ceteris paribus*, decreases the start-ups leverage ratio in approximately 1.2 percent.

The Tobit estimates confirms the results obtained on the OLS regressions: size, assets tangibility, regional and entrepreneurial experience has positive impact on leverage; growth and industry experience has negative impact on leverage.

5.2. External Capital

The impact of the start-ups characteristics on external capital are presented in **Table 7**.

From the OLS regression we find that a 10-fold increase in the size of the firm, *ceteris paribus*, corresponds approximately to a 5.9 percent increase on the external capital ratio and a 10 percent increase in the assets tangibility, *ceteris paribus*, corresponds to a 32.6 percent increase on the external capital ratio. Also, if the founders have previous regional or entrepreneurial experience, *ceteris paribus*, the firms' external capital ratio increases in 1.1 or 2.6 percent, respectively. If the founders are aged between 50 and 60 years old or if they are women, *ceteris paribus*, the external capital ratio decreases 2.4 or 1.2 percent respectively.

By including the independent variable growth on the regression we find that an additional increase in growth rate, *ceteris paribus*, decreases the start-ups external capital ratio in 2 percent. Size and assets tangibility maintained a similar impact; regional and entrepreneurial experience also kept a similar impact but at different significance levels and gender is no longer a significant variable.

The Tobit estimates without the variable growth confirm the OLS results; by including the variable growth the Tobit estimates did not report any significant variable.

5.3. Long-term Bank Loans

Table 8 reports the impact of the start-ups characteristics on long-term bank loans.

Size and assets tangibility appears to be the most important variables to the long term bank loans. A 10-fold increase in the size of the firm, *ceteris paribus*, corresponds to a 0.9 percent increase on the external capital ratio and a 10 percent increase in the assets tangibility, *ceteris paribus*, corresponds to a 4 percent increase on the external capital ratio. Regional experience is significant variables at 5 percent significance. Education

and age category between 50 and 60 years old are significant variables at 1 percent significance. The start-ups founders that are graduated, *ceteris paribus*, increase 0.9 percent the long-term loans ratio; and founders aged between 50 and 60 years old, *ceteris paribus*, have more difficulties in raising long-term loans, the ratio decreases 0.7 percent.

By adding growth in to the estimates, we find that it is not significant for long-term loans.

The Tobit estimates without the variable growth confirm the OLS results; also highlights entrepreneurial experience as a significant variable with a positive impact and *Age 40-49* as a significant variable with a negative impact. By including the variable growth the Tobit estimates did not report any significant variable.

5.4. Short-term Bank Loans

Table 9 reports the impact of the start-ups characteristics on short-term bank loans.

Similar to previous results, size and assets tangibility are still the most important variables. A 10-fold increase in the size of the firm, *ceteris paribus*, corresponds to a 1.9 percent increase on the short-term loans ratio and a 10 percent increase in the assets tangibility, *ceteris paribus*, corresponds to a 2.1 percent increase on the short-term loans ratio. Regional and entrepreneurial experience has a positive impact on the short-term loans ratio with a 0.5 percent and 1.8 percent impact, respectively. The start-ups founders that are aged between 50 and 60 years, *ceteris paribus*, decrease the short-term loans ratio in 1.1 percent.

By adding growth on OLS estimates, we find that this variable is significant with a negative impact, 0.7 percent, on short-term loans ratio. Industry experience and education now appears to significant at 1percent and 10 percent significance, respectively.

The Tobit estimates without the variable growth confirm the OLS impacts of the variables on short-term loans. By including the variable growth the Tobit estimates did not report any significant variable.

5.5. Leasing

Finally, **Table 10** reports the impact of the start-ups characteristics on the leasing ratio.

The OLS estimates presents a positive impact of size, a 10-fold increase in the size of the firm, *ceteris paribus*, corresponds to a 3 percent increase on the leasing ratio of the sample. Assets tangibility also have a positive impact on leasing, a 10 percent increase in the assets tangibility, *ceteris paribus*, corresponds approximately to a 25.6 percent increase on the ratio. Regarding the owners experience, if the founders have previous industry experience, *ceteris paribus*, the start-ups leasing ratio increase 0.6 percent. Education has an important impact on leasing, decreasing the ratio in 1.4 percent if the founders are graduated. And, if the founders are women, *ceteris paribus*, the leasing ratio decreases 1.1 percent.

By including the variable growth on the OLS regression, most of the variables already tested maintained a similar impact on leasing ratio. Growth appears to have a negative influence on leasing; an additional increase in growth rate, *ceteris paribus*, decreases the start-ups leasing ratio in 1.1 percent.

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The Tobit estimates without the variable growth confirm the OLS impacts of the variables on leasing. Additionally, regional and entrepreneurial experience and age category 30 to 39 years are significant variable with a positive impact. By including the variable growth the Tobit estimates did not report any significant variable.

6. Conclusion

To gain insights on how start-ups obtain funding, we conducted an empirical analysis to examine what are the determinants of their capital structure. The sample of our study was obtained from firm-level financial data combined with the matched employer-employee database. After choosing proxies for each variable, multiple regression analysis was developed to observe their coefficients and significances.

Size is one of the most important determinants for start-ups capital structure, with a positive impact, as expected, on the dependent variables; the larger the start-up, the greater the proportion of debt, external capital, long and short-term loans and leasing. Cassar (2004) argues that this relation highlights the importance that scale and market access have upon the capital structure of start-ups.

Assets tangibility is also an important variable. The results are consistent with theoretical arguments, confirming our hypothesis. Firms with lack of tangible assets appear to have less leverage, are less financed through external capital and leasing. This relationship also holds for bank financing especially for long-term bank loans, confirming the theory that loaners use assets as collateral to debt. Consequently, these results are consistent with the pecking order theory and trade-off theory regarding the asymmetric information and agency issues.

Growth is the only independent variable who did not behave according to our expectations. Although, previously we stated that the empirical evidence investigating growth and financing linkages is inconclusive. So, we recommend further studies about the impact of growth on start-ups capital structure, using different measures of past and future growth rates. We argue that the negative relation, observed in our study, between

growth and the capital structure measures can be explain by the fact that start-up firms that are growing have more recourses (derived from sales growth) to finance themselves. This argument is also consistent with the pecking order theory, where the retained profits are firstly used to finance the business (self-financing).

Owners characteristics such industry experience, regional experience, entrepreneurial experience, education, age and gender also appear, in some cases, to be relevant for start-ups financing structure. However, the level of significance and impact of these variables varies widely, not providing consistent results. We recommend further studies on the founders characteristics for the start-ups financing structure.

In a general manner, comparing our results to the relevant literature on determinants of start-ups capital structure, ours results shows up consistent with the existing empirical research³².

External factors such the macroeconomics conditions or the legal framework were not considered, constituting a limitation in this study. Also, data limitation confines us to measure our variables ratios only in book values.

Despite the limitations, this study can provide to the founders, firm managers and policy makers practical guidelines. Firms that are looking to raise capital can anticipate what the requirements to gain access to more capital are. Policy makers can summarize the determinants of capital structure and financing to define better policies and funding programs for start-ups.

³² See. Fluck el al., 1998, Cassar, 2004; Ortqvist et al., 2006; Robb and Robinson, 2010.

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Table 1: Empirical evidence: Determinants of Capital Structure

Author	Data	Methodology	Size	Firm Type	Dependent Variable	Independent Variable
Ferri and Jones (1979)	Compustat Data Types (1969-1971; 1971-1976)	Howard-Harris Clustering Approach	233	Established Firms	Total Debt/Total Assets at Book Value	Industry (+ but N.S.) Size (M.C.) Business Risk (N.S.) Operating Leverage (-)
Titman and Wessels (1988)	Annual Compustat Industrial Files/US. Department of Labor, Bureau of Labor Statistics, "Employment and Earnings" publication (1974-1982)	LISREL Methodology	469	Established Firms	Long-Term Debt/Market Value of Equity Long-Term Debt/Book Value of Equity Short-Term Debt/Market Value of Equity Short-Term Debt/Book Value of Equity Convertible Debt/Market Value of Equity Convertible Debt/Book Value of Equity	Uniqueness (-) Size (+; - S.T.) Profitability (- M.V.E.) Non-Debt Tax Shields (N.S.) Volatility of Earnings (N.S.) Asset Structure (N.S.) Future Growth (N.S.) Industry Classification (N.S.)
Chen, Lensink and Sterken (1998)	Annual Financial report of listed Dutch firm; Jaarboek van Nederlandse ondernemingen dataset (1984-1995)	Least-Squares Method	51	Established Firms	Total Debt/Equity Book Value Total Debt/Equity Market Value	Asset Structure (+) Growth (+ but N.S.) Size (+) Earning Volatility (M.S.) Profitability (-)

Determinants of Start-ups Capital Structure

<p>Michaelas, Chittenden and Poutziouris (1999)</p>	<p>Lotus One-Source Database of U.K. small firms (1986-1995)</p>	<p>Panel Data Analysis; Least Squares Dummy Variable Regression</p>	<p>3500</p>	<p>SMEs</p>	<p>Total Debt/Total Assets Short-Term Debt/Total Assets Long-Term Debt/Total Assets</p>	<p>Age (-) Size (+; - S.T.) Profitability (-) Past Growth (+) Future Growth (+) Operating Risk (+) Asset Structure (+) Effective Tax Rate (N.S.) Net Debtors (+) Non-Debt Tax Shields (N.S. for T. and S.T.; - L.T.)</p>
<p>Jorge and Armanda (2001)</p>	<p>Exame - 500 Melhores e Maiores dataset (1990-1995)</p>	<p>Panel Data Analysis</p>	<p>93</p>	<p>Large Firms</p>	<p>Total Debt/Total Assets Medium and Long-Term Debt/Total Assets Short-Term Debt/Total Assets Total Debt/Total Equity</p>	<p>Industry Classification (N.S.) Size (N.S.) Growth (+) Business Risk (N.S.) Profitability (M.C.) Asset Structure (N.S.) Non-Debt Tax Shields (N.S.)</p>

Determinants of Start-ups Capital Structure

Cassar and Holmes (2003)	Business Longitudinal Survey developed by Australian Bureau of Statistics (1994-1995)	Multivariate Analysis	1555	SMEs	Total Debt/Total Assets Long-Term Debt/Total Assets Short-Term Debt/Total Assets Outside Financing Bank Financing	Size (+ T. and L.T.) Profitability (-) Growth (+) Risk (N.S.) Asset Structure (- T.and S.T.; + L.T.and B)
Cassar (2004)	Business Longitudinal Survey developed by Australian Bureau of Statistics (1996-1998)	Multivariate Analysis - Tobit, Logit and OLS models	292	Start-ups	Total Debt/Total Assets Long-Term Debt/Total Assets Outside Financing Bank Financing	Size (+) Asset Structure (- S.T.; + L.T.) Organization Type (N.S.) Growth Orientation (+ but N.S.) Owners' Characteristics (N.S.)
Barbosa and Moraes (2004)	Brazilian Trade Associations (1989-1992)	Multiple Regression - OLS Method	41	Small firms	Total Debt/Total Assets	Size (+) Growth (+) Operational Cycle (+) Business Risk (-) Asset Structure (-) Profitability (-) Inflation (-) Industry Classification (+) Age (- but N.S) Economic Conditions (+) Entrepreneur's Risk Tolerance (+)

Determinants of Start-ups Capital Structure

Ortqvist, Masli, Rahman and Selvarajah (2006)	Affarsdata Database - Awedish New Ventures (2000)*	Multivariate Analysis - Structural Equation Modeling	592	Start-ups	Short-Term Debt/Total Assets Long-Term Debt/Total Assets	Profitability (M.C. for S.T.; + L.T.) Asset Structure (- S.T.; + L.T.) Size (+ L.T.) Growth (+ S.T.; M.C. for L.T.)
Coleman (2008)	USA Survey of Small Business Finance Conducted by FED (2003)*	Linear Regression Models	4240	Small Firms	Total Debt/Total Assets External Debt Long-Term Debt	Profitability (-) Size (+) Age (-) Asset Structure (+) Organizational Status (+) Owner Wealth (N.S.) Credit History (+)

Note: (+) positive impact; (-) negative impact; (N.S.) Not Significant; (M.C.) Mixed Conclusions; (T./L.T./S.T./B) Total/Long-Term/Short-term/Bank Leverage; (M.V.E) Market Value of Equity; (*) year of data collection.

Table 2: Descriptive Statistics

	Mean	Mediam	Std. deviation
Financial Capital	65,649.62	20,000.00	524,555
Number of inicial employees	4.10	2.00	7.33
Number of founders	1.45	1.00	0.59
Internal Capital Ratio*			
	0.74	0.98	0.33
External Capital Ratio*			
	0.26	0.02	0.33
Bank Financing Ratio*			
Long-term Bank Ratio*	0.12	0.00	0.25
Short-term Bank Ratio*	0.035	0.00	0.14
Leasing Ratio*	0.085	0.00	0.21
	0.13	0.00	0.24
Age of the founders			
	35.56	34.00	9.03
Number of years of information on the founders			
	7.81	6.00	5.82
Number of observations			33,730.00

Note: (*) calculated relative to Financial Capital. Internal capital divided by the financial capital; External capital divided by the financial capital; Bank loans divided by the financial capital; Short-term bank loans divided by the financial capital; Long-term bank loans by the financial capital.

Table 3: Description of the dependent variables

	Description
Debt-to-Financial Capital ratio (Leverage)	Calculated as Debt/Financial Capital*. Debt is capital that has been loaned by other parties; it must be paid back at a later date, usually with interest. Debt includes short and long-term bank loans, bond loans, leasing, shareholders loans and other type of loans.
External Capital-to-Financial Capital ratio	Calculated as External Capital/Financial Capital*. External capital is the amount of capital provided from external sources, outsiders; it refers to bank loans, bond loans, leasing, trade credit and government subsidies for operational activity.
Long-term Bank Loans-to-Financial Capital ratio	Long-term bank loans/Financial Capital*. Long-term bank loans are loans from credit institutions with maturity over one year.
Short-term Bank loans-to-Financial Capital ratio	Calculated as Short-term bank loans/Financial Capital*. Short-term bank loans are loans from credit institutions with a maturity of one year or less.
Leasing-to-Financial Capital ratio	Calculated as Leasing/Financial Capital*. Leasing are contractual arrangements to pay a specified amount for the use of an asset. It includes both short and long-term leasing.

Note: (*) Financial Capital is defined as the amount debt and equity that a startup was able to raise from internal and/or external capital sources. Debt includes short and long-term bank loans, bond loans, leasing, shareholders loans and other type of loans. Equity includes share capital, share premiums, supplementary capital and retained earnings.

Table 4: Statistics - Start-ups characteristics

Variable	Obs	Mean	Std. Deviation	Min	Max
SIZE	33,730	0.97	0.82	0	5.78
TANG	33,730	0.33	0.29	-0.61	9.18
GROWTH	15,634	1.02	1.31	-7.09	9.59

Table 5: Statistics - Owners' characteristics

Experience			
	Frep.	Percent	Cum
Industry			
0	24,676	73.16	73.16
1	9,054	26.84	100.00
Total	33,730	100.00	
Regional			
0	18,391	54.52	54.52
1	15,339	45.48	100.00
Total	33,730	100.00	
Entrepreneurial			
0	10,845	32.15	32.15
1	22,885	67.85	100.00
Total	33,730	100.00	
Education			
	Frep.	Percent	Cum
0	25,497	75.59	75.59
1	8,233	24.41	100.00
Total	33,730	100.00	
Age			
	Frep.	Percent	Cum
Age 20-29			
0	23,856	70.73	70.73
1	9,874	29.27	100.00
Total	33,730	100.00	
Age 30-39			
0	20,194	59.87	59.87
1	13,536	40.13	100.00
Total	33,730	100.00	
Age 40-49			
0	26,526	78.64	78.64
1	7,204	21.36	100.00
Total	33,730	100.00	
Age 50-60			
0	30,614	90.76	90.76
1	3,116	9.24	100.00
Total	33,730	100.00	

Table 6: Impact of the Start-ups characteristics on Leverage

VARIABLES	OLS		TOBIT	
SIZE	0.044*** (0.002)	0.047*** (0.004)	0.059*** (0.003)	0.062*** (0.005)
TANG	0.460*** (0.017)	0.449*** (0.035)	0.605*** (0.009)	0.582*** (0.013)
GROWTH		-0.012*** (0.002)		-0.014*** (0.003)
Industry Exp.	-0.017*** (0.005)	-0.013** (0.007)	-0.022*** (0.006)	-0.018** (0.009)
Regional Exp.	0.010*** (0.004)	0.005 (0.006)	0.016*** (0.005)	0.010 (0.008)
Entrepreneurial Exp.	0.049*** (0.004)	0.035*** (0.006)	0.068*** (0.006)	0.051*** (0.008)
Education	-0.001 (0.005)	0.010 (0.007)	-0.000 (0.007)	0.014 (0.010)
Age 30-39	0.011** (0.004)	0.018*** (0.007)	0.012** (0.006)	0.023*** (0.009)
Age 40-49	0.009 (0.005)	0.012 (0.008)	0.008 (0.007)	0.014 (0.010)
Age 50-60	-0.008 (0.007)	-0.020* (0.010)	-0.015 (0.009)	-0.032** (0.014)
Gender	-0.004 (0.004)	-0.000 (0.006)	-0.004 (0.006)	0.003 (0.008)
Constant	0.210*** (0.025)	0.035 (0.087)	0.075*** (0.017)	-0.210 (0.343)
Observations	33,730	15,634	33,730	15,634
R-squared	0.180	0.181		
Pseudo R-squared			0.1193	0.1215
	Robust standard errors in parentheses		Standard errors in parentheses	

Note: The table evaluates several firms' characteristics (initial size, assets tangibility and growth) and founders characteristics (experience, age and gender) on start-ups leverage. All regressions include year time and industry control variables. Robust standard errors, for the OLS estimates, and standard errors, for the Tobit estimates, are in parentheses. ***Statistical significance at 1%, **significance at 5%, *significance at 10%.

Table 7: Impact of the Start-ups characteristics on External Capital

VARIABLES	OLS		TOBIT	
SIZE	0.059*** (0.002)	0.066*** (0.003)	0.113*** (0.004)	0.118 (0.000)
TANG	0.326*** (0.012)	0.333*** (0.025)	0.619*** (0.011)	0.584 (0.000)
GROWTH		-0.020*** (0.002)		-0.033 (0.000)
Industry Exp.	0.004 (0.004)	-0.001 (0.006)	0.007 (0.008)	-0.004 (0.000)
Regional Exp.	0.011*** (0.004)	0.011** (0.006)	0.024*** (0.007)	0.026 (0.000)
Entrepreneurial Exp.	0.026*** (0.004)	0.010* (0.006)	0.067*** (0.007)	0.032 (0.000)
Education	-0.003 (0.005)	0.006 (0.007)	-0.008 (0.008)	0.006 (0.000)
Age 30-39	0.004 (0.004)	0.009 (0.006)	0.010 (0.008)	0.016 (0.000)
Age 40-49	-0.006 (0.005)	-0.006 (0.007)	-0.012 (0.009)	-0.014 (0.000)
Age 50-60	-0.024*** (0.006)	-0.031*** (0.009)	-0.048*** (0.012)	-0.055 (0.000)
Gender	-0.012*** (0.004)	-0.008 (0.006)	-0.019*** (0.007)	-0.011 (0.000)
Constant	-0.120*** (0.022)	-0.067 (0.071)	-0.397*** (0.022)	-3.417 (0.000)
Observations	33,730	15,634	33,730	15,634
R-squared	0.120	0.121		
Pseudo R-squared			0.0901	0.0887
	Robust standard errors in parentheses		Standard errors in parentheses	

Note: The table evaluates several firms' characteristics (initial size, assets tangibility and growth) and founders characteristics (experience, age and gender) on start-ups external capital ratio. All regressions include year time and industry control variables. Robust standard errors, for the OLS estimates, and standard errors, for the Tobit estimates, are in parentheses. ***Statistical significance at 1%, **significance at 5%, *significance at 10%.

Table 8: Impact of the Start-ups characteristics on Long-term Loans

VARIABLES	OLS		TOBIT	
SIZE	0.009*** (0.001)	0.007*** (0.001)	0.110*** (0.011)	0.121 (0.000)
TANG	0.040*** (0.003)	0.042*** (0.005)	0.511*** (0.031)	0.537 (0.000)
GROWTH		-0.001 (0.001)		-0.024 (0.000)
Industry Exp.	0.001 (0.002)	0.003 (0.003)	0.017 (0.021)	0.028 (0.000)
Regional Exp.	0.004** (0.002)	0.002 (0.002)	0.045** (0.019)	0.033 (0.000)
Entrepreneurial Exp.	0.003 (0.002)	-0.001 (0.002)	0.137*** (0.020)	0.026 (0.000)
Education	0.009*** (0.002)	0.011*** (0.003)	0.043* (0.023)	0.130 (0.000)
Age 30-39	-0.001 (0.002)	0.001 (0.003)	-0.007 (0.021)	0.031 (0.000)
Age 40-49	-0.004 (0.002)	-0.004 (0.003)	-0.053** (0.025)	-0.054 (0.000)
Age 50-60	-0.007*** (0.003)	-0.007* (0.004)	-0.065* (0.033)	-0.048 (0.000)
Gender	0.001 (0.002)	0.000 (0.003)	0.009 (0.019)	0.012 (0.000)
Constant	0.005 (0.010)	0.028 (0.058)	-1.790*** (0.069)	-6.292 (0.000)
Observations	33,730	15,634	33,730	15,634
R-squared	0.016	0.020		
Pseudo R-squared			0.0487	0.0463
	Robust standard errors in parentheses		Standard errors in parentheses	

Note: The table evaluates several firms' characteristics (initial size, assets tangibility and growth) and founders characteristics (experience, age and gender) on start-ups long-term loans ratio. All regressions include year time and industry control variables. Robust standard errors, for the OLS estimates, and standard errors, for the Tobit estimates, are in parentheses. ***Statistical significance at 1%, **significance at 5%, *significance at 10%.

Table 9: Impact of the Start-ups characteristics on Short-term Loans

VARIABLES	OLS		TOBIT	
SIZE	0.019*** (0.001)	0.020*** (0.002)	0.085*** (0.005)	0.091 (0.000)
TANG	0.021*** (0.004)	0.011* (0.006)	0.196*** (0.015)	0.150 (0.000)
GROWTH		-0.007*** (0.001)		-0.027 (0.000)
Industry Exp.	-0.003 (0.003)	-0.013*** (0.004)	-0.012 (0.010)	-0.046 (0.000)
Regional Exp.	0.005** (0.002)	0.010*** (0.004)	0.024*** (0.009)	0.043 (0.000)
Entrepreneurial Exp.	0.018*** (0.003)	0.010*** (0.004)	0.108*** (0.009)	0.056 (0.000)
Education	0.004 (0.003)	0.008* (0.005)	-0.003 (0.011)	0.016 (0.000)
Age 30-39	-0.000 (0.003)	-0.001 (0.004)	-0.001 (0.010)	-0.003 (0.000)
Age 40-49	-0.003 (0.003)	-0.007 (0.005)	-0.013 (0.012)	-0.024 (0.000)
Age 50-60	-0.011*** (0.004)	-0.019*** (0.006)	-0.040*** (0.015)	-0.045 (0.000)
Gender	-0.001 (0.003)	0.003 (0.004)	-0.001 (0.009)	0.014 (0.000)
Constant	0.021 (0.014)	-0.069*** (0.014)	-0.702*** (0.029)	-3.675 (0.000)
Observations	33,730	15,634	33,730	15,634
R-squared	0.021	0.027		
Pseudo R-squared			0.0337	0.0348
	Robust standard errors in parentheses		Standard errors in parentheses	

Note: The table evaluates several firms' characteristics (initial size, assets tangibility and growth) and founders characteristics (experience, age and gender) on start-ups short-term loans ratio. All regressions include year time and industry control variables. Robust standard errors, for the OLS estimates, and standard errors, for the Tobit estimates, are in parentheses. ***Statistical significance at 1%, **significance at 5%, *significance at 10%.

Table 10: Impact of the Start-ups characteristics on Leasing

VARIABLES	OLS		TOBIT	
SIZE	0.030*** (0.002)	0.038*** (0.003)	0.096*** (0.004)	0.105 (0.000)
TANG	0.256*** (0.010)	0.271*** (0.021)	0.665*** (0.006)	0.640 (0.000)
GROWTH		-0.011*** (0.001)		-0.025 (0.000)
Industry Exp.	0.006** (0.003)	0.008 (0.005)	0.012* (0.007)	0.007 (0.000)
Regional Exp.	0.003 (0.003)	0.001 (0.004)	0.015** (0.007)	0.015 (0.000)
Entrepreneurial Exp.	0.004 (0.003)	0.000 (0.004)	0.038*** (0.007)	0.018 (0.000)
Education	-0.014*** (0.003)	-0.011** (0.005)	-0.025*** (0.008)	-0.012 (0.000)
Age 30-39	0.005* (0.003)	0.007 (0.005)	0.022*** (0.007)	0.025 (0.000)
Age 40-49	-0.001 (0.003)	0.002 (0.005)	0.004 (0.009)	0.007 (0.000)
Age 50-60	-0.006 (0.005)	-0.004 (0.007)	-0.022* (0.012)	-0.017 (0.000)
Gender	-0.011*** (0.003)	-0.011*** (0.004)	-0.028*** (0.007)	-0.026 (0.000)
Constant	-0.144*** (0.012)	-0.014 (0.056)	-0.593*** (0.021)	-3.231 (0.000)
Observations	33,730	15,634	33,73	15,634
R-squared	0.117	0.118		
Pseudo R-squared			0.1156	0.1072
	Robust standard errors in parentheses		Standard errors in parentheses	

Note: The table evaluates several firms' characteristics (initial size, assets tangibility and growth) and founders characteristics (experience, age and gender) on start-ups leasing ratio. All regressions include year time and industry control variables. Robust standard errors, for the OLS estimates, and standard errors, for the Tobit estimates, are in parentheses. ***Statistical significance at 1%, **significance at 5%, *significance at 10%.