# Do Firms have Financing Preferences along their Life Cycles? Theory, and Evidence from Iberia

**Gabriela Rocha Teixeira**
FEG - Universidade Católica Portuguesa
Rua Diogo Botelho 1327, 4169-005, Porto Portugal
Phone: 351-918621260
Fax: 351-225433497
E-mail: gabriela.vidal@sapo.pt

**Mário Coutinho dos Santos**
FEG - Universidade Católica Portuguesa
Rua Diogo Botelho 1327, 4169-005, Porto Portugal
Phone: 351-932085237
Fax: 351-225081110
E-mail: msantos@porto.ucp.pt

Preliminary draft
Current Version: January, 2006
Comments are welcome

# Do Firms have Financing Preferences along their Life Cycles? Theory, and Evidence from Iberia


**ABSTRACT**

The paper examines the issue of the strategic financing choice of firms through the lens of the firm life cycle framework. Using firm-level data for the 1994-2003 period, from samples of Iberian firms, (379 start-ups, 789 firm/year observations, and 2 325 firms distributed by the other three phases of the life cycle model adopted for the study,19 647 firm/year observations) the paper investigates whether financing structure of Iberian firms exhibit any pattern along their life cycles. Furthermore, the work explores factors that might underlie firms' choice of their financing structure.

Univariate results document that leverage measured by the debt ratio increases over the life cycle. We report evidence that can be interpreted as consistent with a pecking order model of financing. Findings also indicate that the theory that short-term debt may have a role in firm strategic financing choice. A significant industry effect for all variables included in the analysis was found as well.

Overall, findings provide support to the proposition that firms tend to adopt specific financing strategies as they progress along the phases of their life cycles, and to the notion that the financing strategy design is influenced, among other factors, by asymmetric information considerations, and growth opportunities.



**Keywords**: *Financing policy*, *Asymmetric and private information*, *Capital structure*

**JEL Classification**: C31; D82; G32

## 1. Introduction[1]

The paper analyzes the issue of the strategic financing choice of firms through the lens of the life cycle framework. The observation of the financing structure of firms as they progress through various stages of their life cycles, suggests that they apparently exhibit some kind of preference for specific patterns of funding characterized, among others, by the debt / equity mix, the maturity structure of the outstanding debt, and security placement structure..

Wealth-constrained entrepreneurs endowed with investment opportunities promising randomly distributed expected returns, ought to raise external financing. Because those entrepreneurs have private information about the prospects of their projects and, ex ante, potential financiers do not have such information, the latter face a selection problem if they have a preference for investing in projects with specific return probability distributions. This creates the well-known adverse selection problem. Therefore, during the early phases of a firm's life cycle, when an insider tend to have a informational comparative advantage over outside investors concerning the firm's true risk and return characteristics, the former have an incentive to convey his privileged information to financiers in order to reduce the lemons premium. If the firm-specific informational gap lessens, or publicly available market-specific information becomes more important for investors' asset allocation, then we should expect a reduction in the deadweight adverse selection costs what may generate some preference for equity over debt financing.

If firms at the earlier stages of their life cycles tend, arguably, to have larger levels of asymmetric information, more growth opportunities and to be smaller in size, we may conjecture that they may have preferences for specific financing strategies as they advance through the different phases of their life cycles. Extant empirical literature provides evidence consistent with the notion that financing choices of larger and smaller, as well as younger and older firms are significantly different.

It is widely accepted that investors' expectations about the future cash flow stream and the opportunity cost of capital drive the market value of a firm (e.g., Modigliani and Miller 1958). Arguably, these two value drivers are non-monotonically distributed over the firm life cycle. Therefore, this may imply that the financing structure of firms may also differ along the

[1] The authors are grateful to Pedro Duarte Silva and Fernando Pacheco for valuable suggestions and helpful comments on an earlier version of the paper, and to PricewaterhouseCoopers for providing access to Orbis database. We also thank Pedro Morais for helpful research assistance. The user disclaimer applies concerning errors and omissions. An earlier version of the paper circulated under the title "Do Firms Have Financing Preferences along their Life Cycle".

stages of their life cycle. Moreover, under the assumption that growth opportunities and the capacity to generate and retain cash flow are differently distributed over a firm's life cycle we may also expect some variance on funding patterns.

The literature on firms' financing choices tends to agree that, at the earlier stages of their life cycles, internal sources of financing are predominantly their first choice. However it seems to exist disagreement in respect to sequential financing choices over the life of firms. The empirical contrast of small and large firms financing choices document that larger firms tend to exhibit higher debt ratios, what is consistent with pecking order hypothesis. Small high growth firms apparently do not seem to follow a pecking order of financing (e.g., Frank and Goyal 2003).

According to Berger and Udell (1998), as firms become larger, older and less informationally opaque their financing choices apparently become more attractive for less informed outside investors. They identify four different sources of equity and nine different sources of debt suggesting that the three largest sources of funding are the insiders' equity, bank and trade credit. However, Gregory et al.'s (2004) resilts of empirical tests of Berger and Udell's model only partially support it.

Fluck, Holtz-Eakin and Rosen (1998) find that the proportion of funding from insiders increases during the early stages of life cycle of firms, while the proportion of outsider finance declines. However at some point this relationship reverses. They interpret this result as a consequence of the development of a good reputation in credit markets which allow the firm to obtain cheaper sources of external financing.[2]

Mackie-Mason (1990) on his study of incremental financing behavior of US non-financial corporations concludes that «firms are concerned with who provides their financing, not just with the debt/equity distinction.» Korajczyk et al.'s (1991) find that larger firms compared to small firms experience less severe information asymmetry problems, and consequently firms will prefer to issue equity when the market is better informed about their true quality. Ou and Haynes (2003) suggest that only a relative small number of small firms use external equity and most small firms use internal sources of financing and external borrowing. In contrast, Robb (2002) argues that younger firms use relatively more debt than older firms. However, the former may face greater difficulty in securing commercial bank debt than more established firms. According to Cassar (2004), size appears to be an important factor in the financing of start-ups and the larger the start-up, the greater the proportion of debt, long term

[2] Berger and Udell (1998) suggest that due to the fact that Fluck, Holtz-Eakin and Rosen (1998) do not include trade credit, their results may understate the dependence on outsiders finance through the life cycle.

debt, outside debt and bank financing.[3] Wokukwu's (2000) empirical results of her examination of capital structure decision across a sample of firms of the computer and peripheral industrial, provide evidence in support of the hypothesis that the relation between profitability and leverage varies along the firms' life cycles. This finding is interpreted as a firm's life cycle being a relevant determinant of capital structure choice.

The pecking order theory is a potentially useful tool to analyze the firm's strategic financing choices. However, empirical evidence is contradictory. For example, Helwege and Liang (1996) find little support for the pecking order theory, and Lemmon and Zender (2001) no support at all. Shyam-Sunder and Myers (1999) report strong support to the pecking order model. Fama and French (2002) interpret their findings as being consistent with pecking order as well as with static tradeoff models. Frank and Goyal (2003), in contrast with Shyam-Sunder and Myers (1999) show that net equity commonly exceeds net debt issue and additionally that the support for pecking order theory was weaker in 1990s, even for the type of larger and more mature firms studied by Shyam-Sunder and Myers (1999).

An important consideration on a firm financing structure relates to the maturity structure of its outstanding debt. Whether or not this might be a relevant factor for firms differently positioned across their life cycles remains an empirical question. Since larger firms are more likely to be in the later stages of their life cycles, their characteristics differ, sometimes dramatically, from firms located at early stages of life cycle. Empirical findings of this literature suggest that small firms' maturity of assets, capital structure and probability of default are important determinants of debt maturity choice (Scherr and Hulburt 2001). These determinants seem also important for large firms (Guedes and Opler 1996; Barclay and Smith 1995; and Stohs and Mauer 1996). Little support is found for growth opportunities, level of asymmetric information, and tax status as factors affecting debt maturity choice. Heyman *et al*. (2003) results strongly support the maturity matching principle, which is consistent with empirical evidence on large firms and that firms with better credit risk borrow on the long term. However, the results do not support the hypothesis that firms with growth opportunities will borrow on short term. They also found an inverse relationship between size and debt maturity structure.

Financial theory has discussed the financial structure of firms extensively, yet theoretical results are far from conclusive (e.g., Myers 2001; Harris and Raviv 1991). Despite the recent attention to the empirical examination of the financing patterns of firms, empirical

[3] The author also documents that firms with relatively small tangible asset base tend to resort to less formal financing arrangements.

evidence on the financing structure of firms as they progress along their life cycles is rather limited. Moreover, this literature does not provide convincing evidence. Thus, the financing preferences of firms as they grow remain an unresolved issue and more work is needed to enhance our understanding of firms' choices in this area. Our work aims at contributing towards filling this gap.

The paper distinguishes from prior research in different ways. First, we study the impact of several determinants on leverage and the debt maturity structure along firms' life cycle. Second, most of the studies only include large firms due to the limitation of information for small firms, and in this study by including both small and large firms we avoid the size bias. Third, our work is conducted outside the U.S. and therefore contributes for generalizing empirical results obtained for the hypotheses developed in this study.[4] Additionally, the study of this issue using data from samples of Portuguese and Spanish firms circumvents traditional problems of different institutional features that arise whenever we get involved in multi-country research. Portugal and Spain share a number of institutional features, such as belonging to the European Union with, among others, similar legal and regulatory architectures, and a bank-based governance regime.

Assuming that in each phase of their life cycle firms the growth opportunities and the capacity to generate and retain funds differ and this may imply changes in the financing, the paper asks the following generic research questions: (1) Are firms in the growth phase of their life cycle more likely to use debt than start-up firms? (2) Which are the potential determinants on leverage across the different phases of the life cycle of firms?

The remaining of the paper is organized as follows: the next section discusses the theoretical background of the financing choices along the life cycle and formulates testable propositions. The empirical design, including sample selection and data description, follows. Section four presents and discusses the results. Concluding remarks end the paper.

## 2. Theoretical background and hypotheses

### 2.1 *Theoretical background*

Mueller (1972) proposes a firm life cycle with four stages, which differentiate mainly by the growth rate and the profitability of the investments opportunities available to the firm. [5, 6] In its first stage, the firm founded by an entrepreneur is financed externally. If the project

[4] The generalization of empirical results in the presence of conspicuous disparities, among others, countries' market structures and institutional architectures, such as, market structures, legal and regulatory frameworks, prevailing governance regimes, accounting principles and practices, unavoidably sources non-trivial of evidence variance, may reveal inappropriate or even imprudent

[5] For an early discussion of the life cycle concept and the theory of the firm see Penrose (1952).

turns out a profitable one, the firm continues to grow reaping more profitable investment opportunities and reinvesting retained cash flow. In following stage, as the market begins to saturate, and growth opportunities used up, the firm reduces its size by paying out all profits until it dissolves. However, Mueller argues that the dissolution of the firm is not realistic, therefore he suggest that managerial empire-building behaviour may arise in the late stage of firm's life cycle. Consequently, the combination of the diffused ownership of large firms and the managerial incentives associated with firm size, tend to overinvestment deviating corporate objective from the maximization of shareholders' welfare to size maximization.

Diamond (1991a) contributes to explain the differences in the financing choices of firms and in the design of financial contracts in each stage of life cycle of firms, by showing that firms may either resort to bank debt or public debt as they develop their reputation in credit markets. The reputational capital acquired while being monitored by banks during the early stages of their life cycles, and may be valuable when financing through public debt. Contrastingly, according to Peterson and Rajan (1994) that might be the length of the relationship between the financier and the firm that may play a role in the availability and the cost of funds and not the age of the firm.

Rajan (1992) proposes a model similar to Diamond (1991a) with the main difference of assuming that costs of bank debt are endogenous. Rajan suggests that there is a «trade-off between bank debt and arm's-length debt.»[7] Monitoring by banks may induce wealth transfer between the bank and the firm. Thus, Rajan's model suggests that a firm may prefer a long-term contract offered by an arm's length investor which provides neither the benefit of bank debt nor the costs.

Fluck (1999a) models financing decisions involving various classes of debt and outside equity for each stage of the life cycle.[8] The author assumes that in sequential financing the last issue tends to be affected by firm performance in previous issuances. Fluck argues that investors would reject equilibrium contracts[9] for small firms but accept them for

---

[6] Churchill and Lewis (1983) propose a model of a firm life cycle that does not measure the evolution of the firm solely on sales or age but uses several factors, such as management style, organization, extent of formal systems, major strategy and the role of the entrepreneur.

[7] As pointed out by Rajan an arm's-length investor (e.g. bondholder) only receive public information and any renegotiation can imply informational and free-rider problems.

[8] According to Fluck (1999a) her model differentiates from Diamond's (1991a) model in two aspects: (1) in contrast with Diamond, assumes that the «... friction between the firm and the financer...is not asymmetric information but the incompleteness of financial contracts»; (2) Diamond develops his model based on the choice between bank debt (that monitors to reduce moral hazard) and public debt (without monitoring) and Fluck focus on various classes of debt and outside equity and the interaction between equityholders and debtholders.

[9] Fluck (1999a) argues that equilibrium contracts «impose zero verification cost on the parties, they involve no deadweight loss in equilibrium and the payoff of one party (investors and management) can improved only at the expense of the other party.»

large firms. Consequently, the return required by subsequent claimholders to finance a project in a large firm is lower than the return required financing the same project in a small firm. This implies that investors of large firms are indifferent between equity and debt due to the fact that the conditions set by debtholders for the financing of large firms are similar to the conditions for equityholders finance small firms.

The model proposed by Fluck also assumes that the initial project in the small firm is financed by equity. If subsequently the firm expands the project scale and if it uses debt financing, prospective debtholders are likely to take in consideration managerial incentives eventually provided by equityholders. In case, debtholders reap the return from both the initial and the expansion project then, equityholders will "protect" debtholders' investment because otherwise they will lose the dividends from the initial project.[10] Alternatively, if debtholders only can share the expansion project cash flow stream and equityholders do not expect any dividends from this project, then debtholders cannot rely on the equityholders to protect their interests. In this later case, debtholders must give higher incentive payments to managers to comply with the debt contract and to prevent any opportunistic behavior potentially detrimental to their wealth. Under these conditions larger firms would frequently issue debt than smaller firms.

Fluck (1999b) suggest that contingent control rights[11] allow more potential for insiders to involve in asset substitution behavior. She argues that debt financing provides more incentive to asset substitution than outside equity due to the nature of control rights. Hence an insider planning to default may start to milk the assets prior to the default. Since debtholders have contingent control rights, they cannot exercise control unless default states. To reduce this potential for asset substitution, long-term debt contracts must offer enough higher incentive payments in equilibrium. Long term debt reduces the propensity for asset substitution due to the fact that allows insiders to capture private benefits and consequently reduce their incentive to transfer wealth from long term debtholders. Due to the fact that a firm financed by a long term debt need to assure a incentive payment to the manager, a firm financed by long term debt must show higher profitability than on financed through equity.

Consequently, the theory developed by Fluck (1999a) implies a life-cycle pattern of firm financing: firms will issue outside equity or convertible debt first, and then use retained earnings and finally issue long term debt or outside equity to satisfy their subsequent

[10] The model assumes that the management team receives all cash flow above debt payments and depreciation as private benefits.

[11] Fluck (1999b) suggest that debtholders have contingent control rights, because they cannot exercise control unless in default states.

financing needs. Financing choices of firms and the design of financial contracts (control rights and maturities) also differs for firms in different stages of their life cycles.

A 'financial growth cycle' of small businesses is proposed by Berger and Udell (1998), where financial needs and choices change as the firms growth, become more experienced and less informationally opaque.[12] They suggest that firms lie on a «size / age / information continuum» and «smaller / younger / more opaque firms...must rely on initial insider finance, trade credit and/or angel finance.» Due to the fact that start-ups are «the most informationally opaque», they may have much more difficulty in obtaining external funding. Consequently, start-up firms are financed through insider finance and angel finance. Subsequently, firms are financed through venture capital. They also argue that bank debt is more readily available for firms after achieving significant tangible asset base that might be collateralized. As firms grow, they become older and less informationally opaque, they may access to equity and debt markets.

Berger and Udell (1998) argue that small firms typically resort primarily to private equity and debt markets, whereas larger firms tend to resort must often public markets. They argue this behavior can be explained because: (1) small firms are more informationally opaque and consequently cannot issue publicly traded securities without severe adverse selection discount; (2) public security placements imply significant deadweight costs such as due diligence, distribution and securities registration;[13] and (3) most small firms tend to be owner-managed, and therefore the problems driven by the specialization in management and control mechanisms due to the separation of ownership and control may be less important in small firms, although they may suffer from other problems such higher agency costs of debt.[14]

Prowse (1998) suggests that there are active angels that advise and monitor the firms and sitting on its board and there are passive angels that provide only money and rarely monitor the firm. He also points out that angel capital is active in private equity markets, which are not subject to similar disclosure requirements as established for public securities issuance. Unlike angels, venture capitalists act as financial intermediaries on behalf of third parties, and they monitor investments projects sometimes assuming non-trivial managerial roles (e.g., Barry 1994). Contracting arrangements between venture capitalists and entrepreneurs and

[12] See Appendix 1 for a diagram of the model proposed by Berger and Udell (1998), in which the authors associated sources of financing to each stage of financial growth cycle.

[13] Large firms continue to use private market as bank loans, private placements and other private debt arrangements. Berger and Udell (1998) exemplify that large firms LBOs involve raising substantial sums in the organized private equity markets.

[14] As previously noted, Berger and Udell (1998) argue that start up firms may be financed by angels. Normally, an angel appears as the second round of financing a start-up (after the entrepreneur and related family).

venture capitalists and investors are subject to misalignments in their objective functions (e.g., Sahlman 1990). These agency problems between venture capitalists and entrepreneurs emerge because entrepreneurs tend to be superiorly informed than venture capitalists, to make decisions that are imperfectly monitored by venture capitalists and which outcomes are not observable by them. Ex-ante information asymmetry between venture capitalists and entrepreneurs may create adverse selection problems due to the fact that rational expectations venture capitalists assume that entrepreneurs are better informed and may attempt exploit their informational advantage. Moral hazard problems may also arise whenever the entrepreneurs have incentives to hide information and accept projects that are not desirable for venture capitalists. Asset substitution problem, underinvestment problem and inadequate effort by entrepreneur are the most conspicuous moral hazard problems.[15]

Sequential financing of a firm over its life cycle can also be analyzed through the lens of capital structure theory. As Myers and Majluf (1984) and Myers' (1984) pecking order theory rationalize, the announcement of a new equity issue should drive down shares price. In this framework, managers will issue equity to fund investment projects if equity is perceived as undervalued. Based on this rationale, Myers developed the pecking order theory of firm financing, in which internal funds are firstly preferred, with debt coming next up to the firm's debt capacity and finally equity capital. Internal funding through retained earnings is preferred to external financing since they do not suffer from the non negligible adverse selection costs that affect other sources of financial capital. New equity and debt issues experience adverse selection problems, being however the selection risk premium for equity higher than for debt. Hence, debt financing should be chosen after the exhaustion of internal financing and equity should be chosen only as last resort.

The pecking order theory is a dynamic model that assumes that debt ratio level is determined by the capacity to generate and retain cash flow, and the size of the investment opportunity set.[16]

According to Wu and Wang's (2004) model, when the level of asymmetric information about the true risk and return characteristics of growth opportunities is higher than the level of information asymmetry about assets-in-place, is more likely to expect a positive effect on the announcement of a new common stock issue. According to Wu and

[15] Leland and Pyle's (1977) model assume that entrepreneurs have better information about the expected outcomes of their investments than do outsiders (e.g. venture capitalists). If entrepreneurs continue to invest in the firm, this can serve as a signal of project quality. As Copeland, Weston and Shastri (2005) suggest «... an empirical implication of this signalling argument is that if the original founders of a company going public decide to keep a large fraction of the owner's wealth held as equity in the firm, then the firm will have greater debt capacity and will use greater amounts of debt.»

[16] See also Krasker (1986), Narayanan (1988) and Wu and Wang (2004).

Wang, this argument can be helpful in explaining why «... less levered small-growth firms favor new equity issues...», due to the fact that small-growth firms may have small tangible asset base to collateralize, they rarely can resort to debt when insider equity is scarce. Thus, the model suggests that when asymmetric information comes mainly from growth opportunities rather than from assets-in-place, new issues may not necessarily have adverse welfare effects.

The pecking order theory supports the notion that firms at later stages of their life cycles may have had more potential to accumulate and retain cash flows than firms at early stages of their life cycles and thus more financing it's available to fund growth. The pecking order model also predicts that internal funds are used before external funds and this may imply that firms at later stages of their life cycles should be less likely to use as many external sources as firms at earlier phases of their life cycles. This partially is in part consistent with the financial growth cycle proposed by Berger and Udell (1998), which suggest that firms at early stages of their life cycles firms are financed by external debt supplied by financial intermediaries.

Fluck (1999a) argues that firms will issue first outside equity or convertible debt, then use retained earnings and finally issue long-term debt or outside equity to satisfy their financing needs. This approach contrasts with the pecking order model mainly in respect to the financing choices of start-up firms. Whereas Myers predicts that firms will issue debt first and equity only later, Fluck (1999a) predicts that firms will issue firstly equity.[17]

Ritter's (2003) windows of opportunity approach is based on variation in the relative costs of debt and equity due to market inefficiencies and in the assumption that capital structure is path dependent. In normal conditions firms prefer internal funds, then debt and equity as last resource. According to the windows of opportunity theory if equity is perceived as cheap, firms may firstly prefer internal funds (as predict by pecking order theory), than equity and only at the end debt. In case the equity is perceived as really cheap, outside equity may be preferred to internal financing. If debt is cheap when compared to equity, debt is the first choice of the firms, than internal funds and only as last resource the equity. The author predicts low equity issuance when stock prices are low and that there will be low stock returns following equity issuance. In summary Ritter conclude that an important determinant of what security issue is whether debt or equity is perceived as cheap.

[17] Noe (1988) and Constantinides and Grundy (1989) cast some doubts on the pecking order theory. According to Noe (1988), the pecking order of financing breaks downs and some firms may prefer to issue equity rather than debt. According to this model insiders observe the firm's cash flows imperfectly. However, Noe shows that the average quality of firms financed with debt is always higher than those financed with equity. Constantinides and Grundy (1989) show that if firms are allowed to issue a range of financing choices, the pecking order is no longer valid.

An important feature of the choices firms must do when deciding about their financing strategy is related to the debt maturity structure. Myers (1977) argues that debt maturity choice is affected by firms' growth opportunities because of the underinvestment problem. When leverage is high, residual claims will be lower and part of the benefits from the growth opportunities go to debtholders. In this framework, equityholders will not have incentive to pursue future investments and firms might underinvest. (Myers 1977) suggests that one solution is to reduce the maturity of the debt.[18] Since, firms with growth opportunities tend to be at the early stages of their life cycle, they might borrow short term debt to reduce the underinvestment problem.

Diamond (1991b) assumes that firms with positive private information about their future growth opportunities may have a preference for using short-term debt financing. Firms in the start-up or growth stages are more likely to have information about the returns of their future growth opportunities. In Diamond's (1991b) model, debt maturity choice is rationalized as a trade-off between the managerial preference to issue short-term debt and the liquidity risk associated to such source of financing. Firms with high credit ratings may be relatively indifferent to the liquidity risk, since its premium may not be a relevant component of the all-in-cost debt of financing. Furthermore with upward sloping term structure of interest rate, short term financing may have a cost advantage over the liquidity risk premium. For firms with medium credit ratings, the liquidity risk may be important. Due to the fact that credit ratings may decrease, creditors may refuse to roll-over debt exposing to non-trivial liquidity risk premium. Hence, medium credit rating firms will prefer to borrow long term. Firms with low credit ratings would also prefer to borrow long term.

In an asymmetric information setup the choice of the debt maturity structure may convey inside information (signaling) to less informed market participants. Flannery (1986) argues that when firms have private information, the insiders have an incentive to signal it to outsiders. In this model insiders of firms with highest quality will prefer short term debt exposing firms to liquidity risk. The insiders of firms with worst quality will prefer long term debt to be not dependent of renegotiation. Firms at early stages of their life cycles and firms at later stages of the life cycle differ in their level of asymmetric information. Hence, the asymmetric of information tend to be larger in firms at the early stages of life cycle (this firms produce less information about their business (Peterson and Rajan 1994)), signaling with the debt maturity decision might be more important for these firms.

[18] Other solutions to reduce this underinvestment problem are the reduction of the level of leverage or include restrictive covenants in the debt agreement.

Managers of firms at the early stages of their life cycle (e.g. start-ups), usually have ownership holdings on the firm. Since managers control the firm decision-making, the managers of firms at early stage of their life cycle could be more risk seeking than managers in firms located at later phases of life cycle. According to Heyman et al (2003), this problem may be resolved by issuing short term debt.

Barclay and Smith (1995) argue that firm size is likely correlated with debt maturity. One of the reasons pointed by the authors to this fact is that issuance costs for public placements have a large fixed component, which creates the potential for economies of scale. Since, smaller firms are, arguably less able to capture these scale economies they typically issue private debt with lower fixed costs.

The choice of debt maturity might also be affected by the firms' tax liabilities. The choice between long term debt and short term debt creates a tax timing option to repurchase and issues the debt (e.g. Brick and Raviv (1985)).[19]

2.2. *Hypotheses*

Fluck (1999a) suggests that firms in the earlier stages of their life cycles will issue outside equity or convertible debt, followed by using retained earnings and finally issuing long-term debt or outside equity to satisfy their financing needs. Her approach differs from the pecking order theory mainly in respect to the financing choices of start-up firms. Whereas Myers (1984) predicts that firms will issue debt first and equity only later, Fluck (1999a) predicts that firms will issue firstly equity. Given that in each phase of life cycle of firms growth opportunities and the capacity to generate and retain cash flow differ, and this may imply changes in the financing we hypothesize:

Hypothesis 1: Total debt ratio and long term debt ratio increase over the life cycle of the firms (between start-up and growth phase).

Diamond (1991b) shows that with an upward sloping term structure of interest rate, short term financing may have a cost advantage over the liquidity risk premium consequently debt maturity choice is modelled as a trade-off between the managerial preference to issue short-term debt and the liquidity risk associated to such source of financing. Firms with high credit ratings may be relatively indifferent to the liquidity risk arising from the market discipline, because these firms are able to roll over the short term debt. For firms with medium credit ratings, the liquidity risk may be important. Due to the fact that credit ratings

[19] If the yield curve is upward sloping, the interest costs of issuing long term debt are greater in early years than interest costs of rolling short term debt. Due to the fact that interest costs are lower in later years, Brick and Raviv (1985) suggest that long term debt reduce the tax liability and consequently increase the market value of the firm. However, if yield curve is downward sloping, short term debt increases the market value of the firm.

may decrease, creditors may refuse to roll-over debt exposing the firm to non-trivial liquidity risk premium. Hence, medium and low credit rating firms will prefer to borrow long term.

Hypothesis 2: Since mature firms are more likely to get higher ratings and consequently to obtain better financial conditions, they should to have a higher short term debt to total assets ratio than start-up and growth firms.[20]

According to the pecking order hypothesis of Myers and Majluf (1984) firm's financing choices are driven by the costs of adverse selection between better-informed managers and less-informed investors. The firm insures in these costs when issuing securities and these costs are lower for debt than for equity securities. As a result, firms prefer to use less information-sensitive securities, being retained earnings the most preferred financing source, followed by debt and finally equity capital. This implies that profitable firms will retain earnings and become less levered, while less profitable firms will become more levered determining an inverse relation between profitability and financial leverage.

Hypothesis 3: Profitability is negatively related to total debt ratio, long term debt ratio and short term debt ratio.

Firm size can be seen as a proxy for information asymmetry between insiders and outsiders. As firms grow, they tend to be more closely followed by analysts having better reputation in financial markets and consequently may face lower deadweight information costs.

Size can also be viewed as a proxy for the inverse probability of default (Rajan and Zingales, 1995 and Titman and Wessels, 1988). Therefore, larger firms which tend to be more diversified may be less predisposed to bankruptcy and we would expect them to be more leveraged and smaller firms less leveraged, resulting in a positive relation between size and leverage. However, Titman and Wessel (1998) citing Smith (1977) suggest that smaller firms might borrow more because the relative cost of issuing equity is higher for them. They also suggest that small firms might have more short term debt than issue long term debt due to the lower costs associated with this alternative, assuming a upward rising yield curve.

Hypothesis 4.1: Firm size is positively related to total debt ratio and long term debt ratio.

Hypothesis 4.2: Firm size is negatively related to short term debt ratio.

According to the pecking order theory, given profitability, leverage increases when investment exceeds retained earnings and decreases when investment is less than retained

[20] Mature firms are firms with very low-risk and using short term debt financing allow the interest rate to be reduced at refinancing when positive information arrives to the market.

earnings. However, Myers (1984) suggests also a more 'complex' version of the pecking order model, where firms are concerned with future and current financing costs. In this approach, it is predicted a negative relation between leverage and the investment opportunity. Firms with expected growth opportunities would keep low leverage to avoid the adverse selection and moral hazard costs associated with the financing of new opportunities with new equity capital (Myers and Majluf, 1984). Since growth opportunities enhance the likelihood of conflicts between insiders and outsiders in the form of asset substitution and claim dilution behavior, these agency problems can be mitigated by the use of short term debt which increases the disciplinary scrutiny of investors.

Hypothesis 5.1: Growth opportunities are negatively related to total debt ratio and long term debt ratio.

Hypothesis 5.2: Growth opportunities are positively related to short term debt ratio.

Tangible assets can serve as be collateral in debt security issues and mitigate borrowers' incentives to incur in adverse selection and moral hazard behavior. By issuing collateralized debt, firms can reduce debtholders requires rates of return and interest costs. These arguments underlie the positive relationship between collateral and leverage.[21] Harris and Raviv (1991) point out that firms with few intangible assets would have greater asymmetric information problems and will tend to accumulate more debt over time and consequently become more leveraged. However, this is not the conventional prediction for the relationship between asset structure and financial leverage (e.g. Frank and Goyal 2003).

Hypothesis 6: Firms' asset structure is positively related to total debt ratio, long term debt ratio and short term debt ratio.

## 3. Data selection and description

### 3.1 *Sample selection*

For the empirical analysis we build two separate sub samples. The first, to enable the classification of firms into the stage of their life cycle, excluding the firms in the start-up stage of their life-cycle. The second sub sample to include only the firms that were in that first stage of their life-cycle. Both sub samples were drawn from the 2003 Orbis database.[22]

[21] However, the use of fixed assets as the measure for collateral can be misleading since it does not capture the use of private collateral provided by the owners of firms (Berger and Udell 1998).

[22] Orbis is a global database which has information on 12 million companies: over 37 000 listed companies worldwide, over 24 000 banks and 7 000 insurance companies, approximately 9.5 million European companies from 45 countries, 1.5 million US and Canadian companies, 1 million South American and Central American companies, 110 000 Japanese companies, 21 000 African companies.
Orbis contains further detail such as news, market research, ratings and country reports, scanned reports, ownership and M&A data. Orbis is one of the product of Bureau van Dijk Electronic Publishing,.

The first subsample includes 206 958 Portuguese and Spanish firms, and provides financial information for each firm for the 1994-2003 period. [23]

The requirements for the inclusion in the sample were: (a) not to be a financial intermediary; (b) the availability of financial information for the year 2003; (c) at least six consecutive years of financial information should be available; and (d) should be no missing data in relation to total net assets, net worth, long term debt, short term debt, sales, net income and year of incorporation. From these criteria resulted a final sample of 2 325 firms with 19 647 firm year observations.

The second subsample includes Portuguese and Spanish start-ups incorporated between 1994 and 2003. The following conditions were followed in defining this sample: (a) financial intermediaries were excluded; (b) firms resulting from restructuring transactions (mergers and divestitures) were also excluded; (c) only the first three years of data are included after the incorporation date; (d) firms should not be part of the first sample; (e) should be no missing data in relation to total net assets, net worth, long term debt, short term debt, sales and net income; and (f) firms should have a productive activity in 2003. From a total of 589 firms, the sample includes 379 firms with 789 firm year observations.

3.2. *Firm classification methodology*

For this study, we adopted Miller and Friesen's (1984) typology and characterization of the firm life cycle. Their concept includes five phases: start-up, growth, mature, revival and decline.

*Start-up firm-year classification*

The criteria to classify a firm year-observation as start-up is described in the previous section and the final sample includes 379 firms with 789 firm year observations.[24]

*Growth, maturity and decline firm-year classification*

Firms can be classified into life cycle stages using either univariate and / or multivariate ranking procedures. We adopted a multivariate classification procedure because the univariate approach is more likely to lead to misclassification problems. We followed Anthony and Ramesh (1992) and Black (1998) methodology and classification variables to identify the life cycle stage of each firm-year observation.

[23] Over the horizon of the study, Portuguese and Spanish firms followed similar accounting principles and practices.

[24] According to Miller and Friesen's (1984), start-up firms are «young, dominated by they owners and have simple and informal structures.» In the growth phase, the emphasis is to achieve rapid sales growth. In the maturity stage, the objective is to maintain the sales level and the level of innovation is reduced. Revival phase is characterised by the diversification and development of the market. In the decline phase, markets dry up and firms begin to decline with them.

Three classification variables were used: (1) the annual dividend as a percentage of income; (2) the percent sales growth; and (3) the age of the firm. Differences in the life cycle variables are assumed to signal differences in strategic emphasis. Sales growth proxies firm's progress along its life cycle (Anthony and Ramesh, 1992). Firms in early cycle stages, on average, present higher sales growth. Low dividend payout is usually associated with the early stages of life cycle because firms, arguably, need to retain more cash flow to establish their reputation in financial markets and finance their growth opportunities. Firm's age is included in the model as a nonfinancial life cycle variable aiming at minimizing the effect of possible correlation of risk with life-cycle stage. The expectations of firm-year variables are included in Table 1.

[insert Table 1]

The two financial life cycle variable (dividend payout and sales growth) are calculated for each year for each sample firm. Then median values of the variables are calculated using the prior five year's date. Additionally for each firm, we obtain the year in which the firm was set up.

The three life cycle variables (median of dividend payout, median of sales growth and age) are grouped into various life cycle stages (low, medium and high for median of dividend payout and median of sales growth variables and young, adult and old for the age variable). This criterion is applied yearly to allow temporal shifts in the life cycle stage of sampled firms. Based on Table 1, a firm/year is assigned to a group and it is given a score (growth = 1, mature = 2 and decline =3).

Based on multivariate analysis, we create three life cycle stages based on a composite score obtained by summing the individual variables scores. Firms are then classified into a life-cycle stage as follows:

Growth stage: a firm/year is classified as a growth stage observation if the composite score is less than or equal to four.

Mature stage: a firm/year is classified as a mature stage observation if the composite score is between five and seven.

Decline stage: a firm/year is classified as a decline stage observation if the composite score is greater than or equal to eight.

Based on 19 647 firm year observation, we calculated median values using the prior five years data, consequently the firm year observation classified into one of the three life cycle stages (growth, mature or decline) was reduced to 6 147.[25]

The 6 936 firm-year observations are classified as follows:

- Start –up : 789 firm/year observations (379 different firms);
- Growth : 1039 firm/year observations (442 different firms);
- Mature: 4 014 firm/year observations (1406 different firms);
- Decline: 1 094 firm/year observations (424 different firms).

We removed outliers and the final sample is described as follows:

- Start –up : 518 firm/year observations;
- Growth : 1010 firm/year observations;
- Mature: 3 983 firm/year observations ;
- Decline: 1 090 firm/year observations.

Descriptive statistics for the life cycle variables are given in Table 2 for firm year observations in each of the life cycle stages. These include the classification variables in the multivariate classification, other descriptive statistics are presented in section 3.4.

[insert Table 2]

Table 3 gives the number of firm year observations by year for each of life cycle shows and Table 4 the industry composition of each of the life-cycle stage.[26]

[insert Table 3]

[insert Table 4]

3.3. *Multiple regression model specification*

We estimate a model in which leverage is regressed on a set of potential determinants of financial leverage measured by different specifications of the debt ratio to submit to test hypotheses 3 to 6**.** The empirical model is specified as follows:

$$D_t = \alpha + \beta_1 X_{1,t-1} + \beta_2 X_{2,t-1} + \beta_3 X_{3,t-1} + \beta_4 X_{4,t-1} + \beta_5 X_{5,t-1} + \beta_6 X_{6,t-1} + \varepsilon_t \qquad (1)$$

Because we are analyzing the patterns of financing structure of firms over the stages of their life cycles, and the sample includes firms in the early stage of their life cycle, which

[25] To verify the classification methodology further, a check is made on the stability of the firm-year classifications. If a firm-year is classified into a life-cycle stage, an analysis is made one or two years prior to and after the year of classification to see in which life-cycle stage the firm is classified in those years. For firm years classified into the growth stage in one year, 32 percent are in the growth stage two years prior to, and 36 percent remained in the growth stage two years after incorporation in this stage. For firm years recorded in the mature stage, 40 percent are in the mature stage two years prior to and 73 percent remained in this stage two years after the inclusion. 35 percent of the firm year classified as decline firms are in decline stage two years prior and 40 percent remained in this stage two years after the inclusion in this stage.

[26] The study does not control for industry and macroeconomics factors.

typically do not have securities traded in organized markets, all variables are valued at their book values.[27]

Because the sample includes both Portuguese and Spanish firms, as Rajan and Zingales (1995) suggest, whenever testing multi country samples, we may need to adjust variables and data reconciling for differences principles and practices.[28] Since, there are not significant differences in accounting between Portugal and Spain, we did not introduced any adjustment in the financial information gathered for our sample of Portuguese and Spanish firms.

The dependent variable $D_t$ is defined as debt ratio, which we use in three different specifications: (1) total debt ratio; (2) long term debt ratio; and (3) short term debt ratio. Total debt ratio is defined as total debt to book value of assets.[29] Long term debt ratio is defined as total long term debt to book value of assets. Short term debt is defined as short term debt to book value of assets. We follow the specification used in Titman and Wessels (1988), and Fama and French (2002).[30]

The first definition of financial leverage is the ratio of total liabilities to total assets. This can be viewed as a proxy of what remain for shareholders in case of liquidation, but it does not give a good indication of whether the firm is at risk of default in the near future (Rajan and Zingales, 1995). However this ratio may overstate the amount of leverage because include some items as accounts payable which may not be used for financing. Others definitions of leverage is the ratio of debt (both short term and long term) to total assets or the ratio of total debt to net assets, where net assets are total assets less accounts payable and other liabilities. Despite the fact that this measure is not affected by trade credit, items that may have nothing to do with financing influence it. Rajan and Zingales (1995) purpose another definition of leverage by the ratio of total debt to capital (defined as total debt plus equity), where the effects of past financing decisions are apparently best defined. In this research we adopt as definition of leverage, as referred above, the ratio of debt (both short term and long term) to total assets.

Independent variables are lagged one year, and are specified as follows:

---

[27] Using financial variables valued at book value is a standard practice among rating analysts.

[28] One point of concern in this empirical test is the likelihood of survivorship bias. Surviving firms may have different characteristics for firms that have since "died" and that may influence results. Our sample only includes survivor firms.

[29] For example, Rajan and Zingales (1995) suggest an adjustment to the debt ratio in respect to cash and short-term investments. However is hard to assess the optimal level of cash needed to run a business.

[30] Titman and Wessels (1988) considered also convertible debt. In this research, convertible debt is not distinguished from straight debt. See Rajan and Zingales (1995) for a discussion of different concepts of financial leverage.

$X_1$ Proxies profitability measured by pre-interest, pre-tax and pre-extraordinary items earnings divided by total assets (e.g. Fama and French 2002, Titman and Wessels, 1988).

$X_2$ Surrogates size measured by the natural logarithm of sales (e.g. Titman and Wessels, 1988 and Rajan and Zingales 1995).

$X_3$ Represents past growth measured by the annual percentage increase of total sales (e.g. Titman and Wessels, 1988, Michaelas *et al*. 1999 and Bennet and Donnelly, 1993).

$X_4$ Measures future growth opportunities and is defined as intangible assets to total assets (Michaelas et al, 1999 and similar measured by Titman and Wessels, 1988).

$X_5$ Denotes asset structure measured by total fixed assets divided by total assets (e.g. Titman and Wessels, 1988 and Frank and Goyal, 2003).

Finally, $X_6$ is a dummy variable, characterizing the firm's shares listing condition. The variable assumes the value 1 if the firm has their shares of stock traded in organized market and 0 otherwise.

In the ordinary least squares model estimation heteroscedastic error disturbances were found, arguably affecting the efficiency of parameter estimators, although they are unbiased and consistent. In order to obtain an efficient estimation, we used the weighted least squares procedure, which is a special case of the generalized least squares method.[31]

[insert Table 5]

## 4. Empirical results

4.1. *Univariate analysis*

Table 6 includes both dependent and independent variables used in this study.

[insert Table 6]

To test the hypothesis that for each variable there is a significant difference across the life cycle we performed an analysis of variance (ANOVA) for each variable.[32] At the 1 percent level, we found support for each variable for this prediction, with the exception of profitability that is significantly different at the 5 percent level.

To test our hypothesis 1.1 that the total debt ratio increases over the life cycle of firms, we performed a one-sided test (of two independent samples) to compare the total debt in one

[31] Many studies opt for ordinary least squares regression analysis with heterocedastic-consistent estimator (White, 1980). However, the heterocedastic-consistent estimator generates consistent variance estimates, but it does not provide the most efficient parameter estimates. According to Pindyck and Rubinfeld (2004) «for efficient estimation, one of the weighted least-squares estimation procedures must be used».

[32] The ANOVA test is used to determine whether any differences among two or more means are greater than would be expected by chance.

stage with the previous stage over the life cycle.[33] We found that the difference in total debt ratio between start-up and growth firms is not statistically significant. At the 1 percent level, debt ratio of growth firms is significantly higher than the debt ratio of mature firms (*p-value*: 0.000) and the debt ratio is significantly higher than the debt ratio of decline firms (*p-value*: 0.000). We found that total debt decrease during the later stages of life cycle and this may suggest a pecking order. Firms first use debt and only after that use equity.

To test the hypothesis that the long term debt increases along the life cycle, we conducted a one-sided test (of two independent samples) to compare the long term debt in one stage with the previous stage over the life cycle. A surprising result is obtained, that the average long term debt reduces along the life cycle. At the 1 percent level, we found support for the hypothesis that long term debt for growth firms is lower than for start up firms (*p-value*: 0.0000). At the 5 percent level, we found support that the hypothesis that long term debt for mature firms is lower than for growth firm (*p-value*: 0.0178). At the 1 percent level, we found support for the hypothesis that long term debt for decline firms is lower than for mature firms (*p-value*: 0.0046). Contrary to our prior expectations and hypotheses 1.1, long term debt decrease over the life cycle.

To test the hypothesis 6 that the short term debt decreases along the life cycle, we performed a one-sided test (of two independent samples) to compare the short term debt in one stage with the previous stage over the life cycle. At the 1 percent level we found support for the hypothesis that short term debt for growth firms is higher than for start-up firms (*p-value*: 0.0000). At the 1 percent level, we found support for the hypothesis that short term debt in growth firms is higher than in mature firms (*p-value*: 0.0000). At the 5 percent level, we found support for the hypothesis that short term debt is lower in decline firms than in mature firms (*p-value*: 0.0022). The short term debt increases over the early stages of life cycle and in the later stages of life cycle decrease, consistent with our prior expectation.

At the 5 percent level we found support that the profitability of growth firms is higher than in start up firms (*p-value*: 0.0125). Profitability between growth, mature and decline firms is not statistically different (0.069, 0.067 and 0.066, respectively).

Growth firms do not differ significantly from start up firms in size. At the 1 percent level the size of growth firms is higher than the size of mature firms (*p-value*: 0.0000) and the size of mature firms is higher than the size of decline firms (*p-value*: 0.0000).

[33] We performed a *t*-test assuming unequal variances.

At the 1 percent level, intangibility is lower for start up firms when compared with growth firms (*p-value*: 0.0016). At the 1 percent level, intangibility is lower for start up firms when compared with growth firms (*p-value*: 0.0000). Average intangibility for decline firms is 0.035 and it is below the average intangibility for mature firms. However, the difference in intangibility is not statistically significant.

The asset structure ratio decreases between start-up phase and mature phase. An average tangibility ratio for a start up firm is 0.251, for a growth firm is 0.239 and mature firm is 0.231. Thought, the differences between start-up, growth and mature firms, they are not statistically significant. At the 1 percent level, the tangibility ratio for decline firms is higher than for mature firms (*p-value*: 0.0000).

The number of listed firms increases over the life cycle of firms. In start up stage, none of firms are listed. In growth, mature and decline stages, the percent of listed firms are 0.6, 0.8 and 2.3, respectively. The difference between start up and growth firms is statistically significant at the 1 percent level (*p-value*: 0.0071) and the difference between mature and decline firms is statistically significant at the 5 percent level (*p-value*: 0.0007). The difference between the percent of listed firms in growth and mature stage is not statistically significant.

Summarize, based on the characteristics presented in table 6, start up firms generally have a lower debt ratio, lower short term debt ratio and lower profitability when compared with firms in the growth stages of their life cycle. On the other hand, long term debt, growth, intangibility and tangibility are higher in start up firms when compared with growth firms. Additionally, we found that growth firms generally have higher total debt ratio, long term debt, short term debt, size, growth and intangibility when compared with mature firms. The leverage increases during the early stages of the life cycle and after that it decreases, suggesting a pecking order. However, a surprising result is found in respect to the importance of long term debt in the start up firms.

Table 7 documents that total debt ratio, long term debt ratio, short term debt ratio and the determinants of financial patterns identified in the previous section vary across industries.

[insert Table 7]

To test the hypothesis that for each variable there is a significant difference variable across industries, we performed an analysis of variance (ANOVA) for each variables using the weighted least squares.[34] At 1 percent level, we found support for each variable for this

[34] We identified that the error terms are normally distributed but the variance of the error is not constant. Consequently the weighted least squares must be used to analysis ANOVA model (Neter *et al.'s*, 1990).

hypothesis with the exception of past growth opportunities proxies by the average annual growth rate of total sales.

Average total debt ratio and long term debt ratio are higher than 32.1 percent and 24.8 percent in the education, health and social services compared to just above 21.7 percent and 7.5 percent in the construction industry, respectively. Wholesale and retail industry presents the highest short term debt ratio (18.5 percent) and education, health and social services industry presents the smallest short term debt ratio (7.4 percent).

Future growth opportunities also vary significantly across industries. Education health and social services and transport and communications industries exhibit average growth of more than 10 percent compared to just over 2.4 percent in the wholesale and retail industry.

Asset structure ratio also varies significantly across industries. The education, health and social services industry exhibit an average asset structure ratio of more than 52.5 percent compared to just 12.4 percent in the construction industry. When we compared asset structure with debt ratios, we can see that industry with the highest total debt ratio and long term debt ratio is those which have the highest asset structure. On the other hand, we can see that the industry with the smallest total debt and long term debt is those which have the smallest asset structure.

4.2. *Regression Analysis*

In this sub-section we report results on the multiple regression analysis of the determinants of capital structure on total debt ratio, long term debt ratio and short term debt ratio for (i) all observations included in the sample and (ii) for each stage of life cycle of firms. For a specification and economic interpretation of the variables included in the regression analysis, please refer to Table 8 and 9. Table 10 provides results from the regression estimation of model (1).

*Regressions based in all observations included in the sample*

[insert Table 8]

According to the pecking order theory, profitability should be negatively related to total debt ratio, long term debt ratio and short term debt ratio. For our sample, we found that profitability appears to have a significant influence upon the capital structure with all three dependent variables being negatively related to profitability (*p*-value of about 0.0000 for all regressions). We interpret this finding as consistent with the pecking order theory. The profitability effect is bigger on the short term debt ratio than in the long term debt ratio and this suggest that as firm becomes more profitability decreases in the short term debt ratio will be proportionally higher than decreases in the long term debt ratio.

The coefficient estimates for size is positive in total debt ratio and long term debt ratio regressions and are statistically significant at the 1 percent level (*p*-value: 0.0000 in both regressions). This is consistent with our hypothesis 4.1 which predicts that larger firms which tend to be less exposed to bankruptcy risk and therefore, ceteris paribus, to be more leveraged. The significantly negative coefficient in short term debt ratio regression (*p*-value: 0.0000) is consistent with our hypothesis 4.2 which predicts a negative relation between size and short term debt ratio. This can be interpreted as smaller firms might have a preference for having relatively more short term component on their debt maturity structure. This preference may arise as an attempt to capture any cost advantage that may result from the tradeoff between the short term interest rate derived from an upward yield curve and the liquidity risk.

The coefficient estimates for past growth is positive for all regressions (*p*-value: 0.0079 and 0.0002 for total debt ratio and short term debt ratio regression, respectively and *p*-value: 0.4736 for long term debt ratio)

The positive coefficient for total debt ratio and long term debt ratio is not consistent with hypothesis 5.1 that growth opportunities are negatively related to leverage measured either by total debt ratio and long term debt ratio. We found evidence consistent with the standard pecking order model, which predicts a positive relation between leverage and growth opportunities given that leverage increases when investment exceeds retained earnings and decreases when investment is less than retained earnings.

The positive relation between short term debt ratio past and growth is consistent with hypothesis 5.2, which suggests that firms tend to use short term debt ratio in order to mitigate agency problems that arise between insiders and outsiders.

The coefficient estimates for future growth opportunities are positive in all regression and are always statistically significant (*p*-value of 0.0000 for all regressions). The positive coefficient estimates for future growth opportunities in total debt ratio and long term debt ratio regressions is not consistent with our hypothesis 5.1. However, the positive relation between short term debt ratio and future growth opportunities is consistent with our hypothesis 5.2 that imply that agency problems associated with growth opportunities can be mitigated by the use of short term debt which increase the disciplinary of investors.

The coefficient estimates for asset structure ratio is significantly positive in total debt ratio and long term debt ratio regressions (*p*-value: 0.0000). We find support for the hypothesis 6 at the 1 percent level of statistical significance. These results imply that when firms issue collateralized debt, they may reduce debtholders requires rate of return and

interest cost and, consequently asset structure is positively related to total debt ratio and long term debt.

For short term debt ratio regression, the coefficient estimates for asset structure ratio is significantly negative (*p*-value: 0.0000), contrary to our expectations in hypothesis 6. This may suggest that short term debt ratio may not use as collateralized long term assets.

The listed dummy coefficients are negative in total debt ratio and short term debt ratio regressions and positive in long term debt ratio regression but are not statistically significant.

*Regressions for each stage of life cycle*

For a specification and economic interpretation of the variables included in the regression analysis for each stage of life cycle, please refer to Table 7. Table 10 provides results from the regression analysis expressed in model (1).

[insert Table 9]

When we analyze each stage of life cycle, the coefficients estimated for profitability are negative in most of stages of life cycle but are not always statistically significant. However in the long term debt ratio model in start up and mature stages, the coefficient came out positive. We found strong support in the three regressions and for all stages of the life cycle that all three dependent variables are statistically and negatively related to profitability (with the exception of the start up and mature stage in the long term debt ratio regression and start up stage in the total debt ratio regression) what provides evidence supporting for the pecking order model (hypothesis 3).

The negative influence of profitability on total debt ratio becomes stronger between the start up and growth stage of the life cycle of firms. For firms in the start-up stage a unit increases in profitability, ceteris paribus, decreases the total debt ratio by 0.840 (*p*-value: 0.2660). For firms considered in the growth stage a unit increases in profitability, ceteris paribus, decreases the total debt ratio by 1.389 (*p*-value: 0.0000). Consequently, the profitability effect is bigger on the growth stage than in the start-up stage. Based on the long term debt regression, the profitability does not present a linear pattern and the influence change along the life cycle of firms. For the short term debt ratio the negative influence of profitability is stronger in start up stage than in growth and mature stages of the life cycle of firms. For firms in the start up stage a unit increases in profitability, ceteris paribus, decreases the short term debt ratio by 1.595 units (*p*-value: 0.0130), however for firms in the mature stage a unit increase in profitability, ceteris paribus, decreases the short term debt ratio by 0.274 (*p*-value: 0.0000). The profitability effect on short term debt ratio is bigger on the start-up stage than in the mature stage of life cycle of firms.

The coefficient estimates for size in the total debt ratio regression is significantly negative across the life cycle of firms (*p*-value: 0.0000 for all stages with the exception of start up stage with a *p*-value: 0.0013). These results are not consistent with our hypothesis 4.1 which predicts that firm's size is positively related to total debt ratio. We also note that the negative influence of size on total debt ratio becomes stronger across the life cycle of firms between start up and mature stages.

In respect to long term debt ratio regression the coefficient estimates for size is positive in the start-up and mature stages and is negative in the growth and decline stage, but it is not always statistically significant. In start up stage the coefficient for size is not significant (*p*-value: 0.1555). The hypothesis 4.1, that firm's size is also positively related to long term debt, only found strong support in the mature stage (*p*-value: 0.0000). The negative relation between long term debt ratio and size in growth and decline stages are statistically significant (*p*-value: 0.0000 in both regressions).

In respect to short term debt regression the coefficient estimate for size is negative in all stages over the life cycle, and are always statistically significant (*p*-value: 0.0000) with the exception for growth phase (*p*-value: 0.1392). Consequently the hypothesis 4.2, that firms' size is negatively related to short term debt find strong support across the life cycle of firms, with the exception for growth phase.

The coefficient estimates for past growth proxies by average annual growth rate of total sales in the total debt regression is significantly positive for all stages. This is not consistent with our hypothesis 5.1 that growth opportunities are negatively related to total debt ratio, which is supported by the "complex" version of the pecking order model. On the other hand we found evidence supporting the standard pecking order model, which suggests a positive relation between leverage and growth opportunities.

In the long term debt ratio regression, the coefficients estimate for past growth are positive in start up, growth and decline stages and is negative in the mature stage. However, this variable is only statistically significant for the growth stage (*p*-value: 0.0000). Only in the mature stage the coefficient for past growth is consistent with our hypotheses 5.1, that growth opportunities are negatively related to long term debt ratio, however is not statistically significant (*p*-value: 0.8477).

In the short term debt ratio regression, the coefficient estimates for past growth is positive for all stages of life cycle with the exception for the growth stage. The variables are always statistically significant with the exception for the start up stage (*p*-value: 0.1739, 0.0000, 0.0000, and 0.0060 for start-up, growth, mature and decline stages, respectively). For

all stages with the exception of the growth stage, past growth opportunities are statistically positively related to short term debt ratio, what is consistent with our hypothesis 5.2 that imply that agency problems associated with growth opportunities can be mitigated by the use of short term debt ratio which increases the disciplinary of investors.

Coefficient estimates for future growth opportunities proxies by intangible divided by total assets are positive for each stage of the life cycle in total debt ratio regression, but are not always statistically significant. However, these results are inconsistent with our hypothesis 5.1, that growth opportunities are negatively related to total debt ratio, which is supported by the "complex" version of the pecking order model. The positive influence of growth on total debt ratio becomes stronger between the start up and mature stage of the life cycle of firms. For firms in the start-up stage a unit increases in growth, ceteris paribus, increases the total debt ratio by 0.546 (*p*-value: 0.0000). For firms considered in the mature stage a unit increases in growth, everything else constant, increases total debt ratio by 65.770 (*p*-value: 0.0993).

In the long term debt ratio regression, the coefficient estimates for future growth opportunities is positive in all stages of life cycle, with the exception on the decline stage, but are not always statistically significant. The positive coefficients in start-up (*p*-value: 0.0000), growth (*p*-value: 0.3442) and mature (*p*-value: 0.0000) stages are not consistent with our hypothesis 5.1 that growth opportunities are negatively related to long term debt ratio.

In the short term debt ratio regression, the coefficient estimates for future growth opportunities is negative in all stages of life cycle, with the exception of the decline, but are not always statistically significant. The positive coefficient in the decline stage (*p*-value: 0.000) is consistent with our hypothesis 5.2 that growth opportunities are positively related to short term debt ratio. However, the negative coefficients in start-up (*p*-value: 0.2950), growth (*p*-value: 0.0094) and mature (*p*-value: 0.6815) stages are not consistent with our prediction.

Coefficients estimates for asset structure ratio are positive in the start-up and decline stages and are negative in the remaining stages for the total debt ratio regression. All coefficients are statistically significant with the exception of the start up stage (*p*-values: 0.3695, 0.0914, 0.0000, 0.0000 for start-up, growth, mature and decline stages, respectively). The positive relation between asset structure ratio and total debt ratio in the start up and decline stage is consistent with our hypothesis 6.

The coefficient estimates for asset structure for the long term debt ratio regression for each stage over the life cycle are positive, but are not always statistically significant (*p*-value: 0.1187 for start up stage and *p*-value: 0.0000 for the remaining stages). This is consistent with

our hypothesis 6 that firm's asset structure is positively related to long term debt ratio due to the fact that firms can reduce debtholders required rates of return and consequently reduce costs of debt financing by issuing collateralized debt.

For the short term debt ratio regression, the coefficient estimates for asset structure ratio is negative for each stage of the life cycle and are always statistically significant (*p*-value: 0.0001 for start-up and *p*-value: 0.0000 for the remaining phases). This is contrary to our expectation in the hypothesis 6, that firm's asset structure is positively related to short term debt. This may suggest that short term debt ratio may not use as collateralized long term assets.

The listed dummy coefficients are positive in the growth stage for the total debt ratio and long term debt ratio regressions and mature stage for the short term debt regression. For the remaining stages in the three regressions, the listed dummy coefficients are negative. These coefficients are not always statistically significant at the usual significance levels.

[insert Table 10]

[insert Table 11]

**5. Conclusions**

Using data from a sample of Iberian, Portuguese and Spanish, firms we investigate 379 start-ups (789 firm year observations) and 2 325 firms (19 647 firm year observations) distributed by the other three phases of the life cycle model adopted for the study.

The results of the univariate analysis document that the financial leverage measured by the total debt ratio increases during the early stages of life cycle of firms. We also found that leverage decreases during the later stage of life cycle what can we interpret as evidence in support of a pecking order of financing on the grounds on the well-known negative relation between leverage and profitability. Results also are consistent with the hypothesis that the long term debt ratio decreases over the life cycle.since for growth firms it is significantly lower than for start up firms, and for mature firms is also lower than for growth firms. This evidence is consistent with Diamond (1991b). Although the increase short term debt over the early stages of life cycle and the decline in the later stages of life cycle is consistent with our prior expectation, this latter result is somewhat inconsistent with Diamond (1991b) because we would expect firms in their growth stages to have higher ratings and therefore to be able to roll over short term debt, and cope with the premium associated with that liquidity risk. Profitability of firms in the growth phase of their life cycles is significantly higher than for start-up firms. However, between those firms, and their counterparts in the mature and decline stages, and between growth, mature and decline firms, we failed to find

statistical significant relationships. Firms in the growth stage of their life cycle exhibit statistically significant (at the 10 percent level) lower past growth, proxied by the average annual growth rate of total sales, than start-up firms. The level of future growth opportunities, proxied by the intangible-to-total net assets ratio it is, as expected, significantly lower for mature firms than for start up. We find that the asset structure ratio for start-ups is higher than for firms in the growth stage; however this result is not statistically significant. These latter firms present a higher asset structure ratio than mature firms and this finding is statistically significant at the usual level. Results also indicate that there is a significant industry effect for all variables in the analysis with the exception of past growth.

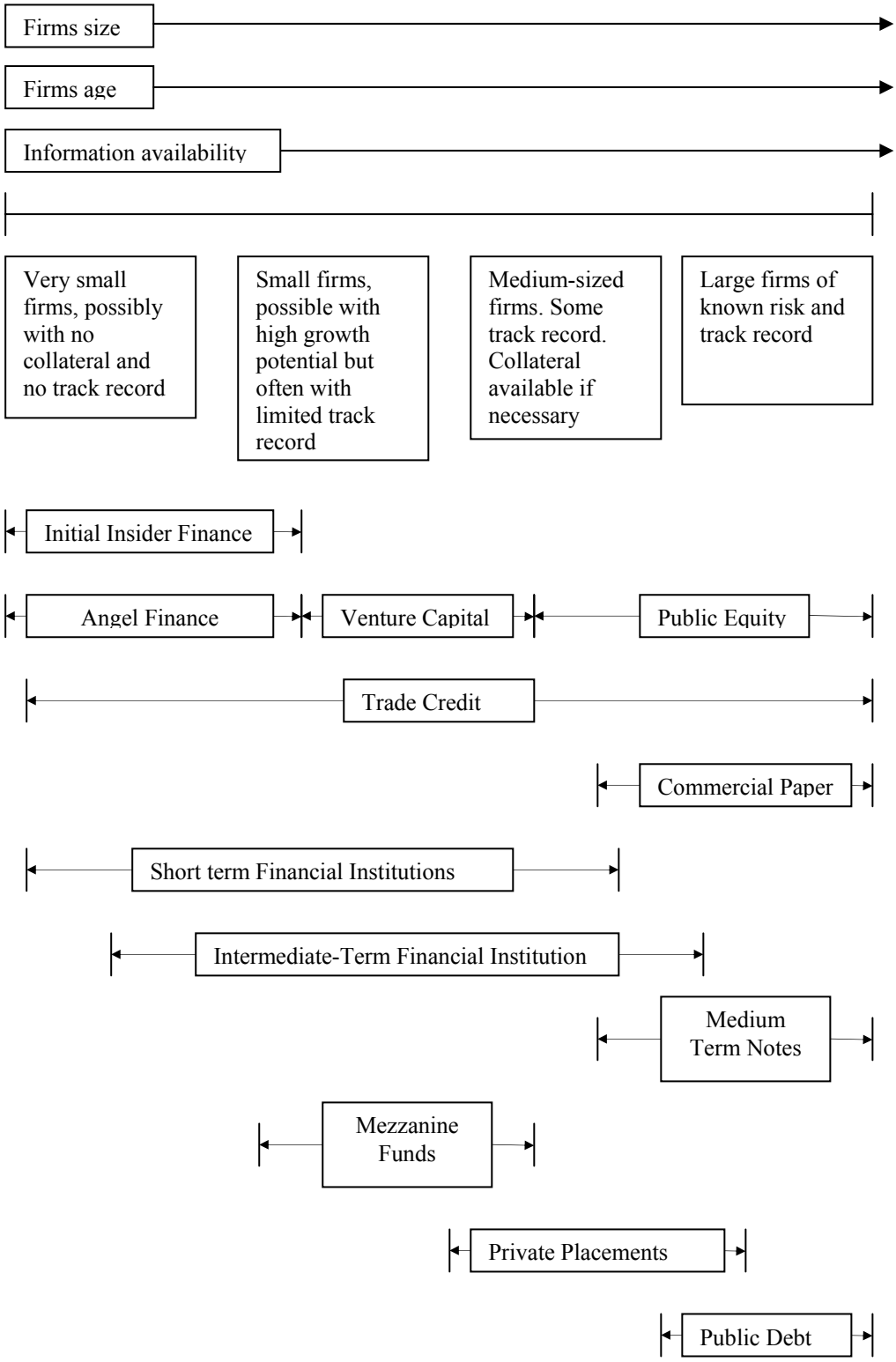
Regression analysis for aggregated data shows that profitability is significantly and negatively related to all three dependent variables, total debt ratio, long term debt ratio and short term debt ratio what we interpret as evidence in support of the pecking order theory. Results also provide evidence that size is significantly and positively related to total debt and long term debt ratios what is consistent with the hypothesis that larger firms tend to be less exposed to bankruptcy risk and therefore, ceteris paribus to be more leveraged. Additionally, results document that size is significantly and negatively related to the short term debt ratio what can be interpreted as smaller firms might have a preference for having a relatively more short term component on their debt maturity structure. This preference may arise as an attempt to capture any cost advantage that may result from the tradeoff between the short term interest rate derived from an upward yield curve and the liquidity risk. We did not find evidence supporting the proposition that past and future growth opportunities are negatively related to leverage measured either by the total debt ratio or the long term debt ratio. In contrast, we found evidence consistent with the standard pecking order model, which predicts a positive relation between leverage and growth opportunities given that leverage increases when the investment opportunity set exceeds retained earnings and decreases when investment is less than retained earnings. However, the past and future growth opportunities are statistically and positively related to short term debt ratio suggesting that the agency problems arising from growth opportunities between insiders and outsiders can be mitigated by the use of short term debt. Results also shows that, asset structure is significantly and positively related to total debt ratio and long term debt ratio which support the prediction that by issuing collateralized debt, firms can reduce debtholders required rates of return. Contradicting our expectations, the asset structure variable is statistically and negatively related to short term debt which suggests that firms may use non-collateralized short term debt. Empirical findings for each stage of life cycle of firms suggest that the impact of some

determinants on the different measures of financial leverage provide mixed results in terms of statistical support for the hypotheses formulated in this study, and therefore should be cautiously interpreted. Results suggest that all three dependent variables are statistically and negatively related to profitability for all stages of life cycle (with the exception of the start-up and mature stage in the long term debt regression and start-up in the total debt ratio regression) what provides evidence supporting the pecking order model. We did not find evidence consistent with the view that firms' size is positively related to total debt ratio and long term ratio across the life cycle. However, the strong support received by the negative effect on short term debt across the life cycle suggests that small firms issue debt with this type of maturity. Little evidence was found in favor of the proposition that past and future growth opportunities are negatively related to total debt ratio and long term debt ratio, which is supported by the "complex" version of the pecking order theory for each stage of life cycle and are positively related to short term debt. Results also found, as expected that asset structure is statistically and positively related to long term debt along the life cycle. However, we did not find evidence consistent with the view that asset structure is positively related along the life cycle with the total debt. Contrastingly with our expectations, firms' asset structure is statistically and negatively related to short term debt for each stage of life cycle which suggests that firms may use non-collateralized short term debt. Listed dummy provide also mixed results along the life cycle.

Overall, we interpret empirical results as documenting the expected dynamics of firm financing along their life cycles.

## APPENDIX 1

## Financial Growth Cycle




[Berger and Udell (1998), Fig. 1]

**References**


Anthony, Joseph and K. Ramesh. 1992. Association between Accounting Performance Measures and Stock Prices. *Journal of Accounting and Economics* 15: 203-227.

Barclay, Michael and Clifford Smith. 1995. The Maturity Structure of Corporate Debt. *The Journal of Finance* 50(2): 609-631.

Barry, Christopher. 1994. New Directions in Research on Venture Capital Finance. *Financial Management* 23(3): 3-15.

Bennet, M. and R. Donnelly. 1993. The Determinants of Capital Structure: Some UK Evidence. *British Accounting Review*. 25: 43-59

Berger, Allen and Gregory Udell. 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: 613-673.

Black, Ervin. 1998. Life-Cycle Impacts on the Incremental Value-Relevance of Earnings and Cash Flow Measures. *Journal of Financial Statement Analysis* Fall 1998; 4(1): 40 -56.

Brick, Ivan and S. Abrahan Ravid. 1985. On the Relevance of Debt Maturity Structure. *Journal of Finance* 40(5): 1423-1437.

Cassar, Gavin. 2004. The Financing of Business Start-ups. *Journal of Business Venturing* 19: 261-283.

Constantinides, George and Bruce Grundy. 1989. Optimal Investment with Stock Repurchase and Financing as Signals. *Review of Financial Studies* 2: 445-465.

Copeland, T., Fred Weston and Kuldeep Shastri 2004. *Financial Theory and Corporate Policy*, 4th ed.. Addison - Wesley.

Diamond, Douglas. 1991a. Monitoring and Reputation: The Choice between Bank Loans and Directly Placed Debt. *Journal of Political Economy* 99(4): 689-721.

Diamond, Douglas. 1991b. Debt Maturity Structure and Liquidity Risk.*Quarterly Journal of Economics* 106(3): 709-737.

Fama Eugene, Keneth French. 2002. Testing Tradeoff and Pecking Order Predictions about Dividends and Debt. *Review of Financial Studies* 15: 1-33.

Flannery, Mark. 1986. Asymetric Information and Risky Debt and Maturity Choice. *Journal of Finance* 41(1).

Fluck, Zsuzsanna, Douglas Holtz-Eakin and Harvey Rosen. 1998. *Where Does the Money Come From? The Financial of Small Entrepreneurial Enterprises*. Working paper New York University.

Fluck, Zsuzsanna. 1999a. *Capital Structure Decisions in Small and Large Firms: A Life-Cycle Theory of Financing*. Working paper Mimeo Stern Scholl of Business New York University.

Fluck, Zsuzsanna 1999b. *Contingent Control Rights and Asset Substitution: The Design of Long-term Debt*. Working paper, New York University.

Frank, Murray and Vidham Goyal. 2003. Testing the Pecking Order Theory of Capital Structure. *Journal of Financial Economics* 67: 217-248.

Gregory, Brian, Matthew Rutherford, Sharon Oswald and Lorraine Gardine. 2004. An Empirical Investigation of the Growth Cycle Theory of Small Firm Financing. *Journal of Small Business Management, forthcoming.*

Guedes, José and Tim Opler. 1996. The Determinants of the Maturity of Corporate Debt Issues. *Journal of Finance* 51(5): 1809-1833.

Harris, Milton and Artur Raviv. 1991. The Theory of Capital Structure. *Journal of Finance* 46(1): 297-355.

Helwege, Jean and Nellie Liang. 1996. Is there a Pecking Order? Evidence from a Panel of IPO. *Journal of Financial Economics* 40: 429-458.

Heyman, Dries, Marc Deloof and Hubert Ooghe. 2003. *The Debt Maturity Structure of Small Firms in a Creditor Oriented Environment*. Working paper, Universiteit Gent.

Korajczyk, Robert, Deborah Lucas and Robert McDonald. 1991. The Effect of Information Releases on the Pricing and Timing of Equity Issues. *Review of Financial Studies* 4(4): 685-708.

Krasker, William. 1986. Stock Price Movements in Response to Stock Issues and Asymmetric Information. *The Journal of Finance* 41(1): 93-105.

Leland, Hayne and David Pyle. 1977. Informational Asymmetries, Financial Structure and Financial Intermediation. *Journal of Finance* 32(2): 371-387.

Lemmon, M. L. a. J. F. Zender. 2001. *Looking under the Lamppost: An Empirical Examination of the Determinants of Capital Structure*. Working paper, University of Utah.

Mackie-Mason, Jeffrey. 1990. Do Firms Care who Provides their Financing? In *Asymmetric Information, Corporate Finance and Investment*, ed. R. G. Hubbard, 63-103. Chicago (IL): University of Chicago Press.

Michaelas, Nicos, Francis Chittenden and Panikkas Poutziours. 1999. Financial Policy and Capital Structure Choice in UK SMEs: Empirical Evidence from Company Panel Data. *Small Business Economics* 12 (2): 113-130.

Miller, Dany and Peter Friesen. 1984. A Longitudinal Study of the Corporate Life Cycle. *Management Science* 30(10): 1161-1183.

Modigliani, Franco and Merton Miller. 1958. The Cost of Capital, Corporation Finance and the Theory of Investment. *American Economic Review* 48(3): 261-297.

Mueller, Dennis. 1972. A life-Cycle Theory of Firms. *Journal of Industrial Economics* 20(3): 199-219.

Myers, Stewart. 1977. Determinants of Corporate borrowing. *Journal of Financial Economics* 5(2): 147-175.

Myers, Stewart. 1984. The Capital Structure Puzzle. *Journal of Finance* 39(3): 575-592.

Myers, Stewart and Nicholas Majluf. 1984. Corporate Financing and Investment Decisions when Firms Have Information that Investors Do Not Have. *Journal of Financing Economics* 13: 187-221.

Myers, Stewart. 2001. Capital Structure. *Journal of Economic Perspectives* 15(2): 81-102.

Narayanan, M. P. 1988. Debt versus Equity under Asymmetric Information. *Journal of Financial and Quantitative Analysis* 23: 39-51.

Noe, Thomas 1988. Capital Structure and Signalling Game Equilibria. *Review of Financial Studies* 1(4): 331-355.

Ou Charles and George Haynes. (2003). *Uses of Equity Capital by Small Firms - Findings from the National Survey of Small Business Finances (for 1993 & 1998)*. Annual Conference on Entrepreneurial Finance and Business Ventures, De Paul University Chicago, Illinois.

Penrose, Edith. 1952. Biological Analogies in the Theory of the Firm. *American Economic Review* 42(5): 804-819.

Peterson, Mitchell and Raghuram Rajan. 1994. The Benefits of Lending Relationships: Evidence from Small Business Data. *Journal of Finance* 49(1): 3-37.

Pindyck, Robert S. and Daniel L. Rubinfeld. 2004. *Econometric Models and Economic Forecasts.* McGraw-Hill.

Prowse, Stephen (1998). Angel Investors and the Market for Angel Investments. *Journal of Banking and Finance* 22: 785-792.

Rajan, Raghuram 1992. Insiders and Outsiders: the Choice between Informed and arm's Length Debt. *Journal of Finance* 47(4): 1367-1400.

Rajan, R. and L. Zingales. 1995. What Do You Know about Capital Structure? Some evidence from International Data. *Journal of Finance* 50(5): 1421-1460.

Ritter, Jay. 2003. *The Windows of Opportunity Theory of Capital Structure*. FMA Meeting.

Robb, Alicia. 2002. Small Business Financing: Differences Between Young and Old Firms. *Journal of Entrepreneurial Finance and Business Venture,* November.

Sahlman, W.A..1990. The Structure and Governance of Venture-Capital Organizations. *Journal of Financial Economics* 473-521.

Scherr, Frederick and Heather Hulburt. 2001. The Debt Maturity Structure of Small Firms. *Financial Management* 30(1): 85-111.

Shyam-Sunder, Lakshmi and Stewart Myers. 1999. Testing Static Tradeoff against Pecking Order Models of Capital Structure. *Journal of Financial Economics* 51: 219-244.

Smith, C. 1977. Alternative Methods for Raising Capital: Rights Versus Underwritten offerings. *Journal of financial Economics* 5: 273-307.

Stohs, Mark and David Mauer. 1996. The Determinants of Corporate Debt Maturity Structure. *Journal of Business* 69(3): 279-312.

Titman, S. a. R. Wessel. 1988. The Determinants of Capital Structure Choice. *Journal of Finance* 43(1): 1-19.

White, Halbert. 1980. A Heteroskedasticity-Consistent Covariance Matrix Estimator and a Direct Test for Heteroskedasticity. *Econometrica* 48 : 817-838.

Wokukwu, Kingley. 2000. *Life Cycle and Capital Structure: Some Empirical Evidence*. 9968180 DBA Dissertation UMI # 9968180.

Wu, Xueping and Zheng Wang. 2005. Equity Financing in a Myers-Majluf Framework with Private Benefits of Control. *Journal of Corporate Finance* 11(5): 915-945.

**Table 1**

Expectations of firm-year variables

| | Life-cycle variables | | |
|---|---|---|---|
| **Life-cycle stages** | **Dividend payout** [35] | **Sales growth**[36] | **Age** |
| Growth | Low | High | Young |
| Mature | Medium | Medium | Adult |
| Decline | High | Low | Old |

[35] $D_t = Div_t / E_t$ , where $Div_t$ denotes common dividend in year *t* and $E_t$ denotes income in year *t*.

[36] $SG_t = \left(Sales_t - Sales_{t-1}\right) / Sales_{t-1}$

**Table 2**
This table presents the descriptive statistics for the life cycle variables used to classify firms into their stage of life cycle, excluding start-ups included in Table 5

| Variable | Observations | Mean | Median | 25th percentile | 75th percentile |
|---|---|---|---|---|---|
| | | Panel A : Growth | | | |
| Median sales growth | 1010 | 0,269 | 0,212 | 0,157 | 0,316 |
| Median dividend payout | 1010 | 0,000 | 0,000 | 0,000 | 0,000 |
| Age | 1010 | 14,096 | 13,000 | 11,000 | 16,000 |
| | | Panel B : Mature | | | |
| Median sales growth | 3983 | 0,117 | 0,094 | 0,038 | 0,157 |
| Median dividend payout | 3983 | 0,239 | 0,000 | 0,000 | 0,159 |
| Age | 3983 | 24,509 | 21,000 | 16,000 | 29,000 |
| | | Panel C : Decline | | | |
| Median sales growth | 1090 | 0,031 | 0,033 | -0,001 | 0,074 |
| Median dividend payout | 1090 | 0,509 | 0,300 | 0,077 | 0,603 |
| Age | 1090 | 38,365 | 34,000 | 28,000 | 44,000 |

**Table 3**
This table presents the number of firms year observations for each year by life-cycle stage

| Year | Start-ups | Growth | Mature | Decline | All firms |
|---|---|---|---|---|---|
| 1995 | 4 | 0 | 0 | 0 | 4 |
| 1996 | 12 | 0 | 0 | 0 | 12 |
| 1997 | 42 | 0 | 0 | 0 | 42 |
| 1998 | 48 | 0 | 0 | 0 | 48 |
| 1999 | 56 | 169 | 581 | 149 | 955 |
| 2000 | 74 | 174 | 610 | 155 | 1.013 |
| 2001 | 92 | 191 | 698 | 172 | 1.153 |
| 2002 | 93 | 219 | 914 | 247 | 1.473 |
| 2003 | 97 | 257 | 1.180 | 367 | 1.901 |
| All | 518 | 1.010 | 3.983 | 1.090 | 6.601 |

**Table 4**

Where industry 1: Agriculture forestry amd mining; Industry 2: Manufacturing; Industry 3: Construction; Industry 4: Wholsesale and retail trade; Industry 5: Hotels and restaurants; Industry 6: Transport and Comunications; Industry 7: Business services; Industry 8: Education health

| Industry | Start-ups | Growth | Mature | Decline | All firms |
|---|---|---|---|---|---|
| 1 | 15 | 24 | 62 | 37 | 138 |
| 2 | 222 | 382 | 1682 | 608 | 2894 |
| 3 | 43 | 221 | 567 | 60 | 891 |
| 4 | 116 | 181 | 952 | 227 | 1476 |
| 5 | 10 | 40 | 175 | 15 | 240 |
| 6 | 19 | 37 | 154 | 64 | 274 |
| 7 | 77 | 108 | 311 | 64 | 560 |
| 8 | 2 | 1 | 16 | 3 | 22 |
| 9 | 14 | 16 | 64 | 12 | 106 |
| All | 518 | 1010 | 3983 | 1090 | 6601 |

**Table 5**

Sample characteristics across the life cycle of firms. Total debt ratio is defined as total debt to book value of assets. Long term debt ratio is defined as total long term debt to book value of assets. Short term debt is defined as short term debt to book value of assets. Profitability is pre-interest, pre-tax and pre-extraordinary items earnings divided by total assets. Size is the natural logarithm of sales.Growth is the percentage increase of total sales. Intangibility is defined as intangible assets to total assets. Asset structure is total fixed assets divided by total assets. Listed dummy assumes the value 1 if the firm is listed and the value of 0 otherwise. Firms year observations are grouped across the life cycle based on the methodology described in section 3.2

| Variable | Observations | Fraction | Mean | Standard deviation | Minimum | Maximum |
|---|---|---|---|---|---|---|
| | | | Panel A : Start up | | | |
| Debt ratio | 518 | n.a. | 0,270 | 0,190 | 0,000 | 0,830 |
| Long term debt ratio | 518 | n.a. | 0,150 | 0,167 | 0,000 | 0,736 |
| Short term debt ratio | 518 | n.a. | 0,120 | 0,119 | 0,000 | 0,560 |
| Profitability | 518 | n.a. | 0,056 | 0,116 | -0,482 | 0,656 |
| Size | 518 | n.a. | 16,810 | 1,347 | 11,376 | 21,143 |
| Growth | 518 | n.a. | 0,357 | 0,573 | -0,995 | 2,811 |
| Intangibility | 518 | n.a. | 0,065 | 0,108 | 0,000 | 0,576 |
| Asset structure | 518 | n.a. | 0,251 | 0,226 | 0,000 | 0,975 |
| Listed dummy | 518 | 0,000% | n.a. | n.a. | n.a. | n.a. |
| Percentage of Portuguese firms | 518 | 10,618% | n.a. | n.a. | n.a. | n.a. |
| | | | Panel B : Growth | | | |
| Debt ratio | 1010 | n.a. | 0,279 | 0,175 | 0,000 | 0,854 |
| Long term debt ratio | 1010 | n.a. | 0,113 | 0,129 | 0,000 | 0,779 |
| Short term debt ratio | 1010 | n.a. | 0,166 | 0,137 | 0,000 | 0,596 |
| Profitability | 1010 | n.a. | 0,069 | 0,080 | -0,351 | 0,806 |
| Size | 1010 | n.a. | 16,812 | 1,025 | 13,406 | 22,037 |
| Growth | 1010 | n.a. | 0,203 | 0,334 | -0,781 | 2,918 |
| Intangibility | 1010 | n.a. | 0,048 | 0,090 | 0,000 | 0,730 |
| Asset structure | 1010 | n.a. | 0,239 | 0,196 | 0,000 | 0,954 |
| Listed dummy | 1010 | 0,500% | n.a. | n.a. | n.a. | n.a. |
| Percentage of Portuguese firms | 1010 | 3,960% | n.a. | n.a. | n.a. | n.a. |
| | | | Panel C : Mature | | | |
| Debt ratio | 3983 | n.a. | 0,255 | 0,174 | 0,000 | 0,963 |
| Long term debt ratio | 3983 | n.a. | 0,104 | 0,121 | 0,000 | 0,860 |
| Short term debt ratio | 3983 | n.a. | 0,152 | 0,138 | 0,000 | 0,806 |
| Profitability | 3983 | n.a. | 0,067 | 0,080 | -0,532 | 0,869 |
| Size | 3983 | n.a. | 16,733 | 1,168 | 8,934 | 23,274 |
| Growth | 3983 | n.a. | 0,088 | 0,271 | -1,000 | 2,955 |
| Intangibility | 3983 | n.a. | 0,036 | 0,065 | 0,000 | 0,666 |
| Asset structure | 3983 | n.a. | 0,231 | 0,185 | 0,000 | 0,965 |
| Listed dummy | 3983 | 0,700% | n.a. | n.a. | n.a. | n.a. |
| Percentage of Portuguese firms | 3983 | 5,900% | n.a. | n.a. | n.a. | n.a. |

| | | | | | | |
|---|---|---|---|---|---|---|
| Panel D : Decline | | | | | | |
| Debt ratio | 1090 | n.a. | 0.223 | 0.159 | 0.000 | 0.761 |
| Long term debt ratio | 1090 | n.a. | 0.093 | 0.112 | 0.000 | 0.704 |
| Short term debt ratio | 1090 | n.a. | 0.130 | 0.119 | 0.000 | 0.693 |
| Profitability | 1090 | n.a. | 0.066 | 0.079 | -0.486 | 0.613 |
| Size | 1090 | n.a. | 16.668 | 1.216 | 11.576 | 22.449 |
| Growth | 1090 | n.a. | 0.018 | 0.159 | -0.909 | 0.891 |
| Intangibility | 1090 | n.a. | 0.035 | 0.074 | 0.000 | 0.608 |
| Asset structure | 1090 | n.a. | 0.275 | 0.196 | 0.000 | 0.913 |
| Listed dummy | 1090 | 2.200% | n.a. | n.a. | n.a. | n.a. |
| Percentage of Portuguese firms | 1090 | 8.991% | n.a. | n.a. | n.a. | n.a. |
| Panel E : All observations | | | | | | |
| Debt ratio | 6601 | n.a. | 0.255 | 0.174 | 0.000 | 0.963 |
| Long term debt ratio | 6601 | n.a. | 0.107 | 0.126 | 0.000 | 0.860 |
| Short term debt ratio | 6601 | n.a. | 0.148 | 0.134 | 0.000 | 0.806 |
| Profitability | 6601 | n.a. | 0.067 | 0.083 | -0.532 | 0.869 |
| Size | 6601 | n.a. | 16.740 | 1.172 | 8.934 | 23.274 |
| Growth | 6601 | n.a. | 0.115 | 0.315 | -1.000 | 2.955 |
| Intangibility | 6601 | n.a. | 0.040 | 0.076 | 0.000 | 0.730 |
| Asset structure | 6601 | n.a. | 0.241 | 0.193 | 0.000 | 0.975 |
| Listed dummy | 6601 | 0.900% | n.a. | n.a. | n.a. | n.a. |
| Percentage of Portuguese firms | 6601 | 6.484% | n.a. | n.a. | n.a. | n.a. |

**Table 6**

Sample characteristics across the life cycle of firms. Total debt ratio is defined as total debt to book value of assets. Long term debt ratio is defined as total long term debt to book value of assets. Short term debt is defined as short term debt to book value of assets. Profitability is pre-interest, pre-tax and pre-extraordinary items earnings divided by total assets. Size is the natural logarithm of sales.Growth is the percentage increase of total sales. Intangibility is defined as intangible assets to total assets. Asset structure is total fixed assets divided by total assets. Listed dummy assumes the value 1 if the firm is listed and 0 otherwise. Firms year observations are grouped across the life cycle based on the methodology described in section 3.2

| Variable | Start up | Growth | Mature | Decline | F statistic |
|---|---|---|---|---|---|
| Debt ratio | 0,270 | 0,279 | 0,255 ††† | 0,223 ††† | 19,737 *** |
| Long term debt ratio | 0,150 | 0,113 ††† | 0,104 †† | 0,093 ††† | 26,315 *** |
| Short term debt ratio | 0,120 | 0,166 ††† | 0,152 ††† | 0,130 ††† | 21,647 *** |
| Profitability | 0,056 | 0,069 †† | 0,067 | 0,066 | 2,983 ** |
| Size | 16,810 | 16,812 | 16,733 ††† | 16,668 ††† | 271481 *** |
| Growth | 0,357 | 0,203 ††† | 0,088 ††† | 0,018 ††† | 188,002 *** |
| Intangibility | 0,065 | 0,048 ††† | 0,036 ††† | 0,035 | 27,904 *** |
| Asset structure | 0,251 | 0,239 | 0,231 | 0,275 ††† | 15,630 *** |
| Listed dummy | 0,000 | 0,006 ††† | 0,008 | 0,023 ††† | 9,632 *** |
| Observations | 517 | 1.010 | 3.983 | 1.090 | |

Significant difference at 1percent, 5 percent and 10 percent level for one-sided tests are marked †††, †† and † respectively.
We performed a ANOVA test and variables are significantly different at 1 percent, 5 percent and 10 percent level and are marked ***, ** and *, respectively.

**Table 7**
Means of variables by industry
Where industry 1: Agriculture forestry amd mining; Industry 2: Manufacturing; Industry 3: Construction; Industry 4: Wholsesale and retail trade; Industry 5: Hotels and restaurants; Industry 6: Transport and Comunications; Industry 7: Business services; Industry 8: Education health and social work and Industry 9: Others.

| **Variable** | **Industry** | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | **1** | **2** | **3** | **4** | **5** | **6** | **7** | **8** | **9** | **F statistic** |
| Debt ratio | 0,265 | 0,256 | 0,217 | 0,262 | 0,257 | 0,279 | 0,269 | 0,321 | 0,268 | 7,398 *** |
| Long term debt ratio | 0,123 | 0,108 | 0,075 | 0,077 | 0,154 | 0,176 | 0,155 | 0,248 | 0,160 | 51,310 *** |
| Short term debt ratio | 0,143 | 0,148 | 0,141 | 0,185 | 0,102 | 0,102 | 0,113 | 0,074 | 0,109 | 29,053 *** |
| Profitability | 0,065 | 0,070 | 0,062 | 0,066 | 0,043 | 0,052 | 0,077 | 0,061 | 0,059 | 5,737 *** |
| Size | 15,956 | 16,800 | 16,753 | 16,762 | 16,786 | 16,556 | 16,649 | 15,901 | 16,827 | 11,682 *** |
| Growth | 0,105 | 0,093 | 0,205 | 0,098 | 0,072 | 0,129 | 0,132 | 0,079 | 0,155 | 12,808 *** |
| Intangibility | 0,031 | 0,038 | 0,035 | 0,024 | 0,064 | 0,104 | 0,046 | 0,124 | 0,113 | 55,524 *** |
| Tangibility | 0,402 | 0,284 | 0,121 | 0,174 | 0,341 | 0,356 | 0,216 | 0,530 | 0,350 | 150,508 *** |
| Number of observations | 138 | 2894 | 891 | 1476 | 240 | 274 | 560 | 22 | 106 | |

We performed a ANOVA test and variables are significantly different at 10 percent, 5 percent and 1 percent and are marked *, ** and ***, respectively.

**Table 8**
Expected and reported signs to parameters of variables included in the multiple regression analysis

| Independent variable | Specification | Predicted Coefficient sign | Sign of parameter estimated |
|---|---|---|---|
| | Panel A: Total debt ratio | | |
| Profitability | Pre-interest, pre-tax and pre-extraordinary items earnings divided by total net assets | - | - |
| Size | Logarithm of sales | + | - |
| Past Growth | Percentage variation of total sales | - | - |
| Future growth opportunities | Intangible assets to total net assets | - | + |
| Asset structure | Total fixed assets divided by total net assets | + | + |
| Listed | Dummy variable (1 for listed firms, 0 otherwise) | | + |
| | Panel B: Long term debt ratio | | |
| Profitability | Pre-interest, pre-tax and pre-extraordinary items earnings divided by total net assets | - | - |
| Size | Logarithm of sales | + | - |
| Past Growth | Percentage variation of total sales | - | + |
| Future growth opportunities | Intangible assets to total net assets | - | + |
| Asset structure | Total fixed assets divided by total net assets | + | + |
| Listed | Dummy variable (1 for listed firms, 0 otherwise) | | + |
| | Panel C: Short term debt ratio | | |
| Profitability | Pre-interest, pre-tax and pre-extraordinary items earnings divided by total net assets | - | - |
| Size | Logarithm of sales | - | - |
| Past Growth | Percentage variation of total sales | + | - |
| Future growth opportunities | Intangible assets to total net assets | + | + |
| Asset structure | Total fixed assets divided by total net assets | + | + |
| Listed | Dummy variable (1 for listed firms, 0 otherwise) | | + |

**Table 9**
Expected and reported signs to parameters of variables included in the multiple regression analysis

| Independent variable | Specification | Predicted Coefficient sign | Sign of parameter estimated | | | |
|---|---|---|---|---|---|---|
| | | | Start-up | Growth | Mature | Decline |
| Panel A: Total debt ratio | | | | | | |
| Profitability | Pre-interest, pre-tax and pre-extraordinary items earnings divided by total net assets | - | - | - | - | - |
| Size | Logarithm of sales | + | + | + | + | - |
| Past Growth | Percentage variation of total sales | - | - | + | - | + |
| Future growth opportunities | Intangible assets to total net assets | - | + | + | + | + |
| Asset structure | Total fixed assets divided by total net assets | + | + | + | + | + |
| Listed | Dummy variable (1 for listed firms, 0 otherwise) | | - | - | + | + |
| Panel B: Long term debt ratio | | | | | | |
| Profitability | Pre-interest, pre-tax and pre-extraordinary items earnings divided by total net assets | - | + | - | - | - |
| Size | Logarithm of sales | + | + | + | - | - |
| Past Growth | Percentage variation of total sales | - | - | + | + | + |
| Future growth opportunities | Intangible assets to total net assets | - | + | + | + | + |
| Asset structure | Total fixed assets divided by total net assets | + | + | + | + | + |
| Listed | Dummy variable (1 for listed firms, 0 otherwise) | | + | + | + | + |
| Panel C: Short term debt ratio | | | | | | |
| Profitability | Pre-interest, pre-tax and pre-extraordinary items earnings divided by total net assets | - | - | + | - | - |
| Size | Logarithm of sales | - | - | + | + | - |
| Past Growth | Percentage variation of total sales | + | - | - | - | - |
| Future growth opportunities | Intangible assets to total net assets | + | - | + | + | + |
| Asset structure | Total fixed assets divided by total net assets | + | - | + | + | + |
| Listed | Dummy variable (1 for listed firms, 0 otherwise) | | - | - | + | + |

**Table 10**

Total debt ratio is defined as total debt to book value of assets. Long term debt ratio is defined as total long term debt to book value of assets. Short term debt is defined as short term debt to book value of assets. Profitability is pre-interest, pre-tax and pre-extraordinary items earnings divided by total assets. Size is the natural logarithm of sales.Growth is the percentage increase of total sales. Intangibility is defined as intangible assets to total assets. Asset structure is total fixed assets divided by total assets. Listed dummy assumes the value 1 if the firm is listed and 0 otherwise. Firms year observations are grouped across the life cycle based on the methodology described in section 3.2

| | | **Start-ups** | **Growth** | **Mature** | **Decline** | **All firms** |
|---|---|---|---|---|---|---|
| Panel A: Total debt | | | | | | |
| Constant | | -1,036 *** | -0,821 *** | -0,274 *** | 0,789 *** | 0,533 *** |
| | | (0,028) | (0,069) | (0,046) | (0,055) | (0,029) |
| Profitability | $X_1$ | -0,062 | -0,027 | -0,736 *** | -0,792 *** | -0,511 *** |
| | | (0,038) | (0,038) | (0,032) | (0,077) | (0,029) |
| Size | $X_2$ | 0,073 *** | 0,054 *** | 0,025 *** | -0,047 *** | -0,026 *** |
| | | (0,002) | (0,004) | (0,003) | (0,003) | (0,002) |
| Growth | $X_3$ | -0,078 | 0,388 | -0,093 | 2,599 | -0,108 |
| | | (0,323) | (0,270) | (0,712) | (1,860) | (0,670) |
| Intangibility | $X_4$ | 0,298 *** | 0,973 *** | 0,257 *** | 4,299 *** | 1,164 *** |
| | | (0,050) | (0,086) | (0,062) | (0,121) | (0,055) |
| Tangibility | $X_5$ | 0,243 *** | 0,491 *** | 0,226 *** | 0,287 *** | 0,286 *** |
| | | (0,020) | (0,020) | (0,015) | (0,029) | (0,011) |
| Listed ou unlisted | $X_6$ | | -0,177 *** | -0,139 *** | 0,059 | 0,113 * |
| | | | (0,055) | (0,053) | (0,252) | (0,059) |
| N | | 518 | 1010 | 3980 | 1090 | 6598 |
| F-Statistic | | 717,767 | 208,634 *** | 368,017 *** | 540,353 *** | 608,853 *** |
| Panel B: Long term debt ratio | | | | | | |
| Constant | | -1,543 *** | -0,074 * | 0,096 *** | 0,552 *** | 0,393 *** |
| | | (0,029) | (0,041) | (0,023) | (0,069) | (0,022) |
| Profitability | $X_1$ | 0,054 | -0,063 *** | -0,405 *** | -0,630 *** | -0,413 *** |
| | | (0,038) | (0,023) | (0,016) | (0,095) | (0,022) |
| Size | $X_2$ | 0,092 *** | 0,004 | -0,002 | -0,033 *** | -0,021 *** |
| | | (0,002) | (0,002) | (0,001) | (0,004) | (0,001) |
| Growth | $X_3$ | -0,026 | 0,416 *** | 0,441 | 3,548 | 0,481 |
| | | (0,326) | (0,160) | (0,350) | (2,313) | (0,503) |
| Intangibility | $X_4$ | 0,505 *** | 0,791 *** | 0,210 *** | 2,529 *** | 1,078 *** |
| | | (0,050) | (0,051) | (0,030) | (0,151) | (0,041) |
| Tangibility | $X_5$ | 0,439 *** | 0,233 *** | 0,118 *** | 0,173 *** | 0,173 *** |
| | | (0,020) | (0,012) | (0,008) | (0,036) | (0,008) |
| Listed ou unlisted | $X_6$ | | 0,075 ** | 0,008 | 0,025 | 0,077 * |
| | | | (0,033) | (0,026) | (0,313) | (0,044) |
| N | | 518 | 1010 | 3980 | 1090 | 6598 |
| F-Statistic | | 1242,273 *** | 229,284 | 413,320 *** | 143,742 *** | 634,275 *** |

| Panel C: Short term debt ratio | | | | | | |
|---|---|---|---|---|---|---|
| Constant | | 0.884 *** | 0.348 *** | 1.703 *** | 0.832 *** | 0.533 *** |
| | | (0.0000) | (0.0000) | (0.0000) | (0.0000) | (0.0000) |
| Profitability | $X_1$ | -1.595 ** | -0.662 ** | -0.274 *** | -0.917 *** | -1.036 *** |
| | | (0.0130) | (0.0426) | (0.0000) | (0.0000) | (0.0000) |
| Size | $X_2$ | -0.041 *** | -0.005 | -0.094 *** | -0.039 *** | -0.021 *** |
| | | (0.0000) | (0.1392) | (0.0000) | (0.0000) | (0.0000) |
| Past growth | $X_3$ | 0.000 | -0.007 *** | 0.008 *** | 1.678 *** | 0.708 *** |
| | | (0.1739) | (0.0000) | (0.0000) | (0.0060) | (0.0002) |
| Future growth | $X_4$ | -0.107 | -0.153 *** | -13.248 | 0.061 *** | 0.437 *** |
| | | (0.2950) | (0.0094) | (0.6815) | (0.0000) | (0.0000) |
| Asset structure | $X_5$ | -0.191 *** | -0.200 *** | -0.101 *** | -0.158 *** | -0.113 *** |
| | | (0.0001) | (0.0000) | (0.0000) | (0.0000) | (0.0000) |
| Listed ou unlisted | $X_6$ | | -0.123 | 0.024 ** | -0.080 | -0.071 |
| | | | (0.3996) | (0.0302) | (0.2382) | (0.1608) |
| N | | 518 | 1010 | 3983 | 1090 | 6601 |
| F-Statistic | | 16.854 *** | 85.449 *** | 771.97 *** | 473.600 *** | 1013.729 *** |

*, **, *** significant at the 10 percent, 5 percent and 1 percent level

**Table 11**
This table presents pair-wise correlations (include all observations)

| Variable | | D | LTD | STD | $X_1$ | $X_2$ | $X_3$ | $X_4$ | $X_5$ | $X_6$ |
|---|---|---|---|---|---|---|---|---|---|---|
| Debt ratio | D | 1.000 | | | | | | | | |
| Long term debt ratio | LTD | 0.636 | 1.000 | | | | | | | |
| Short term debt ratio | STD | 0.697 | -0.109 | 1.000 | | | | | | |
| Profitability | $X_1$ | -0.164 | -0.127 | -0.094 | 1.000 | | | | | |
| Size | $X_2$ | -0.011 | 0.107 | -0.114 | -0.077 | 1.000 | | | | |
| Past growth | $X_3$ | -0.016 | -0.007 | -0.014 | 0.135 | 0.010 | 1.000 | | | |
| Future growth | $X_4$ | 0.199 | 0.263 | 0.012 | -0.041 | -0.021 | -0.001 | 1.000 | | |
| Asset structure | $X_5$ | 0.087 | 0.269 | -0.138 | -0.090 | 0.121 | -0.020 | -0.044 | 1.000 | |
| Listed ou unlisted | $X_6$ | 0.037 | 0.095 | -0.040 | -0.008 | 0.174 | -0.002 | -0.003 | 0.053 | 1.000 |