



UNIVERSIDADE CATÓLICA PORTUGUESA

Investors along the Company Life-cycle

Evidence for Portugal

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by

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Resumo

Este trabalho de pesquisa examina a presença dos investidores ao longo do ciclo-de-vida das empresas portuguesas, juntamente com a estrutura de capital e acionista. Recorrendo a exemplos estilizados do ciclo financeiro das empresas, existentes nas obras de Berger e Udell (1998) e Caselli (2009), foi possível criar um exemplo alternativo que estabelece previsões para o sequenciamento dos investidores ao longo do desenvolvimento das empresas. Variáveis de tamanho e idade das sociedades financiadas são comparadas e usadas para situar cada tipo de investidor.

A análise empírica realizada mostra que, à medida que as empresas crescem e envelhecem, a estrutura acionista e de capital altera-se. De modo geral, a presença dos investidores externos cresce. Tal faz-se notar pelo aumento do nível de dívida, em percentagem da totalidade do capital investido, enquanto a participação de investidores externos no capital próprio também aumenta. Por último, os investidores identificados no ciclo-de-vida, tendem a financiar empresas nas fases de desenvolvimento esperadas segundo a literatura.

Palavras-chave (max. 5): Business angels; Venture capital; Private equity; Mercado acionista; Mercado obrigacionista

Abstract

This research work examines the presence of several investor types along the life-cycle of Portuguese firms, alongside the shareholder and capital structure. By using stylized financial growth cycles found in Berger and Udell (1998) and Caselli (2009), it was possible to build an alternative example that sets predictions for the sequencing of investors in the development of firms. Size and age variables of financed Portuguese companies are compared and used to situate each investor type.

The empirical analysis shows that, as firms become larger and older, the shareholder and capital structure change. Overall, outside investors increase their presence over the life-cycle. The level of debt tends to grow in the global structure, while, at the same time, the participation of outside investors in the equity also rises. Finally, investors tend to finance companies in the stages of development as expected by literature.

Keywords: Business angels; Venture capital; Private equity; Public equity; Public Debt

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Introduction

It is generally accepted that firms progress through various stages in their life. As companies become older and larger, their characteristics and ambitions change (Berger & Udell, 1998; Caselli, 2009; Capizzi, 2004). These issues influence considerably the presence of investors in each stage. According to Berger and Udell (1998) and Caselli (2009), at inception, firms require funding for the development of a business idea and are informationally opaque. In such cases, founders are the largest source of finance available. If the company is innovative and has high growth potential, business angels and, in a later stage, venture capitalists may provide funding and relevant expertise. These early outside equity investors develop mechanisms enabling them to reduce risks derived from informational asymmetries, characteristic of small young firms. On the debt side, financial lenders present themselves as flexible sources of finance, purveying debt to companies from small to large ones (Berger & Udell, 1998; Saldenberg and Strahan, 1999). As firms continue to grow, other investors and forms of finance become available. Private equity is typically involved with funding expansion in later stages, but also structuring governance and corporate finance deals (Caselli, 2009). When companies become mature, relationships developed over time with financial institutions, auditors and business partners leads to reduced informational asymmetries, between insiders and outside investors. This greater transparency allows firms to access the public, equity and

debt, markets without being seriously penalized by investor fear over moral hazard and adverse selection (Berger & Udell, 1998; Pagano et al., 1998).

Considerable work has been developed over time on the topic of sources of finance over the company life-cycle. The article “The economics of small business finance: The roles of private equity and debt markets in the financial growth cycle”, by Allen Berger and Gregory Udell (1998), is possibly the most important piece of literature on the subject. In it, Berger & Udell (1998), review the literature on the various actors intervening in the private equity and debt market. They also provide some analysis on United States data, from 1993, regarding the sources of small business finance and how capital structure varies with size and age.

To the best knowledge of the author of this research, such analysis has never been done to the Portuguese corporate reality. Which raises the question: how do investors position themselves in the life-cycle of Portuguese companies? Having an answer to this will contribute to the understanding of investors’ profiles, and how their activity may be leveraged to benefit Portuguese businesses. By knowing which are the sources of finance most adapted to deal with the risks and objectives of a firm, in a given stage of the life-cycle, companies can learn to identify them and search for funding in a way that maximizes the possibility of successfully obtaining it.

The adopted procedure to answer the research question involved three steps. The first proposed a definition for the company life-cycle and a positioning for the investors involved in every stage, according to literature. Two important proposals were detected, the financial growth cycle (Berger & Udell, 1998), and the Map of Equity Investment: An investor’s perspective (Caselli, 2009)¹. In order to combine the advantages of each, it was believed to be appropriate to develop

¹ The book by Caselli (2009), “Private Equity and Venture Capital in European: Markets, Techniques, and Deals”, was essential as a bibliographic source for the research work as a whole.

an alternative one. The second step describes and places, on a theoretical background, the investors present in the life-cycle. The sequence in which they are approached is based on the third alternative proposal defined previously. The final step uses empirical data from year-end 2014, to test indications coming from literature to Portugal's case.

Two main sources of data were used: SABI and DATASTREAM: Thomson Reuters. Data on firms' turnover, total assets, financial debt, equity book value and shareholder structure was retrieved from SABI. DATASTREAM: Thomson Reuters was used to detect Portuguese firms, with outstanding bond issues in the public debt market, at the 31st of December 2014. The sample was selected following indications from Berger & Udell (1998), which had removed from their own sample businesses related to farming, financial and real-estate, but also not-for-profit institutions, government entities and subsidiaries controlled by other corporations. Additionally, companies with negative equity were excluded as well. The final result was a sample containing 175 276 Portuguese firms.

The conducted tests are separated in two. The first part performs a cross-sectional analysis to the shareholder and capital structure of companies, which are ordered and separated first by firm size, measured as the value of total assets, and then by age. Such analysis will not only provide insight on how financing sources change as firms grow larger and older, but also some evidence on how the reduction of informational asymmetries has a positive effect on investment by outsiders. Afterwards, investors established in the life-cycle are sequenced by size and age values of the companies each type financed. This will allow to understand if they follow the same order, and target the same type of firms, as indicated in literature. The use of variables of firm size and age are intended to serve as proxies for the life stage a company is at. However, some firms, for example, may reach a mature stage in less years than others, or be smaller and yet be more advanced in the life-cycle. Size and age are clearly not perfect

indicators, nevertheless they are used by Berger and Udell (1998) , and other sources in literature (Bolton and Freixas, 2000; Pagano et al., 1998). Since no other alternative seemed adequate, they were adopted here too.

Overall, results follow expectations coming from literature. Regarding the shareholder structure, evidence for Portuguese firms seems to indicate that as they become larger, the equity percentage held by entities other than individuals or families, grows substantially. However, when companies are organized by age, results are mixed. Above the mark of 10 years of age, the presence of outside equity investors increases generally, but shareholders named as individuals appear to be dominant for every age level. The capital structure broadly shows a rise of the percentage of debt as companies become larger and older, with the exception of the ones listed in the public equity market. At last, investors present in the proposed life-cycle do seem to finance Portuguese firms in the expected order of sizes and ages.

The remaining of this research work is structured in four sections. Chapter 1 overviews the work performed by Berger & Udell (1998) and Caselli (2009). It presents the authors' propositions for a stylized scheme of the company life-cycle, and the investors involved. Additionally, an alternative hypothesis for the life-cycle is also provided, which combines features of the previous two, and will be used as a guideline thenceforth. In chapter 2, the theoretical framework chosen to answer the research question is discussed. Predictions are made, based on literature, of how and where investors are positioned in the life-cycle. In the following section, empirical data on Portuguese firms is presented. Finally, main conclusions are presented at the end.

Chapter 1. Company Life-cycle

Having settled the goal of positioning and describing some of the various sources of finance along the company life-cycle, it is crucial to determine this research work's theoretical cornerstones. At this level, the article from Berger & Udell (1998) and the book written by Caselli (2009) stand out. The objective in this section is to show the proposals for the company life-cycle, and the investors involved at every stage, as presented by the authors. Then, given that there are two different, but not diverging, proposals it was considered pertinent to offer a definitive one to be adopted specifically for this research work. The way in which investors are sequenced, sets not only the order of approach in chapter 2, but also predictions, based on literature, on how they are positioned in the Portuguese corporate context.

1.1. Berger & Udell (1998) Financial Growth cycle

In the article by Berger and Udell (1998), the small business finance landscape is the centre piece for the analysis of finance sources and capital structure of firms considered to be in the initial stages of the life-cycle. By exploring US small business data from 1993, the authors are able to “show the sources of small business finance, and how capital structure varies with firm size and age”. To explain these variations, the focus is primarily in the informational opacity that characterises

small firms, the adverse selection and moral hazard style problems that it raises, and the mechanisms, used by investors and financial intermediaries, to resolve them.

The figure below (Figure 1), presented by Berger and Udell (1998), means to represent a stylized version of the financial growth cycle firms are supposed to go through. The authors explain that as firms grow bigger and older, they become more visible and reputable, which in turn helps to dilute informational problems, and grants them access to sources of finance that would otherwise be out of reach.

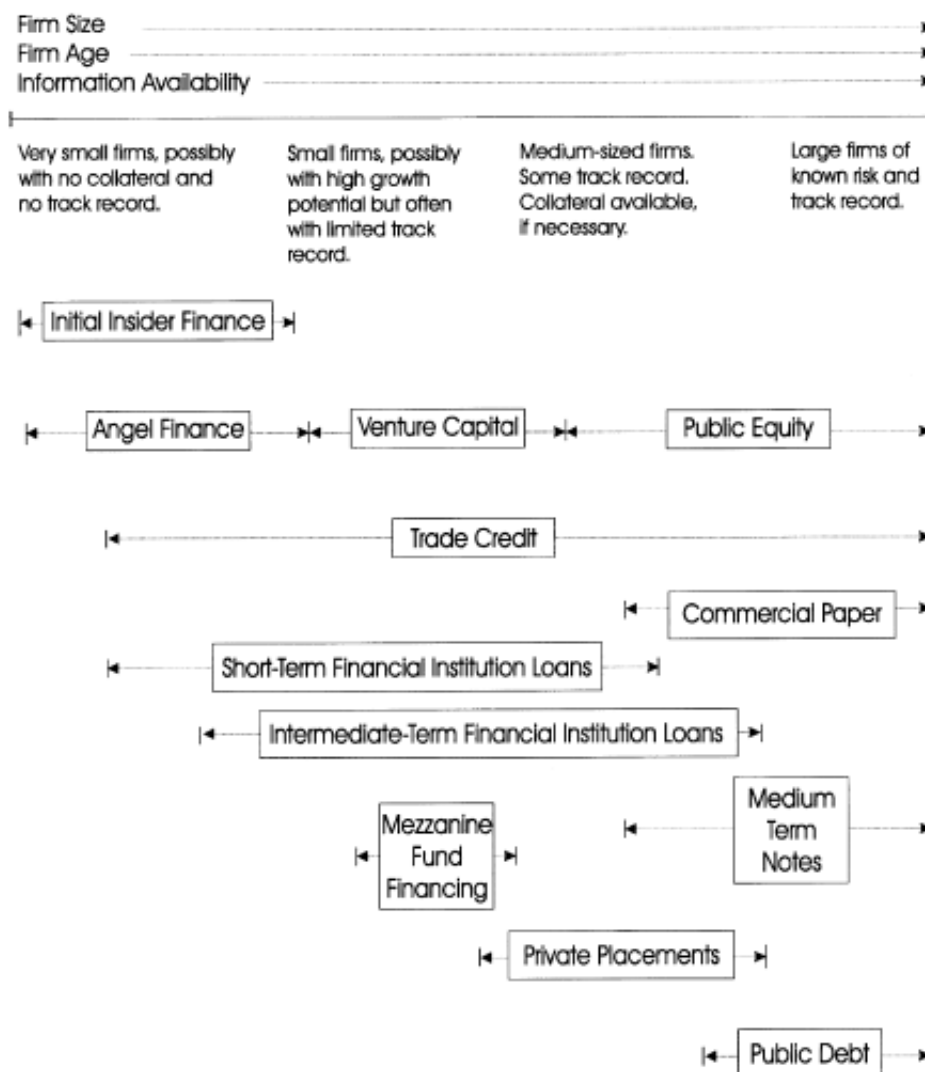


Figure 1: Firm continuum and sources of finance, retrieved from Berger & Udell (1998), page 623

1.2. Caselli (2009) Map of Equity Investment: An investor's perspective

Unlike Berger and Udell (1998), Caselli (2009) does not approach directly the topic of company development through the life-cycle. His work focuses in the activity of venture capital and private equity investors. However, as the author points out, these investors represent only one of the various options when it comes to financing a company. In the author's perspective, profitability, investment needs, sales growth and cash flow generation are characteristics that are key in determining the most appropriate source of finance for any company. This results from the fact that different investors develop profiles that are heterogeneous, and therefore have a preference for firms with certain features that correspond to a determined stage of the life-cycle. By combining the diverse stages in the development of a firm and investor types, a scheme of capital investment availability arises (Figure 2). This scheme is the proposal of Caselli (2009) for the financial growth cycle.

Investor types \ Firm stages	Founder & Family	Other Partners	Business Angels	Private Equity	Banks	Trade Credit	Financial Market
Development	Dark	Light	Light	Light	White	White	White
Start Up	Dark	Dark	Dark	Dark	White	White	White
Early Growth	White	White	White	Light	Dark	White	White
Rapid Growth	White	White	White	Light	Light	Light	White
Mature Age	White	White	White	Light	Light	Light	Light
Crisis or Decline	Light	Light	White	Dark	Dark	White	White

Figure 2: Map of Equity Investment: An investor's perspective, retrieved from Caselli (2009), page

1.3. Sources of finance along the company life-cycle

The reason why both proposals are here included is that even though they address the same issue, which is to show the change in sources of finance and capital structure along the life-cycle of companies, they do so distinctively and in a non-opposing manner at the same time. Figure 1, retrieved from Berger and Udell (1998), enhances the relationship between the three perspectives of firm age, size and information availability with investors and sources of finance, while giving it a sense of flow and interconnectedness. The proposal from Caselli (2009) (Figure 2) makes a simpler, and more direct approach to the positioning of investors along the different stages of the life-cycle. The author clearly identifies the different phases, simplifies the order and the presence of financing sources, and discriminates the areas where each investor is more or less focused.

The financial growth cycle proposed for this research work, which is presented below (Figure 3), is constructed with the intent of combining the previous two, and to take advantage of the positive aspects of each. It plainly identifies the stages of firm development along the life-cycle, and keeps a simple and straightforward approach to the sources of finance involved, similar to Caselli (2009). Still, the sense of interconnectedness from Berger and Udell (1998) is preserved. Many sources of finance coexist in the same spaces and some start where others stop, transpiring their complementarity. Additionally, investors in the cycle overlap a curve representing firm size as time passes. The rate at which size grows, or diminishes, as characterised by this curve, combines with the stage the company is at. From Development to Early-stage, it grows at low pace. When it reaches the Rapid Growth phase, firm size increases precipitously, to stabilize in the Mature stage and afterwards start its decline.

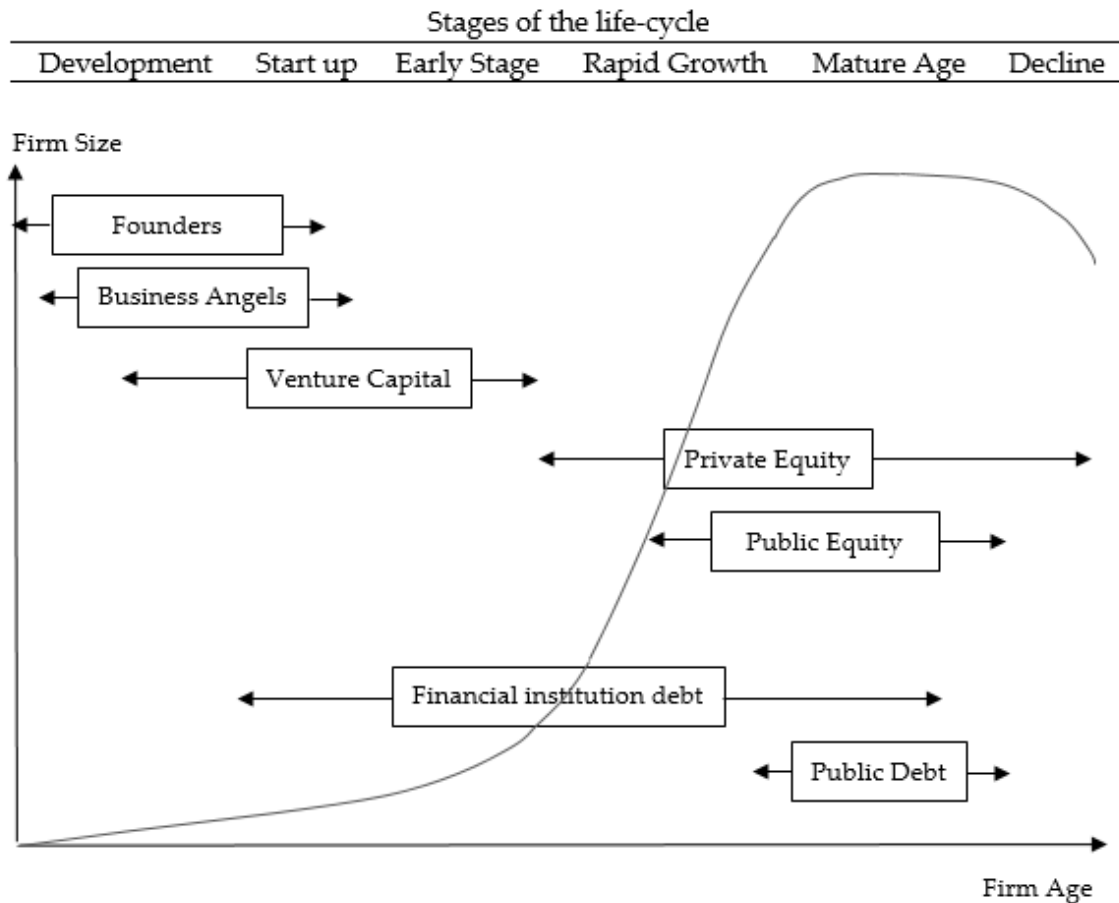


Figure 3: Sources of finance along the company life-cycle

The main source of finance in the initial stage of a firm's life is the founders' equity. The dependence on the entrepreneurs' money largely results from informational asymmetries that prevent outside, equity or debt, investors of financing the company (Berger & Udell, 1998). The high level of need for cash to invest in new projects, compared to the reduced funds provided by the founders, only makes the issue of moral hazard more acute (Berger & Udell, 1998; Caselli, 2009). If the firm has great potential for growth and profitability, business angels may present as valuable partners, given their expertise and knowledge. These investors can navigate through these companies' informational problems by closely monitoring them (Berger & Udell, 1998). As firms continue to grow they become interesting to more complex investors. On the equity side, venture capital, or even private equity, apply strict screening, contracting and monitoring processes to overcome moral hazard and adverse selection (Caselli, 2009). While on the debt

side, financial lenders also develop various types of contracts in order to manage informational problems (Berger & Udell, 1998). The flexibility demonstrated by the private debt market, allowing it to provide funds over such a wide range of ages and sizes, makes it one of the most important sources of finance in the company life-cycle. When firms achieve a large size status, and have built a respectful track-record, the capital markets present important alternatives of financing and restructuring (Pagano et al., 1998).

Chapter 2. Investor Types

After having established a life-cycle, which firms go through, and where investors are positioned in diverse moments, it is now time to explore what are the features that make each one appropriate to a specific stage. In this chapter, sources of finance will be covered as laid out in Figure 3, starting with business angels, followed by venture capital, private equity, financial institution debt, and then public markets, equity and debt.

2.1. Business Angels

The persona of the business angel has gained a lot of popularity in the recent past. Success stories of investors that financed companies, such as Apple and Amazon, in their early days, and television shows have contributed to make them common knowledge and wanted partners for many entrepreneurs. The business angel investor is generally described as a high net worth individual that invests its personal wealth in Seeds, Start-ups and Early-stage firms (Mason & Harrison, 2000). Although the dominant reason for their activity is to gain financial returns, literature indicates other important purposes. Ramadani (2009) states that angels also invest driven by a sense of social responsibility, a chance to help young entrepreneurs to set up their companies, or simply for fun and pleasure. Along

enjoyment from playing a role in the entrepreneurial process, altruism is appointed as well by Mason & Stark (2004).

This source of finance is primarily characterised by its informality, as there are typically no intermediaries, and investors prospect the market for themselves and finance the firms directly (Berger & Udell, 1998). However, this is not always true. Sometimes, they finance companies through investment syndicates, where they coordinate their activity (Prowse, 1998). These networks allow the gathering of capital, experience, and knowledge, resulting in a spreading of risk and the possibility to invest in bigger and better deals (Ramadani, 2009). This sort of association also turns to be an easier way for entrepreneurs to reach more angels at the same time, and, consequently, for investors to generate greater deal flow.

An important advantage of angel finance is that it is not limited to purveying money to young firms. The various professional backgrounds business angel investors usually have allows them to contribute actively to the company's development (Ramadani, 2009). Business angels' skills may assume various forms, depending on their past experience (Alterovitz and Zonderman, 2002). Either business or more product oriented, technology or industry oriented. This happens so because of the heavy importance technical, production related, issues have in the early stages of a firm. In addition, investors represent a source of important contacts, resulting of their long business career, which may include successful entrepreneurs, bankers, accountants, lawyers and possible suppliers and clients for the investee.

2.1.1. Angel finance in the company life-cycle

Business angels typically position themselves in the first stages of the life-cycle, targeting firms that range from the development to start-up phase (Berger & Udell, 1998; Caselli, 2009). The most characteristic feature of this type of companies, as Berger and Udell (1998) described, is informational opacity, resulting in their inability to credibly signal their quality. The authors observed that in such cases,

when there are acute moral hazard problems, external equity provided by angels and venture capital is favoured to external debt. This does not mean business angels and venture capital are alternative sources of finance for firms at these stages, but rather complements. Berger and Udell (1998) argue that “the angel contract is often constructed in anticipation of possible future venture capital, indicating that angel finance and venture capital are often complementary sources”². Mason and Harrison (1996) present a set of reasons why venture capital investors are not able to make small investments that business angels target. Firstly, there is the fact that VC fund managers do not have the same objectives that business angels do, this means that while fund managers will look for bigger investments that can generate a greater volume of profits, business angels will look for attractive financial returns, but also a chance to help entrepreneurs and enjoy themselves. Secondly, the business and technological experience that angel investors possess implies that they do not have to commission costly independent due diligence research. Finally, the simplicity of investment contracts enables business angels to keep costs low. The arguments presented by Mason and Harrison (1996) may help validate the argument of complementarity from Berger and Udell (1998). A firm that has been approved by a business angel may signal to venture capitalists that it has potential, but its size may be insufficient to make it a financially viable investment and, only become a profitable opportunity down the road, when it grows bigger.

2.2. Private Equity and Venture Capital

Literature is far from clear regarding the definition of Private Equity or Venture Capital. Capizzi (2004) commented that “the definition of venture capital in

² Berger, A. N., & Udell, G. F. (1998). The economics of small business finance: The roles of private equity and debt markets in the financial growth cycle. *Journal of Banking & Finance*, 22(6), 613-673. [p. 627].

economic literature is not unequivocal”³, and that it is commonly used as a synonym of private equity. Jeng & Wells (2000) and Caselli (2009) agree that the concepts of Private Equity and Venture Capital assume different meanings in Europe and in the United States. Both authors describe, in the American version, Venture Capital as a cluster of Private Equity dedicated to financing young ventures, while in the European sense, Venture Capital and Private Equity are two separate clusters focused on distinct stages of the company life-cycle. Specifically, Venture Capital finances young ventures in their start-up and early-stage phases, whereas Private Equity involves deals with firms in the later stages of their lives. In this research work the European definition, as described by Caselli (2009), will be the one adopted.

A common ground in this subject seems to be the fact that private equity and venture capital operators invest in the equity of private companies, but their activity is not confined to the role of passive investor, they are also involved in management through advisory services and assistance to the firm development. Nevertheless, the ultimate goal is to make profits, therefore, they plan exit strategies from the start and limit the equity participations to a few years only (Caselli, 2009; Jeng and Wells, 2000; Berger and Udell, 1998).

2.2.1. Venture Capital in the company life-cycle

While angels’ capital and experience, support the young firm’s product test-marketing, VC investors would come later to finance full-scale marketing and production (Berger & Udell, 1998). Venture capitalists operate in Seed (Development), Start-up and Early Stage financing (Caselli, 2009; Capizzi, 2004). As Caselli (2009) describes, in these clusters, funds are typically invested to finance activities such as Research & Development, product entry in the market and sales

³ Capizzi, V. (2004). The constitution of a venture capital company: The case of Italian closed-end funds. *Venture Capital. A Euro-System Approach*. Springer-Verlag: Berlin. [p. 3].

growth. The investors' involvement is characterised by a large ownership of shares and support in strategic decisions and financial advisory.

According to Berger and Udell (1998), the positioning of venture capital investors in the earlier stages of the life-cycle, exposes them to agency problems associated with financing firms which are informationally opaque. Problems, which are mitigated through a barrage of screening, contracting and monitoring mechanisms that characterize venture capital investing.

2.2.2. Private Equity in the company life-cycle

As mentioned before, Private Equity investors are located in the more advanced stages of the life-cycle (Caselli, 2009; Capizzi, 2004) (see Figure 3). Caselli (2009) established in his book that beyond Early-stage, firms leave the venture capitalists' target clusters and enter the ones where Private Equity operators are typically involved.

The types of financing included are Expansion, Replacement and Vulture. Firms at the expansion phase probably have increasing sales and are about to, or have achieved, profitability. Funds are provided to finance sales growth or to improve projects in known fields, so the risk derived from uncertainty is low. The level of ownership starts to diminish as investors need to diversify portfolios, and specific technical skills are no longer required, meaning companies may be financed by a larger number of investors. Replacement capital is needed when firms reach a mature stage. Typical examples would be to fund spin-off projects, equity restructurings, shareholder substitution, IPOs, buy-ins, buyouts, etc. In terms of involvement, the investor usually becomes a prime shareholder, and must be highly skilful structuring governance and corporate finance deals. In the final phase of a firm's life, named as the decline, the cluster of equity financing involved is Vulture financing. This cluster is dedicated to the restructuring of failing companies by improving their financial performance and exploiting new strategic opportunities.

2.2.3. Organization of Private Equity and Venture Capital investors

In the European context, Caselli (2009) points out Banks, Investment firms and Closed-end funds, as the main vehicles to invest in equity. Private equity is considered to be a financial activity and, as such, must comply with rules that regulate the financial system. This fact presents a serious halt to any intentions from Banks, and some forms of Investment firms, to pursue the activities of private equity and venture capital investment. The regulatory constraints applied to Banks and most Investment firms in external equity financing explain the overwhelming importance of Closed-end funds in the private equity and venture capital industry in Europe.

According to Caselli (2009), the vehicles used to invest in private equity are based on a double level system comprised by an Asset Management Company (AMC) and a Closed-end fund. AMCs are financial institutions that manage the Closed-end funds. These funds are separate legal entities that invest on the behalf of a group of investors. The fact that they are Closed-end implies that they have fixed maturities, and that investors cannot withdraw their funds at any time. They are restricted to invest at the beginning and to exit at the end of the fund's life only. The illiquidity associated with investing in private equity makes this type vehicle the most suitable.

2.2.4. The activity of Private Equity and Venture Capital investors

The width of the Private Equity and Venture Capital investors' reach in the life-cycle is mainly due to the development of mechanisms that prevent adverse selection and moral hazard problems, and enable the creation of value (Berger & Udell, 1998; Caselli, 2009).

The process of investing in the equity of private firms starts with the selection and structuring of investments (Sahlman, 1990; Fenn et al., 1997). This selection, as described by Fenn et al. (1997), begins with the generation of deal flow. Fund managers obtain leads from investment bankers, brokers, consultants, lawyers, etc. Proposals are initially screened to discard those classified as unpromising or that are not aligned with the fund's criteria. The surviving ones are then submitted to a more comprehensive due diligence, in order to mitigate the risk of adverse selection (Caselli, 2009; Fenn et al., 1997). According to Fenn, Liang and Prowse (1997), the structuring of the deal starts if, after the due diligence, the investor is still interested. In that case, the fund and the company begin the negotiation of an investment agreement. This document stipulates the amount of ownership to be acquired, the managerial incentives the investor wishes to implement and the control it will enjoy over the firm. As discussed before, ownership varies with the cluster of equity financing, with levels diminishing between earlier and later stages (Caselli, 2009). Fenn et al. (1997) indicated the other two elements, managerial incentives and control, are meant to deal with potential moral hazard problems, driven by asymmetrical information between the fund and the company managers. Regarding incentives to management, some of the available mechanisms are managerial stock ownership, which tries to incentivize the manager's good performance by increasing their ownership in the company; and management employment contracts, that specify that managers can be replaced and their shares bought back if they do badly. Finally, control over the firm is another form of ensuring an alignment of interests between the fund and the portfolio company managers. Exercising control can be achieved through representation of the investors in the Board of Directors; the allocation of voting rights; and by controlling access to additional financing.

When the deal is settled, and the exchange of capital and shares occurs, a new phase of the investment starts. The relationship between fund managers and

company executives becomes even more intricate as, even though an investment agreement has been reached, information asymmetries persist and disagreements may still arise. For these reasons, fund managers get involved with the company's management, acting as directors at the board, recruiting executives, obtaining additional financing, mentoring, etc. (Sahlman, 1990). Managing and monitoring actions, undertaken during the life of the investment, are largely dependent on aspects such as the firm's stage of development in the life-cycle, the duration and participation in the target company, the investor's style of approach (hands-on or hands-off), geographical distance and the investor's expertise (Caselli, 2009).

The exit of portfolio companies is absolutely determinant to the overall success of the fund and, in consequence, the AMC's reputation and ability to raise capital for launching new funds in the future (Fenn et al., 1997). Regarding exit alternatives, a report from EVCA (2014) (European Private Equity and Venture Capital Association) establishes eight: repayment of principal loans, which happens when a private equity or venture capital investor provided loans or acquired preferred shares, and the repayment is made according to a defined schedule; repayment of silent partnership, which is the repayment of a type of mezzanine financing similar to a loan but subject to a subordination clause, giving it the status of equity even though it resembles a loan; sale to another private equity firm; sale to financial institution; trade sale; write-off; initial public offering (IPO); and sale of quoted equity.

In terms of reputation and return, selling a portfolio company through the stock exchange is highly attractive for a private equity investor (Caselli, 2009). This exit alternative bridges venture capital and private equity to the public equity market as sources of finance in the life-cycle of firms (as portrayed in Figure 1, Figure 2 and Figure 3). This type of investors are characterised by literature of being able to enhance the value of financed firms entering the capital market. Venture capital backed-firms are believed to enjoy better performance in public markets, in a long

term analysis, than others which did not receive venture capital financing (Brav and Gompers, 1997). Megginson and Weiss (1991) also found that venture capital plays a role in reducing informational opacity towards investors, with venture capital-backed IPOs experiencing reduced underpricing comparing to nonventure-backed ones.

2.3. Financial institution debt

The private debt market is one of the most widespread sources of finance. In the life-cycle framework, established for this research work (see Figure 3), it stretches from the initial stages of firms' development until their mature age, coexisting with all the others sources of financing, either on the debt or equity side (see Berger & Udell, 1998; Caselli, 2009; Saldenberg and Strahan, 1999).

In the data gathered by Berger and Udell (1998), on small businesses in the United States, the authors observed that from the three major suppliers of debt financing (financial institutions, nonfinancial business and government, and individuals), financial institutions were the main provider of funds. This source represented 52.93% of the total debt funding in the private market. Within it, commercial banks held the biggest share of capital provided, reaching 70% of the funds. Clearly, financial institutions and banks, in particular, play a leading role in the debt funding of companies, according to the authors. Therefore, this section is dedicated to the review of the abilities presented by financial institutions that makes them capable of financing companies of the most diverse sizes, over such a wide space in the life-cycle.

2.3.1. Financial institution debt in the company life-cycle

Caselli (2009) and Berger & Udell (1998) place banks and financial institutions, as purveyors of debt in private markets, across the majority of the life-cycle's length. This is only possible because of these institutions' ability to manage small firms' informational problems, as well as complementing their financing activity with the capital markets in the case of large firms (Berger and Udell, 1998; Saldenberg and Strahan, 1999).

The defining characteristic in financing small businesses is the informational opacity that they present (Berger & Udell, 1998). This specific feature of firms, typically situated in the earlier stages of the financial growth cycle, poses as a big issue financial lenders have to manage through the activities of screening, contracting and monitoring. Therefore, contracting methods are helpful tools banks resort to solve adverse selection and moral hazard problems. However, informational opacity is not the only factor keeping external debt lenders from financing small companies and start-ups. According to Freel (1999), product innovation also affects the accessibility of small firms to bank finance. This author points out the overall difficulty for innovative companies in the sample (238 SMEs from the West Midlands region in the UK) to obtain external finance, comparing to their less innovative peers, especially in when it comes to bank financing. Additionally, this same article makes two claims that Berger and Udell (1998) also indicate: the first is the reliance on debt with shorter maturities than other medium to long-term solutions, based on the natural risk aversion of commercial banks; the second is the importance that providing adequate collateral has in funding applications.

The profile assumed by banks in financing large businesses is considerably different from the one it presented to small companies. The fact is, the risk and return logic at this later stage of the life-cycle is generally much different than in

earlier ones. For starters, the level of informational transparency is much greater, which contributes to a reduction of adverse selection and moral hazard-style problems, and in consequence to the risks incurred by lenders; and second, the access to additional financing sources, such as the public markets, means the possibility of complementing sources of funding.

As firms grow, they increasingly obtain more visibility. As Berger and Udell (1998) describe, contracts with workers, suppliers and customers usually become public knowledge when it comes to larger businesses. This mostly results from the greater media coverage and the production of audited financial statements, but also from the fact that many of these companies are traded on public markets, either equity or debt, and thus are required to disclose business and financial information regularly. The article by Blackwell, Noland & Winters (1998) evidences the effects of information flows that emanate from large firms. According to it, in general, audited firms pay lower interest rates on revolving credit agreements as they are able to signal quality to the debt market, however large companies do not seize the same reduction on interest rates, as small firms, if they purchase audits. One possible explanation for this phenomenon is that financial institutions are able to evaluate large firms' quality through other available sources.

Berger and Udell (1998) argue that one of the main differences between the financing of small and large businesses is the access to public markets. Although public markets may present as additional sources of funding, literature on the topic does not seem to believe that big firms largely substitute banks, and other private debt markets, for them. Even after being able to tap the public debt markets, large firms continue to use private ones with bank loans, private placements and other types of arrangements (Berger & Udell, 1998). Similarly, in an article about the importance of banks for financing large businesses, Saldenberg and Strahan (1999), comment that despite the turn of large corporations towards the securities market, banks continue to provide critical capital to these companies in times of economic

distress. The argument supporting this statement is based on the experience that, when turmoil hits financial markets, firms prefer to use back up lines of credit with banks.

2.3.2. Contracting methods

Financial institutions undertake their role as investors in companies through the financing of external debt. In order to manage risks regarding information and incentive problems, they develop screening, contracting and monitoring skills (Berger & Udell, 1998). The importance of these skills is very significant for financing any company, at any stage of the life-cycle, however, the risk that motivates them, informational opacity, is more acute in small young firms. The research work performed by Berger and Udell (1998) is very much revealing of that. In their article, data collected from commercial banks shows that in year-end 1993, 91.99% of small business debt⁴ was secured⁵, and 53.82% was guaranteed⁶. This shows how important the pledge of collateral and guarantees, by the small borrowing firms, is for banks.

The following paragraphs will address the most relevant contracting methods used by banks and finance companies, when negotiating external debt financing.

2.3.2.1. Collateral and guarantees

According to Berger and Udell (1998), collateral and guarantees enables, informationally opaque, businesses to borrow in better conditions, namely more available financing and with lower costs. On the financier side, they address

⁴ Small business debt includes debt of nonfarm, nonfinancial, nonreal-estate small businesses, with fewer than 500 full-time equivalent employees, excluding real estate operators and lessors, real estate subdividers and developers, real estate investment trusts, agricultural enterprises, financial institutions, not-for-profit institutions, government entities, and subsidiaries controlled by other corporations (Berger & Udell, 1998).

⁵ Considering Secured debt as credit lines used and other loans reported as secured, plus all equipment loans, all mortgage loans, all motor vehicle loans, all capital leases (Berger & Udell, 1998).

⁶ Guaranteed debt includes the used credit lines, mortgage loans, motor vehicle loans, equipment loans, and other loans that are reported as guaranteed (Berger & Udell, 1998).

problems at different stages of the deal, adverse selection at the moment of loan origination and moral hazard after the credit grant.

Although similar, collateral and guarantees are different types of contract. Collateral gives the lender recourse against a specific asset of the borrower. In the case of small firms it is also common that, given the fact that firms of that size are a risky debtor and have few tangible assets, the firm's owner is forced to pledge a personal asset (personal collateral). A guarantee gives the lender a pledge against assets, either the borrower's or from another committed party. Since it is not specific to any asset, a guarantee might be considered broader than a pledge of collateral, but it is also a weaker claim as it does not prevent the assets from being sold or consumed.

These type of contracts turn out to be very effective for creditors in managing risk, in the sense that even if a guarantee or personal collateral represents only a fraction of the value of the loan, it works as a powerful incentive for the borrower to repay the loan (Berger & Udell, 1998). So, what clearly matters is not only ensuring the bank receives the value lent in total, but, more than that, developing the right mechanisms to put pressure on the borrower to repay.

In the first paragraph it was referred the claim, by Berger and Udell (1998), that the pledge of collaterals and guarantees helped debt creditors to manage information problems like adverse selection and moral hazard. Authors on the subject indicate that, forcing the pledge of collateral, may prevent firm managers from issuing debt when there is asymmetric information regarding the project, addressing the problem of adverse selection (Bester, 1987). Additionally, it resolves the moral hazard problem by stopping the borrower from taking riskier projects or not applying enough effort to repay the loan (Boot et al., 1991; Bester, 1987). The inside collateral demanded tends to be associated to observable risk, predicting that lenders will ask for collateral and guarantees to the riskier borrowers (Morsman Jr., 1986).

2.3.2.2. Loan commitments and lines of credit

Loan commitments and lines of credit are alternative forms of financing other than spot loans. The great difference between one and the other is that spot loans involve a single tranche at a specific moment to finance a determinate asset, while loan commitments and lines of credit assume a contract of provision of debt for a certain period of time in the future.

Loan commitments are contracts issued by financial institutions to provide debt, on pre-agreed terms, at a future time under strict conditions, meaning that the creditor will not finance in case of violation of the covenant by the company. Lines of credit are revolving credits, characterised for being flexible debt instruments normally used to cover working capital needs (Berger & Udell, 1998). As Berger and Udell (1998) appointed, on this type of contracts, literature is divergent in what matters informational problems. For example, Thakor and Udell (1987) claim that, under the hypotheses of asymmetric information, banks selling loan commitments are able to differentiate companies with privately held information, by offering two types of contracts with different combinations of commitment fees and usage fees. On the other hand, Avery and Berger (1991) expose the chance that loan commitments actually augments risks derived from informational asymmetries since, at the moment of contract signature, the bank has inferior knowledge on the borrower compared to spot loans. According to this thesis, the lack of information held by the financial institution may permit situations of adverse selection and moral hazard, where firms are financed when, in the case of spot loans, they would not be, and borrowers undertake risk-shifting behaviour.

2.3.2.3. Debt covenants and maturity

Debt covenants and maturity extent are another example of variables, in the negotiation of a loan, that can alter substantially the level of risk taken by the lender, and in consequence, the required return. These variables can be considered effective

tools solving problems of informational opacity (Berger & Udell, 1998). Through covenants, banks demand from borrowers the regular submission of financial information covering their level of indebtedness, profitability or liquidity (Alves, 2012; Berger & Udell, 1998). They can also involve restrictions to changes in strategy that could implicate a risk rise. In the situation of a company wanting to take a business opportunity, being restricted by a debt covenant would force a renegotiation with the lender (Berlin and Mester, 1993). As a result, the bank ends up having some sort of managerial involvement in the firm's business since it has the power to accept or decline propositions of change in strategy, presented by the firm.

As Berger & Udell (1998) mentioned, covenants, especially financial related ones, fall short when companies do not have credible audited financial statements. In that situation this type of contract is substituted by short maturities in order to control informational opacity problems. In line with this argument is the research paper by Blackwell, Noland & Winters (1998) providing empirical evidence on the association between independent auditing services and reduced interest rates on revolving credit agreements. These authors concluded that, *ceteris paribus*, audited firms pay lower interest rates than those that are not. Therefore, banks clearly value the information provided by auditors, particularly when analysing smaller firms, where it is harder to obtain financial data, turning it harder on banks to impose contracts, intended to manage informational problems, such as covenants.

Regarding debt maturity, the longer it is, the riskier it becomes for the lender. This effect results from the possibility that the borrower might incur into riskier deals or face financial difficulties (Berger & Udell, 1998). That is why it is so important for banks to have a tight grip over this feature when contracting loans, especially with small firms, which tend to be more informationally opaque.

2.3.2.4. Relationship lending

As financial intermediaries, banks, are not limited to lending funds to companies and individual clients. These institutions establish a link between depositors and borrowers, they also provide various financial services such as brokerage, transfer of funds, custody of financial assets, etc. The data used by Berger and Udell (1998)⁷ shows that the bulk of small businesses indicate commercial banks as their primary financial institution. The plausible justification offered by the authors is that happens so because of the extensive range of credit, deposit and related financial services provided by them. The result of this widespread contact is the collection of large volumes of information from firms and entrepreneurs, which is used by banks when analysing and designing loan contracts. The sharing of information allows companies, particularly the ones that are more informationally clouded, to benefit from lower costs or more available credit (Berger & Udell, 1998) as banks value the ability to evaluate the quality of a borrower.

In the article from Berger and Udell (1995), the authors proposed to provide empirical tests by using data on small firm finance. Their approach focused on lending under lines of credit, which are considered to be “relationship driven” instead of “transaction driven” as spot loans. The duration of the bank-borrower relationship was used as a proxy for its strength. The conclusion was that, for longer relationships, interest rates are lower and the likelihood of collateral being pledged is diminished. According to the authors, although R²'s are relative low and coefficients of the control variables are irrelevant, the findings are proved to be statistically significant.

⁷ See Table 5: Estimated distribution of small business debt from financial institutions, retrieved from Berger & Udell (1998), page 637, in Appendix.

2.4. Public Equity Market

Of all the sources of finance, and specifically the ones covered in this research work, the capital markets are the ultimate source. They are dedicated only to the firms that become large and transparent enough to issue, equity or debt, publicly (Berger & Udell, 1998; Caselli, 2009; Pagano et al., 1998). In the effort to continue analysing the sources of finance along the company life-cycle, the public equity market will be looked into first, and then proceeded by the debt capital market. Such order follows the proposal presented by Berger and Udell (1998) in their stylized financial growth cycle. The authors stated, while citing Fenn, Liang and Prowse (1997), that between 1991 and 1993 the median asset size, for firms entering the public equity markets in the US, was \$16 million in the case of firms backed by venture capitalists, and \$23.3 million otherwise. On the other hand, the authors' guess for the minimum asset size of firms issuing public debt, also in the US, was around \$150-\$200 million. These values allow the better understanding of the positioning of public equity financing in the life-cycle, and its possible links to preceding financing sources. Clearly, it comes in a stage previous to the financing through public debt markets, and in a later one to the multiple sources of private equity (Business Angels, Venture Capital and Private Equity) addressed previously.

2.4.1. Public Equity in the company life-cycle

The public equity market, as indicated earlier, is typically directed to the financing of firms in the later stages of their lives. Pagano et al. (1998) provide some preliminary indications to this fact. Firstly, the authors indicated in their study that, on average, companies gone public were about 10 years older than firms that did not, controlling for matching sectors and sizes; and second, the median IPO firm was twice as large, in terms of sales, as the median potential IPO firm (a firm that

complied with all the regulator's requirements to enter the public market, but chose not to). Combined, these facts put public companies in a posterior stage in the life-cycle, by age and size, compared to private ones. According to literature, this positioning is seen as the result of: issue costs, informational transparency and the liquidity of shares (Pagano et al., 1998; Berger and Udell, 1998).

Issue costs are the expenses involved with the process of entering the public equity market. According to Berger and Udell (1998), entering the public markets implicates costs which typically have a high fixed component, meaning that companies have to raise funds large enough to guarantee the public offering is economically attractive. Since firm size and issue size tend to be positively related, only firms beyond a certain threshold will be able tap the public markets. Literature of reference seems to be in line with this view. Pagano, Panetta & Zingales (1998) observed that firm size is one of the major factors in the decision to go public. By estimating a model on the probability of a company going public, using ex-ante data, the authors found that size had a positive impact on the chances of an IPO. Curiously, Pagano et al. (1998) noticed that in the United States these same costs are not significantly different, and yet firms obtaining finance are relatively smaller and younger. The authors' proposed justification is that, in the Italian case, the lack of safeguard for minority property rights means that firms with smaller track record face prohibitive adverse selection costs. That is, facing reduced protection of their rights, investors will only be willing to finance firms in the public markets if they demonstrate reputation, with size and age serving as indicators.

Informational transparency, as Berger and Udell (1998) noted, is determinant for a company to obtain financing from the capital markets. The authors point out the ineffectiveness of small firms to signal their quality as a major reason why they are unable to issue equity publicly. The informational asymmetries, between investors and issuers, resulting from this opaqueness implies adverse selection costs that pushes down the price at which shares can be sold. Risks of adverse selection are

mitigated, as firms advance in the life-cycle, and enter relations that increases their reputation and financial transparency, such as contracts covered by the media, become audited, or even get venture capital backing (Berger & Udell, 1998; Megginson & Weiss, 1991). Therefore, with age and size growth, companies are more expected to access the public equity market, as proposed by Pagano et al. (1998).

The case for the liquidity of shares is based on the argument by Pagano et al. (1998) that liquidity is a function of the shares' trading volume, which, is ultimately related to firm size. With pre-IPO owners intending to sell shares after IPO, in order to diversify their portfolios, they can only benefit from the liquidity of the stock market if the firm is large enough. As the authors remarked, this logic adds to the expectation that only large companies will go public.

2.4.2. Why do companies go public?

The reason why firms eventually choose to become traded in the public equity markets is answered by Pagano, Panetta & Zingales (1998), while analysing the case for a sample of Italian firms between 1982 and 1992. The authors were able to infer the determinants of the decision by comparing the ex-ante characteristics and the ex-post consequences of firms that went public in that period. The main conclusions achieved were that the industry market-to-book ratio and firm size are the most important factors affecting the probability of an IPO. However, by separating the sample into two halves: independent firms and subsidiaries of already listed firms, or carve-outs, the authors showed that the purposes for listing in the public equity market diverge. Independent firms tend to go public with the intention of rebalancing their balance sheet, after a period of significant investment and growth. Before IPO data showed that, for independent companies, investment (measured by the lagged Capex over Property, plant and equipment) and growth (measured by the rate of growth of sales) have a strong positive impact in the probability of an

IPO occurring. After the IPO, the firms' leverage is substantially reduced as well as capital expenditures. By putting these evidence together, Pagano et al. (1998) concluded that when independent firms go public, they are more likely to do so in order to use the capital infusion to deleverage. Carve-outs, on the other hand, seem to get listed as a mean for the parent company to divest. Ex-ante data indicated that although industry market-to-book values have a positive impact on the probability of entering the equity market, the estimated effect is greater for carve-outs. Which, as Pagano et al. (1998) suggested, may signal that the decision to go public is timed with the purpose of taking advantage of periods when the industry's market value is perceived as high, so that the proceeds from the sale are greater. Additionally, more profitable firms are more likely to list if they are carve-outs. The same happens to companies with smaller debt burdens, although the effect is not statistically significant. Regarding ex-post consequences of the IPO, in the case of carve-outs, the hypothesis that public holding companies list subsidiaries to sell their stake and reallocate control gains strength. The authors found that controlling shareholders are more likely to divest at the time of IPO, and the probability there is a turnover in control, 3 years later, is greater than with independent companies.

2.5. Public Debt

The debt capital markets are dedicated to the financing of firms which have reached a mature phase in the life-cycle (Berger & Udell, 1998; Caselli, 2009). Bolton and Freixas (2000), based on their theoretical seem to point out in the same direction by stating that "bond finance is found predominantly in mature and relatively safe firms"⁸.

⁸ Bolton, P., & Freixas, X. (2000). Equity, bonds, and bank debt: Capital structure and financial market equilibrium under asymmetric information. *Journal of Political Economy*, 108(2), 324-351. [p. 325].

The Securities Exchange Commission (2013) describes corporate bonds as being debt obligations in which an investor lends money to the company issuing the bond. Then, the company is legally compromised to pay interest on the principal, and pay the principal at the bond's maturity. Corporate bonds can be classified considering numerous variables. Regarding maturities, for example, they can be short-term, if it is less than 3 years, medium-term in case of between 4 and 10 years and long-term for maturities longer than 10 years. Credit quality is also a variable used to classify bonds, as they can be considered investment or non-investment grade by credit rating agencies based on default risks. Additionally, bonds can differ according to their payment structure, coupon bonds or zero-coupon bonds, and the nature of the coupon rate, which can be a fixed or a floating rate. An important factor determinant of the risk and return level of a corporate bond is the priority of its claim, on the assets and cash flows, in case of issuer's default. Such precedence depends if the bond is secured or unsecured, senior or subordinated. A secured bond means the debtor pledged a specific asset as security for the bond and, in case of default, the secured bondholders are legally permitted to foreclose on the collateral. Unsecured bonds do not have a specific but a general claim on the company's assets, and can be either senior or subordinated. As the name suggests, senior bonds have a higher priority claim on the assets and cash flows than junior ones.

As the financial investment corporate bonds are, they involve risks. These risks are generally connected to the issuer, the market and economic events, and characteristics of the bond itself. Credit risk, one of the common risks bond investors have with private market lenders, it is the probability that the issuer company will be unable to make interest or principal payments. In bond investments there is also interest rate risk, which is the possibility that bond prices change due to rises or falls in market interest rates, and liquidity risk, when the investor may not receive a price corresponding to the true value of the bond as a result of the inability to sell it for

cash. Finally, callable bonds also present the risk that the company exercises the right, embedded in these bonds, to buy them back before maturity, or call risk.

2.5.1. Bond finance in the company life-cycle

The stylized timeline presented by Berger and Udell (1998), demonstrated in this research work in Figure 1, clearly shows that financing using public debt markets is strictly directed to large firms. Based on the financial growth cycle laid out by the authors, at the moment of its inception, a company would be financed by the start-up team, family and friends. As it developed, it would gain access to financial intermediaries either on the equity, formal and informal venture capital, or on the debt side, banks and finance companies. Ultimately, financing on the public equity and debt markets would come as the firm achieved a large size status and long track record. The argument offered by Berger and Udell (1998) is that, much like in the public equity market, obtaining finance through public debt is limited to companies that can find it economically viable, considering issue costs and informational problems associated with adverse selection and moral hazard, which are typically related to age and size.

Literature proposes that bond financing succeeds the public equity market as a source of finance. Firstly, as indicated before, Berger & Udell (1998) suggest, based on Carey et al. (1993), a minimum asset size ranging between \$150 and \$200 million for firms issuing bonds. At the same time, for companies entering the public equity market, they assume a minimum asset value of only \$10 million. Bolton and Freixas (2000) reinforce this hypothesis. The authors developed a model of financial markets, assuming asymmetric information and no taxes, where companies may issue equity or raise debt through bank loans and bonds. The main conclusions obtained indicate that, in equilibrium, riskier firms find more advantageous to get financing through loans, while the ones considered to be safer issue debt in the public market. When in between, firms favour the issue of equity and debt

simultaneously. Naturally, safer firms get financing in better conditions than others. In the private debt market, financed companies have to born intermediation costs that are non-existent in the public market, and issuing equity involves dilution costs. Finally, the authors state that if firm size and age had been considered, it would have likely strengthened conclusions, assuming greater size and age as indicators of lower risk.

Chapter 3. Empirical Analysis

In this chapter, an empirical analysis is performed in order to understand if the Portuguese corporate reality is according to theory. First, issues related to data are discussed. Its sources; how the sample was obtained; limitations and procedures taken to, in some measure, surpass them; and finally, the selected variables. Afterward, the distribution of the sample is observed, considering firm size and age, revealing some traces of the existence of an actual company life-cycle. Third, theoretical predictions are tested, first, by examining the shareholder and capital structure of firms distributed by size and age, and then through the analysis of firms financed by each investor type, also considering size and age.

3.1. Data description

There are two main sources of data in this research work. Information on the balance sheet, income statement and shareholder structure of Portuguese companies comes from SABI. Data on the amount of outstanding corporate bonds, and the respective issuers, is drawn from DATASTREAM: Thomson Reuters.

The data retrieved from SABI reports the value of Turnover, Total Assets, Equity Book Value, Debt Financing, Date of Incorporation and the Shareholder Structure, including Name, Type and Direct Equity Share, of companies located in Portugal. DATASTREAM: Thomson Reuters was used to pinpoint Portuguese firms with

outstanding bond issues in the public debt markets. The database detected 88 issues of interest, and 46 different firms as their issuers. All values refer to the date of the 31st of December 2014. Considering there is information of multiple firms for a single moment in time, this implies a cross sectional analysis of the positioning of sources of finance in the life-cycle of Portuguese companies.

The sample contains 175 276 Portuguese firms. The sample's selection largely followed indications from Berger and Udell (1998) in order to ensure, at least, some degree of comparability. In their work, the authors excluded from the sample all agricultural, financial and real-estate businesses, but also not-for-profit institutions, government entities and subsidiaries controlled by other corporations⁹. The reasoning is that, in most cases, these activities do not pursue an entrepreneurial growth strategy, or because of fundamental dissimilarities in operations, such as in financial and real estate institutions. In order to obtain a sample following the same guidelines, the first step was to select firms under the chosen codes of economic activity¹⁰. From the initial 565 822 firms located in Portugal, this action reduced the number to 489 248. Then another filter, minimizing the Equity Book Value to zero, was applied cutting an additional 285 644 companies. Finally, in order to discriminate subsidiaries controlled by other companies, only firms collectively owned by a group set of shareholder types¹¹, that excludes industrial companies, were selected.

Regarding limitations in the data, there are a few that are important to mention. First, the informality that characterises business angel investing makes it very hard to spot this type of investors in firms' shareholder structure. Therefore, the

⁹ Specifically, Berger & Udell (1998) excluded all firms operating as real estate operators and lessors, real estate subdividers and developers, real estate investment trusts, agricultural enterprises, financial institutions, not-for-profit institutions, government entities, and subsidiaries controlled by other corporations.

¹⁰ See Table 9 in Appendix.

¹¹ The group of shareholders included: Banks, Financial companies, Insurance companies, Private Equity firms, Hedge funds, Venture Capital, Mutual and Pension funds/Nominees/Trusts/Trustees, Foundations/Research institutions, One or more named individuals, Employees/Managers/Directors, Public (publicly listed companies), Unnamed private shareholders aggregated and Other unnamed shareholders aggregated.

procedure followed in this case was to choose a sample of entities¹², identifying themselves as business angels, through public member lists of associations¹³ and SABI itself. Each of these entities were then tracked on SABI, and their subsidiaries determined. In order to guarantee that subsidiary firms were held as an actual financial investment, and not with mere “operational” intent, these firms were cross-checked with investment portfolios usually available on the investors’ web page. This resulted in a sample of 14 firms financed by business angels. Financial debt presents two additional limitations in the data. The first is that from SABI it is not possible to discriminate the multiple types of financial debt on the balance sheet. Which means that bank loans, financial leases and other sources of debt finance are all bundled together, separating only short and medium/long term sources (Portugal, 2010). The second comes from the fact that debt contracts between borrower and financial lender are also unobservable on SABI. When theoretical predictions related to this issue are tested, in some cases, proxies are used to solve the problem. For example, collaterals are proxied by total assets, and firm age (calculated as the difference between 31/12/2014 and the date of incorporation) is used as a proxy for the length of a firm relationship with its financial lenders. When it is not possible to use proxies, as in the case of debt covenants and lines of credit, no tests are conducted on the subject. The final limitation regards the inability to access information on private placements of corporate bonds, since not all of them are issued in public debt markets. As before, tests are refrained.

The main variables used in this research work are Turnover, Total Assets, Equity book value, Financial debt (short and medium/long term) and Age. Unless specifically indicated, Turnover, Total Assets, Equity book value and Financial debt values are in thousands (th) of euros (EUR). For the variable Age, the unit of

¹² The entities identified as business angels and included in the sample are: Eggnest, Smart Ventures- Business Angels, Invicta Angels, Green Capital, Busy Angels, First Angels, Lisbon Angels and Redangels.

¹³ The Portuguese business angel associations searched included: FNABA, APBA, Business Angels Club and Business Angels Club de Lisboa.

measurement is years. The choice for these variables results from indications coming from literature (Berger & Udell, 1998; Pagano et al., 1998). Turnover and Total Assets serve as references for firm size, while Age is for oldness. In turn, size and age are proxies meant to position a given company in its life-cycle, as theory predicts that a young firm with a low value of assets is in an early stage, for example. The remaining variables are used to analyse companies' capital structure.

The table below presents descriptive statistics of the main variables.

Variable	Mean	Median	Minimum	Maximum	Standard deviation	Skewness
Turnover th EUR	634,33	129,26	- 30 080,34	1 794 020,31	7629,69	142,33
Total Assets th EUR	655,09	132,91	0,00001	3 775 563,13	12555,54	214,06
Equity th EUR	304,11	47,63	-0,00001	3 775 142,44	10309,09	300,41
Financial Debt th EUR	154,63	2,50	0,000000	779 675,62	3105,48	165,37
Age (years)	13,87	11,60	0,00	146,00	12,56	1,82

Number of firms by Total Assets (in thousands of euros)						
	0 - 2000	2000 - 10000	10000 - 43000	43000 - ...		
	166984	7274	857	161		
	95,27%	4,15%	0,49%	0,09%		
Number of firms, by Age (years)						
	0 to 5	5 to 10	10 to 15	15 to 20	20 to 25	above 25
	49329	31055	32789	20666	14493	26944
	28,1%	17,7%	18,7%	11,8%	8,3%	15,4%

Table 1: Descriptive statistics of the whole sample

In a sample of 175 276, the average company has a turnover a little more than 634 thousand euros, the value of total assets is about 655 thousand euros and has survived in the marketplace for a reasonable almost 14 years. Overall, mean values are not surprising. The level of turnover and assets classify it has micro-company according to the European Commission¹⁴, which is very much in line with reality of the Portuguese corporate landscape, heavily composed by small and medium enterprises (Pereira, 2011). Looking at median and maximum values, the

¹⁴ http://ec.europa.eu/growth/smes/business-friendly-environment/sme-definition/index_en.htm

perspective is the same. While half of the observations have around 130 thousand euros or less, in turnover and total assets, the maximum is a staggering almost 1.8 billion euros and over 3.7 billion euros, in turnover and assets respectively. The positive values for skewness show a distortion in the distribution of all variables, indicating they are skewed to the right. The minimum age and total assets present values that are zero or virtually zero, which is unsurprising, but also a baffling negative turnover of 30 million euros.

Regarding the distribution over firm size and age, much of what was said above is confirmed. Over 95% of the sample are companies with assets from 0 to 2 million euros. While firms in the range of ages between 0 and 15 correspond to more than 64% of the total. Interestingly, around 29%, the largest share in any period, of firms below 2 million euros in assets, have less than 5 years. Which suggests a concentration of smaller firms in the lowest age ranges.

3.2. Preliminary analysis

At this stage, it is important to understand if there is any evidence of a life-cycle in the case of Portuguese companies. According to the proposal for the financial growth cycle in Figure 3, it is expected to see firm size and age increase at the same time until the mature phase is reached. From that point onwards, as age continues to increase, firms are supposed to decrease in size, and eventually disappear.

Figure 4 is a scatterplot of the distribution of a part of the original¹⁵ sample, by age and size (as Total Assets).

¹⁵ See the original distribution scatterplot in Figure 12, in the appendix.

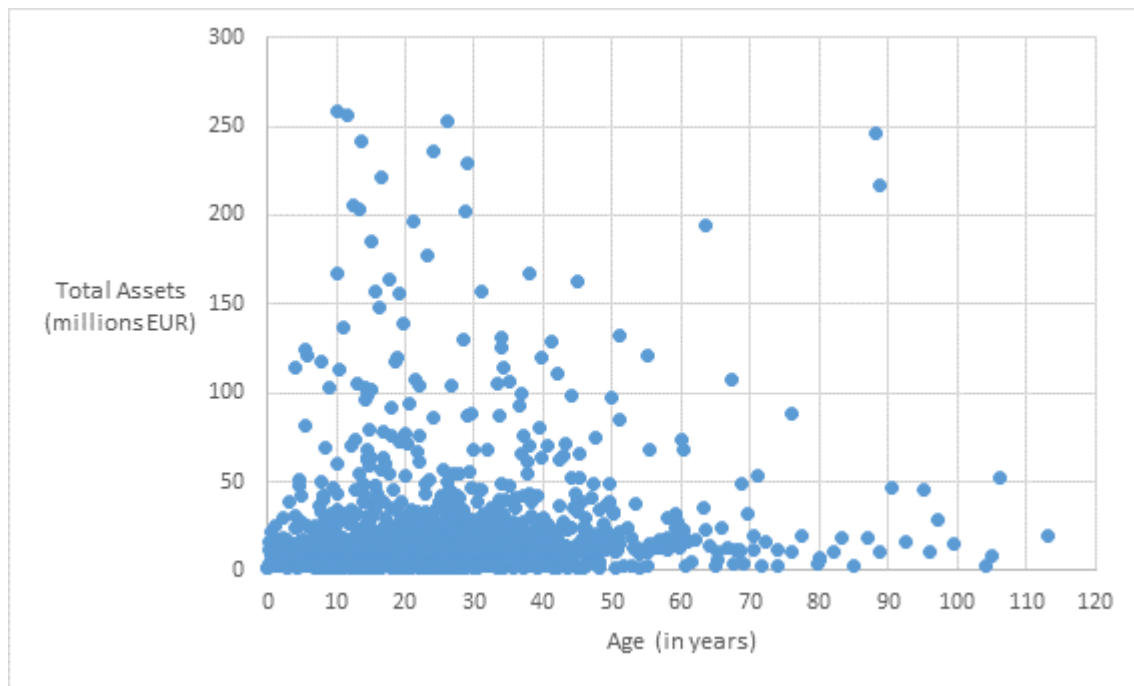


Figure 4: Distribution of the partial sample, by Age and Total Assets

Even though it is a very rough procedure to present evidence of the business life-cycle, Figure 4 presents some features that seem to be in line with those of the theoretical life-cycle. The first one is the emptiness in the region of very large and very old firms, especially above 80 years of age. This is partly due to the fact that most does not survive for such a long time, and the ones that did the majority of them cannot be considered large enterprises, measured by assets. Additionally, in general, there seems to be a negative trend in size and age for firms over 40 years old. All of these aspects combined seem to suggest the existence of a decline phase. A second interesting feature is that most very large firms, namely the ones with an asset value above 100 million euros, concentrate in a range of ages between 10 and 40 years. However, before the 10 year mark there are very few observations of companies with asset values above 100 or even 50 million euros. This contrast may lead to believe that smaller firms are concentrated in the time period from 0 to 10, while the ones in a more mature phase are focused in the following 30 years. This analysis is no evidence there is actually a life-cycle that Portuguese firms go through. In fact, Berger and Udell (1998) stressed that firm size, age and

informational availability¹⁶ were far from perfectly correlated. By testing for correlations between the three main variables, the authors' statement seems to hold true for the Portuguese context. As it is observable in Table 2, correlations of both variables related to firm size, Turnover and Total Assets, and age are very close to zero. It was considered the possibility that near-zero value was only the result of combining a positive with a downward trend, however tests for correlations in several age ranges yielded results with no material differences.

Correlations	Turnover th EUR	Total Assets th EUR	Age (years)
Turnover th EUR	1,00	0,34	0,05
Total Assets th EUR	-	1,00	0,04
Age (years)	-	-	1,00

Table 2: Correlations between the three main variables: Turnover, Total Assets and Age

3.3. Empirical procedure and results

After having collected theoretical predictions, set and explained variables, selected a sample and hypothesized about firms following a determined life-cycle, from this point onwards the focus is to show how investors and capital structure changes as firms develop. By separating companies in the sample into different levels of size and age, it will be demonstrated how shareholder and capital structure varies between levels. Then, each investor established in Figure 3, with the exception of insider finance, is compared to the others in terms of positioning in the life-cycle of firms, by looking at the size and age variables of the financed firms.

¹⁶ An additional variable considered by the authors.

3.3.1. Shareholder and Capital structure

Shareholder and capital structure by size was obtained by ordering and separating the sample in size levels. Size is measured by Total Assets (in thousands of euros), and there are four levels, as indicated in Figure 5.

For each asset level, building the shareholder structure took four steps. The first, was to calculate the capital participation of each shareholder for each company. This was done by multiplying the percentage of equity held by the shareholder by the total equity book value of the company. Alongside the shareholder name, SABI provides a classification of shareholder type given its characteristics¹⁷. The second step was to sum the capital participations per type. Third, sum the equity values of all the companies. Finally, the fourth step was to divide the capital participation of each shareholder type by the total equity value. The final result was the weight of every investor type in the overall equity for a certain level of Total Assets.

To get to the capital structure for each asset level, the procedure was merely to divide the value of financial debt by the sum of the equity and debt combined. Exact

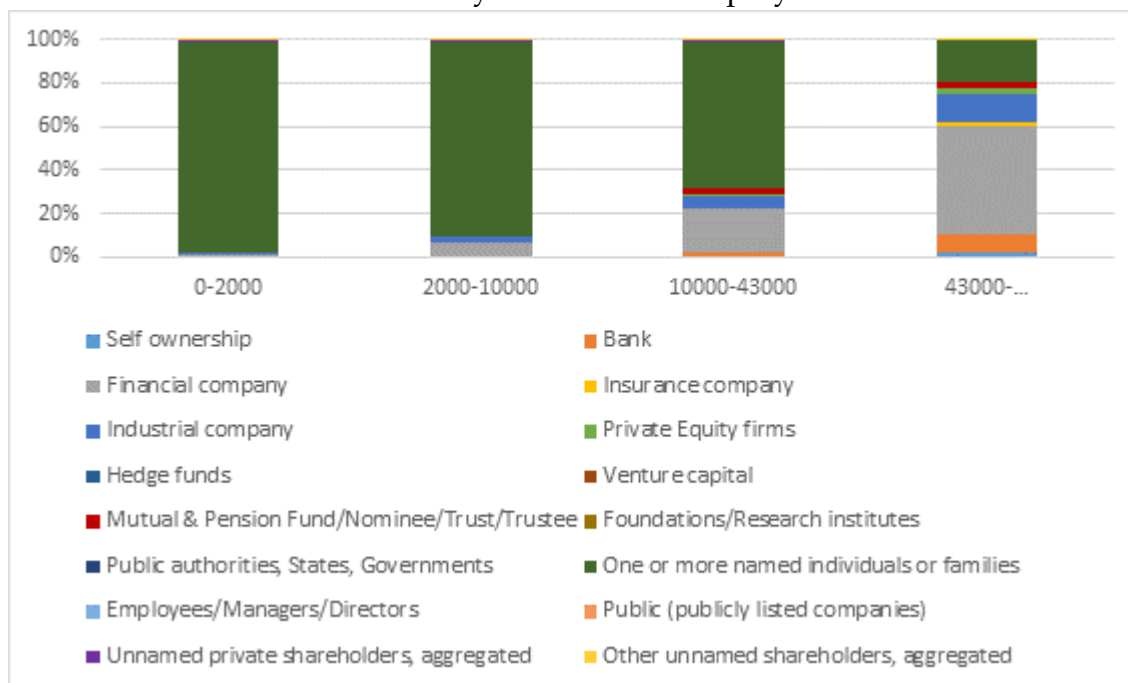


Figure 5: Shareholder structure by Total Assets (in thousands of euros)

¹⁷ See footnote number 14, in page 52.

percentage values for the shareholder and capital structure are included in the appendix (Table 3 and Table 4).

Figure 5 shows, according to theoretical predictions, that equity investors change as firms grow in size. Small companies, represented in the level with a value of total assets ranging between zero and 2 million euros, are dominated by individual shareholders. This is completely in line with the view of Berger and Udell (1998) that insider finance is essential to small firms, as their informational opacity raises serious moral hazard and adverse selection risks for outside equity investors. Firms become increasingly more transparent as they provide information to financial institutions, auditors, the media, etc. Ultimately, when they reach a large firm status, they are owned by different types of often sophisticated investors. It should be noticed how certain types of shareholders located in the later stages of the life-cycle (see Figure 3), are primarily focused in firms with total asset values of 10 million euros or higher. Private Equity is such a case, but it also happens with investors typically associated with listed firms, namely Mutual and Pension funds, Banks and Insurance companies.

Regarding capital structure, presented in Figure 6, once again indications coming from theory (see Berger & Udell, 1998; Pagano et al., 1998) are broadly in line with observations for the Portuguese reality. For the first three groups of firms, the level of debt grows continuously, which may indicate that it is a result from increases in informational transparency, reputation and track-record that induces investors to lend more. However, the debt level for firms with asset values above 43 million euros decreases. A possible explanation for this is that these firms are obtaining finance from other sources such as the public equity market. Such hypothesis was pointed by Pagano et al. (1998), who found that one of the reasons a company may choose to go public is to rebalance its balance sheet. Since the book equity of listed companies, with 43 million euros or more in total assets, represents around 26% of all the firms' equity in this group, it is possible that this is the case. Another fact

giving strength to this argument is that the weight of debt in the capital structure of listed companies is even lower, only 26,2%¹⁸.



Figure 6: Capital structure by Total Assets (in thousands of euros)

The construction of the shareholder and capital structure by age was similar to the one by total assets, only instead of ordering and separating companies by asset value it was done by firm age.

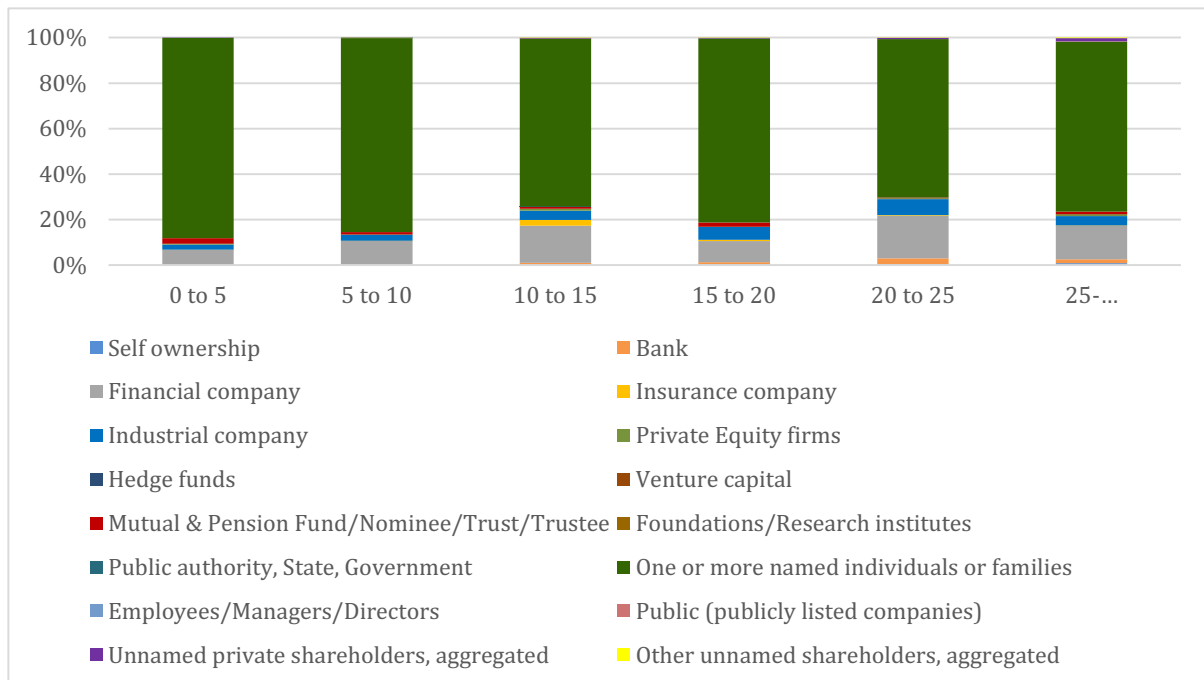


Figure 7: Shareholder structure by firm age (in years)

¹⁸ This value is obtained by calculating the weight of debt in the capital structure of listed companies belonging to the group of firms with total assets above 43 million euros.

Figure 7 depicts the shareholder structure by firm age. Unlike the one performed by asset value, the structure in Figure 7 does not demonstrate a clear shift in shareholders as firms grow older. Although some outside equity investors show increased presence for firms over 10 years old, such as insurance companies, banks and financial companies, overall, the dominant shareholders are individuals. The contrast in the weight of outside investors, in firms before and after the 10 year mark, may reinforce the case of greater informational transparency and reputation, as firms progress in the life-cycle. Still, the all-around supremacy of individuals seems to be more in line with the remark made by Berger and Udell (1998), where the authors stressed that not all companies were operated following growth strategies, leading from inception to IPO. The ordering of firms by age appears to enhance this factor, which it did not happen in Figure 5 since most “non-meant for growth” firms were probably included in the first level of total assets (0 – 2000). An important conclusion to be taken from combining Figures 5 and 7, is the importance of insider finance in small and young firms. In both cases the share held by individuals is crushing, representing 96,4% and 87,7% of the equity of companies in the first groups, regarding size and age.

Capital structure by age is considerably more in line with expectations brought from theory. As Figure 8 demonstrates, firms from zero to 5 and 5 to 10 years have a higher level of debt than other age groups. Although this may seem opposing the financial transparency and reputation logic, it is explainable considering the contracting methods used by financial lenders. Many small young firm loans are guaranteed by company insiders, who pledge their personal wealth as collateral. This type of contract reduces moral hazard and adverse selection risks and, in consequence, lenders will have more funds available. In companies with 10 to 15 years and beyond, the debt level drops but then increases steadily. The justification for this is possibly together with another sort of contracting method, which is

relationship lending. According to Berger and Udell (1998), firms tend to keep its primary financial institution throughout their lives, developing a relationship with ties strengthening as its duration increases. Companies share progressively more information about themselves, which is then used by the lender when it needs to decide whether to provide financing. Theory suggests that as the financial institution knows the firm better, funds will be more accessible.

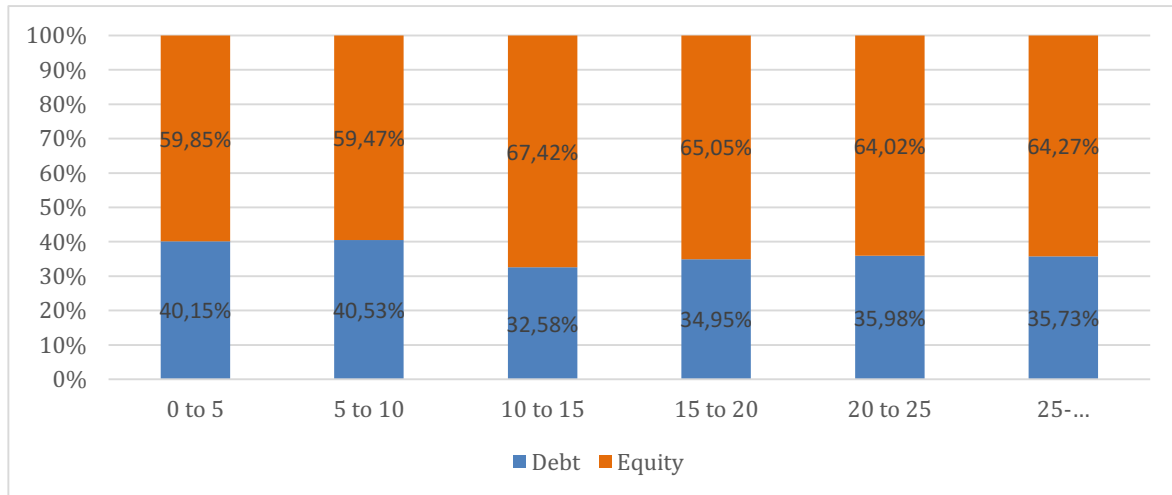


Figure 8: Capital structure by firm age (in years)

In the appendix, it is provided percentage values for the shareholder and capital structure by firm age (Table 5 and Table 6).

3.3.2. Investors along the life-cycle

The final step in this research work is to order the investors established in Figure 3 and compare with predictions from theory¹⁹. The ordering is conducted resorting to measures of size and age. Data on financed firms was retrieved from SABI, but not using the original sample of 175 276 since it was rather limitative in some cases. For venture capital, private equity and public equity, the collection of data was similar to the one described before, but regarding shareholder types, firms were

¹⁹ Business Angels, Venture Capital, Private Equity, Public Equity and Public Debt.

picked if the investor in question had any ownership level in the company, from 0% to 100%. This resulted in 37 firms with venture capital investors in its equity, 123 with private equity and 24 publicly listed companies. Data of firms financed by public debt, was obtained by first determining which ones had outstanding debt issues in 31/12/2014, and then collecting values for total assets and date of incorporation. In total, there are 37 companies with bonds issued in the public market. The 14 firms intervened by business angels are all from the original sample. Descriptive statistics for companies financed by business angels, venture capital, private equity, public equity and public debt are presented in appendix (Table 7 and 8). Finally, conclusions on the activity of financial lenders are also presented, focusing particularly in contracting methods. The private debt market is analysed separately given its widespread presence over all asset and age levels.

Evidence for the Portuguese corporate reality is generally in line with indications from Caselli (2009) and Berger and Udell (1998). Figure 9 demonstrates the natural log of mean and median values of firms' total assets. The first interesting aspect to refer is that business angels invest in companies which are considerably smaller than the ones venture capital finances, which reinforces arguments, presented by Berger and Udell (1998) and Mason and Harrison (1996), that they these to investor types are more likely to be complementary than alternatives.

Regarding venture capital and private equity investors, some observations can be seen as unclear. The median value of total assets in firms financed by venture capital is higher than the one of companies backed by private equity, which is contrary to expectations²⁰. Nevertheless, other mean and median values for turnover and total assets are consistently higher for firms with private equity participation.

²⁰ See table 7, in Appendix.

The fact that public equity and public debt are the sources of finance whose firms have the highest mean and median values for total assets, also confirms claims from Berger and Udell (1998), Pagano et al. (1998) and Bolton and Freixas (2000). According to these authors, only firms that have attained a certain level of transparency and reputation, and are large enough to guarantee that public issues are economically attractive, are able to tap the capital markets.

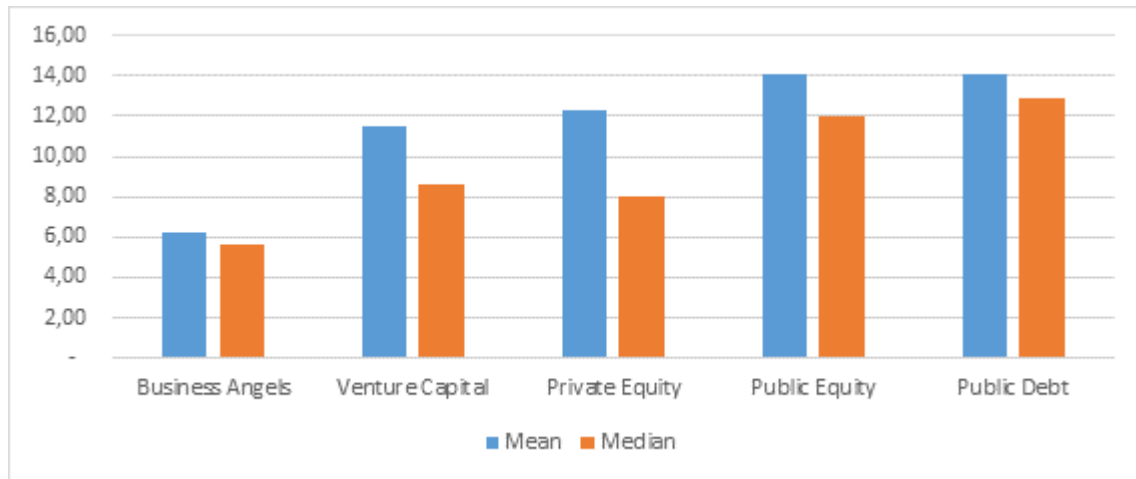


Figure 9: Natural log of Total Assets (in thousands of euros) of firms financed by investor type

The mean and median values for the age of financed companies, by investor type, is shown below in Figure 10. Comparing to Figure 9, there are plenty similarities, reinforcing what was said before. The striking difference is that age values for firms financed by public debt is much lower than the ones with public equity financing.

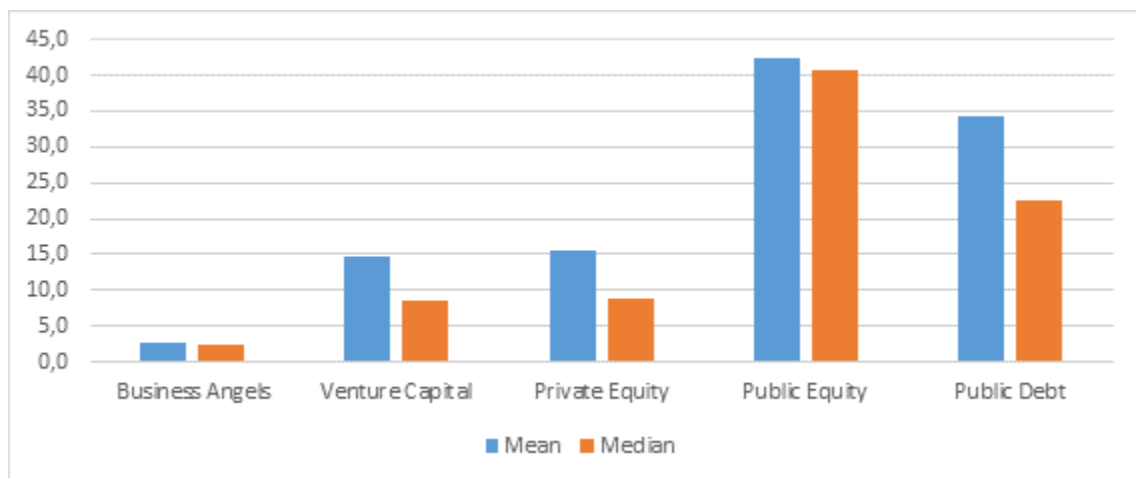


Figure 10: Age (in years) of firms financed by investor type

An explanation for this phenomenon lies with the age distribution of bond issuing companies. By analysing the sample, it is possible to see there are two separate groups of firms (see Figure 13 in appendix). One of them has ages comprised between 0 and 30 years, and the other group is from 60 to more than 100 years old. The age difference between these groups is what pushes down age values for mean and median. This division into two groups is not divergent with theory though. As Bolton and Freixas (2000) proposed, safe firms will tap the bond market for financing. Figure 13 and Table 8²¹ shows that the younger group is majorly composed of considerably large firms²². So if larger and older firms are safer, as Bolton and Freixas (2000) assumed, it makes sense that younger but larger firms, and older ones get financing in the bond market.

Regarding financial institution debt, Figures 6 and 8 have already proven, according to theory (Berger & Udell, 1998; Caselli, 2009; Saidenberg and Strahan, 1999), that the private debt market is the most widespread source of finance. Evidence for the sample of Portuguese firms clearly shows, for any size and age, that debt plays a significant role. It does not mean all companies in the sample carry it, but even for the group of firms with the smallest percentage it represents over 30% of capital employed.

One of the multiple types of contracting methods approached in chapter 2, relationship lending, was already discussed in Figure 8, so only collateral and guarantees, and maturities are left. According to Berger and Udell (1998), collaterals and guarantees are demanded by financial lenders in order to reduce risk associated with informational asymmetries. So typically, companies with high asset values are able to borrow more since, to lenders, they are less risky. As the authors noted, smaller firms can also have a high level of debt, in percentage of capital employed,

²¹ See table 8 in Appendix.

²² The second and third smallest firms have over 69 million euros and 100 million euros in total assets, respectively.

as, many times, firm owners pledge personal assets as collateral. Finally, theory also predicts that financial lenders provide financing with shorter maturities to riskier firms. As firms become less risky, they are available to grant longer maturities. In Figure 11, evidence of both contracting methods is clear. This graph represents the weight of Medium/Long-Term debt over the whole financial debt, by firm size level, where size is measured as Total Assets (in thousands of euros). The medium/long-term debt of very small firms (with a value of total assets between zero and 500 thousand euros) corresponds to more than 80% of all of their debt. For companies with higher asset levels, this weight is significantly lower. The only exception are large firms, where it goes back up to 70%. Considering what theory tells us, it seems that financial lenders perceive large firms as safe, possibly because they are more informationally transparent and have assets that can be pledged as collateral. Surprisingly, they are also willing to lend funds with longer maturities to small firms. The possible explanation, is that firm insiders are asked to present their personal wealth as collateral in exchange for the loan. Companies in between, do not have as much assets to pledge as large firms, and are too big for the owner/manager's personal assets be enough to cover the loan.

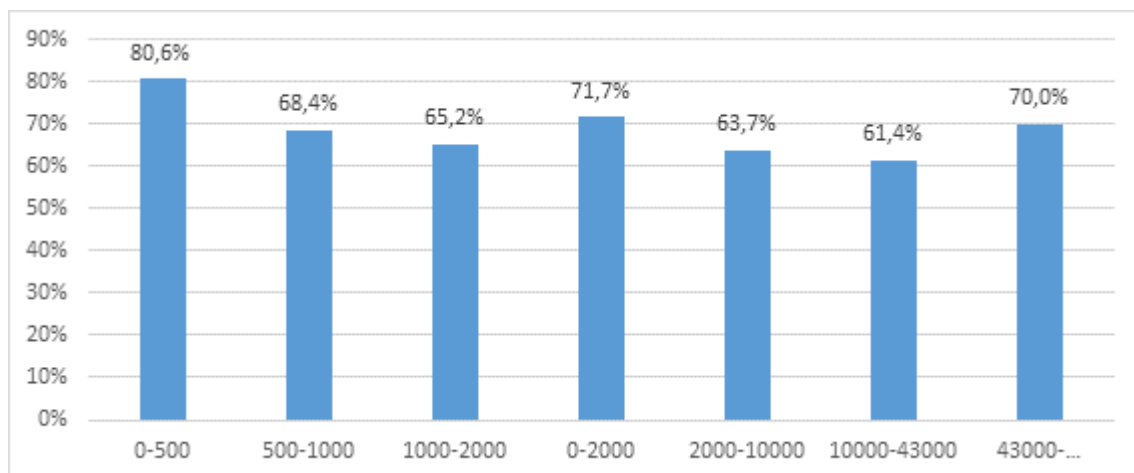


Figure 11: Weight of Medium/Long-Term Debt, by Total Assets (in thousands of euros)

Conclusions

This dissertation intent was to contribute to the better understanding of the positioning of investors, along the life-cycle of Portuguese companies. By knowing the sources of finance that are most adjusted to their characteristics, firms can present themselves in the market in a way that not only increases their likelihood of success raising capital, but of receiving valuable expertise and support.

The conducted empirical analysis, using data for a sample of 175 276 firms located in Portugal, demonstrated that shareholder and capital structure shift as they grow larger and older. This change is mainly due to the greater informational transparency as firms evolve, and their own objectives. Additionally, investors present in the stylized financial growth cycles found in Berger & Udell (1998) and Caselli (2009), appear to be in line with the Portuguese reality. Generally, sources of finance follow the sequence, and are positioned in the life-cycle, as expected from literature.

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Appendix

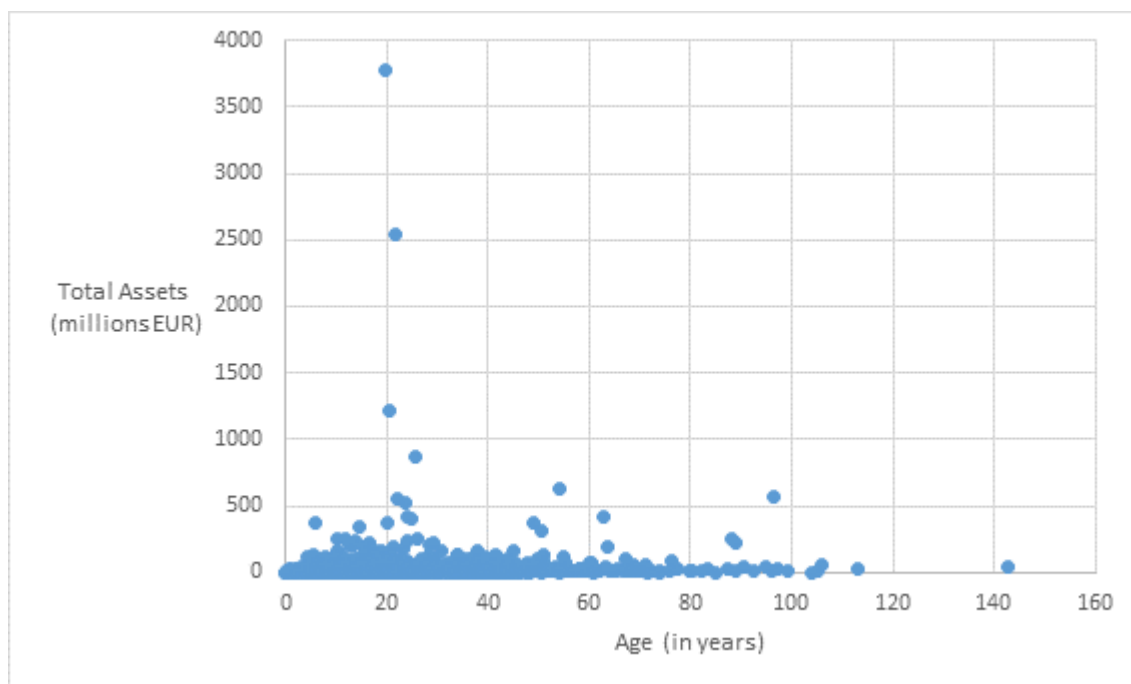


Figure 12: Sample distribution by age and total assets

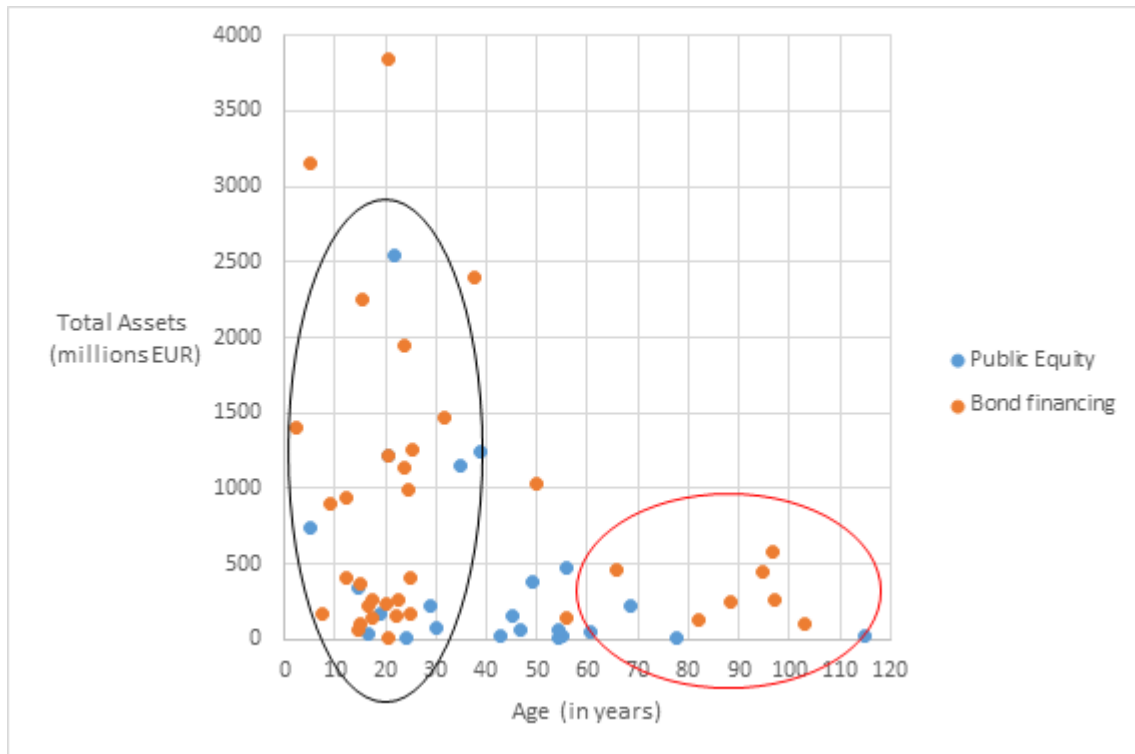


Figure 13: Sample distribution by age and total assets

Investor type	Total Assets (in thousands of euros)			
	0-2000	2000-10000	10000-43000	43000-...
Self ownership	0,25%	0,48%	0,59%	1,53%
Bank	0,01%	0,10%	1,69%	8,72%
Financial company	1,16%	5,63%	19,27%	47,11%
Insurance company	0,02%	0,14%	0,02%	1,97%
Industrial company	0,88%	2,59%	5,78%	11,93%
Private Equity firms	0,01%	0,11%	0,72%	2,83%
Hedge funds	0,00%	0,00%	0,00%	0,00%
Venture capital	0,0020%	0,0000%	0,0820%	0,0000%
Mutual & Pension Fund/Nominee/Trust/Trustee	0,13%	0,41%	2,24%	2,50%
Foundations/Research institutes	0,00%	0,00%	0,00%	0,00%
Public authorities, States, Governments	0,00%	0,00%	0,04%	0,00%
One or more named individuals or families	96,38%	88,12%	65,42%	18,03%
Employees/Managers/Directors	0,00%	0,02%	0,00%	0,00%
Public (publicly listed companies)	0,00%	0,00%	0,00%	0,43%
Unnamed private shareholders, aggregated	0,67%	0,96%	0,85%	0,20%
Other unnamed shareholders, aggregated	0,14%	0,13%	0,12%	0,06%
TOTAL	99,66%	98,68%	96,83%	95,30%

Table 3: Shareholder structure by Total Assets (in thousands of euros)

Capital structure	Assets (in thousands of euros)			
	0-2000	2000-10000	10000-43000	43000-...
% Debt/(Equity + Debt)	30,98%	38,51%	39,61%	36,06%
% Equity/(Equity + Debt)	69,02%	61,49%	60,39%	63,94%

Table 4: Capital structure by Total Assets (in thousands of euros)

Investor type	Age (years)					
	0 to 5	5 to 10	10 to 15	15 to 20	20 to 25	25-...
Self ownership	0,1%	0,1%	0,2%	0,3%	0,3%	0,8%
Bank	0,0%	0,1%	0,8%	0,9%	2,7%	1,7%
Financial company	6,6%	10,4%	16,2%	9,1%	18,6%	14,7%
Insurance company	0,1%	0,0%	2,5%	0,6%	0,2%	0,0%
Industrial company	2,4%	2,7%	4,0%	5,6%	7,1%	4,0%
Private Equity firms	0,4%	0,1%	0,9%	0,1%	0,5%	0,9%
Hedge funds	0,0%	0,0%	0,0%	0,0%	0,0%	0,0%
Venture capital	0,0%	0,0%	0,0%	0,0%	0,0%	0,0%
Mutual & Pension						
Fund/Nominee/Trust/Trustee	2,4%	1,0%	0,9%	1,8%	0,2%	1,0%
Foundations/Research institutes	0,0%	0,0%	0,0%	0,0%	0,0%	0,0%
Public authority, State, Government	0,0%	0,0%	0,0%	0,0%	0,0%	0,0%
One or more named individuals or families	87,7%	84,8%	72,8%	79,5%	69,2%	73,5%
Employees/Managers/Directors	0,0%	0,1%	0,0%	0,0%	0,0%	0,0%
Public (publicly listed companies)	0,0%	0,0%	0,1%	0,0%	0,0%	0,2%
Unnamed private shareholders, aggregated	0,1%	0,1%	0,2%	0,3%	0,5%	1,3%
Other unnamed shareholders, aggregated	0,0%	0,0%	0,1%	0,0%	0,1%	0,2%
TOTAL	99,6%	99,4%	98,7%	98,3%	99,3%	98,4%

Table 5: Shareholder structure by Age (in years)

Capital Structure	Age (years)					
	0 to 5	5 to 10	10 to 15	15 to 20	20 to 25	25-...
% Equity/(Equity + Debt)	59,8%	59,5%	67,4%	65,0%	64,0%	64,3%
% Debt/(Equity + Debt)	40,2%	40,5%	32,6%	35,0%	36,0%	35,7%

Table 6: Capital structure by Age (in years)

	Turnover (th euros)	Total Assets (th euros)	Age (years)
Business Angels			
Mean	865,95	513,17	2,53
Median	620,55	289,13	2,34
Minimum	1,75	14,74	0,23
1st quartile	156,80	39,84	0,78
3rd quartile	1 544,75	970,51	3,96
Maximum	2 177,73	1 703,31	6,01
Standard deviation	841,86	551,06	2,06
Venture Capital			
Mean	8 750,74	96 946,15	14,77
Median	929,53	5 598,56	8,42
Minimum	24,23	97,27	1,28
1st quartile	355,16	724,71	4,95
3rd quartile	8 762,12	21 810,38	14,77
Maximum	44 416,45	1 051 784,23	115,07
Standard deviation	13 770,37	237 549,73	21,39
Private Equity			
Mean	36 343,37	210 229,75	15,46
Median	1 428,46	2 981,66	8,88
Minimum	- 3 664,25	1,21	0,65
1st quartile	245,11	533,76	5,43
3rd quartile	8 186,72	15 201,33	19,65
Maximum	2 518 100,73	21 237 359,79	96,52
Standard deviation	235 866,56	1 917 826,87	16,29

Table 7: Descriptive statistics of companies financed by Business Angels, Venture Capital and Private Equity

	Turnover (th euros)	Total Assets (th euros)	Age (years)
Public Equity			
Mean	193 986,77	1 271 055,00	42,39
Median	15 315,14	166 823,83	40,72
Minimum	- 444,30	4 495,86	5,09
1st quartile	5 770,60	32 574,99	23,46
3rd quartile	110 230,34	545 832,40	54,35
Maximum	2 518 100,73	21 237 359,79	114,93
Standard deviation	518 235,20	4 295 153,36	23,99
Public Debt			
Mean	202 687,46	1 366 152,96	34,41
Median	65 399,22	409 369,06	22,43
Minimum	- 29 894,12	7 656,21	2,34
1st quartile	2 518 100,73	166 601,06	15,47
3rd quartile	10 803,94	1 218 237,77	38,53
Maximum	137 789,73	21 237 359,79	103,20
Standard deviation	449 109,15	3 477 264,86	29,50

Table 8: Descriptive statistics of companies financed by Public equity and Public Debt

Classificação de Actividade Económica (CAE), in Portuguese. The codes of economic activity selected were the following (Primary codes only): 05 - Extração de hulha e lenhite, 06 - Extração de petróleo bruto e gás natural, 07 - Extração e preparação de minérios metálicos, 08 - Outras indústrias extractivas, 09 - Actividades dos serviços relacionados com as indústrias extractivas, 10 - Indústrias alimentares, 11 - Indústria das bebidas, 12 - Indústria do tabaco, 13 - Fabricação de têxteis, 14 - Indústria do vestuário, 15 - Indústria do couro e dos produtos do couro, 16 - Indústrias da madeira e da cortiça e suas obras, excepto mobiliário; fabricação de obras de cestaria e de espartaria, 17 - Fabricação de pasta, de papel e cartão e seus artigos, 18 - Impressão e reprodução de suportes gravados, 19 - Fabricação de coque, produtos petrolíferos refinados e de aglomerados de combustíveis, 20 - Fabricação de produtos químicos e de fibras sintéticas ou artificiais, excepto produtos farmacêuticos, 21 - Fabricação de produtos farmacêuticos de base e de preparações farmacêuticas, 22 - Fabricação de artigos de borracha e de matérias plásticas, 23 - Fabrico de outros produtos minerais não metálicos, 24 - Indústrias metalúrgicas de base, 25 - Fabricação de produtos metálicos, excepto máquinas e equipamentos, 26 - Fabricação de equipamentos informáticos, equipamento para comunicações e produtos eletrónicos e opticos, 27 - Fabricação de equipamento eléctrico, 28 - Fabricação de máquinas e de equipamentos, n.e., 29 - Fabricação de veículos automóveis, reboques, semirreboques e componentes para veículos automóveis, 30 - Fabricação de outro equipamento de transporte, 31 - Fabrico de mobiliário e de colchões, 32 - Outras indústrias transformadoras, 33 - Reparação, manutenção e instalação de máquinas e equipamentos, 35 - Electricidade, gás, vapor, água quente e fria e ar frio, 36 - Captação, tratamento e distribuição de água, 37 - Recolha, drenagem e tratamento de águas residuais, 38 - Recolha, tratamento e eliminação de resíduos; valorização de materiais, 39 - Descontaminação e actividades similares, 41 - Promoção imobiliária (desenvolvimento de projectos de edifícios); construção de edifícios, 42 - Engenharia civil, 43 - Actividades especializadas de construção, 45 - Comércio, manutenção e reparação, de veículos automóveis e motociclos, 46 - Comércio por grosso (inclui agentes), excepto de veículos automóveis e motociclos, 47 - Comércio a retalho, excepto de veículos automóveis e motociclos, 49 - Transportes terrestres e transportes por oleodutos ou gasodutos, 50 - Transportes por água, 51 - Transportes aéreos, 52 - Armazenagem e actividades auxiliares dos transportes (inclui manuseamento), 53 - Actividades postais e de courier, 55 - Alojamento, 56 - Restauração e similares, 58 - Actividades de edição, 59 - Actividades cinematográficas, de vídeo, de produção de programas de televisão, de gravação de som e de edição de musica, 60 - Actividades de rádio e de televisão, 61 - Telecomunicações, 62 - Consultoria e programação informática e actividades relacionadas, 63 - Actividades dos serviços de informação, 69 - Actividades jurídicas e de contabilidade, 70 - Actividades das sedes sociais e de consultoria para a gestão, 71 - Actividades de arquitectura, de engenharia e técnicas afins; actividades de ensaios e de análises técnicas, 72 - Actividades de investigação científica e de desenvolvimento, 73 - Publicidade, estudos de mercado e sondagens de opinião, 74 - Outras actividades de consultoria, científicas, técnicas e similares, 75 - Actividades veterinárias, 77 - Actividades de aluguer, 78 - Actividades de emprego, 79 - Agências de viagem, operadores turísticos, outros serviços de reservas e actividades relacionadas, 80 - Actividades de investigação e segurança, 81 - Actividades relacionadas com edifícios, plantação e manutenção de jardins, 82 - Actividades de serviços administrativos e de apoio prestados às empresas, 85 - Educação, 86 - Actividades de saúde humana, 87 - Actividades de apoio social com alojamento, 88 - Actividades de apoio social sem alojamento, 90 - Actividades de teatro, de música, de dança e outras actividades artísticas e literárias, 91 - Actividades das bibliotecas, arquivos, museus e outras actividades culturais, 92 - Lotarias e outros jogos de aposta, 93 - Actividades desportivas, de diversão e recreativas.

Table 9: Selected codes of economic activity