

Entrepreneurial financing decisions, venture capital ownership and bargaining power.

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Executive Summary

It is widely acknowledged that entrepreneurial companies play a key role in shaping a local economy. Entrepreneurial companies are a source of growth and innovation for an industry and provide jobs for the local population. However, entrepreneurs of high growth oriented companies rarely have the capital to finance their innovative ideas themselves and therefore also have to accept the risks associated with assessing and acquiring the necessary finance resources from other investors. The goal of this dissertation is to study the impact of venture capital (VC) finance on such entrepreneurial finance decisions. Although VC investors are a highly focused and specialized kind of investors that offer a wide range of differentiated services, it is to date still unclear how VC investors may reduce agency costs for other potential investors.

In the first study of this dissertation, I study empirically if VC investors are better able to reduce agency problems in entrepreneurial companies. If so, what is the impact of this effect for other investors who have the potential to invest in these companies? This study demonstrates that VC ownership results into a larger supply of finance for the entrepreneurial company. Second and more specifically, I find that VC ownership results into an even larger positive effect on capital investment decisions from equity investors as VC finance is typically also associated with the implementation of an equity-oriented corporate governance mechanism in entrepreneurial companies. VC ownership does not have an effect on the supply of finance from financial debt investors, however. Nevertheless, debt is equally available for companies with VC ownership as compared to companies without VC ownership, which is surprising given the high risk associated with high growth companies that raise VC finance. Another important finding of this study is that the positive effect of VC ownership is stronger for repeated VC finance versus non-repeated VC finance. In fact, these results indicate that the effect of VC finance for entrepreneurial companies' finance decisions is considerably larger if VC investors commit to further finance the company, so that VC finance can make entrepreneurial companies even more attractive for potential investors, especially for equity investors.

The second study of this dissertation explores the effect of VC ownership on entrepreneurial finance decisions in different institutional settings. Although the effect of VC ownership is not limited to one specific institutional context, this study shows that its impact on entrepreneurial finance decisions is stronger in countries with a better quality of law

enforcement and in countries where the entrepreneur is able to obtain a fresh start after bankruptcy. Specifically, in countries with a better enforcement of law, VC investors are more effective in reducing agency problems between entrepreneurs and potential investors. Further, the attractiveness of a fresh start after bankruptcy will be higher for an entrepreneur who raised VC finance, as VC investors focus more on maximizing the value of their portfolio rather than on the survival of individual firms. In this study, we show that VC corporate governance at the company-level complements with institutional standards at the country-level like the quality of law enforcement and the forgiveness of bankruptcy law.

The third study acknowledges the fact that VC investors are not all equal and explores which VC investor types have more bargaining power versus the entrepreneur and how such differences in VC investor bargaining power affect company valuations in VC investment rounds. VC investor bargaining power is important because company valuations are the outcome of negotiations between the VC investor and the entrepreneur. We show that university VC firms and government VC firms negotiate lower valuations compared with independent VC firms. The proprietary deal flow of university VC firms and the limited competition in niche markets in which government VC firms compete will directly increase their bargaining power versus the entrepreneur, which these VC investor types then further exploit by negotiating lower company valuations compared with independent VC investors. Although differences in VC investor type did not affect entrepreneurial finance decisions in the first and second study, they do affect the equity stake that an entrepreneur will retain after the VC investment. Hence, differences in VC investor type affect the ‘price’ an entrepreneur will have to pay in order to raise VC finance and in order to have a greater access to entrepreneurial finance from potential investors in the future.

The implications of the three studies of this dissertation are important. Limited access to finance from potential investors may negatively affect entrepreneurial investment decisions, corporate growth and even the survival of entrepreneurial companies. Finance decisions are therefore important strategic decisions for both entrepreneurs and policy makers. This dissertation indicates how VC finance may alleviate such financing constraints of entrepreneurial companies. The results further also demonstrate that there are also certain costs related to raising VC finance. In fact, this dissertation demonstrates how the relative bargaining position of a VC investor affects the valuation of an entrepreneurial company which is often the most important concern for entrepreneurs that consider to raise VC finance, but also important for a VC investor as it will determine its future financial return.

Samenvatting (in Dutch)

Algemeen wordt aangenomen dat startende en jonge ondernemingen een belangrijke rol vervullen binnen een economie. Deze ondernemingen vormen een belangrijke bron voor de groei en innovatie binnen een bepaalde economie en ze creëren werkgelegenheid voor de lokale bevolking. Desondanks worden deze snelgroeïende ondernemingen ook vaak geconfronteerd met een gebrek aan financieringsmiddelen. Startende ondernemers beschikken namelijk zelden over voldoende eigen financiële middelen om hun innovatieve ideeën te financieren en zijn sterk aangewezen op externe bronnen van financiering, die echter vaak terughoudend zijn om dergelijke innovatieve, maar ook risicovolle projecten te financieren. Een rechtstreeks gevolg hiervan is dat voor een startende ondernemer een belangrijk deel van het ondernemingsrisico cruciaal gelinkt is aan het ophalen van financiering via nieuwe investeerders, die overtuigd kunnen worden van de toekomstperspectieven van dergelijke risicovolle projecten. De opzet van dit doctoraal proefschrift is om de invloed van risicokapitaalinvesteerders op de financieringsbeslissingen van deze jonge, snelgroeïende ondernemingen te bestuderen. Risicokapitaalinvesteerders worden vaak aanzien als een heel specifieke vorm van investeerders die naast de eigenlijke financiering van ondernemingen, een uitgebreid scala van uiteenlopende diensten aanbieden aan ondernemingen. Bovendien wordt risicokapitaalfinanciering vaak geassocieerd met de financiering van jonge, snelgroeïende ondernemingen, gezien risicokapitaalinvesteerders over specifieke controlemechanismen beschikken die in staat zijn om de risico's te reduceren die verbonden zijn aan een investering in dergelijke ondernemingen die andere investeerders vaak niet bezitten. Echter, tot op vandaag, is het niet duidelijk hoe dat de aanwezigheid van een risicokapitaalinvesteerder in jonge en startende ondernemingen een invloed kan hebben op de toekomstige financieringsbeslissingen van deze ondernemingen. Meer specifiek, de vraag blijft of een risicokapitaalinvesteerder andere potentiële investeerders kan overtuigen om ook te investeren in startende en jonge ondernemingen.

In de eerste studie van dit proefschrift wordt nagegaan of risicokapitaalinvesteerders de risico's die verbonden zijn aan investeringen in startende en jonge ondernemingen beter beheersen en welke de gevolgen hiervan zijn voor de financieringsbeslissingen van deze ondernemingen. Die investeringsrisico's worden in de literatuur vaak herleidt tot twee specifieke risico's, die beiden ontstaan uit het feit dat een ondernemer over meer en betere informatie beschikt dan een potentiële investeerder. Enerzijds kan, voorafgaand aan een investering, een ondernemer het ondernemingsrisico beter inschatten dan een investeerder

waardoor een investeerder rekening zal houden met het ‘gemiddeld’ risico van een onderneming voor het bepalen van de financieringskost. Voor ondernemers die financiering zoeken voor projecten waarbij het risico lager ligt dan het gemiddeld risico zal de financieringskost te hoog zijn; voor projecten waarbij het risico hoger ligt dan het gemiddeld risico zal de ‘gemiddelde’ financieringskost te laag zijn waardoor uiteindelijk enkel de ondernemers met meer risicovolle projecten het financieringsaanbod zullen accepteren. Anderzijds bestaat er nog een tweede risico voor investeerders die ontstaat na de investering, namelijk het risico dat de ondernemer de financiering die hij ophaalt misbruikt (bv. om privé-uitgaven te bekostigen) of niet optimaal benut waardoor het rendement van de investering voor de investeerder dreigt lager uit te vallen.

Uit de eerste studie blijkt dat risicokapitaalinvesteerders een positieve invloed uitoefenen op het aanbod aan financiering voor startende en jonge ondernemingen waaruit dus volgt dat investeerders minder risico lopen wanneer een risicokapitaalinvesteerder in de onderneming heeft geïnvesteerd. Verder blijkt dat dit positief effect van risicokapitaal financiering het grootst is op het aanbod aan eigen vermogen financiering maar dat er geen invloed is van risicokapitaalinvesteerders op het aanbod aan financiële schuldfinanciering. Deze resultaten liggen in lijn met de verwachtingen, al werd verwacht dat risicokapitaal financiering ook ofwel een positief effect ofwel een negatief effect zou teweegbrengen op het aanbod aan schuldfinanciering. Als verklaring voor het feit dat er op het aanbod aan schuldfinanciering geen effect waargenomen wordt, wordt aangegeven dat risicokapitaalinvesteerders naast het reduceren van de investeringsrisico’s voor schuldfinanciers, in de ondernemingen nieuwe bestuursregels en codes van goede praktijk introduceren die minder gunstig zijn voor schuldfinanciers waardoor potentiële schuldfinanciers een afweging maken tussen de voor- en nadelen van risicokapitaal financiering waardoor er uiteindelijk geen effect waargenomen wordt. Verder wordt er in deze studie het onderscheid gemaakt tussen de effecten van risicokapitaal financiering die het resultaat zijn van een éénmalige dan wel herhaalde investering(en) van risicokapitaalinvesteerders. Uit de studie blijkt dat ondernemingen die meerdere rondes risicokapitaal financiering kunnen ophalen minder problemen kennen om bijkomende financiering, en opnieuw vooral financiering van eigen vermogen financiers, op te halen dan ondernemingen die in één enkele financieringsronde risicokapitaal financiering ophalen. Herhaalde investeringen van een risicokapitaal financierer binnen dezelfde onderneming hebben dus een sterker positief effect op de daaropvolgende financieringsbeslissingen.

In de tweede studie wordt het effect van risicokapitaalfinanciering op de financieringsbeslissingen van ondernemingen geanalyseerd rekening houdend met een aantal belangrijke verschillen op institutioneel vlak, die kenmerkend zijn tussen de zes Europese landen (België, Finland, Frankrijk, Italië, Spanje en het Verenigd Koninkrijk) die deel uitmaken van deze studie. Hoewel we in deze studie vinden dat het positief effect uit de eerste studie van risicokapitaalfinanciering op financieringsbeslissingen, niet beperkt is tot één specifieke institutionele omgeving, vinden we dat ondernemingen meer financiering ophalen in landen waar er een duidelijk wetgevend kader bestaat dat investeerders gemakkelijker toelaat om hun rechten als investeerder te vrijwaren. Daarnaast vinden we in deze landen ook een sterker positief effect van risicokapitaalfinanciering op financieringsbeslissingen. Dit duidt erop dat in deze landen, het aanbod aan financiering gemiddeld genomen hoger is maar ook dat risicokapitaalinvesteerders in deze landen de ondernemingsrisico's beter beheersen en dus ook deze risico's beter reduceren voor andere potentiële investeerders waardoor het aanbod aan financiering nog verder toeneemt. Daarnaast focust deze studie ook op de wetgeving rond falings in elk land en hoe de gevolgen van een potentiële faling die uit deze wet voortvloeien een invloed kunnen hebben op de verdere financieringsbeslissingen van ondernemingen. Meer specifiek vinden we dat ondernemingen meer financiering ophalen en dat het effect van risicokapitaalfinanciering opnieuw groter is in landen waar de wetgever de schulden van een ondernemer kwijtscheldt na faling. Het kwijtschelden van schulden na een faling wordt hierbij als een ja/nee vraag behandeld en er wordt rekening gehouden met het soepeler (kwijtschelden van schulden) of strenger (geen kwijtschelding van schulden) worden van de wetgeving in een bepaald land doorheen de tijd. Dit duidt erop dat ook de ondernemer, die de vraag naar financiering vertegenwoordigt, een belangrijke invloed heeft op de financieringsbeslissingen van een onderneming. Meer concreet, ondernemers halen minder vaak financiering op wanneer de wetten met betrekking tot faling hen in voorkomend geval geen kwijtschelding van schulden toekent en dat effect wordt opnieuw sterker nadat ondernemers risicokapitaalfinanciering hebben opgehaald. Als verklaring voor dit laatste resultaat stellen we dat risicokapitaalfinanciers minder focussen op de overlevingskansen van de ondernemingen waarin ze investeren afzonderlijk. Anders gesteld, voor ondernemers zal de kans op faling toenemen na een investering van risicokapitaalfinanciers, omdat risicokapitaalinvesteerders vaak hun investeringsrisico minimaliseren door de minst succesvolle ondernemingen in hun portefeuille te liquideren, bijvoorbeeld door middel van een gedwongen faling of een ontbinding van de onderneming. Een belangrijke conclusie uit deze studie is dat de positieve effecten op de financieringsbeslissingen van ondernemingen

die het gevolg zijn van risicokapitaal financiering op het niveau van de onderneming enerzijds en de bescherming van investeerders of de vergevingsgezindheid voor ondernemers binnen elk land anderzijds complementair blijken te zijn.

In de derde studie wordt dieper ingegaan op het feit dat risicokapitaal investeerders verschillend kunnen zijn, specifiek in deze studie omdat er verschillende types van risicokapitaal investeerders bestaan. In deze studie wordt bestudeert hoe verschillende types van risicokapitaal investeerders zich in een betere of slechtere onderhandelingspositie bevinden ten opzichte van de ondernemer en welke invloed dit geeft op de waardering van een onderneming in een financieringsronde. De onderhandelingspositie van een risicokapitaal investeerder is cruciaal voor het bepalen van het aantal aandelen dat een risicokapitaal investeerder ontvangt in ruil voor een bepaalde som geld en beïnvloedt dus rechtstreeks de waardering van een onderneming. Uit deze studie blijkt dat een zelfde onderneming lager gewaardeerd wordt door risicokapitaal financiers die verbonden zijn aan een universiteit en door risicokapitaal financiers die opgestart zijn door de overheid relatief ten opzichte van de meer traditionele risicokapitaal investeerders die niet verbonden zijn aan een eender welke institutie (bank, overheid, universiteit of onderneming). We verklaren dit door te stellen dat beide types van risicokapitaal financiers zich in een betere onderhandelingspositie bevinden dan de traditionele risicokapitaal investeerders; meer concreet investeren universitaire risicokapitaal financiers hoofdzakelijk in universitaire spin-offs die weinig alternatieven hebben op vlak van financiering en waarbij ondernemers vaak vanuit een reglementair kader universitaire risicokapitaal financiers een kans moeten geven om te investeren in hun onderneming. Risicokapitaal investeerders die fondsen ter beschikking krijgen van de overheid, zijn vaak opgericht vanuit het motief het aanbod aan risicokapitaal financiering te verbreden en krijgen de opdracht zich te focussen op twee specifieke niche-markten: enerzijds op de meest jonge en risicovolle ondernemingen en anderzijds op de meer mature ondernemingen die beiden omwille van ofwel een te hoog risico (heel jonge ondernemingen) of een te laag groeipotentieel (mature ondernemingen) minder aantrekkelijk zijn voor andere types van risicokapitaal financiers. Samengevat, uit de eerste twee studies van dit doctoraal proefschrift blijkt dat risicokapitaal financiering een positief effect heeft op financieringsbeslissingen, onafhankelijk welk type van risicokapitaal investeerder in de onderneming investeert. Echter, uit de derde studie blijkt dat het type van risicokapitaal investeerder een belangrijke invloed zal uitoefenen op het aantal aandelen dat een ondernemer moet afstaan en zal dus ook bepalen hoeveel medezeggenschap

hij moet afstaan aan een risicokapitaalinvesteerder in ruil voor dit positief effect op verdere financieringsbeslissingen.

De resultaten van dit doctoraal proefschrift leveren belangrijke inzichten op voor de praktijk. Ten eerste, een tekort aan financiering voor startende en jonge ondernemingen heeft belangrijke negatieve gevolgen voor de investeringsbeslissingen en de groei van ondernemingen en zelfs voor de overlevingskansen van een onderneming waaruit volgt dat financieringsbeslissingen belangrijke strategische beslissingen zijn voor deze ondernemingen. Dit proefschrift toont aan hoe startende en jonge ondernemers het aanbod aan financiering voor hun onderneming kunnen verhogen. Aangezien deze snelgroeiende ondernemingen een belangrijke bron zijn van groei en tewerkstelling binnen een economie, zijn deze resultaten bovendien eveneens belangrijk voor beleidsmakers. Voor de ondernemers en risicokapitaalinvesteerders in kwestie, wordt het belang van hun relatieve onderhandelingspositie ten opzichte van elkaar in dit proefschrift onderstreept. Ondernemers die tussen verschillende investeringsvoorstellen van risicokapitaalinvesteerders kunnen kiezen en dus een sterkere onderhandelingspositie bekomen, zullen uiteindelijk minder aandelen moeten afstaan voor dezelfde som geld; risicokapitaalinvesteerders die tijdens de onderhandelingen met een ondernemer minder competitie van andere risicokapitaalinvesteerders ondervinden zullen op hun beurt meer aandelen krijgen voor een zelfde investering en dus een hoger potentieel rendement uit hun investering kunnen halen.

Chapter 1

Introduction

The goal of this PhD dissertation is to study the impact of venture capital (VC) finance on subsequent finance decisions of entrepreneurial companies. In this introduction, I first describe why entrepreneurial companies are often confronted with limited access to finance. Then, I will describe why VC finance is typically associated with high growth oriented entrepreneurial companies as a source of finance. Next, I will focus on how VC finance may affect entrepreneurial companies' finance decisions, thereby integrating the research questions that are studied in this dissertation and how these contribute to the literature. In the last part of this introduction, I describe the data and give an overview of the three studies that are the main part of this PhD dissertation.

1.1 Entrepreneurial companies

It is widely acknowledged that entrepreneurial companies play a key role in shaping any local economy (Bottazzi and da Rin, 2003). Entrepreneurial companies are a source of growth and innovation in the industry and provide jobs for the local population (European Commission, 2003). For example, it has been argued that worldwide, six out of every ten newly-created jobs are created by entrepreneurial companies (OECD, 2010) and that entrepreneurial companies are at the forefront of developing and exploiting innovations with a clear competitive advantage. Hence, entrepreneurial companies are considered to be fundamental contributors to a nation's economic growth and development. As a result, entrepreneurial companies have received increased attention from economists and policy makers in recent years. Governments have now widely recognized entrepreneurial companies as a key driver of economic development (European Commission, 2003). Entrepreneurial companies are however not solely associated with innovativeness and growth. Miller and Friesen (1983) for example argue that entrepreneurial companies' organizational structure exhibits three underlying dimensions: innovativeness but also calculated risk-taking and proactiveness. The more innovative, risk-taking and proactive the activities of the company, the more entrepreneurial. Hence, entrepreneurs also have to accept the risks associated with starting a new business which includes defining a business concept, assessing and acquiring the necessary resources, and managing the entrepreneurial company. In short, entrepreneurial companies exploit new opportunities and hence contribute significantly to innovation and

welfare but are also typically confronted with liabilities of newness and smallness which poses significant challenges to their longevity and viability.

Moreover, entrepreneurs who decide to exploit entrepreneurial opportunities are characterized by differences in optimism and perceptions compared with more traditional employees. First, entrepreneurs are on average overly optimistic about the value of the opportunities they discover. Entrepreneurs typically perceive their chances of success as much higher than they really are and much higher than those of others in their industry (Cooper et al., 1988; Cassar, 2010). Most entrepreneurs are convinced that they have exciting and dynamic ideas. They believe that the technological innovation or new marketing idea may have huge market potential, and competitors offer poor alternatives. Second, the entrepreneurs' flexibility is a key resource in the success of any entrepreneurial company. Flexibility is important because of the critical need for continuous organizational change to deal effectively with the increasing turbulence in competitive markets (Shane and Venkataraman, 2000). The creation of new products and markets involves significant downside risk, because time, effort, and money must be invested before the distribution of the returns is known (Venkataraman; 1997). Several researchers have argued that individual differences in the willingness to bear this risk influence the decision to exploit entrepreneurial opportunities (Khilstrom and Laffont, 1979).

As a result, entrepreneurial companies differ substantially from other companies. In general, there is much more uncertainty and risk associated with entrepreneurial companies which has an important impact on their relationship with stakeholders like for example suppliers, customers, employees and potential investors. These stakeholders of entrepreneurial companies are prone to a higher risk and are also confronted with a higher level of asymmetric information as compared with stakeholders in other companies.

1.2 Entrepreneurial companies' finance decisions

As a consequence of the particular risks and opportunities associated with entrepreneurial companies, finance decisions in entrepreneurial companies and finance decisions in other, more mature companies may be different. First, in an entrepreneurial company, investments are mostly contingent upon finance decisions. Entrepreneurs themselves rarely have the capital to finance their ideas (Hellmann, 2007), thus the need for finance from other investors is often a major concern to support the companies' development and growth. Rapid growth in entrepreneurial companies may hence only be possible with substantial amounts of finance

from other investors, whereas a more mature company may be able to finance an entire project with internally generated cash. Second, the level of investor involvement in entrepreneurial companies is much higher. Successful entrepreneurship is often largely dependent upon the entrepreneur's competence to make the right decisions (Gimeno et al., 1997). Good ideas with large growth potential may fail because of poor implementation or poor strategic decisions. Investors that possess not only financial resources but also non-financial resources that have the potential to create value for entrepreneurial companies, can reduce the uncertainty which is related with the survival of entrepreneurial companies (Bates, 1990) and hence decrease the risks associated with their investment. Third, information problems on the entrepreneurs' ability to undertake a project are more central in entrepreneurial companies (Amit et al., 1998) as entrepreneurs and investors often have different expectations about the future performance of the company. Basically, entrepreneurs have a clear view of the possibilities of their company and of their personal commitment and efforts while the capital providers, on the other hand, have considerably less information. Moreover, is it often not easy for entrepreneurs to communicate their true beliefs about the potential for success of their new venture (Cable and Shane, 1997). Most entrepreneurs do not have much experience and therefore cannot demonstrate their abilities through a track record of past achievements (Berger and Udell, 1998). Fourth, the role and importance of contracts in order to resolve incentive problems between investors and entrepreneurs is much higher in entrepreneurial companies. Although financial contracts are far from perfect (Kaplan and Strömberg, 2003), elaborated financial contracts between the entrepreneur and the investor may mitigate some of the information problems that arise when entrepreneurs search for finance from other investors (Grossman and Hart, 1986). Specifically for investors, a financial contract helps to protect and maximize the value of their financial claims. For entrepreneurs, accepting the terms of the financial contract offers often an important and credible signal about their confidence in the company.

1.3 Adverse selection and moral hazard problems

The large information asymmetries that may exist between investors and entrepreneurs give rise to two kind of problems. The first one is adverse selection and the second one is moral hazard (Darrough and Stoughton, 1986, Arrow, 1973, Akerlof, 1970). These problems of adverse selection and moral hazard may impede for an entrepreneur the supply of finance from other investors and will increase the cost of raising finance.

The adverse selection problem relates to the fact that entrepreneurs often do not have a track record and are likely to present overly optimistic projections of success when searching for finance from investors (Amit et al., 1998). To compensate for these unproven capabilities of entrepreneurs and their overly optimistic claims, investors typically demand higher rates of return. In these circumstances, high-quality entrepreneurs with superior opportunities and realistic cash flows projections are confronted with undervaluation of their entrepreneurial business and will most likely decide not to pursue the financing from these investors. Those with inferior companies or too optimistic expectations, on the other hand, remain in the market. Hence, adverse selection problems lower the average quality of entrepreneurial companies that search for financing (Akerlof, 1970). The moral hazard problem arises because financial contracts are incomplete and outside investors cannot perfectly monitor the performance of the company. Once entrepreneurial companies have attracted finance, entrepreneurs may act in ways that are no longer consistent with their original intentions. For example, entrepreneurs may have the tendency to undertake higher risks because the potential costs associated with undertaking these risks are partly borne by the investor (Amit et al., 1998). Or entrepreneurs may feel less urged to work towards achieving success for reason that investors share in the benefits of the entrepreneurial companies' success after the investment. In general, moral hazard problems increase the need for oversight.

Signaling by entrepreneurs (Spence, 1973) and screening by investors (Stiglitz, 1975) may provide a solution to adverse selection problems. Signaling permits high-quality entrepreneurs to distinguish themselves from low-quality entrepreneurs. It is an effective mechanism as long as the cost of imitating the signal is higher for low-quality entrepreneurs than the expected benefit (Spence, 1973). Screening on the other hand, is a mechanism used by investors to separate between high- and low quality entrepreneurs. Screening reveals whether the hidden information that entrepreneurs possess is positive or negative. Solutions to the moral hazard problem are typically associated with monitoring and contracting (Sahlman, 1990). Monitoring activities are designed to limit the ability of an entrepreneur to act opportunistically. Likewise, the enforcement of restrictive covenants embedded in financial contracts is another way for investors to align the entrepreneurs' incentives (Gompers, 1995).

Financial intermediaries can overcome to some extent these asymmetric information problems in entrepreneurial companies by acting as delegated monitors (Diamond, 1984). Investors often delegate the task of costly monitoring to financial intermediaries because they have a cost advantage in producing and collecting information that may help to resolve incentive

problems in entrepreneurial companies. Hence, besides their funding task, financial intermediaries such as banks, venture capitalists, mutual funds and other institutional investors fulfill an important information production task (Leland and Pyle, 1977) which is able to mitigate the asymmetric information between the outside investor and the entrepreneur. As a result, financial intermediaries are able to alleviate some of the market imperfections that occur when entrepreneurs search for outside finance (Boyd and Prescott, 1986). However, not all financial intermediaries are the same (Allen and Santomero, 2001). In this dissertation, I will focus on one, unique kind of financial intermediary, namely venture capital investors (Amit et al., 1993) of whom it is often argued that they possess better skills to address the agency problems in entrepreneurial companies. In the remainder paragraphs of this introduction, I will first shortly describe what venture capitalists are and what venture capitalists do. Then I will describe some characteristics of VC finance which makes VC finance unique, thereby providing a framework for some arguments of the research questions that are studied in this PhD dissertation. The last paragraph gives an overview of the data, the research questions and the three studies that form the main part of this PhD dissertation.

1.4 The structure of VC finance

Before focusing on VC finance, it is important to notice that most of the finance that is supplied to entrepreneurial companies does not come from VC investors (Gompers and Lerner, 2001). More specifically, 90 percent of all entrepreneurial companies are never raise VC finance and on average more than 95 percent of entrepreneurial financing comes from sources other than from VC investors (Davis, 2003). In fact, most entrepreneurial companies do not have the characteristics that would make them suitable for VC finance while companies that raise VC finance often find it difficult to meet their financing needs through alternative and more traditional sources of finance. So why then focus on VC finance in this dissertation? The answer to that question pertains to the unique organizational structure of VC finance which has been designed to finance companies which are financially constrained in a niche market. Many well-known companies, including Apple, Devgen, Skype, Intel and Microsoft, which are today captains of the technology sector have raised VC finance; in fact without VC finance these companies would probably today not exist. Hence, VC finance is much more important in terms of sources of finance particularly associated with innovation and in terms of finance that fuels economic growth and value creation (Schwienbacher, 2008, Hellmann and Puri, 2000; Kortum and Lerner, 2000). The following paragraph summarizes the history and evolution of the VC industry.

The VC industry in Europe is today a well-established industry. The VC industry experienced most of its growth however only over the past fifteen years. Figure 1.1 shows the amount of funds flowing into the European VC industry since 1986. As Figure 1.1 shows, fund raising activity was relatively small during the 80s and the early 90s as compared with later time periods. At the end of the 20th century, VC finance became more important together with the emergence of many high-tech companies. Further, Figure 1.1 indicates that VC fund raising activity is subject to boom and bust cycles in the economy. Specifically, VC fund raising activity increased sharply from 1998 until the burst of the high-tech bubble in 2001. In the aftermath of the dot-com crisis, VC fund raising activity increased again year by year until the start of the financial crisis in 2007.

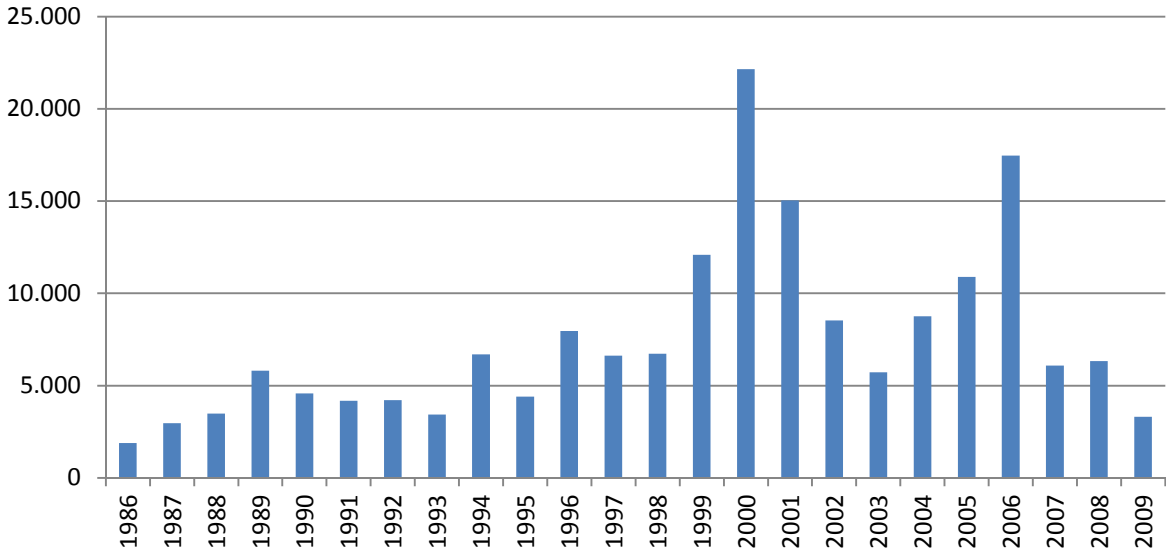


Figure 1.1: Amounts of funds raised by the VC industry in Europe (in € million) (source: EVCA).

In VC finance, VC investment managers are responsible for the investments which includes taking up different roles. The first one is maintaining relationships with investors who provide them with capital. Institutions such as pension funds, university endowments, banks, insurance companies and wealthy individuals amongst other institutional investors are the most important capital providers to the VC industry (EVCA, 2012). VC investment managers typically raise their money through VC investment funds. These funds take often the form of limited partnerships (Kaplan and Schoar, 2005) and typically have a ten-year life although extensions with three years are possible (Gompers and Lerner, 2001). After that period, the VC fund is closed, the proceeds are distributed back to the institutional investors (limited partners) and a new fund is raised. VC professionals that manage funds in such a limited

partnership structure are often referred to as independent VC firms (Gompers and Lerner, 2001). Although this limited partnership structure dominates in the U.S. VC industry, other governance structures also exist. For example, some VC funds have corporations, banks, public institutions or academic institutions as dominant shareholder. VC professionals managing such type of VC funds are often referred to as captive VC firms (Bottazzi et al., 2008). These captive VC firms not only have different governance structures, but they also have different incentive structures and additional or different goals (Bottazzi et al., 2008). For example, independent VC investment managers typically receive a combination of an annual, fixed management fee which is often equal to up to 2 percent of the committed capital and a performance-contingent carried interest pay which is typically 20 percent of the profits of the fund (Barry, 1994). VC professionals that manage funds that are structured as corporate or bank subsidiaries often receive lower incentive-based compensation (Tykvová, 2006). On the other hand, corporate and bank-affiliated VC funds may benefit from closely related activities such as obtaining a window on new opportunities (Dushnitsky and Lenox, 2005) or cross-selling bank loans (Hellmann et al., 2008).

VC investment managers play a second role in the screening of investment proposals and in the oversight of companies that are selected for investment (Manigart et al., 1997). A VC organization typically receives a large number of investment proposals. Although many of these investment opportunities are discarded after a short analysis of the business plan (Tyebjee and Bruno, 1984), remaining potential candidates are extensively screened. Specifically, the technology and market potential are formally studied in depth alongside an informal assessment of the entrepreneurial management team. When the investment decision is affirmative after this screening phase, venture capital investors typically do not provide all the capital at once, but invest in different stages (Gompers, 1995). Consequently, entrepreneurs are obliged to return periodically to the VC investor to ask for additional finance and repeatedly have to prove that the money is spent on value-creating projects. Moreover, VC investors mostly install at the same time intensive monitoring mechanisms by asking convertible securities in return for their invested cash and representation on the board of directors (Kaplan and Strömberg, 2003). These screening and monitoring activities may again be more important for one particular type of VC firm compared to the other (Mayer et al., 2005, Sapienza et al., 1996, Bottazzi et al., 2008). For example, it is often argued that independent VC firms are better at monitoring companies.

Another important responsibility of a VC investment manager is to prepare the exit of their investments in companies and to disburse the returns to institutional investors. Venture capitalist investors often prefer an Initial Public Offering (IPO) as the most desirable exit route given that an IPO typically accounts for the bulk of the venture capital funds' return (Black and Gilson, 1998). However, only a small percentage of entrepreneurial companies (historically between five and six percent) are taken public (Puri and Zarutskie, 2012). Other, entrepreneurial companies are sold to other corporations that are active in the same industry or to another financial investor, or are liquidated when the VC fund is closed (Schwienbacher, 2008). The shares of a VC investor in entrepreneurial companies that are able to generate a modest income for the entrepreneur, are typically reacquired by the entrepreneur at the exit.

1.5 The unique characteristics of VC finance

It has often been argued that VC investors are unique in a number of aspects (Amit et al., 1993). From a more general perspective, VC investors are a rather small but highly focused and specialized kind of investors (Bottazzi et al., 2008) that offer a wide range of differentiated services. The benefits of VC finance for the entrepreneur lies in the provision of information-related services that go well beyond the provision of funds. Moreover, VC investors operate in a specific part of the financial market where asymmetric information problems are likely to be more pronounced and where such non-financial information-related services are extremely valuable. In each of the following three paragraphs, I focus on one particular aspect in which VC investors are specialized: their screening and monitoring skills, their value-adding assistance and their certification effect.

First, given that VC investors provide funding to companies in which agency conflicts are likely to be more severe, they develop several screening mechanisms (Chan, 1983) and their monitoring mechanisms are likely to be highly sophisticated (Hellmann, 1998; Gompers, 1995). VC investors typically receive many business proposals (Tyebjee and Bruno, 1984). During the screening phase, VC investors decide rather quickly which business proposals deserve further attention (Zacharakis and Meyer, 2000). Important criteria that are used during the screening phase relate to the entrepreneurial companies' chance of success. For example, earlier research divided the screening criteria used by VC investors into four different categories: the competencies of the entrepreneur or the entrepreneurial management team (1), the uniqueness and the potential of the product (2), the competition in the market (3) and the return potential of the company (4) (Timmons et al., 1987, MacMillan et al., 1987,

Robinson, 1987). Furthermore, VC investors often specialize by industry or stage (Norton and Tenenbaum, 1993) and are thus generally in a good position to screen companies that fall inside their investment scope (Ueda, 2004). Moreover, when companies are initially selected by VC investors, the VC investor believes that there is potential but they still typically perform an in-depth evaluation of the entrepreneur's capabilities and the product's market potential before they actually decide to invest (Kaplan and Strömberg, 2004).

After the investment, VC investors implement sophisticated monitoring mechanisms in the companies (Sahlman, 1990). It is often argued that VC investors implement good corporate governance practices in the companies in which they invest. For example, VC investors typically hold equity stakes and obtain significant control rights in the companies they finance (Kaplan and Strömberg, 2003). These enhanced control rights enable them to curb managerial entrenchment and to limit the pursuing of private benefits by the entrepreneur more efficiently. Furthermore, given their equity position, VC investors need to ensure that good governance systems are in place in order to protect the value of their ongoing investments in these companies. As a result, VC investors typically do not provide all the cash at once but make further VC investment contingent upon the achievement of certain targets (Gompers, 1995) and often replace the existing entrepreneur with more experienced managers if this is necessary (Hellmann, 1998; Cable and Shane, 1997). Third, VC firms' high-powered compensation schemes give VC investment managers incentives to monitor companies closely because their individual compensation is closely linked to the VC funds' return (Gompers and Lerner, 2001).

Second, VC investors do not only provide cash to entrepreneurial companies but also many other non-financial resources. The value-added skills of the VC investor often provides the margin of success over failure for the entrepreneurial company (Chemmanur et al., 2012). Specifically, VC investors contribute to the success of entrepreneurial companies in many ways. For example, VC investors help professionalizing the management team. The entrepreneurial team is typically a key factor contributing to the survival and success of a company. VC investors can rely on a large network of contacts that they can use to convince for example top managers to give up their current position and to join a new and risky entrepreneurial company (Bygrave and Timmons, 1992). Likewise, VC investors can use their network of contacts to introduce suppliers and potential customers. As another example, in a startup company the entrepreneur often lacks experience and knowledge to have a realistic view of the market potential and customer demands whereas VC investors typically have a

more thorough understanding of the market. Another important value-adding role of VC investors is acting as a sounding board (Fried et al., 1998). Discussing new strategies and new directions with the entrepreneur before implementing them can help to avoid costly mistakes. As a final example, VC investors bring in other investors (Lerner, 1994, Vanacker et al., 2013). These investors often have complementary skills that can help entrepreneurial companies to achieve the next level in their growth path. Overall, scholars generally support the argument that VC investors play an active role in guiding their companies towards potential success (Hellmann and Puri, 2002; Sapienza et al. 1996).

Third, another important role of VC investors is to provide credibility and legitimacy by signaling the quality of the company. Other potential investors tend to rely on the reputation of the current investors in the absence of credible information about the companies themselves (Boot and Smith, 1986). In general, existing investors with a better reputation are associated with superior certification abilities, making companies more attractive to potential investors. Studies from the VC literature (Nahata, 2008; Li and Masulis, 2008) claim that VC investors have much reputational capital at stake because they are repeated, long-term players in the VC industry. First, better VC reputation can help VC investment managers in raising funds from limited partners (Kaplan and Schoar, 2005). Second, VC reputation helps forming relationships with other reputable VC investment partners which is crucial for future deal flow (Lerner, 1994). Third, a higher VC reputation is often associated with more favorable investment conditions (Hsu, 2004; Sorensen, 2007). Gompers (1996) provides empirical evidence of the ‘grandstanding’ behavior of younger VC firms. He finds that younger VC investors push entrepreneurial companies quickly to successful exit, most preferably an IPO in order to establish a good reputation. Moreover, for entrepreneurial companies, this certification-based approach of relying on VC investors’ reputational capital is particularly important because little is known about the company’s history. Therefore entrepreneurial companies will benefit particularly from choosing reputable VC investors that can signal credible information about entrepreneurial quality (Booth and Smith, 1986; Titman and Trueman, 1986).

1.6 The impact of VC on entrepreneurial finance decisions.

The goal of this PhD dissertation is to study the impact of a VC investor on finance decisions in entrepreneurial companies. To date, a large and growing body of literature has documented the unique aspects of VC finance as described above. Overall, there exists a clear consensus

among researchers that VC investors possess some unique characteristics in order to decrease the agency costs between the entrepreneur and themselves. What is much less clear to date from the existing literature however, is how VC finance may affect agency costs for other potential investors. Therefore, the central theme of this PhD dissertation is to study the effect of VC finance on entrepreneurial finance decisions. This is important for entrepreneurial companies as limited access to finance may negatively affect investment decisions, entrepreneurial growth and company survival (Cassar, 2004). Hence, finance decisions are important strategic decisions for entrepreneurial companies. Moreover, the level of information asymmetries between the entrepreneur and potential investors are central to understand the finance decisions in the specific context of entrepreneurial companies. Hence, the impact of VC on finance decisions in entrepreneurial companies provides an excellent research setting to explore how VC finance may resolve information asymmetries. In the first study of this dissertation, I focus on the effect of VC ownership on entrepreneurial finance decisions. In the second study, I study the joint effect of VC ownership and institutional characteristics in order to have a more complete understanding of the effect of VC ownership on finance decisions in different institutional settings. In the third study, I acknowledge the fact that not all VC is equal and focus on different types of VC investors and how these differences affect VC bargaining power and company valuations in VC investment rounds.

1.7 The datasets that are used in this dissertation

The studies of this dissertation take advantage of two different datasets of young, high tech entrepreneurial companies. The dataset that is used in the first and second study is a large, longitudinal sample of 6,813 European companies that were collected through the VICO project. The dataset that is used in the third study is a sample of 180 Belgian companies. Both datasets with their specific strengths and limitations are discussed in the following paragraphs.

1.7.1 The dataset used in the first and second study

Dataset and Data sources

The European dataset in the first and second study was collected through the VICO project which involved 9 research teams from 7 European countries (Belgium, Finland, France, Germany, Italy, Spain and the U.K.). The research teams collected data for 8,730 high tech entrepreneurial companies; of which 759 companies received VC finance. Detailed company-level information was collected over time which resulted into a large, longitudinal dataset covering more than 20 years. The data were mainly collected through public data sources but

were also supplemented with non-publicly available data which was obtained by sending out a survey to both the companies that raised VC finance and the VC investors.

In the first step, companies that raised VC finance were identified, mainly from the VentureXpert database but also from other data sources (Library House, Zephyr, EVCA Yearbooks,..) or more country-specific data sources (press clippings, VC websites,...). After the identification of these companies with VC finance, a control group of companies that did not raised VC finance were identified from the Amadeus database or another country-specific database (e.g. the BelFirst database was used for the identification of Belgian control group companies). In a second step, company-level data (VAT code, NACE-classification, address,..) was collected for each company (mainly from the Amadeus database). For the companies with VC finance, this information was further supplemented with VC firm level information (VC investor name, VC type, VC age,...) and investment deal specific information (date of investment, amount invested, number of VC investors,...) from VentureXpert or country-specific data sources. In a third step, accounting information (approximately twenty different accounting variables) from Amadeus or an equivalent database and patent information from the Patstat database was collected for all companies and for all years available.

Sampling procedure

Data was first collected at the country-level by the local research teams of each country. Thereafter, the data was sent to a centralized coordination unit that checked for the consistency of the research strategy followed by the different research teams and to ensure that the same criteria and definitions were used in each country.

In order to identify young, high tech entrepreneurial companies, companies were to be younger than 20 years, active in high tech industries (defined by their NACE rev.1 and NACE rev.2 code) and independent. The sample of companies that raised VC finance was further restricted to those companies with an initial VC investment when they were less than ten years old (to exclude PE investments) and occurring after 1994 (to ensure data availability) but before 2004 (in order to have a minimum number of observations over time). Control group companies were randomly selected however ensuring that these companies never raised VC finance. The research partners further agreed to set the sample size of the control group companies at ten times the size of the VC sample, hence the ratio of companies that raise VC

finance relative to companies that do not raise VC finance is approximately equal to 1:10 in each country.

Strengths of the data

The VICO dataset has several strengths of which the most important are reported here. First, data was collected by local research teams who had access to local sources of information, who were not hindered by language barriers and who had an in-depth knowledge of the rules which abide in their country. This benefits the reliability and validity of the data collected. Moreover, given that the data collection process was coordinated from a central research unit, the consistency of the sampling procedure and methodologies applied across the different countries is warranted. This process ensured a high quality dataset, with highly reliable variables. This approach of centralizing the data further also increased the flexibility of the data collection process. More specifically, in some specific countries information turned out to be unavailable, the central unit then decided to collect other information that was available in all countries. Hence, the information that was collected was also complete.

A second strength of this dataset is the fact that it is a comprehensive dataset containing rich and detailed information collected from a combination of several data sources. The dataset reports company-level non-financial data and accounting information, which is typically not available in broad datasets, but also information about VC investors and investment deal specific data which is usually more confidential information. Further, a survey was sent to both the entrepreneurs and the VC investors to make sure that the information was not a reflection of the entrepreneurs' or investors' perception only. The richness of the company- and deal-specific data is a particular strength of the VICO dataset, that allows to study novel research questions.

A third important strength is that clear-cut selection criteria were used to define the sample frame. Researchers can often interpret the same information in different ways. Here, the profile target of companies (young, high tech and entrepreneurial) was clearly defined by age, sector and independence indicators and VC investments were clearly separated from PE investments. Hence, the risk of misinterpretations among researchers was quite low which increased the consistency and reliability of the data collected at the country level and facilitates the comparability with other studies. Another advantage of using clear-cut selection criteria, is that it diminishes the risk of potential biases due to unobserved heterogeneity across companies.

As a fourth important strength, this dataset avoids or diminishes the likelihood of many of the biases which other datasets typically suffer from. For example, (i) there is no survivorship bias in the data as companies were included that eventually failed or were liquidated, and (ii) there is no self-selection bias as both companies with VC finance and companies without VC finance were selected. Studies focusing on VC finance typically only study companies with VC finance and thus the empirical results might be the result of this selection process. There is also a lower risk of self-reporting biases which is often present in survey-based data as the survey was sent to both the entrepreneur and the VC investor which results into a more unprejudiced view of the non-financial services provided by a VC investor.

Limitations of the data

However, there are also some limitations of the data. In fact, the features of the data that give rise to some of the abovementioned strengths simultaneously also give rise to some limitations. First, the data collection process was limited to seven countries in which the research teams were located. Following the 2011 Global Entrepreneurship Monitor Report, several other European countries that are not included in the data (e.g. Sweden, the Netherlands, Switzerland) are equally important or even more important in terms of entrepreneurial activity. Further, the EVCA statistics from recent years report that the VC investment activity is larger in for example Norway, Switzerland and Sweden as compared to Spain and Italy. From this perspective, at least some of these countries could also be included in order to get a better representation of the importance of VC finance for entrepreneurial companies in Europe. Related to this critique, the European Union includes today many transition economies (Poland, Ukraine, Hungary,..) which are substantially different from the Western and Southern European countries that are studied in the VICO project. Hence, the data may not be representative for all European countries.

A second limitation is that the definition of high tech companies is based upon a two or three digit NACE Rev 1.1 and NACE Rev 1.2 classification system which might result into a relatively spacious classification of companies. Similarly, not all initial VC investments in companies younger than ten years are equally early-stage investments. Hence, the within sample heterogeneity for VC companies and for VC investments may be underestimated for this dataset and even endogenously affect some the results of the studies that use this dataset. Third, despite many advantages of collecting data at a country level, each local research team has its own characteristics in terms of experience, expertise, education,... This might have introduced a subjective bias resulting from differences in interpretation. Further, due to

budget constraints, it was impossible to cross-check or to duplicate the data collection effort in order to limit this risk. Fourth, the selection of a control group of companies avoids self-selection bias but may simultaneously introduce other biases like for example classification biases or measurement biases which are typically associated with peer group analysis. Fourth, another potential limitation of the data is the fact that most data sources used are public data sources which typically suffer from self-reporting biases. Hence, it might be that the distribution of VC companies that are included in the VICO dataset is skewed toward the more successful companies with VC finance. Finally, information on the VC investors is somewhat more limited than what is typically available in recent studies, which precludes introducing some control variables that might have been relevant.

1.7.2. The dataset used in the third study

Dataset and Data sources

The dataset that is used in the third study is a hand-collected database of 362 VC investments in Belgian companies between 1988 and 2009 which I collected during my PhD. This dataset includes 180 companies that raised VC finance; 90 of these companies were later on selected to construct the Belgian VC sample for the VICO project.

Company-level information was included from the BelFirst database, company websites and VC websites. Patent information was collected from the European Patent Office database. Information about the VC investor (VC type, VC firm size, IPO market share,..) was collected from press clippings, VC websites, IPO prospectuses, EVCA directories and VentureXpert. VC investment deal specific information was included from two different kind of data sources. General VC-related information (number of VC investors, investment date, VC investment round) was obtained from press clippings and VC websites; specific information concerning the number of shares that a VC investor obtained in return for a given amount of cash invested was identified from the official Belgian Law Gazette.

Sampling procedure

Only companies who received initial VC finance when less than ten years old were considered to focus on pure VC investments. To take the evolution of the VC activity in Belgium and other data availability considerations into account, the initial VC investment was further limited to investments that occurred after 1988. Next to the initial VC investment, all follow-on VC investments were identified from the Belgian Law Gazette until the first half of

2009, which resulted into a complete overview of all VC investment rounds in the companies between 1988 and 2009. In order to include investments from different types of VC investors and to obtain a sample size that would allow econometric analysis, no other, further restrictions were applied at the company-level with respect to company industry or age. Hence, this dataset includes both early-stage and later stage VC investments, in both high tech and non-high tech Belgian companies.

Strengths of the data

The most important strength of this dataset stems from the reliability of the information about the company valuations in VC investment rounds. In commercial databases (Zephyr or VentureXpert), this information is often noisy or subject to self-reporting biases. In this dataset, the company valuation data is retrieved from an official source of information, the Belgian Law Gazette in which companies are legally obliged to announce all capital increases. Hence, the reliability of the valuation data in this dataset is particularly high. A second related strength is that the information about company valuations or VC investments is also complete as all VC financing rounds could be identified avoiding as such any risk that some VC investment events were overlooked. Further, the number of VC investors and the identity of each of them was accordingly published in the Law Gazette. Hence, this dataset gives a reliable and complete overview of all VC investment rounds, the valuation of the companies in each VC investment round and the identity of the VC investors. A second important strength is that the dataset contains primary data collected with the purpose of assessing the impact of different types of VC investors on company valuation. Hence, this dataset avoids limitations which are typically associated with secondary data (e.g. problems of definitions or comparability) This data is further also free from survivorship bias as some companies failed or were liquidated and free from self-selection bias as a combination of multiple data sources were used to identify companies that raised VC finance. A last important strength is the richness of the data. Detailed yearly accounting information was included from the BelFirst database, important non-financial company information (mainly patent data) could be controlled for and several constructs for VC investor experience and VC firm size were collected.

Limitations of the data

The most important limitation of this panel dataset is that it includes a limited number of observations, both in the time series dimension as in the cross-sectional dimension. The unit

of analysis in the third study of this PhD is a VC investment round but there are only 362 VC investment rounds identified from 180 different companies. Hence in the econometric analyses, this dataset may impose some restrictions on the level to which we were able to control for observable and unobservable heterogeneity between companies and between investors. Furthermore, the observations are relatively scattered over time which makes it even more difficult to control for all potential factors that may introduce some noise. Specifically, VC investment conditions change over time. This dataset may not allow to control sufficiently for these changing conditions. A second limitation is that only Belgian companies are included. The external validity of the results may be questionable if VC investment conditions in Belgium prove substantially different from other countries. Moreover, this dataset is rather unique and hence difficult to replicate in other countries. Hence, it is difficult to assess empirically whether the external validity is warranted or not. As a third limitation, the data is quite riche however the level of detail is often limited. For example, the Belgian Law Gazette reports all capital increases in companies, however it is unclear whether these capital increases are all equity finance, debt finance or a combination of both. This dataset further only reports information about the cash flow rights the VC investor receives, there is no information about the control rights the VC investor receives.

1.8 Overview of the dissertation studies

Study 1: The role of venture capital in company financial decision making

Principal Topic

Entrepreneurial companies are typically subject to finance constraints which is translated by a lack of internally generated funds and the inability to obtain sufficient capital from other investors (Brav and Gompers, 1997). The limited supply of finance from other, potential investors is often the result of the large information asymmetries that exist between the entrepreneur and these investors. Specifically, these information asymmetries potentially give rise to two problems. First, before the investment entrepreneurs typically have more and better information about the quality of their project than investors which may result into an adverse selection problem for investors (Akerlof, 1970). Second, after the investment entrepreneurs might exercise less effort or invest in strategies that have high personal returns but low monetary payoffs which may give rise to moral hazard problems for the investor (Amit et al., 1998; Sahlman, 1990). Under these conditions of potentially high adverse selection and moral hazard risks, entrepreneurs are typically denied finance from outside investors which may in

turn jeopardize the future growth of their company or even the survival of their company (Cassar, 2004).

Scholars have argued that VC investors can overcome some of these information asymmetries in entrepreneurial companies because they fulfill an important information production task besides their funding task (Diamond, 1984; Dewatripont and Tirole, 1994). Specifically, it is often argued that VC investors possess sophisticated screening mechanisms, that they are expert monitors and active investors providing many valuable non-financial resources besides their financial resources and that VC investors provide legitimacy and credibility to entrepreneurial companies. However, there is currently still a lack of insight whether VC finance results into a greater access to finance for entrepreneurial companies. The goal of this study is to analyze the impact of VC ownership on the finance decisions of entrepreneurial companies. The research questions that this study seeks to answer are : (a) what is the effect of VC ownership on entrepreneurial finance decisions, and (b) what is the effect of VC ownership on finance decisions from equity investors and on finance decisions from financial debt investors? I first argue that VC investors will have a positive impact on the supply of entrepreneurial finance given that they reduce agency problems in entrepreneurial companies for investors. I further argue that VC investors typically implement governance mechanisms which will be especially more protective and beneficial for equity investors. Hence, I argue that VC ownership will have a large positive impact on capital investment decisions from equity investors. Likewise, in the third hypothesis, I first argue that VC ownership may have a positive impact on financial debt investment decisions. However, there might also be a negative impact of VC ownership on entrepreneurial debt finance decisions given that an equity-oriented VC governance mechanism will be less beneficial for debt financiers and the staging of VC finance may have negative effects on the supply of debt finance. I further also study whether the effect of VC ownership on entrepreneurial finance decisions will be different between repeated VC finance and non-repeated VC finance. Much of the existing VC literature that looks at the effect of VC finance does not take the incremental effect of repeated VC finance into account. The contributions of this study are threefold. First, consistent with the expectations, I find that VC finance has a significant positive impact on the supply of entrepreneurial finance which contributes to the literature that has focused on the governance role of VC finance. This positive impact is particularly important for equity financiers, I do not find a positive effect for debt financiers. However, I find that debt finance is equally important for companies with VC finance as compared with companies without VC

finance. Second, I find that entrepreneurial companies benefit from raising VC finance in terms of a greater access to finance, whatever the characteristics of the VC investor are. Academics that focus on VC heterogeneity might underestimate this effect. Third, I find that repeated VC finance results into a larger effect on entrepreneurial finance and a larger effect on equity finance compared with non-repeated VC finance which is interesting as it shows that a significant part of the overall effect of VC finance will be associated with VC commitment.

Method

To test for the effect of VC finance, this study takes advantage of a unique, hand-collected longitudinal dataset of 6,813 entrepreneurial companies from six European countries (Belgium, Finland, France, Italy, Spain and the U.K.). 606 of these entrepreneurial companies received VC finance, the remainder 6,207 companies did not. Entrepreneurial companies that raised VC finance were identified from several public data sources. I further identified whether the VC companies raised one (resp. 260 VC companies) or several rounds of VC finance (resp. 346 VC companies). After the identification of the VC companies, a control group was randomly selected using similar criteria from the population of companies that did not raise VC finance. For each company that raised VC finance, ten companies that did not raise VC finance were selected which on average reflects the importance of VC finance for entrepreneurial companies (Bottazzi and da Rin, 2002; Puri and Zarutskie, 2012).

The dependent variables in this study are measures of incremental finance decisions. These finance decisions include raising entrepreneurial finance, unconditional upon the type of security (equity or debt) raised, the amount of entrepreneurial finance raised, the decision to raise capital from equity investors, the amount of equity capital raised, the decision to raise debt from financial debt investors and the amount of financial debt raised. The main explanatory variable is a VC dummy variable which studies the impact of VC ownership on entrepreneurial finance decisions. In a subsequent analysis, a different impact between repeated and non-repeated VC finance is explored. The control variables include company accounting variables, company non-accounting variables, macro-economic variables and year-, industry- and country-fixed effects.

Probit regression models predict the entrepreneurial finance decisions, Tobit regression models predict the log-transformed amount of entrepreneurial finance raised. An Inverse Mills Ratio is included to correct for possible selection biases that may arise if companies

self-select to raise VC finance or if VC investors select particular entrepreneurial companies based on observable and unobservable characteristics (Heckman, 1979).

Findings

In this study I first find that there is a significant effect of VC finance on entrepreneurial finance decisions. Controlling for the traditional determinants of corporate finance decisions, I find that VC ownership results into a greater access to entrepreneurial finance and particularly into a greater access to equity finance. I do not find any effect of VC ownership on debt finance but interestingly, debt finance is equally important for companies with VC finance as compared with companies without VC finance. I secondly find that repeated VC finance results into a larger effect of VC ownership as compared with non-repeated VC finance. Specifically, I find that repeated VC finance leads to a greater access to entrepreneurial finance in general and entrepreneurial equity finance in particular as compared with non-repeated VC finance. Again, there is no effect of repeated VC finance on finance decisions from financial debt investors. The implications of these results are important. First, from an academic perspective, I extend the governance role of VC investors, and more specifically the value-adding and certification role by showing that there is a significant effect of VC finance on entrepreneurial finance decisions. Further, I provide evidence that repeated VC finance may have a larger effect. Researchers so far often neglect the fact that the effect of VC ownership is also affected by whether VC investors commit to further financing or not. Second, from a practitioner's point of view, entrepreneurs should be aware that VC ownership has important consequences for their corporate governance structure. Specifically, VC investors will develop a governance structure in their portfolio companies which will be most protective and beneficial for equity investors.

Study 2: Institutional Frameworks, Venture Capital and the Financing of European Entrepreneurial Companies

Principal Topic

In the second study, we study whether VC ownership has a smaller or larger effect on entrepreneurial companies' finance decisions in countries with a different institutional framework. To date, it is unclear whether country-level and company-level corporate governance mechanisms act as substitutes or complements in mitigating agency problems in entrepreneurial companies. In order to address this void, we study whether the effect of VC ownership on entrepreneurial finance decisions is weaker or stronger in different institutional

contexts. Specifically, we study the joint effects on the supply of entrepreneurial finance of (a) VC ownership as a company-level corporate governance mechanism and (b) the quality of the law enforcement and the forgiveness of bankruptcy law as country-level corporate governance mechanisms. More specifically, the research questions in this study are: (a) how do cross-country differences in institutional and legal characteristics influence finance decisions of entrepreneurial companies and (b) how does VC ownership at the company-level influence these relationships?

As measures of country-specific governance factors, we focus on the quality of law enforcement as a measure of the country's legal system and the availability of a fresh start for the entrepreneur after a bankruptcy as a measure of the severity of bankruptcy law for reason that these factors are relevant in an entrepreneurial context and are expected to influence finance decisions (Cumming et al., 2010; Bottazzi et al., 2009; Lerner and Schoar, 2005). As company-specific corporate governance factor, we focus on VC ownership because VC investors are highly skilled investors that are generally better at monitoring entrepreneurs and generally more active in providing non-financial support to entrepreneurs (Sapienza et al., 1996; Hellmann and Puri, 2002).

The main contributions of this study are that we combine the insights from two largely separate streams of work within corporate governance research: studies that have focused on how national governance mechanisms such as laws and institutions affect the agency costs of investors in companies (La Porta et al., 1997; 2000); and studies that have focused at the company-level more directly on the governance mechanisms that different types of investors use to decrease these agency costs (Shleifer and Vishny, 1986; Sapienza et al., 1996). We show that the finance decisions in entrepreneurial companies are the outcome of both country-level institutional factors such as the quality of the law enforcement and the forgiveness of bankruptcy law and company-level factors such as VC ownership. A second contribution is that we show that there is a complementary effect between VC ownership and corporate governance at the country-level. Specifically, we find that VC ownership has a larger positive effect on the supply of entrepreneurial finance in countries with a better governance system.

Method

This study takes advantage of the same dataset of 6,813 entrepreneurial companies that was used in Study 1. The dependent variables in this study are measures of incremental finance decisions that are similar to those used in the first study. The measures of the finance

decisions include the decision to raise entrepreneurial finance, unconditional upon the type of security (equity or debt) raised; the amount of entrepreneurial finance raised; the choice between raising equity or debt, conditional upon raising finance; the amount of capital raised from equity investors; and the amount of debt raised from financial debt investors. Moreover, in this study we also include the ratio of financial debt on total assets as a measure of capital structure for entrepreneurial companies.

The main explanatory variables in this study are measures for country-specific and company-specific corporate governance mechanisms. At the country-level, we study (a) the impact of the *Legality Index* developed by Berkowitz et al. (2003) which measures the quality of law enforcement and (b) the impact of *Discharge Not Available*, a variable which reflects the ability of entrepreneurs to obtain a fresh start after a bankruptcy (Armour and Cumming, 2008). At the company level, we study the effect of VC ownership on entrepreneurial companies' finance decisions. Interaction terms between these measures of VC ownership and of the institutional variables study whether the effect of VC ownership is weaker or stronger in countries with a better legal system or less forgiving bankruptcy law. Probit regression models are used to predict entrepreneurial finance decisions or equity versus debt finance decisions. Capital structure and the amount of entrepreneurial finance raised is studied in a pooled OLS regression framework.

Findings

The results from this study indicate first that entrepreneurial companies operating in countries with a better law enforcement or with more forgiving personal bankruptcy laws raise more entrepreneurial finance. Moreover, companies from these countries raise larger amounts of entrepreneurial finance (both debt and equity) and have on average a higher financial debt ratio. Second, VC ownership, as a measure of corporate governance practices at the company-level, results in more entrepreneurial finance, in larger amounts of capital from equity investors and in lower amounts of debt from financial debt investors. Third, the positive relationship between better law enforcement or more forgiving personal bankruptcy laws and entrepreneurial finance decisions becomes stronger when entrepreneurial companies raise VC finance, suggesting that VC ownership and a country's legal system or bankruptcy law play a complementary role in reducing agency problems for investors in entrepreneurial companies. The implications of this study are important for policy makers, but also for entrepreneurs and investors. They should not consider the quality of a nation's legal system or the entrepreneur-

friendliness of bankruptcy law separately from initiators of good governance practices at the company-level such as VC ownership but instead take also the complementary effects into account that exist between such country-specific and company-specific governance mechanisms.

Study 3: Firm Valuation in Venture Capital Financing Rounds: the Role of Investor Bargaining Power

Principal Topic

When entrepreneurs raise VC finance, the equity stake retained after the investment is often a major concern for both parties. At the time of the VC investment, entrepreneurs are reluctant to give away much equity (Zingales, 1995; Bowden, 1994); VC investors on the other hand will prefer as much equity as possible to mitigate moral hazard problems (Kaplan and Strömberg, 2003; Gompers, 1995). The equity that either party finally retains, will crucially depend upon its relative bargaining position (Cable and Shane, 1997; Chahine and Goergen, 2011).

Recently, researchers started to focus on the negotiation process and more specifically on VC investor characteristics that may affect the VC equity stake and thus the valuation of the company. Hsu (2004) for example found that entrepreneurs accept lower valuations from more reputable VC investors and Cumming and Dai (2011) found a convex relationship between VC fund size and the value of a company. Despite these compelling empirical studies, there is still much to learn about the negotiation of the value of a company between the entrepreneur and the VC investor. The goal of this third study is to extend this work by studying the joint effect of VC firm type and VC bargaining power on company valuations. Specifically, we argue that the competition between VC investors will depend upon the type of VC firm which will further affect VC bargaining power and ultimately be reflected in the valuation of the company. To empirically study these joint effects, we compare between the valuations of independent VC investors and (a) captive VC firms which have a corporation or bank as parent organization, (b) university VC firms which invest university money in university spin-offs and (c) government VC firms which are funded by government agencies. We argue that these non-independent VC investor types have more bargaining power compared with independent VC investors, either because they have a captive deal flow or because they target niche markets with low levels of competition. We further argue that these non-independent VC investor types exploit their greater bargaining power by negotiating

lower company valuations. The research questions in this study are: (a) how do differences in deal sourcing and VC investment strategies between different VC investor types affect the bargaining power of a VC investor versus the entrepreneur and (b) how do these differences in VC bargaining power ultimately affect company valuations in VC investment rounds.

The main contribution of this study is that we show that VC investor heterogeneity goes beyond differences in value-added support (Bottazzi et al., 2008) and governance structure (Mayer et al., 2005) but also affects company valuations in investment rounds. Specifically, we find that company valuations are lower from independent VC firms as compared with some types of non-independent VC firms.

Method

We empirically examine the joint effects of VC type and VC bargaining power on company valuations using a unique, hand-collected and unbiased dataset of 362 initial and follow-on VC investment rounds in 180 Belgian investee companies between 1988 and 2009. The equity value of the company in each VC investment round is calculated on the basis of the total amount of cash invested by the VC investor and the number of newly created shares as reported in the Belgian Law Gazette. This research strategy ensures the creation of a dataset that contains highly-reliable information about company valuations, and data that is free of self-reporting bias and survivorship bias.

The dependent variable of interest is the premoney equity value of the company as a measure of the negotiated value of a company in a VC investment round (Hand, 2005; Armstrong et al., 2006). The premoney value is defined as the total number of shares outstanding prior to the VC investment multiplied by the price per share paid by VC investors in the focal investment round. Key explanatory variables are dummy variables for different types of non-independent VC investors, using independent VC investors as the reference category. We further control for company financial and non-financial characteristics, VC investor characteristics and VC investment round characteristics that may affect company valuation.

A log-linear OLS-regression model is used to study the relationship between the premoney value of a company and the different types of VC investors taking into account potential selection effects.

Findings

We find that the relative bargaining power of a VC investor measured as differences in VC firm type affects company valuations in VC investment rounds. VC firm types of which we argue that they have more bargaining power obtain higher equity stakes for a given amount of cash and thus value companies lower compared with VC firm types with less bargaining power. More specifically, university and government VC firms value companies lower compared with independent VC firms. We argue that the proprietary deal flow of university VC firms and the limited competition in niche markets in which government VC firms invest, increases their bargaining power which they exploit by negotiating lower company valuations. We find no differences in valuation between captive VC firms and independent VC firms.

This study has important implications. First, this study is important for entrepreneurs as they need to secure sufficient sources of VC finance in order to increase their bargaining power versus the VC investor. This will ultimately lead to a higher valuation of their company in a VC investment round. Second, from an academic perspective, the results from this study are far from trivial as we might expect higher company valuations from university VC firms or government VC firms from a value-adding (Hirsch and Walz, 2013) or reputation based perspective (Hsu, 2004). University VC firms and government VC firms are less well equipped to provide non-financial services. The lower levels of non-financial services provided by these type of VC firms could make their funding less valuable and thus lead to higher company valuations. In contrast, our results indicate to the opposite and are thus consistent with a greater competition between VC investors and thus a relatively lower VC bargaining power for independent VC firms as compared with university VC firms and government VC firms. A limitation of the study is that I jointly test the VC type and bargaining power argument. A fruitful avenue for further research would be to study the VC negotiation process in more detail in order to disentangle both effects.

Table 1.1: Overview of the three dissertation studies.

	<i>Study 1</i>	<i>Study 2</i>	<i>Study 3</i>
<i>Title</i>	The role of venture capital in company financial decision making	Institutional Frameworks, Venture Capital and the Financing of European Entrepreneurial Companies	Firm Valuation in Venture Capital Financing Rounds: the role of investor bargaining power.
<i>Goal</i>	To study how VC corporate governance mechanisms reduce agency problems between entrepreneurs and potential investors.	To study how the joint effects of VC corporate governance mechanisms and country-level institutional frameworks reduce agency problems between entrepreneurs and potential investors.	To study the joint effect of VC firm type and VC bargaining power on company valuations in VC investment rounds.
<i>Research Questions</i>	<p>(a) What is the role of VC ownership in explaining entrepreneurial finance decisions?</p> <p>(b) How does VC ownership affect entrepreneurial equity finance?</p> <p>(c) How does VC ownership affect entrepreneurial debt finance?</p>	<p>(d) How do cross-country differences in the quality of law enforcement and the forgiveness of personal bankruptcy law influence finance decisions of entrepreneurial companies ?</p> <p>(e) How does VC ownership influence these relationships?</p>	<p>(f) How do VC proprietary deal flow affect VC competition and VC bargaining power?</p> <p>(g) How do differences in relative bargaining power between different type of VC investors affect company valuations in VC investment rounds?</p>
<i>Theoretical framework used</i>	Agency Theory	Agency Theory and Institutional Theory	Bargaining Theory
<i>Dataset</i>	Longitudinal database comprising a sample of 6,813 entrepreneurial companies from six European	Same dataset as in Study 1.	Longitudinal database of 180 Belgian entrepreneurial companies that raise VC finance in 362 initial and follow-

	countries (Belgium, Finland, France, Italy, Spain and U.K.), of which 606 firms have raised VC finance.		on VC investment rounds.
<i>Main Findings</i>	<p>First, companies that raised VC finance have greater access to entrepreneurial finance compared with companies that do not raise VC finance. Second, VC ownership has a positive effect on entrepreneurial equity finance.</p> <p>Moreover, the difference between non-repeated and repeated VC finance is significant. Additional or repeated VC funding results into a greater access to entrepreneurial finance in general and entrepreneurial equity finance in particular as compared with non-repeated VC finance.</p>	<p>Entrepreneurial companies from countries with a higher quality legal system or a more forgiving bankruptcy law have greater access to entrepreneurial finance.</p> <p>The positive association between legal quality or entrepreneur-friendly bankruptcy laws and entrepreneurial finance decisions is stronger for companies that raise VC finance, suggesting there exists a complementary effect from VC corporate governance mechanisms and institutional standards of corporate governance.</p>	VC investor types with relatively more bargaining power negotiate lower company valuations. Specifically, university VC firms and government VC firms negotiate lower valuations as compared with independent VC firms due to low levels of VC competition (government VC firm) or a proprietary deal flow (university VC firm).
<i>Academic Contributions</i>	<p>This paper has two major contributions.</p> <p>First, I add to the value-adding role and certifying role of VC investors by showing that VC governance mechanisms have an important effect on entrepreneurial finance decisions.</p>	<p>First, we integrate in this study institutional theory and agency theory. Studies that rely on institutional theory typically ignore the impact of differences in company-level corporate governance systems. Studies that rely on agency theory typically ignore the impact of different</p>	<p>First, with this study, we focus on an aspect of VC investors which is barely understood; namely the importance of VC bargaining power in the negotiation process between VC investors and entrepreneurs. We show that limited competition and proprietary deal flow lead to more VC</p>

	<p>Second, I show that there is a strong effect associated with repeated VC finance, repeated VC finance results in a larger positive effect of VC ownership as compared with non-repeated VC finance.</p>	<p>institutional frameworks. This paper studies the combined effects of company-level corporate governance systems and different institutional frameworks.</p> <p>Second, we focus on an important but largely ignored aspect of institutional law for entrepreneurial companies' finance decisions; namely the 'forgiveness' of bankruptcy law.</p>	<p>bargaining power.</p> <p>Second, we provide evidence that VC firm types exploit their greater bargaining power to negotiate lower company valuations in VC investment rounds.</p> <p>Third, while exploring the implications of differences in VC firm type for company valuations, we further add to the growing literature that finds that VC investors differ substantially in quality, behavior and skills.</p>
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Chapter 2

The role of venture capital in company financial decision making¹

Andy Heughebaert

Abstract

This paper studies the effect of venture capital (VC) finance on private entrepreneurial companies' finance decisions. For this purpose, I take advantage of a unique, large, longitudinal database of 6,813 entrepreneurial companies in six European countries, of which 606 received VC finance. Using a selection model framework that controls for the endogeneity of venture capital finance and measures that control for the traditional determinants of corporate finance decisions, I find that VC companies raise more finance compared with non VC companies. Second, VC companies raise more equity finance but interestingly, do not raise less debt finance. Next, I study whether repeated VC finance has a different effect on entrepreneurial finance decisions as compared with non-repeated VC finance. I show that repeated or additional VC finance results in a higher supply of entrepreneurial finance, a higher supply of equity finance and a similar supply of debt finance. This study presents novel empirical evidence about the positive effect of VC ownership on entrepreneurial financing decisions. Second, while VC finance is typically associated with equity or equity-linked finance, I show that VC companies are equally associated with debt finance as non VC companies, even for those companies that are only able to raise VC finance once.

Keywords: venture capital, entrepreneurial companies, financing decisions

2.1 Introduction

Entrepreneurial financing situations are typically characterized by two fundamental problems (Berger and Udell, 1998) given the large information asymmetries that exist between entrepreneurs and investors (Sahlman, 1990): adverse selection and moral hazard problems. Adverse selection refers to the fact that entrepreneurs have more and better information about the quality of their project than investors. Hence entrepreneurs may have an incentive to misrepresent the quality of their projects which results into the risk that investors select only inferior projects. Second, there is a potentially serious moral hazard problem for investors (Eisenhardt, 1989). Once entrepreneurs have raised funds from investors, the entrepreneur

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might exercise less effort or might invest in strategies that have high personal returns but low expected monetary payoffs. Under these conditions of asymmetric information between investors and entrepreneurs, entrepreneurial firms are typically subject to financing constraints which is translated by the inability to obtain sufficient capital (Brav and Gompers, 1997). Moreover, such financing constraints are often exacerbated by the high risk nature of the investment in entrepreneurial companies that typically involves financing untested, technological innovations that are characterized by high illiquidity and uncertainty (Gompers and Lerner, 2001).

Scholars have argued that financial intermediaries such as venture capital (VC) investors, banks, pension funds, mutual funds, and other institutional investors can partly resolve these imperfections in the capital markets (Dewatripont and Tirole, 1994). Financial intermediaries use several mechanisms to reduce the risk of adverse selection and to reduce moral hazard problems such as pre-investment screening and closely monitoring the progress of the companies in order to align the entrepreneurs' incentives. Likewise, optimal financial structure design by financial intermediaries can effectively help in mitigating such agency problems (Grossman and Hart, 1986; Hart, 2001).

The purpose of this paper is to study from an agency perspective how venture capital investors, as a unique type of financial intermediaries, may have an impact on the finance decisions of entrepreneurial companies. The research questions that this paper seeks to answer are: (a) what is the role of VC in explaining entrepreneurial finance decisions, and (b) how does VC ownership affect entrepreneurial equity finance and entrepreneurial debt finance.

I focus on the impact of VC ownership because VC investors represent a unique kind of financial intermediaries. First, it is often argued that VC investors are specialized investors (Norton and Tenenbaum, 1993) that have better resources to obtain knowledge about project prospects and are more effective in overcoming the information asymmetry problem through a profound due diligence (Kaplan and Strömberg, 2001; Winton and Yerramilli, 2008). Second, VC ownership creates a corporate governance structure that is unique (Wijbenga et al., 2007). VC investors optimize the corporate governance structure of their portfolio companies by negotiating complex control rights at the time of their investment (Kaplan and Strömberg, 2003) and putting into place extensive monitoring and advisory systems (Sapienza et al., 1996). Moreover, VC investors separate between cash flow rights and control rights and typically introduce staged financing (Gompers, 1995) to reduce the moral hazard problems

associated with financing entrepreneurial companies. Third, VC investors also provide valuable support services to entrepreneurial companies (Hellmann and Puri, 2002), next to their financial input. Specifically, VC investors provide mentoring, strategic advice and assistance in the recruitment of top managers amongst several other services (Denis, 2004). Finally, VC ownership provides legitimacy and credibility to the entrepreneurial company (Megginson and Weiss, 1991; Hsu, 2004) making them more attractive to other investors.

I use agency theory (Jensen and Meckling, 1976) as a theoretical framework to explain the impact of a VC investor on entrepreneurial finance decisions. Agency theory is expected to be a relevant framework because entrepreneurial companies are primarily characterized by a lack of internal financing resources and outside investors are typically confronted with large information asymmetries when they invest in entrepreneurial companies (Bonini et al., 2012). Hence, it is therefore extremely likely to observe agency problems when outside investors provide finance to entrepreneurial companies. Moreover, except from a few notable exceptions in the VC literature (e.g. Cable and Shane, 1997, Hsu, 2004) agency theory has been the dominant theoretical perspective to motivate why venture capital investors exist, arguing that they have better skills to work in environments that are characterized by high information asymmetry and high uncertainty (Amit et al., 1998).

To address the abovementioned research questions, I take advantage of a unique longitudinal database comprising a sample of 6,813 entrepreneurial companies from six European countries (Belgium, Finland, France, Italy, Spain and U.K.). 606 companies have VC investors as shareholders. I focus on private, entrepreneurial companies mainly for two reasons. First, given entrepreneurial companies' lack of adequate internal financing resources, entrepreneurial companies rely more on finance from outside investors compared with mature, public companies. Second, access to finance is likely more limited given that entrepreneurial companies typically face liabilities of newness and smallness (Zahra and Filatotchev, 2004) which imposes a higher risk to outside investors. If any, the effect of VC ownership on finance conditions might therefore in particular be important for entrepreneurial companies. Moreover, Brav (2009) finds significant differences in financing decisions between public and private companies in the U.K., while he assumes that all private companies are equal. This study contributes to Brav's study by showing that VC ownership has an important impact on private companies' finance decisions.

The contributions of this study are three-fold. First, this paper is related to the large literature on the principal-agent problem in financial contracting. Most of this research however studies financing decisions of public companies while I focus on private companies. Most companies never reach the stage of going public (Berger and Udell, 1998) and asymmetric information problems are likely to be more severe in private companies as compared with public companies (Fazzari et al., 1988). Moreover, beyond the entrepreneur VC investors are often one of the most important investors in entrepreneurial companies who are expected to have a significant impact on corporate governance mechanisms and to take up a role as reference shareholder (Van den Berghe and Levrau, 2002). As a result, VC ownership is expected to have an important impact on entrepreneurial finance decisions.

A second major contribution of this paper is that the potential impact of VC ownership on private companies' financing policies has attracted virtually no scrutiny. This is surprising, as VC financing decisions have drawn significant attention in the literature. Most of the VC financial contracting literature however stresses the type of security used by VC investors (Kaplan and Strömberg, 2001; Hellmann, 2002; Sahlman, 1990), or the type of covenants included in venture capital contracts (Sahlman, 1990; Kaplan and Strömberg, 2001; Black and Gilson, 1998) or the staging of capital infusion (Gompers, 1995). Further, research that studied the non-financial impact of VC ownership merely focused on a broad range of governance roles including a screening (Fried and Hisrich, 1994; Norton and Tenenbaum, 1993; Admati and Pfleiderer, 1994), contracting (Kaplan and Strömberg, 2001; Berglöf, 1994), monitoring (Sapienza et al. 1996; Lerner, 1995), mentoring (Sapienza, 1992; Hellmann and Puri, 2002) and certifying role (Megginson and Weiss, 1991; Davila et al., 2003). With this study, I show that VC ownership also has a direct impact on financing decisions, and thus bring new evidence about the value-adding and certifying role that has previously been studied.

As a third contribution, prior research that studied the role of a VC investor almost exclusively focused on a sample of companies with VC finance which raises selection problems (Cumming et al., 2010). Alternatively, this study compares the financing strategies between VC and non VC entrepreneurial companies using a selection model framework that instruments for self-selection in venture capital financing. I thus control for the fact that the propensity of receiving VC may be correlated with entrepreneurial financing decisions which is probably the most important bias that may affect the results. Finally, I acknowledge the fact that entrepreneurial companies attract financing from alternative sources of capital (Cosh et

al., 2009). Hence, I do not impose any restrictions on the source of funding which is a contribution to the largely segmented entrepreneurial finance literature.

The rest of this paper is organized as follows. In the next section, I use an agency perspective to develop my hypotheses from an agency perspective. The third section starts with the data sources and a description of the sample and then defines the variables and the method used in this paper. In section four, I present the main results about differences in financing decisions between a) VC companies and non VC companies and b) companies with one round of VC finance and companies with several rounds of VC finance. The last paragraph of section four discusses the robustness checks. Section five discusses the results and concludes this paper.

2.2 Theoretical framework and hypotheses

Agency theory is mainly concerned about resolving two problems in a principal-agent framework (Eisenhardt, 1989). First, goal conflicts may arise between the agent and the principal. Second, it may be difficult or expensive for the principal to observe the actions of the agent. A central element within agency theory is that principals address these problems by protecting their stake by means of mechanisms that curb agent opportunism. For example, in the context of the relation between an investor and a manager, agency theory views the board of directors as an important mechanism to implement monitoring systems for the control of management (Fama and Jensen, 1983). Another focus of agency theory is the development of managerial incentive systems. For example, equity ownership by managers (Jensen and Meckling, 1976) or managerial reward systems (Gompers and Lerner, 2000) are effective mechanisms to align the interests with those of investors.

An agency theory perspective has been widely used in the entrepreneurial literature (see e.g. the seminal work of Amit et al., 1990; Sapienza and Gupta, 1994; Sahlman, 1990; Gompers and Lerner, 1996; Amit et al., 1998) to explain the relationship between a VC investor (principal) and the entrepreneurial management team (agent). The main argument to use such an agency framework, is that VC investors are likely confronted with the two above-mentioned agency problems. First, goal conflicts may arise between the VC investor and the entrepreneur on several items such as the valuation of stock, risk perceptions, strategic decisions, allocation of resources and exit timing (Wijbenga et al., 2007). Second, venture capital investors typically invest in early stage companies with no financial track record, with large growth opportunities and much uncertainty with respect to their technology (Black and Gilson, 1998; Sahlman, 1990). Venture capital investors thus typically invest in companies in

which asymmetric information is likely to be more severe and where the value of oversight is greater (Gompers, 1995). As a result, agency costs are often largely present in a VC-entrepreneurial relationship. In the following paragraphs, we rely on such an agency framework to develop hypotheses that consider the effect of VC ownership on entrepreneurial finance decisions.

2.2.1. The effect of VC on finance decisions.

Venture capital investors are an important source of funding for young, high-tech entrepreneurial companies (Jeng and Wells, 2000). Other, more traditional sources of financing are often costly or difficult to obtain. The main reason why entrepreneurial companies are confronted with these financing constraints from traditional sources of capital is that they are characterized by high uncertainty and information asymmetries (Black and Gilson, 1998). For example, equity investors may be reluctant to provide equity financing because entrepreneurs might engage in wasteful expenditures without bearing the full cost (Gompers and Lerner, 2001). Similarly, debt investors may be reluctant to provide debt financing because entrepreneurs might subsequently increase risk to undesirable levels (Jensen and Meckling, 1976). Such financing constraints are further exacerbated due to the uncertainty surrounding high-tech investments. Much of the value lies in the potential for future growth and an established track record which could serve as a performance metric is often unavailable (Jeng and Wells, 2000).

Venture capital investors possess specific skills and use sophisticated investment techniques to alleviate these information gaps and thus to allow these companies to receive VC finance that they are unable to raise from other sources (Jeng and Wells, 2000). However, given that VC investors represent a unique kind of investors (Amit et al., 1998), they might also affect the supply of finance from other sources and thus have a direct impact on the total supply of finance for entrepreneurial companies. I argue that VC investors are unique mainly because of three reasons.

First, VC investors have superior screening and monitoring skills (Winton and Yerramilli, 2008; Ueda, 2004). To reduce potential adverse selection problems, VC investors first evaluate the quality of the business proposal and the characteristics of the entrepreneur. These signals are equally visible for other potential investors, however VC investors may react more appropriately to these signals (De Clercq and Dimov, 2008). Specifically, it is often argued that VC investors have better expertise and better abilities in picking ‘winners’ which they

have learned from successes and failures in the past. Further, VC investors possess better resources through extensive due diligence mechanisms to overcome adverse selection problems (Amit et al., 1990).

VC investors further reduce agency costs after the investment by actively monitoring the progress of their companies (Gompers, 1995; Gorman and Sahlman, 1989; Winton and Yerramilli, 2008). VC investors typically require board seats and therefore have a direct influence on for example the hiring and replacement of the management team, the executive compensation and strategic decisions making (Bonini et al., 2012). Moreover, VC investors use complex contracts that separate between cash flow rights and control rights (Kaplan and Strömberg, 2001) and typically stage their capital infusions (Gompers, 1995) in order to facilitate monitoring and to reduce potential agency problems.

Because of these superior screening and monitoring skills, venture capital investors have a comparative advantage at working in environments that are characterized by high information asymmetries and high uncertainty (Chan, 1983).

A second unique feature of VC finance stems from the fact that VC investors are active investors with a hands-on investment approach (Hellmann and Puri, 2002). More specifically, VC investors provide a variety of support services including the development of a business plan, bringing in strategic partnerships and assisting with the recruitment of employees amongst several other services (Kaplan and Strömberg, 2003). Hellmann and Puri (2000; 2002) find that as a result of these non-financial support services, VC companies bring products faster to the market. Further, it is argued that VC investors bring in several strategic stakeholders such as suppliers, customers and other investors (Sapienza et al., 1996). Moreover, VC investment managers typically receive performance-based compensation schemes which creates incentives to provide significant support (Admati and Pfleiderer, 1997). Hence, VC ownership in entrepreneurial companies is typically associated with considerable non-financial support beyond receiving VC finance.

A third unique aspect of VC finance, is that a VC investor will provide legitimacy and credibility to the entrepreneurial company (Megginson and Weiss, 1991; Hsu, 2004) because VC reputation is highly important. First, a traditional venture capital investors is a highly-networked and repeat player in the VC industry (Wright and Lockett, 2003), occasionally raising new funds from institutional investors. Successful investments from the past allow them to raise follow-on funds more easily or to form a syndicate with other VC investors with

a strong reputation. Hence, VC investors are highly concerned about their reputation. Second, VC reputation might also be an important concern for the entrepreneur. Entrepreneurs give up on average substantial equity stakes to VCs in exchange for relatively small capital infusions. Hsu (2004) provides empirical evidence that entrepreneurs take into account VC reputation as he shows that entrepreneurs are willing to accept offers with lower valuations from more reputable VC partners. Hence, reputable VC investors often further have more and better investment opportunities. In short, given that VC reputation is important, VC investors fulfill a credible certification role and provide legitimacy and credibility to the entrepreneurial company which is expected to increase the supply of entrepreneurial finance.

Following these unique aspects that are typically associated with VC finance, I expect that VC ownership will have a positive impact on the supply of finance for entrepreneurial companies given that VC investors apply more specialized and more sophisticated screening, monitoring and contracting mechanisms that will reduce the agency costs between the entrepreneur and the investor. Moreover, VC ownership will provoke an important positive signal of the quality of the company for investors.

From a demand side perspective, the fact that entrepreneurs searched for VC finance, identifies their willingness to give up control which is an important prerequisite when searching for finance. Moreover, entrepreneurs who formerly raised VC finance were able to overcome a number of challenges related to VC finance, like for example the development of a business plan and the technical and judicial aspects of the VC investment contract (Van Auken, 2001). Likewise, entrepreneurs were often confronted with the rejection of their business plan from several other VC investors (Tyebjee and Bruno, 1984). This learning experience gained from the process of raising VC finance will help entrepreneurs in the future to avoid the pitfalls associated with raising finance. On the other hand, some other entrepreneurs may not apply for VC finance because they are less familiar with non-traditional sources of finance like VC finance. This lack of information about capital alternatives and the specific funding requirements may cause these entrepreneurs to ineffectively pursue some sources of capital while ignoring others (Van Auken, 2001). All else equal, I hence expect that entrepreneurs that raised VC finance will also be better able to raise finance in the future.

My first hypothesis is therefore:

H1: entrepreneurial companies that are associated with VC finance raise (i) more often and (ii) larger amounts of entrepreneurial finance.

2.2.2. The effect of VC on finance decisions from equity providers

Although the effect of VC ownership is expected to be positive for all entrepreneurial finance decisions, I argue that VC ownership will particularly have a positive impact on capital investment decisions from equity providers.

The basic argument is that the effects of VC ownership will be most beneficial for equity providers. First, it is often argued that VC investors implement a corporate governance structure in their portfolio companies which will result into an equity-oriented governance system (John and Litov, 2008). For example, VC investors will typically implement value-enhancing governance mechanisms that are less focused on limiting downside risk. Such an equity-oriented governance system will likely be highly beneficial and protective for equity providers.

Second, VC investors do not provide all the capital at once, but make further funding contingent upon the achievement of specific milestones (Gompers, 1995). The use of such entrepreneurial incentives will encourage the entrepreneur to pursue high-growth strategies. For example, Puri and Zarutskie (2012) find that VC investors actively push entrepreneurs to pursue high-growth strategies. Such growth-oriented entrepreneurial strategy will be beneficial for equity providers whose return will largely depend upon the upside potential of the company. Hence, I expect that there will be in particular a positive effect from VC staging on the supply of equity finance.

Third, the implication for the entrepreneur from these two arguments is that equity providers might invest at lower prices in companies that are characterized by VC ownership or assign higher values to these companies. Hence, capital investments from equity providers may become less expensive for an entrepreneur after she has raised VC finance.

Following these three arguments, I expect that there will be a positive impact of VC ownership on capital investment decisions from equity providers. My second hypothesis is therefore:

H2: entrepreneurial companies that are associated with VC finance raise (i) more often equity finance and (ii) larger amounts of equity finance.

2.2.3. The effect of VC on finance decisions from debt providers

I predict that there may be two opposing effects of VC ownership on investment decisions from debt providers.

First, similar to equity investors, debt providers will accordingly try to limit the potential for opportunistic behavior of the entrepreneur as this will expropriate their wealth and will reduce the value of their claims (Ashbaugh-Skaife et al., 2006). I hence argue that the implementation of a stronger corporate governance mechanism that starts with VC ownership and in which entrepreneurs are perceived less likely to engage in such behavior will also be beneficial for debt providers. Second, the support services and credibility provided by a VC investor are expected to be equally important and advantageous for debt providers as for other investors. Further, debt investors who anticipate these positive effects may ask for lower interest rates which makes debt finance from a demand side perspective also more attractive. Thus, following these arguments, VC ownership is expected to have a positive impact on both the supply and demand of debt finance. Hypothesis H3A is therefore:

H3A: entrepreneurial companies that are associated with VC finance raise (i) more often debt finance and (ii) larger amounts of debt finance.

However, there are still some important differences between the corporate governance mechanism that is most optimal for a debt provider and the corporate governance mechanism for an equity provider. For example, debt providers are often the first claimants of a companies' pledgeable assets and thus will try to preserve the value of the companies' assets-in-place as these can be sold to meet the fixed debt repayment or such assets may at least reduce the consequences of a potential bankruptcy. Equity investors on the other hand may promote new or additional investments in intangible assets that are typically associated with the largest growth potential, rather than preserving the value of the existing assets. Another important difference between equity providers and debt providers is that equity providers may try to increase their decision power through the board of directors (Berger and Udell, 1998) while this may be less of a concern for debt providers. Given these differences, an equity-oriented governance system that flows from VC ownership is expected to be less beneficial or optimal for debt providers as compared to equity providers as they both type of financiers focus on different aspects of a company in order to reduce the risk of their investment.

Second, the staging of a VC investment may have a negative effect on the supply of debt finance. Staging also provides the VC investor the option to abandon the investment (Amit et al., 1998). Specifically when additional VC financing is needed, VC investors may decide first which companies in their portfolios have the best chance of achieving a successful exit and stop funding those that do not in the interest of allocating more capital to the likely ‘winners’ in their portfolios (Puri and Zarutskie, 2012). As a result, a considerable number of VC investments finally results into a bankruptcy (Hochberg et al., 2007; Cumming and MacIntosh, 2003). This potential bankruptcy risk might further be exacerbated by the fact that VC investors have more power compared with other investors (Van den Berghe and Levrau, 2004) and face a higher pressure to achieve a high return for their fund and so can be expected to adopt a more savage attitude in divesting from underperforming investments (Mason and Harrison, 2002). Given that debt providers will try to limit downside risk as much as possible, this higher bankruptcy risk which is associated with VC staging may negatively affect the supply of debt finance.

Third, debt providers might anticipate only the higher risk associated with VC staging or the evolution to a suboptimal corporate governance system and therefore offer less favorable financing terms to VC companies (John et al., 2008) which may have a negative effect on debt finance decisions from a demand side perspective.

Following these arguments, there may also be a negative impact of VC ownership on investment decisions from debt providers. Hypothesis H3B is therefore:

H3B: entrepreneurial companies that are associated with VC finance raise (i) less often debt finance and (ii) lower amounts of debt finance.

2.3 Method

2.3.1. Data Sources and sample

In order to test the hypotheses, a unique, hand-collected longitudinal dataset of 6,813 entrepreneurial companies from six European countries (Belgium, Finland, France, Italy, Spain and the U.K.) is used². 606 of these companies received VC financing, 6,207 companies did not receive any VC financing. Moreover, to increase the representativeness of the data for

² Data were gathered through the European VICO project, which is described in detail by Bertoni and Pellón (2011). Germany is excluded from this study because almost no relevant accounting data, needed for the purpose of this study, is available on German firms.

the population of entrepreneurial companies in Europe, a stratified selection method was used. The population was therefore first divided into seven different strata, each representing a different country.

Entrepreneurial companies that received VC financing were identified from several public data sources including press clippings, VC websites and commercial databases (VentureXpert, Zephyr, country-specific databases). VC companies were included if they satisfied four criteria at the time of their initial VC investment. First, the initial VC investment occurred between 1994 and 2004. Initial VC investments were equally divided between the pre-bubble, the bubble and the post-bubble investment period as VC investment strategies have proven to be significantly different in each period (Gompers and Lerner, 2001) and to mitigate as such potential biases due to the selection of VC companies in only one single investment period. Second, at the time of the initial VC investment all companies were maximum ten years old. This ensures I study young companies that raised VC financing, rather than mature companies that raised buy-out financing or other types of private equity financing. Third, companies were active in high-tech industries which were identified from the NACE Rev2 classification system. The NACE Rev2 sectors were reclassified into more aggregate sectors following the transformation guidelines provided by the European Venture Capital and Private Equity Association (EVCA): Life Sciences (Biotech and Pharmaceutical), Communication (Telecom), ICT (ICT Manufacturing), Internet Related (Internet and Web Publishing), Software and Other (including Aerospace, Energy, Nanotech, Other R&D and Robotics). Fourth, companies were independent at first investment, which implies they were not controlled (< 50 percent) by a third party.

After the identification of the VC companies, a control group was *randomly* selected from the population of companies that did not receive VC funding. The population of non VC companies was derived from the country-specific, economy-wide databases or the Amadeus database (Bureau van Dijk). Similar criteria were used with respect to country of origin, founding period, high-tech industries and independence as described above. Specifically, each country selected a control group of companies from the same sectors as those in which the VC companies were active; the control group could further only include companies that were founded between 1984 and 2004 and the companies were also independent (< 50 percent owned by another company) at start-up. Companies were first filtered by foundation date, second by selected sectors and, finally, by independence indicator. For each VC company, ten non VC companies were selected. The ten-to-one ratio reflects the importance of VC

financing for entrepreneurial companies (Bottazzi and da Rin, 2002; Puri and Zarutskie, 2012). It was additionally checked whether firms in the control group had never received VC in any form.

For all VC and non VC companies, detailed yearly financial statement data was collected through the Amadeus database or an equivalent country specific database from the moment the companies entered the VICO database until 2007, or until the companies disappeared (either through bankruptcy or through acquisition). This procedure entails that I limit survival bias because my database also includes companies which eventually fail. As such, I had a track record of the financial history of the VC and non VC companies included in this sample. Further, yearly non-financial data such as the number of patent applications (Patstat database) or important events that occurred during the period of analysis such as Initial Public Offerings and Mergers and Acquisitions were registered.

In order to select the sample under study from the VICO dataset, 297 company-year observations were excluded for reason that the companies transformed from private into public companies which is likely to have a significant impact on financing strategies (Brav, 2009). Pre-IPO years, however, were kept in the sample. Finally, 398 company-year observations were excluded because of missing data. This results in a final, longitudinal sample of 6,813 entrepreneurial companies of which 606 raised VC. For each VC company, I further identified whether the company raised only one round of VC financing or several rounds. I therefore could further divide the VC subsample into 260 VC companies with one round of VC (henceforth called single round VC companies) and 346 VC companies with several rounds of VC (henceforth called multiple round VC companies). Table 2.1 provides a description of the sample.

Table 2.1: Description of the sample

Parameter	Panel A		Panel B		VC		Panel C		Multiple Round VC	
	Total Sample		Non VC		VC		Single Round VC		Multiple Round VC	
	Number	%	Number	%	Number	%	Number	% of VC	Number	% of VC
Country										
Finland	757	11.11	688	11.08	69	11.39	33	47.83	36	52.17
Spain	876	12.86	795	12.81	81	13.37	29	35.80	52	64.20
Belgium	913	13.40	823	13.26	90	14.85	23	25.56	67	74.44
Italy	1,055	15.49	958	15.43	97	16.01	71	73.20	26	26.80
U.K.	1,534	22.52	1,365	21.99	169	27.89	71	42.01	98	57.99
France	1,678	24.63	1,578	25.42	100	16.50	33	33.00	67	67.00
Foundation Period										
1984-1989	983	14.43	962	15.50	21	3.47	13	61.90	8	38.10
1990-1994	1,204	17.67	1,115	17.96	89	14.69	46	52.27	42	47.73
1995-1999	2,136	31.35	1,887	30.40	249	41.09	101	40.56	148	59.44
2000-2004	2,490	36.55	2,243	36.14	247	40.76	100	40.32	148	59.68
Industry										
Other	815	11.96	775	12.49	40	6.60	23	57.50	17	42.50
Communication	349	5.12	311	5.01	38	6.27	15	39.47	23	60.53
Life Sciences	631	9.26	529	8.52	102	16.83	35	34.31	67	65.69
Internet Related	801	11.76	684	11.02	117	19.31	62	52.99	55	47.01
ICT	1,137	16.69	1,035	16.67	102	16.83	41	40.20	61	59.80
Software	3,080	45.21	2,873	46.29	207	34.16	84	40.58	123	59.42
Total	6,813	100.00	6,207	100.00	606	100.00	260	42.90	346	57.10

Table 2.1 breaks the number of companies down by country, foundation period and industry. Panel A includes the full sample. Nearly 25 percent of the companies are French companies, closely followed by U.K. companies (23 percent). Italian companies represent 15 percent of the sample, Belgian and Spanish companies each 13 percent and Finnish companies 11 percent. Nearly 37 percent of all companies were founded between 2000 and 2004, 31 percent between 1995 and 1999, 18 percent between 1990 and 1994 and 14 percent between 1984 and 1989. 45 percent of the companies operate in the software industry, followed by ICT (17 percent), internet (12 percent), life sciences (9 percent) and communication (5 percent). The other, remaining industries represent 12 percent.

Panel B presents characteristics of the VC and the non VC companies. Some differences between VC and non VC companies can be observed. First, U.K. companies represent a higher share in the VC sample as compared within the non VC sample (28 percent within VC; 22 percent within non VC); French companies are less represented in the VC sample (17 percent within VC; 25 percent within non VC). Second, VC companies are younger compared with non VC companies: 41 percent of the VC companies (36 percent for non VC) were founded after 1999 while only 3 percent (16 percent for non VC) were founded before 1990. Third, VC financing is more important for the internet sector (19 versus 11 percent) and the life science sector (17 versus 9 percent) while comparatively less important for the software industry (34 percent versus 46 percent). Obviously, as Table 2.1 indicates, VC companies and non VC companies do not perfectly match with each other since entrepreneurs select their companies as candidates for receiving VC financing and VC investors select companies in which they want to invest based on observable and unobservable company characteristics (Eckhardt et al., 2006). I control for these selection issues in my econometric models (see more details below).

Panel C presents characteristics of the single round VC companies and multiple round VC companies. Consistent with the argument that staging is an important control mechanism in VC financing (Gompers, 1995), 57 percent of the VC companies report several rounds of VC financing. At the country level, Italy constitutes an exception compared with other countries given that 73 percent of the Italian VC companies report only one round of VC financing. Moreover, older VC investments (before 1995) and VC investments in the internet sector (53 percent) or in the non-specific other sectors (58 percent) were less likely followed by new rounds of VC financing. In general, no other large differences appear between single round and multiple round VC companies.

2.3.2. Dependent Variables

The dependent variables in this study are measures of incremental financing events. Book values retrieved from balance sheets are used to calculate different measures as market variables are unavailable for private companies (Brav, 2009). Previous research has shown that the use of book values is not a serious limitation when studying debt and equity investment decisions (Fama and French, 2002; Leary and Roberts, 2005).

Following previous research (Brav, 2009; Cosh et al., 2009), multiple constructs are selected as dependent variables, reflecting debt and equity investment decisions. These include raising finance in general, unconditional whether this is equity finance, debt finance or a combination (*Finance Issue*); the amount of finance raised (*Ln Amount of Finance Issued*), raising capital from equity investors (*Equity Issue*), the amount of equity capital raised (*Ln Amount of Equity Issued*), raising debt finance (*Debt Issue*) and the amount of debt finance raised (*Ln Amount of Debt Issued*).

Finance Issue is a dummy variable that takes the value of one if a company raised finance in a given year T. This may be capital from equity investors only, only debt finance or a combination of both. Hence, this dummy variable is not conditional upon the type of security raised. Raising finance is further defined as a minimum five percent increase in the total amount of debt and/or equity from year T-1 to year T, relative to pre-issue total assets. The minimum threshold of five percent benefits the comparability of this study with prior research and excludes smaller, less significant financing events (Brav, 2009; de Haan and Hinloopen, 2003; Leary and Roberts, 2010; Vanacker and Manigart, 2010). The second dummy variable, *Equity Issue*, is a dummy variable equal to one if companies raise capital (net of profit) from equity investors, zero otherwise. Likewise, *Debt Issue* is a dummy variable equal to one if companies raise finance from debt investors, zero otherwise. For the identification of equity investments or debt investments, the same minimum five percent threshold was applied. The amount of finance raised, unconditional upon the type of security issued (*Ln Amount of Finance Issued*), the amount of equity capital raised (*Ln Amount of Equity Issued*) and the amount of debt raised (*Ln Amount of Debt Issued*) were log-transformed before they were studied. In order to include also the non-issuing events in which companies did not raise finance (in which the amounts are accordingly set equal to zero), a constant value of 1 was added before the log-transformation.

Figure 2.1 compares equity and debt investment activities between VC and non VC companies.

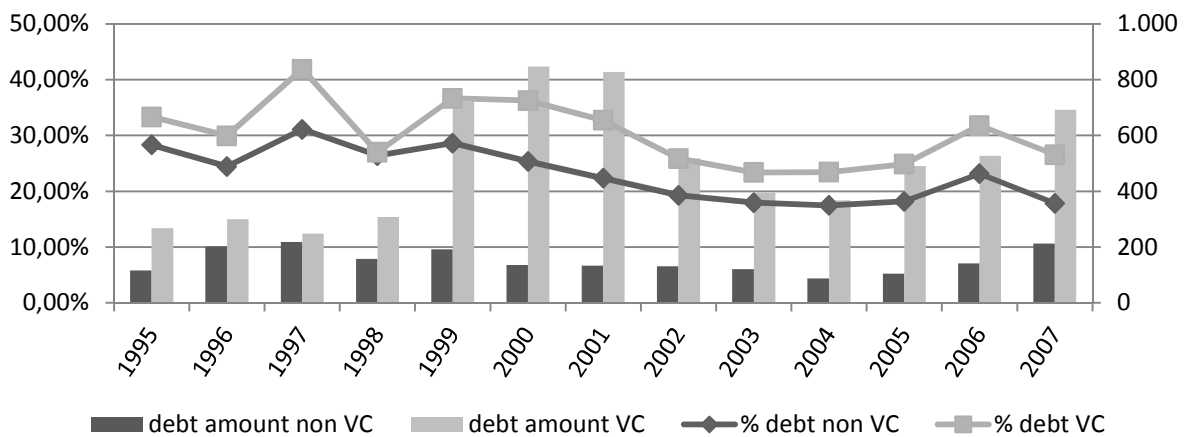
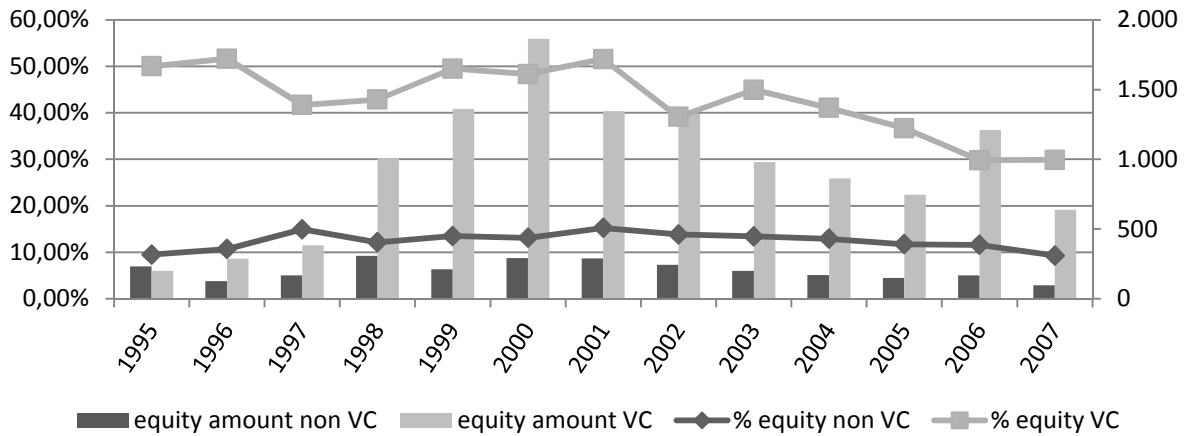


Figure 2.1: Panel A of this figure 2.1 shows the percentage of VC and non VC companies raising capital from equity investors and the median amount of capital raised. Issuing equity is defined as a minimum five percent increase in capital net of profit (book values) relative to pre-issue total assets. Panel B shows the percentage of VC and non VC companies raising finance from financial debt investors and the median amount of financial debt invested. Issuing debt is defined as a minimum five percent increase in financial debt, measured in book values relative to pre-issue total assets. The median amount of equity and debt finance raised are in thousands of euro.

Panel A presents the percentages of VC and non VC companies raising capital from equity investors and the median amount of equity capital, net of profit raised in thousands of euro. Panel B presents the percentages of VC and non VC companies raising financial debt and the median amount of financial debt raised in thousands of euro.

Equity capital and financial debt investment decisions are strikingly different between VC and non VC companies. First, VC companies raise more often and larger amounts of equity capital compared with non VC companies. Between 30 and 52 percent of the VC companies raise equity capital which is considerably larger compared with non VC companies (only between 9 and 15 percent raise equity capital). Moreover, the amount of equity capital raised increases significantly from the moment companies raise VC financing. The median amount of equity capital raised by VC companies varies between 1 and 1.6 million euro per year, non

VC companies raise only between 100,000 and 310,000 euro capital per year. Second, VC companies do not seem to substitute more capital from equity investors with less debt finance from financial debt investors. Financial debt is raised in between 23 percent and 42 percent of the VC companies; and in between 17 percent and 31 percent of the non VC companies. The amount of financial debt raised is also much larger for VC companies. The median debt investment amount varies between 250,000 and 850,000 euro for VC companies and between 100,000 and 200,000 euro for non VC companies.

2.3.3. Independent Variables

The main explanatory variable in the regression models is a VC dummy variable which studies the impact of VC ownership on debt and equity investment decisions. *VC* is a company level variable equal to one from the year in which the company receives VC financing (if any), and zero otherwise. Likewise, *non VC* is a company level dummy variable equal to one for all years with no VC ownership, zero otherwise.

I further defined two dummy variables that differentiate between single round VC companies and multiple round VC companies in order to study whether there are different effects associated with a one-time VC finance event and repeated VC finance events. *Single round VC* is a dummy variable equal to one for VC companies with one VC investment round, zero otherwise. *Multiple round VC* is a dummy variable equal to one for VC companies with minimum two VC investment rounds; zero otherwise.

2.3.4. Control Variables

The control variables that are used are largely motivated by prior research. They can be aggregated in three different categories.

Company Accounting Variables.

Extant corporate finance literature (Leary and Roberts, 2005; 2010; Brav, 2009; Fama and French, 2002) has demonstrated the relevance of company-level accounting characteristics to explain finance decisions. The amount of internal resources available is defined as the beginning year's cash level plus the net operating cash flow minus the change in working capital (Leary and Roberts, 2010). Internal resources are further split into deficit amounts (*Deficit Funds*) and surplus amounts (*Surplus Funds*) where respectively negative values of internal resources are reported (in absolute amount) and positive values are set equal to zero (*Deficit Funds*) or vice versa (*Surplus Funds*) (Leary and Roberts, 2010; Helwege and Liang,

1996). I further control for company size (*Size*) measured by the logarithm of total assets and the book value of net working capital (*Net working capital*) defined as the outcome related to accounts receivable plus inventory minus accounts payable.

Company Non-Accounting Variables.

The second category of control variables are non-accounting company-level characteristics. I control for a company's growth in employees (*Employee Growth*) as high-growth companies need more finance to support their growth (Gompers, 1995; Mande et al., 2012). I further control for the cumulative number of patent applications (*# of Patent Applications*), as innovation (captured by the number of patent applications) is positively related to a company's degree of asymmetric information which may have a negative impact on the supply of finance (Myers, 1984).

Other Control Variables.

As a last category of control variables, country-level variables are included that control for between-country differences that may affect equity and debt investment decisions. Constructs for the economic development of a country in general (*GDP per capita* and *GDP Growth*), and the development of equity markets (*MSCI (Morgan Stanley) index* and *Market capitalization of listed companies*), and of debt markets (*Bank credit as a % of GDP* and *LT Government Interest Rate*) in particular are included. Remaining country effects, time-variant effects and industry effects are captured by country, year, and industry dummies.

2.3.5. Econometric Approach

Six regression specifications study entrepreneurial finance decisions. Probit models are used for the estimation of *Finance Issue*, *Equity Issue* and *Debt Issue* because the dependent variables are dummy variables. Tobit models are used for the estimation of *Ln Amount of Finance Issued*, *Ln Amount of Equity Issued* and *Ln Amount of Debt Issued*. Tobit models account for the fact that the log transformed variables of the amount of finance are truncated below by zero (for all non-issuing events) (Cosh et al., 2009). Log transformed variables are taken in order to reduce heteroskedasticity and to reduce the impact of sample outliers. If the probability of attracting VC is correlated with the residuals of entrepreneurial finance decisions, the reported results might suffer from a selection bias. I therefore include an Inverse Mills Ratio (obtained from a probit model (reported in Table 2.3) estimating the probability that companies raise VC financing at a certain moment) in the basic regression

model. The Inverse Mills Ratio corrects for possible selection biases that arise if companies self-select into VC financing or VC investors select particular companies based on observable and unobservable characteristics (Heckman, 1979).

The amount of deficit funds (*Deficit Funds*) and surplus funds (*Surplus Funds*) are scaled by total assets to control for size effects and to mitigate heteroskedasticity (Brav, 2009). The size of the company (*Size*), the relative growth in employees (*Employee Growth*) and the amount of net working capital (*Net Working Capital*) are lagged one year to limit potential endogeneity issues. The regressions also include a constant, country, year and industry fixed effects (coefficients not reported).

All currency variables are in thousands of euro except for the constructs that measure differences in economic development (*GDP per capita* in 10,000 U.S. dollars and *GDP Growth* in U.S. dollar) and corrected for inflation (2008=100 for variables in euro, 2000=100 for variables in dollar). In order to mitigate the impact of potential sample outliers, variables were winsorized at the five percent level (one-tail winsorizing) if needed. Since it is further plausible that the distribution of variables is different between VC and non VC companies, outliers were identified in each subsample separately.

Company-years are the unit of analysis. The coefficients of the regression models are corrected for heteroskedasticity and correlation across observations of a given company by the clustering technique (Petersen, 2009). I report marginal effects to show the economic significance alongside the statistical significance (Cosh et al., 2009).

2.4. Results

2.4.1. Descriptive statistics

Table 2.2 reports descriptive statistics of the entrepreneurial finance decisions and company-level control variables. The number of observations, the mean and median value for the VC sample and the non VC sample and statistical significant differences (t-test for mean values, Mann-whitney test for median values) are indicated. For reasons of conciseness, no correlation matrix is reported but nor the correlation matrix nor Variance Inflation Factors (VIF>10) indicate that high correlations exist between the independent variables that may lead to multicollinearity problems.

Table 2.2 : Descriptive statistics

Table 2.2 presents descriptive statistics of the finance decisions and the company-level control variables. *Finance Issue* is a dummy variable equal to one if the company raised finance, zero otherwise. *Equity Issue* and *Debt Issue* are dummy variables respectively equal to one if the company raised capital from equity investors or finance from financial debt investors, zero otherwise. The amounts of finance raised are in thousands of euro. All currency control variables are in thousands of euro and corrected for inflation (2008=100). †, **,*** denote statistical significant differences between the non VC companies and the VC companies at the 10 percent, 5 percent and 1 percent level correspondingly.

		Sample			
		Obs.	Mean	Median	
Finance Issue (0/1)	Full sample	26,126	0.385	0.000	
	Non VC	23,542	0.359	0.000	
	VC	2,584	0.614	1.000	
	Difference		-0.255	***	***
Amount of Finance issued	Full sample	10,046	3,577	213	
	Non VC	8,460	3,678	157	
	VC	1,586	3,036	917	
	Difference		642	***	-760 ***
Equity Issue (0/1)	Full sample	26,126	0.217	0.000	
	Non VC	23,542	0.193	0.000	
	VC	2,584	0.436	0.000	
	Difference		-0.243	***	
Amount of Equity issued	Full sample	5,675	4,120	246	
	Non VC	4,549	4,375	162	
	VC	1,126	3,086	943	
	Difference		1,289	***	-781 ***
Financial Debt Issue (0/1)	Full sample	26,126	0.214	0.000	
	Non VC	23,542	0.206	0.000	
	VC	2,584	0.282	0.000	
	Difference		-0.076	**	
Amount of Financial Debt issued	Full sample	5,581	2,250	155	
	Non VC	4,852	2,311	132	
	VC	729	1,836	464	
	Difference		475	***	-332 ***
Surplus Funds	Full sample	21,570	0.265	0.195	
	Non VC	19,208	0.273	0.206	
	VC	2,362	0.201	0.104	
	Difference		0.072	***	0.102 ***
Deficit Funds	Full sample	21,570	0.046	0.000	
	Non VC	19,208	0.040	0.000	
	VC	2,362	0.094	0.000	
	Difference		-0.054	***	
Total Assets	Full sample	50,120	2,001	510	
	Non VC	46,401	1,838	460	
	VC	3,719	4,028	1,643	
	Difference		-2,189	***	-1,183 ***

Employee growth	Full sample	31,321	1.211		1.066	
	Non VC	28,961	1.195		1.060	
	VC	2,360	1.409		1.168	
	Difference			-0.214 ***	-0.108	***
Net working capital	Full sample	25,271	0.132		0.052	
	Non VC	22,793	0.146		0.054	
	VC	2,478	0.008		0.030	
	Difference			0.138	0.024	***
Patent Applications	Full sample	50,135	0.401		0.000	
	Non VC	46,401	0.335		0.000	
	VC	3,734	1.228		0.000	
	Difference			-0,893 ***		

Table 2.2 presents substantial differences in finance decisions between the VC companies and the non VC companies. First, VC companies raise finance in 61 percent of all company-year observations, non VC companies only in 36 percent. VC companies raise at median values 917,000 euro per finance event, non VC companies 157,000 euro. Second, VC companies raise capital from equity investors in 44 percent of all company-year observations, non VC companies only in 19 percent. The median amount of capital raised is 943,000 euro for VC companies and 162,000 euro for non VC companies. Third, VC companies raise finance from financial debt investors in 28 percent of all company-year observations, non VC companies only in 21 percent. The median amount of financial debt raised is 464,000 euro for VC companies and 132,000 euro for non VC companies. These descriptive statistics indicate that VC companies raise more often finance and larger amounts of entrepreneurial finance compared with non VC companies, both in terms of entrepreneurial finance from equity investors as from financial debt investors.

VC and non VC companies further have on average different company characteristics. Accounting characteristics are statistically different hinting that VC companies have less internal financing resources available compared with non VC companies. For example, surplus funds, if any, are on average 27 percent of total assets for non VC companies but only 20 percent for non VC companies; deficit funds, if any, on the other hand are on average 9 percent for VC and 4 percent for non VC companies. The book value of total assets is around 4 million euro for VC and 1.8 million euro for non VC companies suggesting that VC companies are on average considerably larger. Median net working capital scaled to total assets as an indicator of a company's operational capital is 3 percent for VC and 5.4 percent for non VC companies. Non-accounting company characteristics are also different though all

companies were initially selected as young, high-tech entrepreneurial companies. Nevertheless, VC companies remain more growth-oriented and more innovative compared with non VC companies. More specifically, VC companies report on average 40 percent growth per year (in terms of employees), non VC companies only 19.5 percent. The average number of total patent applications per company is mathematically 1.2 for VC companies and 0.3 for non VC companies.

In a nutshell, Table 2.2 indicates that VC ownership has a significant impact on entrepreneurial finance decisions. VC companies raise more frequently finance (*Finance issue*) compared with non VC companies, larger amounts of finance (*Amount of finance issued*), more frequently capital from equity investors (*Equity Issue issues*) and larger amounts of equity capital (*Amount of Equity Issue*). Further, and perhaps most interestingly, VC companies raise more often debt finance as non VC companies and higher amounts of debt finance. Further, VC companies have less internal funds available (*Surplus Funds/Deficit Funds*) compared with non VC companies but grow faster (*Employee Growth*) and invest more in innovations (*Patent Applications*). I will control for these different company characteristics in the regression models.

2.4.2. Controlling for self-selection in the VC-entrepreneur relationship

The primary concern in analyzing the impact of VC ownership on entrepreneurial finance decisions is the endogeneity of which companies receive VC finance ex-ante (Hochberg, 2012). Even if VC ownership has no impact on entrepreneurial finance decisions, I might observe a significant impact of VC ownership if companies that receive VC finance are inherently different from companies that do not receive VC. In the most extreme situation, there may be no impact of VC ownership and companies with different finance characteristics might search for VC finance in the first place or may be selected by VC investors (Eckhart et al., 2006). To address this endogeneity concern, a standard two-step Heckman correction method is used. The first step, the selection model is reported in Table 2.3.

Table 2.3 : Selection model estimating the probability of attracting VC funding

Table 2.3 presents multivariate estimates of the probability that companies attract VC finance for the period under study. Company-years are the unit of analysis and coefficients are corrected for heteroskedasticity and correlation across observations of a given company. The dependent variable of this probit model is a dummy variable, VC, which is equal to one from the moment companies attract VC finance, zero otherwise. The regression model also includes a constant and country, year and industry fixed effects (not reported). †, **,*** denote statistical significance at the 10 percent, 5 percent and 1 percent level correspondingly.

	Probability of VC funding
Surplus Funds	-0.018
Deficit Funds	1.440***
Size	0.145***
Employee Growth	0.182***
Log Company Age	-0.773***
Patent Applications	0.028**
VC Inflow _{t-1}	0.049**
Country fixed effects	YES
Year fixed effects	YES
Industry fixed effects	YES
# of Observations	18,035
R ²	0.203

Table 2.3 reports estimates for the only observable outcome of this selection process, namely the *event* of attracting VC finance. The dependent variable in this selection equation, VC, is a dummy variable equal to one from the moment the company raises VC finance, zero otherwise. The independent variables that are expected to influence the probability of VC finance are the amount of internal funds available, disaggregated into surplus funds (*Surplus Funds*) and deficit funds (*Deficit Funds*). Entrepreneurs are often reluctant to give up control thus VC finance is typically viewed as a last resort type of outside finance (Vanacker and Manigart, 2010). We therefore expect that the likelihood of the VC finance event increases when internal resources are exhausted. Other control variables are the age of the company (*Log Firm Age*), the relative growth of a company (*Employee Growth*), company size (*Size*) and the number of patent applications (*# of Patent Applications*) as VC finance is typically associated with companies with significant growth ambitions which are especially vulnerable to liabilities of newness and smallness (Zahra and Filatotchev, 2004). As a last determinant, the lagged inflation-adjusted yearly inflow of capital in the VC industry (*VC inflow_{t-1}*) is included, which is likely to positively affect deal origination (Gompers and Lerner, 2000) and

thus also the initial VC finance event. Fixed effects are included to control for all other country-, industry- and time specific factors that might affect the event of attracting initial VC finance.

Consistent with expectations, the probability of attracting VC finance increases significantly when deficit funds are larger and when firms are younger, when they report higher growth rates and have more patent applications. Size of the company is also positively associated with the probability of raising VC finance. A larger inflow of capital in the VC industry ($VC\ Inflow_{t-1}$) also increases, as expected, the probability of the VC finance event.

In the followings paragraph, I test my hypotheses after controlling for the propensity of companies to raise VC finance. To do so, I estimate an Inverse Mills Ratio, based on the selection model described above, which I include in all regression models that compare between entrepreneurial finance decisions from VC and non VC companies.

2.4.3. The effect of VC ownership on entrepreneurial finance decisions

To explicitly test the hypotheses, I study both the direct and indirect effect of VC ownership on finance decisions. The VC dummy variable (VC) measures the *direct* effect of VC ownership on finance decisions. I further included interaction terms in the regression models between the company-level control variables and the VC dummy variable to measure the *indirect* impact of VC ownership on finance decisions. Entrepreneurial finance events were defined in book values and identified as increases (above a five percent threshold) in equity capital and/or the amount of financial debt in book year T relative to book year T-1. Following this methodology, entrepreneurial finance decisions could be defined for almost 13,000 company-year observations where T and T-1 accounting information was available. Hence, the number of observations in the regression models is bounded by these finance decisions. The regression models are presented in Table 2.4.

Table 2.4 : The effect of VC ownership on entrepreneurial finance decisions

Table 2.4 presents multivariate estimates of the finance decisions for VC companies and non VC companies. Company years are the unit of analysis. Panel A reports marginal effects, corrected for heteroskedasticity and correlation across observations of a given company. Probit models are used for the dependent variables *Finance Issue*, *Equity Issue* and *Debt Issue*. *Finance Issue* is a dummy variable equal to one if companies raise finance (equity capital, financial debt or a combination), zero otherwise. *Equity Issue* is a dummy variable equal to one if companies raise capital from equity investors, zero otherwise and *Debt Issue* is a dummy variable equal to one if companies raise finance from financial debt investors, zero otherwise. Tobit models study for each of these specifications, the log transformed amount of finance raised. The main explanatory variable, *VC* is a dummy variable equal to one from the year the company raised VC finance, zero otherwise. *Non VC* is a dummy variable equal to one for all company years with no VC ownership, zero otherwise. *VC X (Non VC X)* are interaction terms between the company level control variables X and the VC and non VC dummy variable respectively. The regressions also include a constant and country, year and industry fixed effects (coefficients not reported). Panel B tests for each company-level control variable X the nullhypothesis $VC X = non VC X$ at different significance levels. †, **, *** denote statistical significance at the 10 percent, 5 percent and 1 percent level correspondingly.

PANEL A						
	Finance Issue (1/0)	Ln Amount of finance issued	Equity Issue (1/0)	Ln Amount of Equity issued	Debt Issue (1/0)	Ln Amount of Debt issued
VC	0.208*	1.729+	0.298**	6.463**	-0.068	-2.318
VC Surplus Funds	-0.729**	-11.412**	-0.354**	-13.844**	-0.381**	-10.453**
Non VC Surplus Funds	-0.624**	-9.525**	-0.229**	-9.439**	-0.446**	-11.820**
VC Deficit Funds	2.465**	1.237	0.160*	-0.033	-0.069	-0.733
Non VC Deficit Funds	1.808**	8.630**	0.233**	7.908**	0.214**	4.964**
VC Size	-0.074**	-0.289*	-0.036**	-0.895**	-0.018**	-0.105
Non VC Size	-0.066**	-0.374**	-0.026**	-0.658**	-0.032**	-0.485**
VC Employee Growth	0.014	-0.020	0.005	-0.001	-0.013	-0.325
Non VC Employee Growth	0.013+	0.109	0.000	0.007	0.013**	0.263*
VC Net Working Capital	-0.089	-1.244**	-0.123**	-3.700**	0.085**	2.047**
Non VC Net Working	0.000	0.009	-0.000	-0.000	0.000	0.014
VC Patent Applications	-0.066**	-0.374**	-0.026**	-0.658**	-0.032**	-0.485**
Non VC Patent	0.014	-0.020	0.005	-0.001	-0.013	-0.325
LT Interest Rate	-0.354	-13.635	-0.426	-13.131	-1.114	-42.567
GDP per capita	-0.160*	-1.879*	-0.050	-1.768	-0.107*	-2.897*

GDP Growth	-0.003	-0.019	0.009	0.372	-0.009	-0.263
Market Cap Listed	-1.234*	-16.280*	0.325	8.538	-1.465**	-37.454**
MSCI Index	0.354**	4.176**	-0.003	0.315	0.322**	7.934**
Bank Credit	0.036	0.155	-0.072*	-2.727*	0.090**	1.967**
Inverse Mills Ratio	-0.555**	-7.219**	-0.276**	-10.777**	-0.233**	-6.147**
Country dummy variables	YES	YES	YES	YES	YES	YES
Year dummy variables	YES	YES	YES	YES	YES	YES
Industry dummy variables	YES	YES	YES	YES	YES	YES
Observations	12,977	12,977	12,977	12,977	12,977	12,977
R ²	0.296	0.137	0.268	0.147	0.174	0.094

PANEL B

Surplus Funds		†	**	**		
Deficit Funds						
Size			†			
Employee Growth						
Net Working Capital						
Patent Applications						

Panel A reports the marginal effects of the VC dummy variable on entrepreneurial finance decisions. The first hypothesis predicts that VC ownership has a positive effect on entrepreneurial finance decisions, which is supported. The VC dummy variable is positive and significant in the model that predict finance decisions that are unconditional upon the type of security raised (*Finance Issue*) ($p < 0.05$) and in the model that predict the corresponding amount of entrepreneurial finance raised (*Ln Amount of Finance Issued*) ($p < 0.10$). The direct impact of VC ownership is further meaningful. All else equal, companies with VC ownership raise on average 21 percent more often entrepreneurial finance and the amount of entrepreneurial finance raised is also higher³. The second hypothesis predicts that VC ownership will have a positive impact on capital from equity investors which is strongly ($p < 0.01$) supported. VC companies raise on average 30 percent more often capital from equity investors as compared with non VC companies and the amount of equity capital is again also larger. The difference between the impact of VC ownership on all finance decisions, including equity finance, debt finance and combinations of both (20.9 percent) and the impact on capital increases from equity investors only (29.8 percent) is 9 percent which is statistically significant ($p < 0.05$). Hence, the positive effect of VC ownership is more meaningful for equity investors.

In hypothesis H3A, I predict that VC ownership will have a positive impact on finance decisions from financial debt investors; in hypothesis H3B, I predict that VC ownership will have a negative impact on finance decisions from financial debt investors. Both hypotheses are not supported given that I do not find any significant effect of VC ownership on finance decisions from financial debt investors. In fact, while I expected to see, or a significant positive coefficient (consistent with hypothesis H3A) or a significant negative coefficient (consistent with hypothesis H3B), I do not find that finance decisions from financial debt investors are significantly different between VC companies and non VC companies. The amount of financial debt raised is also not significantly different. Although this insignificant effect of VC ownership on financial debt investments is unexpected, the fact that debt finance is equally important for companies that raise VC finance is an interesting finding as VC finance has typically been associated with high growth oriented companies that are often denied debt finance. Opposite to this perception, Table 2.4 demonstrates that financial debt is

³ Coefficients of a Tobit model cannot be interpreted straightforward as the direct effect of the explanatory variable on the dependent variable. In fact, the coefficient represents a combination of two effects: (1) a change in the probability of raising finance and (2) a change in the amount of finance raised, conditional upon raising finance. Hence, I do not interpret these coefficients as it this would potentially lead to false conclusions.

equally important for companies that raise VC finance compared with companies that do not raise VC finance.

The signs of the coefficients for the control variables are in line with previous research. Companies with more positive internal resources (*Surplus Funds*) raise less finance, companies with a higher deficit (*Deficit Funds*) raise more finance hinting that these entrepreneurial companies raise capital or debt only when their own internal resources become depleted. This is especially true for the non VC companies. Larger companies (*Size*) raise less outside finance. Non VC companies with higher growth (*Employee Growth*) raise more debt finance which can be explained if growth is correlated with growth in assets that can be pledged in favor of the creditor (such as machines or inventory); for VC companies differences in growth are unrelated to finance decisions. VC companies with a better liquidity position (*Net Working Capital*) raise less capital from equity investors but more financial debt. Finally, the number of patent applications as an indicator for the level of innovation is only significant for VC companies suggesting that more innovative VC companies are less able to raise equity or debt finance. Patents are unimportant for non VC companies, probably because only few non VC companies report a patent application.

The country-level control variables are also in line with the expectations but appear to be less associated with entrepreneurial finance decisions. It appears that these decisions are less affected by the market conditions. Companies located in countries with a higher GDP per capita and a larger share in GDP from public companies raise less finance. As expected, companies raise more debt finance in countries with a higher availability of bank credit at the macro-economic level.

The inverse Mills ratio is negative and significant suggesting that there exists a negative association between the residuals of the selection model and the residuals of the entrepreneurial finance models. Hence, the unobserved factors that are likely to influence the probability of raising VC are thus negatively correlated with the unobserved factors that are likely to influence entrepreneurial finance decisions.

To summarize, the results from Table 2.4 indicate that there is a significant effect of VC ownership on the financing decisions of entrepreneurial companies. I find empirical support for the argument that a VC investor may decrease the agency costs and information asymmetries that may exist between entrepreneurs and investors as investors on average invest more often and larger amounts of finance in companies that are characterized by VC

ownership. Second, these effects are particularly large for finance decisions from equity investors suggesting that VC ownership indeed leads to an equity-oriented corporate governance mechanism. For investments from financial debt investors however, I find no positive or negative effect on the supply of debt finance following from VC ownership suggesting that in general the positive effect stemming from a reduction in agency costs for this particular kind of investors will be offset by the negative effects stemming from the disadvantages associated with the implementation of an equity-oriented governance mechanism and the staging of VC investments.

Panel B studies whether VC ownership has a moderating effect on the relationship between the company-level control variables and entrepreneurial finance decisions. The total effect of VC ownership on entrepreneurial finance decisions will be greater/lower if there is a significant moderating effect that complements/substitutes with/for the direct effect of the VC dummy variable. Panel B reports therefore whether the coefficients between VC*X and non VC*X are significantly different with X representing different company-level control variables. I find that VC ownership complements with the negative effect of the size of the company (*Size*) and the amount of positive internal funds (*Surplus Funds*). Specifically, I find that VC companies have a larger negative effect on finance decisions, mainly on capital from equity investors, from increases in size and increases in positive internal resources. The coefficients of other control variables are not significantly different between VC and non VC companies however thus the moderating effect of VC ownership, if any, is limited.

2.4.4. The impact of additional VC finance on entrepreneurial finance decisions

A question that arises when analyzing the impact of VC ownership on finance decisions is whether VC investors give rise to an equally large effect depending on whether they provide finance to companies over several investment rounds or through only one round of VC finance. The major difference, most relevant for this study, between one round and several rounds of VC finance, is the difference between repeated VC finance and non-repeated VC finance which may have important consequences for the information production task of a VC investor and the extent to which they are able to certify the quality of their portfolio companies (Janney and Folta, 2003). More specifically, a further commitment of the existing VC investor in a follow-up financing round or the participation of new VC investors in follow-on financing rounds may provide a stronger signal about the quality of the company to investors compared with a one-time VC finance event. Moreover, a further commitment of VC investors (new or existing VC) is also likely to result in a more positive and larger impact

of the monitoring and value-adding role of a VC investor. First, a higher equity stake by existing VC investors involves a higher exposure to the company-specific risks and opportunities that arise. Hence, VC investors that repeatedly invest in the same company will have a greater incentive to assist the company and their involvement and oversight is likely to be higher. Second, VC investors have different skills and expertise (Dimov and Shepherd, 2005). Existing VC investors will likely invite other VC investors with complementary skills to join the syndicate (Hochberg et al., 2007). Hence, the entrance of new VC investors will most likely also have a positive impact on the quality of non-financial resources that VC investors bring in. I further expect that investors are able to fully recognize these benefits associated with repeated VC finance and that therefore, repeated VC finance may result in a larger, positive effect on the use of entrepreneurial finance as compared with non-repeated VC finance.

To study the incremental effect of additional or repeated VC finance relative to a one-time or single VC finance event, I compare finance decisions between VC companies with one round of VC finance (*Single round VC*) and VC companies with several rounds of VC finance (*Multiple round VC*). If no important differences in outside finance decisions exist between *Single round VC* companies and *Multiple round VC* companies, the incremental effect of additional VC finance will be limited. The results of the regression models are reported in Table 2.5.

Table 2.5 : The impact of repeated VC finance on finance decisions

Table 2.5 presents multivariate estimates of the entrepreneurial finance decisions of *Multiple round VC companies* and *Single round VC companies*. Company-years are the unit of analysis. Panel A reports the marginal effect of the coefficients, corrected for heteroskedasticity and correlation across observations of a given company. *Multiple VC* is a dummy variable equal to one for VC companies with several rounds of VC finance, zero otherwise; *Single VC* is a dummy variable equal to one for VC companies with one round of VC finance, zero otherwise. *Multiple VC X (Single VC X)* represent interaction terms between each company-level control variable X and the *Multiple VC (Single VC)* dummy variable. The regressions also include a constant and country, year and industry fixed effects (coefficients not reported). Panel B tests for each company-level control variable X the null hypothesis $\text{Multiple VC X} = \text{Single VC X}$ at different significance levels. †, **, *** denote statistical significance at the 10 percent, 5 percent and 1 percent level correspondingly.

PANEL A						
	Finance Issue (1/0)	Ln Amount of finance issued	Equity Issue (1/0)	Ln Amount of Equity issued	Debt Issue (1/0)	Ln Amount of Debt issued
Multiple VC	0.457*	5.052**	0.360*	5.506*	0.086	2.749
Multiple VC Surplus Funds	-0.820**	-10.164**	-0.710**	-11.652**	-0.461**	-10.156**
Single VC Surplus Funds	-0.739**	-9.714**	-0.477**	-8.320**	-0.655**	-14.540**
Multiple VC Deficit Funds	2.377**	7.091**	0.899**	9.180**	0.095	3.207+
Single VC Deficit Funds	2.386**	12.742**	0.972**	13.526**	0.668**	14.445**
Multiple VC Size	-0.046**	0.129	-0.029*	0.015	-0.008	0.170
Single VC Size	-0.001	0.580**	-0.001	0.333	0.001	0.459+
Multiple VC Employee Growth	0.067**	0.474**	0.045*	0.610**	0.017	0.327
Single VC Employee Growth	0.059+	0.470	0.051	0.806+	-0.007	-0.132
Multiple VC Net Working Capital	-0.186*	-1.288*	-0.276**	-3.155**	0.076+	1.549
Single VC Net Working Capital	-0.089	-1.043	-0.275**	-3.782**	0.144**	2.742*
Multiple VC Patent Applications	0.019**	0.146**	0.017**	0.241**	-0.006	-0.127
Single VC Patent Applications	0.005	0.086	0.007	0.161	0.001	0.027
LT Interest Rate	1.271	66.747	-1.402	52.079	-0.391	-5.108
GDP per capita	-0.000	0.000	0.000	0.000	-0.000+	-0.001+
GDP Growth	-0.023	-0.279	-0.028	-0.379	-0.003	-0.156
Market Cap Listed companies	0.002	0.007	-0.000	-0.004	0.002	0.029
MSCI Index	-0.174	-0.797	0.130	1.798	-0.168	-3.608

Bank Credit	0.057	0.523	-0.100	-1.440	0.095	2.048
Country dummy variables	YES	YES	YES	YES	YES	YES
Year dummy variables	YES	YES	YES	YES	YES	YES
Industry dummy variables	YES	YES	YES	YES	YES	YES
Observations	1,828	1,828	1,828	1,828	1,828	1,828
R ²	0.352	0.132	0.321	0.141	0.164	0.082

PANEL B

Surplus Funds						
Deficit Funds		***				**
Size						
Employee Growth						
Net Working Capital						
Patent Applications						

In Table 2.5, the main explanatory variable in all models is *Multiple VC*. *Multiple VC* is a dummy variable equal to one for VC companies that receive several rounds of VC finance (*Multiple round VC companies*) and equal to zero for VC companies that receive only one round of VC finance (*Single round VC companies*). Measures (0/1) of this dummy variable are available from the moment the VC company receives the first round of VC finance. Hence, I treat VC companies with one round of VC finance and VC companies with multiple rounds of VC finance in these models as mutually exclusive. *Multiple VC*X* and *Single VC*X* are interaction terms of the two VC subsamples with X, where X represents different company-level control variables.

The *Multiple VC* dummy variable in Panel A is positive and significant in the models that predict all entrepreneurial finance decisions (equity, debt and combinations) (*Finance Issue*), the amount of entrepreneurial finance raised (*Ln Amount of Finance Issued*), capital investment decisions from equity investors (*Equity Issue*) and the amount of equity capital (*Ln Amount of Equity issued*) raised. The *Multiple VC* dummy variable is positive but insignificant in the models that predict finance decisions from financial debt investors (*Debt Issue*) and the amount of financial debt raised (*Ln Amount of Debt issued*). These differences in finance decisions are further also meaningful⁴. All else equal, VC companies with multiple rounds of VC finance that benefit from repeated VC finance raise on average 46 percent more entrepreneurial finance compared with VC companies with one round of VC finance. Moreover, repeated VC finance results in 36 percent more capital from equity investors relative to non-repeated VC finance.

The effects of the company-level control variables are largely the same as those discussed in Table 2.4. I find that surplus funds (*Surplus Funds*) have a negative effect and deficit funds (*Deficit Funds*) a positive effect on entrepreneurial finance decisions, larger (*Size*) VC companies raise less entrepreneurial finance and VC companies with more operational capital (*Net Working Capital*) raise less capital from equity investors but more from financial debt investors. More innovative VC companies (*number of patent applications*) raise more entrepreneurial finance and more capital from equity investors, however only if they receive multiple rounds of VC finance. Further, the moderating effect of repeated VC finance on the relationship between the company-level control variables and entrepreneurial finance

⁴ As in Table 2.4, I do not interpret the coefficients of the Tobit models here.

decisions is in general not significant (see Panel B for occasional differences between the interaction terms).

The implications of the results in Table 2.5 are important. First, the results that additional VC finance results into more entrepreneurial finance and larger amounts of entrepreneurial finance compared with one-time VC finance provides further empirical support for the role of VC finance in mitigating agency costs between entrepreneurs and potential investors. The fact that additional VC finance leads to a stronger effect, is an interesting finding. It first reinforces the previous conclusions from Table 2.4 that VC investors have an important information production task and will provide a positive signal about the quality of the company and second, it indicates that these effects will further increase if VC investors provide additional VC finance. Second, the result that additional VC finance results into more capital from equity investors and larger amounts of equity capital supports the argument that VC ownership results in an corporate governance mechanism that is more beneficial for equity investors. Again, though this reported effect may be consistent with my expectations, the empirical result that repeated VC finance has a larger effect on equity finance is an interesting finding. Third, the result that additional VC finance has no impact on finance decisions from financial debt investors may again indicate that the positive effects of repeated VC finance that are associated with the higher reduction in agency cost for financial debt investors are offset by the negative effects that are associated with (i) the staging of VC finance and (ii) the development of a stronger equity-oriented corporate governance system.

2.4.5. Robustness tests

Additional robustness checks were performed; the detailed results of these tests are available upon request. Overall, the robustness tests confirm the results that are reported earlier in this paper. In a first robustness test, I test whether the effect of VC ownership is limited to a short term effect (0-3 years after VC finance) or persists in the long term (after 3 years). I find similar results for both the short term as the long term effect of VC ownership on finance decisions. Likewise, the results remain robust if I limit the effect of VC ownership to five years. In a second robustness test, I excluded French companies from the dataset because the correlation between equity finance decisions and the total amount of cash invested by VC investor(s) was surprisingly low (only 3 percent) in French VC companies, suggesting that a significant amount of VC cash was debt finance which may disturb the reported results. The regression results without the French companies remained robust however. In a third robustness test, I studied whether VC investors that are subsidiaries of a bank have a different

effect compared with other non-bank VC investors. Specifically, bank-affiliated VC investors may have a larger positive effect on debt finance decisions because for example they have strong ties with potential creditors and other banks. I do not find such an effect, however I find that bank-affiliated VC firms have a larger effect on the amount of entrepreneurial finance raised which might also be affected by their selection strategy. Hence, there is no evidence that bank-affiliated VC investors will have a different effect on finance decisions as compared to other type of VC investors.

Further, I tried to get an idea of the importance of *convertible debt* finance in VC companies. Convertible debt may overestimate the positive effect of VC on equity finance because converting debt into equity brings de facto no new, additional finance to the company. I therefore identified from the data firstly whether and secondly how often an increase in the amount of equity capital coincided with a similar decrease in the amount of debt finance. Only 11 (0.41 percent) company-year observations in the VC sample report an increase in equity capital together with a similar (allowing 5 percent deviation) decrease in debt finance. This percentage remained low (0.68 percent) even when considering a 10 percent deviation between increases in the amount of equity capital and decreases in the amount of debt finance.

2.5. Discussion and conclusion

Prior research in the VC literature that focused on the role of VC finance largely focused on a governance role, a value-adding role or a certifying role of VC. In this paper, I study the impact of VC ownership on entrepreneurial finance decisions. The arguments and hypotheses are derived from an agency framework and empirically tested by using a large longitudinal dataset comprising 6,813 entrepreneurial companies from six European countries.

I test for the effect of VC ownership by comparing entrepreneurial finance decisions between VC companies and non VC companies. First, my results indicate that VC ownership has a positive impact on entrepreneurial finance decisions in general. This positive effect is even stronger when VC investors repeatedly invest in their portfolio companies. I argue that the expert value-adding, contracting and monitoring role of a VC investor will result into a reduction of the agency costs that exist between an entrepreneur and potential investors. Moreover, VC investors will provide legitimacy and credibility to the entrepreneurial company which may further increase the attractiveness for potential investors. Second, I find that VC ownership has a high positive impact on capital investment decisions from equity investors and I again find that this positive effect is stronger when VC investors repeatedly

invest in their portfolio companies. I argue that VC ownership is typically associated with the development of an equity-oriented governance system which is particularly protective and beneficial for equity investors. Third, though I expected to see or a positive or a negative impact, I find that VC ownership or repeated VC finance has no effect on finance decisions from financial debt investors. I hence argue that for financial debt investors, the positive effect associated with a reduction in agency cost will be offset by the negative effect associated with the development of an equity-oriented corporate governance mechanism. However, I find that debt finance is equally important for companies that raise VC finance which is an interesting finding as these companies are typically less associated with debt finance in the entrepreneurial literature. These effects are further meaningful, indicating that VC ownership as such has an important influence on entrepreneurial finance decisions. Hence, I add with this study to the certifying and value-adding role which is typically associated with VC ownership.

This research has some potential limitations that offer fruitful avenues for future research. First, I test for the role of VC ownership in relatively well-developed European capital markets. It would be interesting to test for this role in other markets as well. For example, it remains unclear whether this effect is equally strong in less developed markets (for example Argentina or Mexico) which tend to have other financing policies (Lerner and Schoar, 2005) or in countries with different corporate governance systems (for example the keiretsu system in Japan). Second, the effect of VC ownership is measured by a VC dummy variable which limits the level of detail which is included in the analysis to the mere presence of a VC investor. However, not all VC investors are equal. Dimov and Shepherd (2005) for example show that VC heterogeneity may both affect portfolio companies' success or failure; hence VC investors with different characteristics may result into different effects of VC ownership on entrepreneurial finance decisions. Likewise, not all non VC companies are equal. Non VC companies may have unsuccessfully applied for VC finance or may be controlled by other large, non VC block holders; it would be interesting to separate those companies from those which have never searched for VC finance or those which have a largely dispersed ownership structure in a robustness test. Third, it would be interesting to study the effect of VC ownership on different *types* of financiers (e.g. strategic partners, institutional investors, private individuals, banks,...). Whether the investors who actually invested in the company were connected with the VC investor before the investment or not remains an open question

and an interesting avenue for further research. Moreover, this would shed some light on the interesting question whether VC investors bring in pure financiers or strategic investors.

Despite these interesting avenues for further research, this paper shows that VC ownership has a significant effect on entrepreneurial finance decisions. The implications of these results are important. First, from an academic perspective, I extend the governance role of VC investors, and more specifically the value-adding and certifying role by showing that there is an important effect of VC ownership on entrepreneurial finance decisions. Prior research often neglected or underestimated this effect as it focused more on the securities that are used by the VC investor himself. Further, I provide evidence that the overall effect of VC finance is different depending on whether VC investors commit to further financing or not. Researchers so far often neglect the fact that much of the certification value of VC ownership is associated with additional or repeated VC finance. Second, from a practitioner's point of view, entrepreneurs should be aware that VC ownership has important consequences for their corporate governance structure. Specifically, VC companies develop a governance structure which is more protective and beneficial and hence more attractive for equity investors. Entrepreneurs that are reluctant to give up large equity stakes, should take this effect into account when applying for VC finance. However, we also hint that VC finance and repeated VC finance in particular may alter entrepreneurial finance less expensive. It is hence important that entrepreneurs who are keen to attract VC finance, try to attract VC investors who are able to invest in follow-up financing rounds. Policy-makers should also be aware of the impact of these effects when they promote public VC investment programs that aim to bridge the finance gap for young, innovative companies. I show that an increase in the supply of VC finance through the foundation of a government VC fund will have positive spill-over effects that will further increase the supply of entrepreneurial finance.

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Chapter 3

Institutional Frameworks, Venture Capital and the Financing of European Entrepreneurial Companies⁵

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Abstract

Using a unique longitudinal dataset comprising 6,813 entrepreneurial companies from six European countries, we first study how cross-country differences in legal quality and personal bankruptcy laws affect the financing of entrepreneurial companies. Second, we study how venture capital (VC) investors, as expert monitors and initiators of good governance practices in their portfolio companies, moderate abovementioned relationships. We find that higher quality legal systems increase the use of entrepreneurial finance. Less forgiving personal bankruptcy laws decrease the use of entrepreneurial finance. More importantly, VC ownership strengthens the abovementioned relationships. This paper provides new evidence on the link between national legal systems and the financing of entrepreneurial companies. More specifically, this paper shows that the financing of entrepreneurial companies is the outcome of both national institutional frameworks and company-level corporate governance.

Keywords: Corporate Governance, Entrepreneurial Finance, Legal Quality, Personal Bankruptcy Laws, Venture Capital

3.1 Introduction

A rich literature shows how the institutional framework of the country in which companies are incorporated impacts their financing. Seminal work on law and finance, for instance, has shown that countries with higher quality legal systems have larger and more developed equity and debt markets (Armour and Cumming, 2006; Djankov et al., 2007; Groh et al., 2010; La Porta et al., 1997). Higher quality legal systems increase the supply of finance towards

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companies because they decrease the costs of investors to monitor entrepreneurs and curb the scope for entrepreneurs to maximize private benefits (Cumming et al., 2010). A largely separate stream of research has focused on how company-level corporate governance systems relate to companies' finance strategies. Agency theorists in particular have, for example, focused on the role of large (and often public) shareholders as governance factors that may reduce agency problems (Brush et al., 2000; Demsetz and Lehn, 1985; Shleifer and Vishny, 1986), which influence companies' finance strategies (Jensen and Meckling, 1976).

More recently, multiple scholars have called for an integration of the above research streams because country-level institutional frameworks and company-level corporate governance mechanisms may operate as interdependent systems in controlling agency problems (Aguilera et al., 2008; Strange et al., 2009). Several recent studies on Initial Public Offerings (IPOs) have indeed demonstrated that the effectiveness of corporate governance systems at the company level is likely to differ significantly from country to country (Bruton et al., 2010; Chahine and Saade, 2011).

Most studies investigating the role of country-level institutional frameworks or corporate governance systems on companies' finance strategies focus on public companies. Nevertheless, it is generally acknowledged that entrepreneurial companies contribute significantly to the development of our modern knowledge-based economies in terms of exports, employment, innovations and the like (e.g., Colombo and Grilli, 2005; Knockaert et al., 2011; Storey and Tether, 1998). Due to high information asymmetries and agency problems, these companies face considerable difficulties in raising sufficient finance (Berger and Udell, 1998). It is hence surprising that to date, scholars have primarily focused on the independent effects of either country-level institutional frameworks or company-level corporate governance systems as mechanisms which may ease information asymmetry and agency problems and as such facilitate access to finance for entrepreneurial companies. The goal of the present paper is to integrate a country-level institutional perspective and a company-level agency perspective to explain finance strategies in entrepreneurial companies. More specifically, we ask the following research questions: (a) how do cross-country differences in legal quality and personal bankruptcy laws influence finance strategies of entrepreneurial companies and (b) how does venture capital (VC) ownership as a mitigating factor of agency risk influence these relationships?

We focus on VC ownership as an important company-level governance mechanism in entrepreneurial companies because VC investors are frequently described as initiators of good governance mechanisms in their portfolio companies (Bottazzi et al., 2008; Knockaert et al. 2006; Lerner, 1995; Sapienza et al., 1996; Van den Berghe and Levrau, 2002). They are typically more actively involved than non-management shareholders in public companies, including institutional shareholders (Wright and Robbie, 1998), thereby actively monitoring entrepreneurs and decreasing agency risks (Gompers, 1995). Furthermore, VC investors are often one of the most important shareholders in entrepreneurial companies, ranked second behind entrepreneurs themselves (George et al., 2005).

To address the research questions, we take advantage of a unique longitudinal database comprising a sample of 6,813 entrepreneurial companies from six European countries (Belgium, Finland, France, Italy, Spain and U.K.), of which 606 companies have VC investors as shareholders. While the countries in our sample are geographically close to each other, they are characterized by significant differences in institutional frameworks (Bruton et al., 2010). Furthermore, focusing on a more homogenous sample of developed European countries helps to minimize unobserved heterogeneity among countries (Armour and Cumming, 2006).

The contributions of our study are two-fold. First, this paper expands on previous research that studied how cross-country differences in legal systems influence the finance strategies of companies. Prior work has largely focused on the relationship between creditor or shareholder rights and finance decisions in public companies (e.g., Acharya et al., 2011; Roberts and Sufi, 2009; Seifert and Gonenc, 2012). This is unfortunate because the vast majority of companies never reach the stage where they become public (Berger and Udell, 1998) and extant research has shown how finance decisions are very different in public versus private companies (Brav, 2009). Moreover, given our focus on private entrepreneurial companies, we focus on an important but often overlooked aspect of law, namely *personal* bankruptcy laws, and study their impact on the financing of entrepreneurial companies. Although these laws have been argued to be particularly relevant for influencing entrepreneurial activity (Armour and Cumming, 2008), we know little about their role in entrepreneurial companies' finance decisions. While Armour and Cumming (2006) show that more forgiving bankruptcy laws stimulate the development of VC markets at the country level, they also call for more research that captures the company-level effects of these laws. We contribute to this call with the current study and show how personal bankruptcy laws influence the finance strategies of

entrepreneurial companies. Finally, previous research has studied how differences in the quality of legal systems affect the finance behavior of VC investors (Cumming et al., 2010; Bottazzi et al., 2009, Lerner and Schoar, 2005). For this purpose, prior research has exclusively focused on VC companies and the finance provided by VC investors, which raises important selection problems (Cosh et al., 2009; Cumming et al., 2010). We address this shortcoming in the literature by studying the role of the quality of legal systems on the finance strategies of both VC and non VC companies.

A second major contribution of the present research is its contribution to a further integration of institutional theory and agency theory (Filatotchev and Boyd, 2009). On the one hand, studies drawing on institutional theory focus on those institutions which shape “the rules of the game in a society” (North, 1990, p. 3) but largely ignore the impact of company-level corporate governance systems. In these studies, entrepreneurs are more or less passive, and may be advantaged or disadvantaged based on the country from which they operate. On the other hand, studies drawing on agency theory focus on how corporate governance mechanisms at the company level affect company development but typically ignore the impact of different institutional frameworks. In these studies, entrepreneurs are often assumed to operate within an institutional vacuum. Multiple scholars have called for an integration of both perspectives, because our understanding of the effectiveness of governance systems would benefit from viewing these systems as operating as a bundle of interdependent systems (Aguilera et al., 2008; Filatotchev and Boyd, 2009). Nevertheless, our understanding of the nature of these interdependencies is limited. This study is one of the first that provides large sample evidence of the combined effect of national legal systems and company-level governance factors, such as VC ownership, on the financing of entrepreneurial companies. We argue and show that the finance strategy of entrepreneurial companies is the complex outcome of both national legal systems and company-level corporate governance factors.

The rest of this article is organized as follows. In the following section, we provide the theoretical background of this paper. Then, we develop specific hypotheses. Thereafter, we discuss the method, including the sample, variables and econometric approach used. Next, we present the main research findings. Finally, we conclude by discussing our results from both a theoretical and practical perspective.

3.2. Theoretical Background

Much of corporate governance research is concerned with the mechanisms that mitigate agency problems (Jensen and Meckling, 1976). When entrepreneurial companies raise equity finance, two related types of agency problems may emerge (Gompers, 1995). First, entrepreneurs may invest in projects that have high personal returns but low expected monetary payoffs to shareholders. When entrepreneurs have raised equity finance, they still receive all of the benefits related to the consumption of perquisites but no longer bear all of the costs. Second, entrepreneurs who possess private information may choose to continue investing in value destroying projects. Entrepreneurs, for instance, may want to undertake inefficient continuation of their companies because they provide them significant private benefits including independence. Additional agency problems may emerge when companies raise debt finance (Myers, 1977). For instance, entrepreneurs may sell assets to pay themselves dividends thereby leaving less value to debtors in case of bankruptcy; they may take excessive risks of which the costs are primarily borne by debtors; or they may reject value creating projects in which the proceeds would accrue primarily to debtors. Not surprisingly, such agency problems make the financing of entrepreneurial companies a process fraught with difficulties (Cassar, 2004; Heyman et al., 2008; Gompers, 1995).

To date, two largely separate streams of work have focused on the factors which may mitigate agency problems when entrepreneurial companies raise finance. First, since the seminal work by La Porta et al. (1997), a significant body of research has argued and shown that national laws affect the costs and benefits of investors related to monitoring entrepreneurs and as such influence the supply of sources of finance. Specifically, the costs associated with monitoring entrepreneurs is lower in higher quality legal systems, which reduces the scope for entrepreneurs to maximize private benefits (Cumming et al., 2010). This explains why both equity (including VC) markets and debt markets are larger and more developed in countries with higher quality legal systems (Armour and Cumming, 2006; Djankov et al., 2007; Groh et al., 2010; La Porta et al., 1997) thereby increasing the supply of debt and equity finance.

Second, agency theorists have long considered the monitoring role of large shareholders as a governance mechanism that may reduce specific agency problems (Brush et al., 2000; Demsetz and Lehn, 1985; Shleifer and Vishny, 1986). In entrepreneurial companies, VC investors are often one of the most important owners next to entrepreneurs themselves (George et al., 2005). Unlike other institutional investors, such as pension funds, insurance

companies and banks, VC investors are more active and act more like reference shareholders (Van den Berghe and Levrau, 2002). VC investors engage in extensive monitoring of their portfolio companies through shareholders agreements, differentiated shareholders rights, board membership and intense relationships with management. Besides monitoring, VC investors also provide value adding services, including the professionalization of their portfolio companies (Hellmann and Puri, 2002; Sapienza et al., 1996). Finally, VC investors may signal company quality to other prospective investors, thereby making these investors more likely to contribute finance (Janney and Folta, 2003).

Despite the value of these two separate streams of research, scholars increasingly argue that the effectiveness of corporate governance mechanisms, including block ownership by VC investors, differs significantly from country to country (Bruton et al., 2010; Chahine and Saade, 2012; Dharwadkar et al., 2000; Douma et al., 2006; Hoskisson et al., 2004). However, to date, we have only limited knowledge on how country-level and company-level corporate governance systems operate together and influence the finance strategies of entrepreneurial companies. Indeed, ambiguous results in the corporate governance literature (e.g., Dalton et al., 2003) have often been attributed to the lack of attention towards multiple governance mechanisms which may interact with each other (Aguilera et al., 2008). Hence, Filatotchev and Boyd (2009) state that “although the vast majority of previous corporate governance studies are predominantly focused on organizational aspects in a single-country setting, future research should also focus on national systems or corporate governance and their interactions with company-level governance factors” (p. 263).

A major question is whether national and company-level systems act as substitutes or complements. In a substitution framework, national governance mechanisms and company-level corporate governance mechanisms may substitute for one another (Dalton et al., 2003). Klapper and Love (2004), for instance, show that companies can (partially) compensate for ineffective laws and enforcement at the country level by establishing good corporate governance at the company level. In contrast, others suggest that country-level and company-level governance mechanisms operate in a complementary manner (Aguilera et al., 2008). Specifically, higher quality national laws and company-level corporate governance mechanisms may mutually enhance each other such that their combined presence increases their effectiveness. Chahine and Saade (2012), for instance, confirm the existence of a complementary relationship between the level of shareholder protection at the country level and board independence at the company level in reducing IPO underpricing.

In what follows, we first develop hypotheses on the relationship between country-level institutional systems, focusing on the quality of a country's legal system and on personal bankruptcy laws, and the finance strategies of entrepreneurial companies. Next, we discuss how VC investors may moderate abovementioned relationships.

3.3 Hypotheses

3.3.1 National Legal Systems and the Financing of Entrepreneurial Companies

As higher quality legal systems allow for more transparency and possibilities to enforce contracts and thereby reduce the agency costs for investors associated with investing in companies, higher quality legal systems lead to larger and more developed equity and debt markets (La Porta et al., 1997). Much research in the law and finance tradition, however, has focused on the development of public equity and debt markets which are only accessible for large and mature companies (e.g., La Porta et al., 1997), and thereby ignoring those financial markets which are accessible for entrepreneurial companies, such as the VC market.

Recently, Groh et al. (2010) showed that VC and private equity investment activity is positively related to a country's investor protection in Europe. Higher quality legal systems may also be relevant for private debt investors. Djankov et al. (2007) investigate cross-country determinants of private credit, using data on private and public credit registries. Their results suggest that both creditor protection through the legal system and information-sharing institutions are associated with higher ratios of private credit to gross domestic product. Higher quality legal frameworks and corporate governance at the country level are hence expected to increase the *supply* of finance, including equity and debt, to entrepreneurial companies.

Higher quality legal systems are not only likely to increase the supply of finance, but may also stimulate the *demand* for finance. First, private equity transactions in countries with higher quality legal systems have higher valuations (Lerner and Schoar, 2005). This implies that for a given investment, entrepreneurs can retain a larger equity stake, which is important because this determines their future financial return and their control over the company. Hence, VC will be more attractive for entrepreneurs operating in countries with higher quality legal systems and higher ensuing valuations. Second, the search costs for entrepreneurs are lower in countries with higher quality legal systems, as investors are likely to provide finance more quickly (Cumming et al., 2010). Many entrepreneurial companies require significant amounts of finance to fund their founding and subsequent development (Cosh et al., 2009;

Robb and Robinson, 2012; Vanacker and Manigart, 2010). The lower cost of finance combined with an increased supply of finance in countries with higher quality legal systems may stimulate entrepreneurs to demand more finance. Therefore,

H1: Higher quality legal systems will be associated with the use of more finance (including equity and debt) in entrepreneurial companies.

Prior academic research has related entrepreneurship to personal bankruptcy laws (Armour and Cumming, 2008). Personal bankruptcy laws are widely regarded as having a direct influence on entrepreneurs even when entrepreneurs are seeking to incorporate their companies as limited liability companies. First, prior to incorporation entrepreneurs typically use their own sources of finance first before raising finance (Berger and Udell, 1998). Second, creditors frequently demand personal guarantees from entrepreneurs, which is tantamount to “contracting out” the liability shield incorporation provides to entrepreneurs (Armour and Cumming, 2008). Hence, national personal bankruptcy laws significantly influence the strategies of entrepreneurs. Countries with more forgiving personal bankruptcy laws, reflected in the ability of bankrupt entrepreneurs to obtain a fresh start (i.e., a discharge from pre-bankruptcy indebtedness) have larger VC markets (Armour and Cumming, 2008). Aggregate data on the development of VC markets as a whole, however, do not capture the details of how individual entrepreneurs adjust their finance strategies in response to different bankruptcy laws. Two opposing forces might be at work. On the one hand, investors may be more willing to provide finance to entrepreneurial companies when bankruptcy laws are less forgiving, as these enable investors to recuperate a larger fraction of their investment. On the other hand, entrepreneurs may limit their demand for finance as a result of less forgiving bankruptcy laws because these laws increase entrepreneurs’ personal risk when their companies go bankrupt.

We argue that demand-side arguments dominate, as there is significant evidence that entrepreneurs have a strong influence on the financing policies of their companies. Eckhardt et al. (2006), for instance, show how investors can only invest in those companies where entrepreneurs are willing to raise finance. Many entrepreneurs are reluctant to raise finance because investors may limit the independence of entrepreneurs or may even push their companies into bankruptcy under certain conditions (Manigart and Struyf, 1997; Sapienza et al., 2003). For instance, although banks do not intervene in the day-to-day operations and strategic planning of companies, when companies are unable to fulfill fixed debt-related

payments (i.e., interest and principle amount) banks can push companies into bankruptcy (Balcaen et al., 2013). Equity investors such as VC investors limit the independence of entrepreneurs through their active involvement, although they may also help entrepreneurs to realize more than what would be possible when they go it alone. Further, shareholders have a portfolio perspective and may decide to de-commit themselves from a portfolio company when other investments in their portfolio are expected to create more value. This may lead to bankruptcy (Cumming and Dai, 2012; Dimov and De Clercq, 2006), even if the focal company would still be viable for the entrepreneur. The above is especially problematic for entrepreneurs operating in countries with less forgiving bankruptcy laws. For example, while in some countries entrepreneurs are discharged from their company's liabilities after bankruptcy, in other countries they may be held personally liable for all remaining liabilities for a number of years or even indefinitely (Armour and Cumming, 2008). The fact that personal discharge is not available strongly increases the personal risk of entrepreneurs and limits them to obtain a fresh start and become independent entrepreneurs in the future after having experienced a bankruptcy. Hence, entrepreneurs will be less likely to seek equity or debt finance for their entrepreneurial companies in countries with less forgiving bankruptcy laws.

Overall, although investors may be more willing to provide finance to entrepreneurial companies when bankruptcy laws are less forgiving, we expect that entrepreneurial motives will dominate. Specifically, entrepreneurs operating in countries with less forgiving bankruptcy laws will be less likely to seek sources of finance. Thus,

H2: Less forgiving bankruptcy laws will be associated with the use of less finance (including equity and debt) in entrepreneurial companies.

3.3.2 Venture Capital and the Relationship between National Legal Systems and the Financing of Entrepreneurial Companies

We argued that higher quality and more forgiving legal systems will be associated with the use of more finance. So far, however, we have ignored how company-level governance systems may influence the relationship between national legal systems and the use of finance. One particular company-level corporate governance system on which we focus in this study is VC ownership. VC investors play a particularly important role in entrepreneurial companies not only because they are expert monitors, but also because they influence the governance systems in their portfolio companies (Gompers, 1995; Sapienza et al., 1996; Van den Berghe

and Levrau, 2002). VC investors are, for example, instrumental in expanding the management teams of their portfolio companies with key employees (Jain and Kini, 1999), replace them with more professional managers (Hellmann, 1998; Gorman and Sahlman, 1989; Sahlman, 1990) and install more independent directors (Williams et al., 2006; Suchard, 2009) that reduce the agency risks related to entrepreneurs' opportunism (Hellmann, 1998). We hence argue that VC ownership will influence the relationship between the quality of national legal systems and the use of finance in a number of ways.

Several arguments may be advanced to suggest that VC ownership substitutes for the quality of legal systems at the country level. First, VC investors are known to write extensive contracts which govern the relationship between entrepreneurs and shareholders (Kaplan and Strömberg, 2004). These contracts can cover gaps in national legal frameworks (Abdi and Aulakh, 2012) as VC investors often have the flexibility to adopt or decline specific provisions which affect the level of legal protection (Chahine and Saade, 2011; Klapper and Love, 2004). Specifically, the capacity of contracting to establish the obligations (typically of entrepreneurs) and privileges (typically of VC investors) in different aspects of the investment relationship can remedy for the absence of high quality national laws. Consequently, VC companies in countries with weak investor protection may still be able to raise significant amounts of finance despite weak governance frameworks at the country level.

Second, termination rights and contractual hostages are two mechanisms which may further reduce the dependence on national legal frameworks (Abdi and Aulakh, 2012). Termination rights entail that VC investors can unilaterally decide to stop providing further (financial) support to their portfolio companies. VC investors typically do not provide all finance at once, but rather engage in staged finance, which allows them to limit their losses when specific portfolio companies do not perform according to expectations (Gompers, 1995). When inside VC investors decide not to provide additional finance this often has far reaching consequences, as investors will interpret this as a negative signal of company quality, thereby limiting a company's ability to raise additional finance from new finance sources. Contractual hostages entail that VC investors are often endowed with rights to block particular decisions. Such hostages further relieve the dependence on legal frameworks, since opportunistic behavior can be blocked directly with limited reliance on national legal systems (Abdi and Aulakh, 2012). Thus,

H3A: VC ownership will decrease the positive relationship between higher quality legal systems and the use of more finance in entrepreneurial companies (substitutive relationship).

A different stream of reasoning challenges the above claims and argues for a complementary relationship between the quality of national legal systems and VC ownership. Inadequacies in the legal enforcement of contracts entail that contractual provisions have a restricted capacity to cover for gaps in national legal systems (Abdi and Aulakh, 2012). Contractual governance used by investors to reduce agency problems is hence only valuable when investors have access to an effective national legal system. Another reason why contractual provisions may be insufficient to cover for gaps in legal systems is the incomplete nature of contracts themselves. Specifically, under high uncertainty, the parties involved in a contract are not able to include all contingencies (Hart, 1995). This explains why the quality of national legal systems is expected to remain important even when investors are able to write extensive contracts. The above entails that VC investors may be more effective in reducing agency problems through contractual monitoring when they operate in countries with high quality legal systems, which should benefit the likelihood that they will provide additional financial support towards their portfolio companies in these countries. The additional financial resources provided by VC investors may furthermore provide a positive signal to other prospective investors thereby increasing their likelihood of contributing new financial resources as well (Janney and Folta, 2003). This leads to the following alternative hypothesis:

H3B: VC ownership will increase the positive relationship between higher quality legal systems and the use of more finance in entrepreneurial companies (complementary relationship).

We previously argued that less forgiving bankruptcy laws will be associated with the use of less finance in entrepreneurial companies. VC investors, however, are expected to influence the relationship between personal bankruptcy laws and the use of finance. Specifically, when VC investors are present, we expect that entrepreneurial companies will use even less finance in countries with less forgiving bankruptcy laws. Entrepreneurs typically invest a significant part of their personal wealth in their own companies (Berger and Udell, 1998). Consequently, the wealth of entrepreneurs is often linked to the outcome of one particular company. Entrepreneurs will hence avoid their companies going bankrupt with all means possible and may even prefer their companies to continue although this is inefficient from an economic

point of view. For VC investors, however, a specific entrepreneurial company is only one of their investment projects. VC investors are hence less affected when one of their portfolio companies goes bankrupt. Indeed, VC investors typically get most of their returns from only one or a few successful exits from their larger portfolio in which most investments eventually turn out to be outright failures (Sahlman, 1990). When companies raise additional finance from an increasingly broader pool of equity investors, this may decrease the commitment by any investor, thereby increasing the risk of bankruptcy (Dimov and De Clercq, 2006).

As VC investors are less concerned with the failure of one specific portfolio company, entrepreneurs who raised VC finance in the past might become extremely wary to raise additional finance. For these companies, raising additional equity finance typically implies increasing the size of the VC syndicate and hence reducing VC investors' commitment, thereby increasing the risk of bankruptcy (Dimov and De Clercq, 2006). This is especially detrimental for entrepreneurs in a context where entrepreneurs are confronted with less forgiving personal bankruptcy laws. Moreover, all else equal, the more finance is raised from investors, the higher will be their power to push companies towards bankruptcy when (financial) problems emerge. While VC investors, for instance, are known to support their portfolio companies, it is also well-established that they eventually focus most of their attention towards those companies with the highest prospects and de-commit from portfolio companies with poor prospects (Puri and Zarutskie, 2012). This may make entrepreneurs who previously raised VC finance particularly wary to raise additional finance in countries with less forgiving bankruptcy laws. Thus,

H4: VC ownership will increase the negative relationship between less forgiving bankruptcy laws and the use of less finance in entrepreneurial companies.

3.4 Method

3.4.1 Sample and Data Sources

In order to test the hypotheses, a unique, hand-collected longitudinal dataset of 6,813 entrepreneurial companies from six European countries (Belgium, Finland, France, Italy, Spain and the U.K.) is used⁶. In order to increase the representativeness of the data for the full population of entrepreneurial companies in these countries, a stratified selection method was

⁶ Data were gathered through the European VICO project, which is described in detail by Bertoni and Pellón (2011). Germany is excluded from our study because almost no relevant accounting data, needed for the purpose of this study, is available on German companies.

used. The population was therefore first divided into seven different strata, each representing a different country. Moreover, stratification weights were applied to restore the different sizes of the VC industry across the countries.

Entrepreneurial companies that received VC finance were identified from several public data sources including press clippings, VC websites, commercial databases (VentureXpert, Zephyr, country-specific databases). VC companies were included if they satisfied four criteria at the time of their initial VC investment. First, the initial VC investment occurred between 1994 and 2004. Initial VC investments were divided between the pre-bubble, the bubble and the post-bubble investment period as VC investment strategies have proven to be significantly different in each period (Gompers and Lerner, 2001) and to mitigate as such potential biases due to the selection of VC companies in only one single investment period. Second, at the time of the initial VC investment all companies were maximum ten years old. This ensures we study young companies that raised VC finance, rather than mature companies that raised buy-out finance or other types of private equity finance. Third, companies were active in high-tech industries which were identified from the NACE Rev2 classification system. The NACE Rev2 sectors were reclassified into more aggregate sectors following the transformation guidelines provided by the European Venture Capital and Private Equity Association (EVCA): Life Sciences (Biotech and Pharmaceutical), Communication (Telecom), ICT (ICT Manufacturing), Internet Related (Internet and Web Publishing), Software and Other (including Aerospace, Energy, Nanotech, Other R&D and Robotics). Fourth, companies were independent at first investment, which implies they were not controlled (< 50 percent) by a third party.

After the identification of the entrepreneurial companies that raised VC finance, a control group was randomly selected from the population of entrepreneurial companies that did not receive VC funding, using similar criteria with respect to country of origin, founding period (age), high-tech industries and independence as described above. It was carefully checked whether companies in the control group had never received VC finance in any form. The population of entrepreneurial companies was further derived from the country-specific economy-wide databases or Amadeus (Bureau van Dijk). For each company with VC finance, ten non VC companies without VC finance were selected. Survey statistics⁷ on the factual use

⁷ Since 2008, the European Commission and the European Central Bank conduct every two year a comprehensive survey to assess the supply and use of external sources of finance for SMEs. The outcomes of these surveys provide a good reflection of the different sources of finance used by the 9,000 (2009 survey) or

of different sources of finance by small- and median enterprises (SMEs) indicate that this ratio will closely reflect the importance of VC finance for young, high tech entrepreneurial companies in the countries we study. The 2011 survey report for example, indicates that 8 percent of the innovative SMEs use external equity finance, for ‘gazelles’ this increases to 12 percent. An additional two percent used ‘mezzanine’ financing (i.e. subordinated loans, participation loans or similar financing instruments). The sum of these percentages, between 10 and 14 percent, will be a good indicator for the importance of VC finance. For the ‘average’ SME however, the same percentages are significantly lower. In short, for the companies and countries we study, a 1:10 ratio between the number of VC and non VC companies is expected to be representative.

For each company, yearly financial statement and employment data was collected through the Amadeus database or an equivalent country specific database from the year the companies entered the database until 2007 or until the companies disappeared (either through bankruptcy or through acquisition). This procedure entails that we limit survival bias because our database also includes companies which eventually fail. Further, yearly non-financial data such as the number of patent applications (Patstat database) or important events that occurred during the period of analysis such as Initial Public Offerings and Mergers and Acquisitions were registered. As our study focuses on the financing strategies of private companies, 297 company-year observations were excluded for reason that the entrepreneurial companies transformed from private into public companies which is likely to have a significant impact on finance strategies (Brav, 2009). Pre-IPO years, however, were kept in the database. Finally, 398 company-year observations were excluded because of missing data. This results in a final, longitudinal sample of 6,813 entrepreneurial companies of which 606 raised VC finance.

15,000 (2011 survey) respondents. The results of these studies further allow to draw separate conclusions for a subpopulation of young, fast growing SMEs which are the main focus of this dissertation. These reports can be downloaded at: http://ec.europa.eu/enterprise/policies/finance/data/index_en.htm

Table 3.1: Description of the sample

	Total Sample		VC companies		Non VC companies	
	Number	%	Number	%	Number	%
Country						
Finland	757	11.11	69	11.39	688	11.08
Spain	876	12.86	81	13.37	795	12.81
Belgium	913	13.40	90	14.85	823	13.26
Italy	1,055	15.49	97	16.01	958	15.43
UK	1,534	22.52	169	27.89	1,365	21.99
France	1,678	24.63	100	16.50	1,578	25.42
Period of incorporation						
1984-1989	983	14.43	21	3.47	962	15.50
1990-1994	1,204	17.67	89	14.69	1,115	17.96
1995-1999	2,136	31.35	249	41.09	1,887	30.40
2000-2004	2,490	36.55	247	40.76	2,243	36.14
Industry						
Other	815	11.96	40	6.60	775	12.49
Communication	349	5.12	38	6.27	311	5.01
Life Sciences	631	9.26	102	16.83	529	8.52
Internet Related	801	11.76	117	19.31	684	11.02
ICT	1,137	16.69	102	16.83	1,035	16.67
Software	3,080	45.21	207	34.16	2,873	46.29
Total	6,813	100.00	606	100.00	6,207	100.00

Table 3.1 provides a description of the sample by breaking down the number of company by country, period of incorporation and sector. Nearly 25 percent of the companies in the sample are French, closely followed by the U.K. (23 percent). Italian companies represent 15 percent of the sample, Belgian and Spanish companies each 13 percent and Finnish companies 11 percent. Nearly 37 percent of all companies were founded between 2000 and 2004, 31 percent between 1995 and 1999, 18 percent between 1990 and 1994 and 14 percent between 1984 and 1989. Most companies operate in the software industry (45 percent), followed by ICT (17 percent), internet (12 percent), life sciences (9 percent) and communication (5 percent). The other industries represent the remaining 12 percent. Obviously, VC companies and the random sample of non VC companies will not perfectly match with each other since entrepreneurs select their companies as candidates for receiving VC finance and VC investors select companies in which they want to invest based on observable and unobservable company characteristics (Eckhardt et al., 2006). We control for such selection issues in our econometric models (see more details below).

3.4.2 Dependent Variables

The dependent variables of interest in this study include measures of incremental finance events and capital structure. Book values retrieved from balance sheets are used to calculate different measures as market variables are unavailable for private companies (Brav, 2009). Previous research has shown that the use of book values is not a serious limitation when studying finance and capital structure decisions (Fama and French, 2002; Leary and Roberts, 2005).

Following previous research, multiple constructs are selected as dependent variables, reflecting incremental finance decisions and capital structure (Brav, 2009; Cosh et al., 2009). These include raising finance (*Finance Issue*), the amount of finance raised conditional upon raising finance (*Ln Amount of Finance Issued*), the choice between equity versus debt (*Equity/Debt*), the amount of equity raised when equity is raised (*Ln Amount of Equity issued*) and the amount of debt raised when debt is raised (*Ln Amount of Debt issued*). We further model capital structure decisions with the financial debt ratio (*Leverage*) as dependent variable. While the measures reflecting finance events capture more the dynamics of finance strategies at particular points in time, the capital structure of companies provides a snapshot of all previous finance events (de Haan and Hinloopen, 2003).

Finance Issue is a dummy variable that takes the value of one if a company raised finance in a given year T. Raising finance is defined as a minimum five percent increase in the total amount of debt and equity from year T-1 to year T, relative to pre-issue total assets. The minimum threshold of five percent benefits the comparability of our study with prior research and allows us to study significant finance events (Brav, 2009; de Haan and Hinloopen, 2003; Leary and Roberts, 2010; Vanacker and Manigart, 2010). Companies may issue only debt, only equity or both in year T. A second variable, *Equity/Debt*, is a dummy variable equal to one if companies raise equity and zero if companies raise debt, treating equity and debt issues as mutually exclusive finance events (see Helwege and Liang (1996) for a similar approach). The amount of finance raised in any given company-year—including both equity and debt—(*Ln Amount of Finance Issued*), of equity (*Ln Amount of Equity issued*) and of debt (*Ln Amount of Debt issued*) were log-transformed before they were studied. These amounts of finance raised are studied conditional upon raising finance. Hence, non-issuing events are

excluded in these regression models.⁸Our construct for capital structure, *Leverage*, is defined as the ratio of total financial debt on total assets.

3.4.3 Independent Variables

The main explanatory variables in the regression models are constructs that measure country-level differences and company-level differences in corporate governance systems. At the country-level, we include differences in the quality of the legal framework (*Legality Index*) and differences in the severity of personal bankruptcy law reflected by the ability of entrepreneurs to obtain a fresh start after bankruptcy (*Discharge Not Available*). The values of these variables for each country are reported in Table 3.2 (see further). At the company-level, we include the effectiveness of corporate governance reflected by VC ownership (*VC*).

Legality Index. *Legality Index* is a measure for the quality of the legal framework in each country. We use the legality index developed by Berkowitz et al. (2003), which is the weighted sum of legal measures derived from La Porta et al. (1997, 2000), for several reasons. First, because it is a weighted average of five important aspects of legal rule *enforcement*. Rather than studying whether different countries have different rules which might explain differences in their financing patterns, we studied how well these rules are enforced in different countries and what effect these differences in enforcement have. Given the countries that we study, there is only limited variation in legal origin. Hence, there will be not much variation in the nature of laws that protect e.g. shareholders and creditors between these countries. However, variation in the level of enforcement of these laws is expected to be much higher as some countries may lack effective legal institutions to enforce these laws or may be plagued by corruption (Pistor et al., 2000). In particular, the underlying constructs of the Legality Index measure the investor's assessment of the efficiency and integrity of the legal environment and four other aspects of law enforcement (assessed by an independent agency). All these elements vary substantially over the countries which are studied. Second, next to the fact that the underlying variables are directly related to contract enforcement by investors rather than whether investors are protected or not, previous research (Cumming et al., 2005; 2010, Bottazzi et al., 2009) has indicated that the Legality index determines how entrepreneurs are compensated and how costly it is for an investor to monitor the entrepreneur. Hence, we expect that the legality index will also be an important determinant of entrepreneurial finance decisions. Third, the different measures of law enforcement are also

⁸ Tobit models including the non-issuing events (in which case the amount is set equal to zero) report similar results.

highly correlated. Hence it is impossible to simultaneously include all these variables in the same regression model. To avoid this limitation, Berkowitz et al. (2003) constructed a weighted average of these indices and referred to it as the Legality Index which allows us to appropriately measure variation in the degree of law enforcement in several dimensions at the same time.

Discharge Not Available. The variable used to measure cross-country differences in personal bankruptcy law, i.e. whether entrepreneurs are able or unable to obtain a fresh start after bankruptcy, is based upon Armour and Cumming (2008) but extended to cover the period of study. The variable *Discharge Not Available* is a dummy variable that indicates whether there is a discharge from personal indebtedness for entrepreneurs after a bankruptcy or not. The dummy variable takes the value one if there is no discharge available for entrepreneurs and thus no opportunity to obtain a fresh start and takes the value zero if bankruptcy law foresees a discharge. Bankruptcy law was relaxed and a fresh start was introduced during the period of analysis in Belgium (1998), Finland (1993) and Italy (2006), so the *Discharge Not Available* dummy variable shifts from one to zero in the year in which the reform took place.

VC. Prior research indicates that the mere presence of VC investors as shareholders influences the operations and governance of companies (e.g., Hellmann and Puri, 2002; Puri and Zarutskie, 2012). The variable *VC* is a dummy variable that captures VC ownership and is hence a construct that measures company-level differences in corporate governance systems. *VC* is equal to one from the year in which the company receives VC finance (if any), and zero otherwise. In addition, we calculate interaction terms between the *VC* dummy variable and the country-level variables described above.

3.4.4 Control Variables

Control variables are used in the multivariate analyses, which are largely motivated by prior research. They can be aggregated in different categories.

Company Accounting Variables.

Extant corporate finance literature (Leary and Roberts, 2005, 2010; Brav, 2009, Fama and French, 2002) has shown that company-level accounting variables are important determinants of finance decisions. The amount of internal resources available is defined as the beginning year's cash level plus the net operating cash flow minus the change in working capital (Leary and Roberts, 2010). Internal resources are further split into deficit funds (*Deficit Funds*) and

surplus funds (*Surplus Funds*) where respectively negative values of internal resources are reported and positive values are set equal to zero (deficit variable) or vice versa (surplus variable) (Leary and Roberts, 2010; Helwege and Liang, 1996). We further control for the size (*Size*) of the company by taking the logarithm of total assets, the amount of operational capital (*Net working capital*) defined as accounts receivable plus inventory minus accounts payable, asset tangibility (*Tangible*), the proportion of short term debt to total debt (*Short Term to Tot Debt*) and the difference between target and actual leverage (scaled to total assets) (*T-A Leverage*). Target leverage is defined as the predicted leverage obtained from a standard OLS leverage regression (Brav, 2009). In our capital structure regression model, we substitute the amount of internal funds by another often used construct for profitability, return on assets (*ROA*) which is defined as EBIT scaled to the average of current and preceding total assets and we control for the amount of capital expenditures (scaled to total assets) (*CAPEX*).

Company Non-Accounting Variables.

The second category of control variables are non-accounting company-level variables. We control for a company's growth in employees (*Employee Growth*) as high-growth companies need more external finance (Gompers, 1995, Mande et al., 2012). We further control for company age (*Log Company Age*) and the cumulative number of patent applications (*# of Patent Applications*) as both company age and innovativeness (captured by the number of patent applications) are indicators of a company's degree of asymmetric information which may affect finance options (Myers, 1984).

Other Control Variables.

Finally, country-level variables control for between-country differences apart from personal bankruptcy law or law enforcement. Differences in economic development (*GDP Growth*) and the development of capital markets (*MSCI* (Morgan Stanley Capital International) index) that might affect entrepreneurial activity (Armour and Cumming, 2008) are included. We further control directly and indirectly for differences in entrepreneurial activity by including the proportion of self-employed as a percentage of total employment (*Self Employment*) and the difference between personal tax rate and corporate tax rate (*Personal minus Corporate*) (Groh et al., 2010). Remaining time-variant effects and industry effects are captured by year dummies and industry dummies.

3.4.5 Econometric Approach

Five regression specifications study entrepreneurial finance decisions. Probit models are used for the estimation of *Finance Issue* and *Equity/Debt* because the dependent variables are dummy variables. Pooled OLS models are used for the estimation of *Ln Amount of Finance Issued*, *Ln Amount of Equity issued* and *Ln Amount of Debt issued*. Capital structure is studied using *Leverage* as dependent variable in a pooled OLS regression model. If the probability of attracting VC is correlated with the residuals of finance decisions or capital structure, the reported results might suffer from a selection bias. In all models we therefore include an Inverse Mills Ratio (obtained from a probit model estimating the probability that companies raise VC finance). The Inverse Mills Ratio corrects for possible selection biases that arise if companies self-select into VC finance or VC investors select particular companies based on observable and unobservable characteristics (Heckman, 1979).

The control variables for the amount of internal funds (*Surplus Funds* and *Deficit Funds*), asset tangibility (*Tangible*), and capital expenditures (*CAPEX*) are scaled by total assets to control for size effects and to mitigate heteroskedasticity (Brav, 2009). Company size (*Size*), company growth (*Employee Growth*), the amount of net working capital (*Net Working Capital*), asset tangibility (*Tangible*), the proportion of short term debt to total debt (*Short Term to Tot Debt*), the difference between target and actual leverage (*T-A Leverage*), return on assets (*ROA*) and capital expenditures (*CAPEX*) are lagged one year to limit potential endogeneity issues. The regressions also include a constant, year and industry fixed effects.

All currency variables are in thousands of euros and corrected for inflation (2008=100). In order to mitigate the impact of potential sample outliers, variables were winsorized at the five percent level (one-tail winsorizing) if needed.

Company-years are the unit of analysis. The coefficients of the regression models are corrected for heteroskedasticity and correlation across observations of a given company by the clustering technique (Petersen, 2009). We report marginal effects to show the economic significance alongside the statistical significance (Cosh et al., 2009).

3.5 Results

3.5.1 Descriptive Statistics and Correlations

Table 3.2 reports descriptive statistics and the correlation matrix. Panel A reports the underlying measures of the Legality Index by country as well as data on the availability of a fresh start. Panel B reports country-level correlations and company-level correlations.

Table 3.2: Descriptive Statistics and Correlations

Panel A: Legality Index and Discharge not Available

	<i>Legality Index</i>	<i>Judiciary System</i>	<i>Rule of Law</i>	<i>Corruption</i>	<i>Expropriation</i>	<i>Contract Repudiation</i>	<i>Discharge not Available</i>
Belgium	20.82	9.50	10.00	8.82	9.63	9.48	1991-1997:1 1998-2007:0
Finland	21.49	10.00	10.00	10.00	9.67	9.15	1991-1992:1 1993-2007:0
France	19.67	8.00	8.98	9.05	9.65	9.19	1991-2007:0
Italy	17.23	6.75	8.33	6.13	9.35	9.17	1991-2005: 1 2006-2007:0
Spain	17.13	6.25	7.80	7.38	9.52	8.40	1991-2005: 1 2006-2007:0
U.K.	20.41	10.00	8.57	9.10	9.71	9.63	1991-2007:0

Panel B: Descriptive Statistics and Correlations

	<i>Mean</i>	<i>S.D.</i>	<i>(1)</i>	<i>(2)</i>	<i>(3)</i>	<i>(4)</i>	<i>(5)</i>	<i>(6)</i>	<i>(7)</i>	<i>(8)</i>	<i>(9)</i>	<i>(10)</i>	<i>(11)</i>	<i>(12)</i>
Country level correlations														
<i>Discharge Not Available* (1)</i>	0.38	0.49	1.00											
<i>Legality Index (2)</i>	19.47	1.70	-0.75	1.00										
<i>GDP Growth (3)</i>	2.50	1.47	-0.06	0.10										
<i>MSCI (4)</i>	0.97	0.49	-0.36	0.06	0.15	1.00								
<i>Self Employment (5)</i>	17.29	6.14	0.79	-0.73	-0.15	-0.32	1.00							
<i>Personal - Corporate Tax (6)</i>	10.60	6.59	-0.18	0.23	-0.24	-0.20	-0.15	1.00						
Company level correlations														
<i>Finance Issue*(7)</i>	0.38	0.49	0.07	-0.10	0.02	0.03	0.08	-0.09	1.00					

	<i>Mean</i>	<i>S.D.</i>	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
<i>Ln Amount of Finance (8)</i>	5.41	2.21	-0.04	-0.01	0.06	0.12	-0.03	-0.05	NA	1.00				
<i>Equity/Debt*(9)</i>	0.43	0.49	-0.02	-0.07	-0.11	-0.02	-0.01	0.04	NA	0.16	1.00			
<i>Ln Amount of Equity (10)</i>	5.49	2.34	-0.15	0.12	0.06	0.16	-0.15	0.03	NA	0.98	NA	1.00		
<i>Ln Amount of Debt (11)</i>	5.17	1.97	0.14	-0.21	0.08	0.09	0.23	-0.19	NA	0.95	NA	0.71	1.00	
<i>Leverage (12)</i>	0.15	0.22	-0.03	0.15	0.10	-0.04	0.00	-0.09	0.37	0.08	-0.48	-0.06	0.30	1.00
<i>VC* (13)</i>	0.07	0.26	-0.01	0.00	0.01	0.01	0.01	-0.03	0.16	0.25	0.17	0.26	0.19	0.04
<i>Surplus Funds (14)</i>	0.27	0.26	-0.13	0.13	0.06	0.02	-0.15	-0.01	-0.38	-0.31	-0.04	-0.29	-0.27	-0.25
<i>Deficit Funds (15)</i>	0.05	0.12	-0.03	0.03	-0.01	0.01	-0.02	0.01	0.45	0.32	0.21	0.29	0.22	0.26
<i>Size (16)</i>	6.25	1.98	0.04	-0.09	-0.02	0.04	0.02	0.00	-0.01	0.80	-0.02	0.80	0.83	0.06
<i>Employee Growth (17)</i>	1.21	0.77	0.03	-0.03	0.01	-0.01	0.00	-0.02	0.13	0.13	0.06	0.16	0.05	0.00
<i>Net Working Capital (18)</i>	0.13	0.31	0.02	-0.03	-0.01	-0.01	0.04	-0.01	-0.01	0.02	-0.02	0.00	0.04	0.03
<i># of Patent Applications(19)</i>	0.40	6.12	-0.03	0.02	-0.01	0.03	-0.03	0.01	0.03	0.13	0.06	0.14	0.17	0.00
<i>Tangible (20)</i>	0.13	0.18	0.15	-0.04	0.10	-0.21	0.09	-0.09	0.03	0.00	-0.06	-0.04	0.06	0.22
<i>Short Term to Tot Debt (21)</i>	0.37	0.42	-0.18	0.09	-0.03	0.13	-0.26	0.12	0.09	0.07	-0.10	0.12	0.05	0.10
<i>Log Company Age (22)</i>	0.81	0.32	-0.06	0.03	0.06	0.08	-0.03	-0.08	-0.21	0.07	-0.20	0.06	0.16	-0.01
<i>T-A Leverage (23)</i>	0.01	0.19	0.01	-0.03	0.00	0.02	-0.01	0.01	-0.09	0.02	-0.02	0.05	0.00	-0.54
<i>ROA (24)</i>	0.04	0.32	0.01	0.00	0.08	0.02	0.05	-0.05	-0.28	-0.24	-0.34	-0.24	-0.16	-0.15
<i>CAPEX (25)</i>	0.06	0.09	0.04	-0.04	-0.04	-0.04	0.04	0.00	0.14	0.11	0.03	0.10	0.09	0.10

Table 3.2 Continued

	(13)	(14)	(15)	(16)	(17)	(18)	(19)	(20)	(21)	(22)	(23)	(24)	(25)
<i>VC* (13)</i>	1.00												
<i>Surplus Funds (14)</i>	-0.09	1.00											
<i>Deficit Funds (15)</i>	0.14	-0.39	1.00										
<i>Size (16)</i>	0.15	-0.19	0.01	1.00									
<i>Employee Growth (17)</i>	0.07	-0.03	0.09	0.07	1.00								
<i>Net Working Capital (18)</i>	-0.01	0.03	0.00	-0.01	0.01	1.00							
<i># of Patent Applications(19)</i>	0.04	-0.04	0.06	0.11	0.01	0.00	1.00						
<i>Tangible (20)</i>	-0.04	-0.13	0.02	0.05	-0.01	0.00	-0.01	1.00					
<i>Short Term to Tot Debt (21)</i>	-0.07	-0.08	0.03	0.18	0.01	0.01	0.02	-0.01	1.00				
<i>Log Company Age (22)</i>	-0.08	0.03	-0.15	0.23	-0.25	0.00	0.01	-0.01	0.06	1.00			
<i>T-A Leverage (23)</i>	0.01	0.08	-0.08	0.03	0.02	-0.02	0.01	-0.06	-0.04	-0.01	1.00		
<i>ROA (24)</i>	-0.29	0.28	-0.40	-0.12	-0.03	0.01	-0.05	-0.07	-0.03	0.13	0.06	1.00	
<i>CAPEX (25)</i>	0.07	-0.09	0.09	0.09	0.21	0.00	0.01	0.22	0.03	0.00	-0.01	-0.07	1.00

The mean value of *Legality Index* in Panel B is 19.47. Panel A indicates that the *Legality Index* for Finland (21.49), Belgium (20.82), U.K. (20.41) and France (19.67) are above the mean value, the index value for Italy (17.23) and Spain (17.13) fall below the mean value. This index is further a weighted average of five measures of different aspects of contract enforcement. More specifically, the *Legality index* = $0.3810 * (\text{Judiciary System}) + 0.5778 * (\text{Rule of Law}) + 0.5031 * (\text{Corruption}) + 0.3468 * (\text{Risk of Expropriation}) + 0.3842 * (\text{Risk of Contract Repudiation})$ (Berkowitz et al., 2003). The measures of the efficiency of the judiciary system, rule of law and corruption show the largest cross-country variation where Finland scores the highest value of ten in all three domains and Italy and Spain receive considerably lower scores compared with other countries. Risk of expropriation and risk of contract repudiation (except for Spain) are more stable across the countries, with most countries receiving a score higher than nine. The range of each of these measures falls between 0 and 10 but the lowest value is still 6.25 (judiciary system in Spain), hence the quality of the legal system in all these countries is from a world-conceiving perspective on average quite high. The mean value of *Discharge Not Available* in Panel B is 0.38, which indicates that in 62 percent of the observations entrepreneurs could obtain a fresh start after bankruptcy. Panel A further indicates into more detail that a fresh start has always been available between 1991 and 2007 in France and the U.K. In the other countries, a fresh start was introduced in 1993 (Finland) or 1998 (Belgium) or more recently in 2006 (Italy and Spain). VC ownership (Panel B) was reported in on average 7 percent of the company-year observations.

Panel B indicates further that companies are on average 5 years old (after taking the antilog of *Log Company Age*), 13 percent of total assets are tangible assets (*Tangible*) and companies report a profit margin (*ROA*) of 4 percent. Entrepreneurial finance (*Finance Issue*) was raised in on average 38 percent of the company-year observations. The average amount of entrepreneurial finance raised for these issuing events is 3.6 million. Equity (on average 4.1 million) accounts for 43 percent of all finance events, debt (on average 2.2 million) accounts for the remaining 57 percent (*Equity/Debt*). The financial debt ratio (*Leverage*) is on average 15 percent.

The Pearson correlation coefficients between on the one hand the quality of the legal system (*Legality Index*) and on the other hand debt finance (*Equity/Debt*), the amount of equity (*Ln Equity Amount*) and financial debt ratios (*Leverage*) are significantly positive ($p < 5\%$). This is consistent with the first hypothesis. The measure of the availability of a fresh start, *Discharge*

not Available, is a dummy variable and hence its correlations should be interpreted with care. Keeping this caveat in mind, correlation coefficients are significantly negative ($p < 5\%$) between no fresh start available (*Discharge not Available*) and the amount of finance (*Ln Amount of Finance Issue*), the amount of equity raised (*Ln Amount of Equity raised*) and financial debt ratios (*Leverage*), which is consistent with the second hypothesis.

Unreported Variance Inflation Factors (VIF) indicate that high correlations between the *Legality Index* variable, the *Discharge Not Available* variable, the VC dummy and their respective interactions may lead to multicollinearity problems ($VIF > 10$). We therefore orthogonalize these variables in Stata (using the orthog procedure) and create new orthogonal variables that are used to replace the original variables in the regression models. Pollock and Rindova (2003) provide more details on this procedure which limits any multicollinearity concerns.

3.5.2 Controlling for Selection Issues.

We first model the propensity of companies to raise VC finance, as a first step in the two-step Heckman procedure; the outcome is shown in Appendix. Following Eckhart et al. (2006), the VC selection process is a two-stage process in which entrepreneurs first self-select their companies as candidates for VC finance and in the second stage VC investors select companies from the pool of companies willing to attract VC funding. Irrespective of who selects whom (Hellmann et al., 2008), the first step of the Heckman correction method reports estimates for the only observable outcome of this selection process, namely the *event* of attracting VC finance.

The dependent variable in the selection equation, *VC*, is a dummy variable equal to one from the moment the company raises VC finance, zero otherwise. The independent variables that are expected to influence the probability of VC finance are the amount of internal funds available, disaggregated into positive funds (*Surplus Funds*) and deficit funds (*Deficit Funds*). Entrepreneurs are often reluctant to give up control thus VC finance is typically viewed as a last resort type of finance (Vanacker and Manigart, 2010). We therefore expect that the likelihood of the VC finance event increases when internal resources are exhausted. Other control variables control for the age of the company (*Log Company Age*), company growth (*Employee Growth*), company size (*Size*) and the innovativeness of a company (*# of Patent Applications*) as VC finance is typically associated with entrepreneurial companies with significant growth ambitions which are especially vulnerable to liabilities of newness and

smallness (Zahra and Filatotchev, 2004). As a last determinant, the lagged inflation-adjusted yearly inflow of capital in the VC industry ($VC\ inflow_{t-1}$) is included, which is likely to positively affect deal origination (Gompers and Lerner, 2000) and thus also the initial VC finance event. Fixed effects are included to control for all other country-, industry- and time specific factors that might affect the event of attracting initial VC finance.

Consistent with expectations, the probability of attracting VC finance increases significantly when deficit funds (*Deficit Funds*) are larger and when companies are younger (*Log Company Age*), report higher growth rates (*Employee Growth*) and have more patent applications (# of Patent Applications). Company size (*Size*) is positively associated with the probability of raising VC finance. A larger inflow of capital in the VC industry ($VC\ Inflow_{t-1}$) also increases, as expected, the probability of the VC finance event.

In the subsequent section, we test our hypotheses after controlling for the propensity of companies to raise VC finance. To do so, we estimate an Inverse Mills Ratio, based on the probit model described above, which we include in all subsequent regression models.

3.5.3 Hypotheses Tests.

To test Hypotheses 1 and 2, we run the multivariate regression models as reported in Table 3.3. All models are significant (unreported). The number of observations in each model is different, bounded by the number of observations of the dependent variable. For example, the use of entrepreneurial finance is defined for all company-year observations (almost 13,000), but the amount of funding is *conditional* upon the decision to raise finance, and thus only observed for 4,099 company-year observations in which companies raise finance. Likewise, the choice between equity finance and debt finance (*Equity/Debt*) treats equity and debt as mutually exclusive. As a result, all company-year observations in which companies raise both equity and debt finance are excluded in this regression model which reduces further the number of observations to 2,546.

Table 3.3: Regression models: Main effects

Table 3.3 presents multivariate estimates of the finance decisions and leverage. Company year observations are the unit of analysis. The coefficients represent the marginal effect of the coefficients, corrected for heteroskedasticity and correlation across observations of a given company to show the economic significance alongside the statistical significance. The regressions also include a constant, and control for year and industry effects (coefficients not reported). †, **,*** denote statistical significance at the 10 percent, 5 percent and 1 percent level correspondingly.

	Finance Issue	Ln Amount of Finance Issued	Equity/Debt	Ln Amount of Equity Issued	Ln Amount of Debt Issued	Leverage
Legality Index	0.169** [0.013]	0.423** [0.038]	0.011 [0.029]	0.415** [0.063]	0.371** [0.045]	0.103** [0.007]
Discharge not Available	-0.025* [0.010]	-0.085** [0.032]	-0.023 [0.021]	-0.073 [0.050]	-0.082* [0.037]	-0.012** [0.004]
VC	0.034** [0.004]	0.026* [0.012]	0.055** [0.008]	0.043** [0.016]	-0.053** [0.014]	0.003 [0.003]
Surplus Funds	-0.631** [0.030]	-0.519** [0.090]	0.049 [0.063]	-0.767** [0.142]	-0.171+ [0.099]	
Deficit Funds	1.941** [0.216]	2.286** [0.168]	0.614** [0.109]	1.287** [0.213]	2.073** [0.217]	
Size	-0.058** [0.004]	0.740** [0.014]	0.018+ [0.011]	0.749** [0.020]	0.767** [0.016]	-0.017** [0.003]
Employee Growth	0.018** [0.007]	-0.051** [0.020]	-0.039** [0.015]	-0.067* [0.028]	-0.054* [0.024]	-0.016** [0.003]
Net Working Capital	0.000 [0.001]	0.016* [0.008]		0.015 [0.011]	0.061* [0.024]	
# of Patent Applications	-0.002 [0.002]	-0.012+ [0.006]	0.004 [0.005]	-0.002 [0.007]	-0.020** [0.004]	-0.005** [0.002]
Tangible			-0.080 [0.065]			0.221** [0.024]
Short Term to Tot Debt			-0.127** [0.028]			0.055** [0.007]
Log Company Age			-0.333** [0.067]			0.101** [0.014]

T-A Leverage			-0.088			
			[0.057]			
ROA						-0.089**
						[0.012]
CAPEX						0.109**
						[0.026]
GDP Growth	-0.018+	-0.084**	-0.010	-0.124**	-0.011	0.020**
	[0.010]	[0.030]	[0.022]	[0.046]	[0.033]	[0.005]
MSCI	0.388**	1.078**	0.018	1.145**	0.894**	0.195**
	[0.030]	[0.098]	[0.070]	[0.162]	[0.110]	[0.018]
Self Employment	-0.000	0.013*	0.000	0.003	0.041**	0.008**
	[0.002]	[0.006]	[0.005]	[0.009]	[0.009]	[0.001]
Personal–Corporate Tax	-0.001	0.015**	0.010**	0.021**	-0.002	-0.004**
	[0.002]	[0.005]	[0.004]	[0.008]	[0.005]	[0.001]
Inverse Mills Ratio	-0.482**	-1.545**	0.005	-1.631**	-1.037**	-0.170**
	[0.026]	[0.084]	[0.069]	[0.123]	[0.099]	[0.012]
Year fixed effects	YES	YES	YES	YES	YES	YES
Industry fixed effects	YES	YES	YES	YES	YES	YES
# of Observations	12,977	4,099	2,546	1,947	2,686	13,467
R ²	0.29	0.39	0.12	0.37	0.39	0.21

Hypothesis 1 predicts that higher quality legal systems will be associated with the use of more finance in entrepreneurial companies, which is strongly supported ($p < 0.01$). An increase of the *Legality Index* with one unit, increases the probability of entrepreneurial finance with 17 percent, the amount of finance raised (conditional upon raising finance) with approximately 42 percent (37 percent for debt) and results into a 10 percent higher leverage. Differences in legal quality between for example U.K (20.41) and Spain (17.13) thus explain why U.K. companies use, around 50 percent more often finance, around 2.5 times larger amounts of finance (around 2 times the amount of debt) and report on average a 30 percent higher leverage ratio as compared with Spanish companies. The quality of legal systems does not impact the choice between equity and debt, however, as the coefficient of *Legality Index* is insignificant in the *Equity/Debt* model. This suggests that both equity and debt finance become equally more important in higher quality legal systems.

Hypothesis 2 predicts that less forgiving bankruptcy laws will be associated with the use of less finance in entrepreneurial companies. A change of the *Discharge Not Available* dummy variable from zero (fresh start) to one (no fresh start) decreases the probability of a finance event with 2.5 percent ($p < 5\%$), decreases the amount of finance raised with 8.5 percent when companies raise finance (8 percent for debt finance when companies raise debt – $p < 1\%$) and leads to a 1 percent lower leverage ($p < 1\%$). These results thus empirically support the second hypothesis. Interestingly, the economic impact of a better overall legal system is higher than the impact of the introduction of a fresh start.

VC ownership (VC) is also an important determinant of finance decisions. Compared with non VC entrepreneurial companies, VC entrepreneurial companies raise on average (i) more often finance and (ii) higher amounts of entrepreneurial finance when they raise finance (both around 3 percent), (i) more often equity (5.5 percent) and (ii) higher amounts of equity when they raise equity (plus 4.3 percent) but less debt and lower amounts of debt when they raise debt finance (both around 5.5 percent). Interestingly, financial debt ratios are not significantly different between VC and non VC companies. The inverse Mills ratio is negative and significant suggesting that there exists a negative association between the residuals of the selection model and the residuals of the finance models. The unobserved factors that are likely to influence the probability of raising VC are thus negatively correlated with the unobserved factors that are likely to influence finance decisions.

The effects of the other significant company-specific variables are largely in line with previous findings. More positive internal funds (*Surplus Funds*) lead to less finance but more deficit funds (*Deficit Funds*) lead to more finance. Larger companies (*Size*) raise less often finance but the amounts are larger when they raise finance; they raise more equity (or less debt) (marginally significant). Companies with higher employee growth raise more often finance and more often debt (or less equity). A higher amount of operational capital (*Net Working Capital*) increases the amount of debt raised; more patent applications (*# of Patent Applications*) have a negative impact on finance decisions (and especially debt raised). Asset tangibility (*Tangible*), the proportion of short term debt (*Short Term to Total*), company age (*Log Company Age*) and capital expenditures (*CAPEX*) are positively associated with debt finance, while the measure of profitability, return on assets (*ROA*) is negatively associated with debt finance.

Some country-level variables⁹ also affect entrepreneurial companies' finance strategies. A higher economic development (*GDP Growth*) results in less finance but higher debt ratios. More developed capital markets (*MSCI*) and higher levels of self-employment (*Self Employment*) are positively associated with finance, a higher wedge between personal income tax and corporate tax (*Personal-Corporate Tax*) is positively associated with equity finance.

To test Hypotheses 3 and 4, we add interaction terms to our models. *VC*Legality Index* is the interaction between *Legality Index* and *VC* and provides a test of Hypotheses 3A and 3B. *VC*Discharge Not Available* is the interaction between *Discharge Not Available* and *VC* and provides a test of Hypothesis 4. The results of the models including the interaction terms are reported in Table 3.4.

⁹ Country dummy variables are excluded in the models since there is no variation in the Legality Index over the time period considered. Hence, there exists perfect collinearity between this index and country dummies.

Table 3.4: Regression models including VC interaction

Table 3.4 presents multivariate estimates of the finance decisions and leverage adding the interaction terms between *Legality Index* and *VC* (*VC* Legality Index*) and between *Discharge Not Available* and *VC* (*VC* Discharge not Available*). Company years are the unit of analysis. The coefficients represent the marginal effect of the coefficients, corrected for heteroskedasticity and correlation across observations of a given company. The regressions also include a constant, and control for year and industry effects (coefficients not reported). †, **,*** denote statistical significance at the 10 percent, 5 percent and 1 percent level correspondingly.

	Finance Issue	Ln Amount of Finance Issued	Equity/Debt	Ln Amount of Equity Issued	Ln Amount of Debt Issued	Leverage
Legality Index	0.161** [0.013]	0.395** [0.040]	-0.007 [0.031]	0.350** [0.068]	0.371** [0.046]	0.104** [0.007]
Discharge not Available	-0.024* [0.010]	-0.075* [0.032]	-0.018 [0.021]	-0.053 [0.051]	-0.080* [0.037]	-0.012** [0.004]
VC	0.034** [0.004]	0.025* [0.012]	0.051** [0.009]	0.033* [0.016]	-0.048** [0.015]	0.003 [0.003]
VC* Legality Index	0.014** [0.004]	0.027* [0.011]	0.014 [0.009]	0.043** [0.016]	-0.003 [0.014]	-0.001 [0.003]
VC* Discharge not Available	0.000 [0.004]	-0.027** [0.010]	-0.009 [0.008]	-0.025* [0.012]	-0.014 [0.011]	0.002 [0.002]
Surplus Funds	-0.632** [0.030]	-0.520** [0.090]	0.050 [0.064]	-0.771** [0.141]	-0.173+ [0.099]	
Deficit Funds	1.935** [0.215]	2.253** [0.168]	0.592** [0.110]	1.249** [0.213]	2.071** [0.216]	
Size	-0.059** [0.004]	0.737** [0.014]	0.016 [0.011]	0.748** [0.020]	0.767** [0.016]	-0.017** [0.003]
Employee Growth	0.017* [0.007]	-0.052** [0.020]	-0.040** [0.015]	-0.073** [0.028]	-0.054* [0.024]	-0.016** [0.003]
Net Working Capital	0.000 [0.001]	0.014+ [0.008]		0.012 [0.011]	0.061* [0.024]	
# of Patent Applications	-0.002 [0.002]	-0.013* [0.006]	0.004 [0.005]	-0.004 [0.007]	-0.020** [0.004]	-0.005** [0.002]
Tangible			-0.074			0.221**

			[0.065]			[0.024]
Short Term to Tot Debt			-0.129**			0.055**
			[0.028]			[0.007]
Log Company Age			-0.331**			0.101**
			[0.067]			[0.014]
T-A Leverage			-0.086			
			[0.057]			
ROA						-0.090**
						[0.012]
CAPEX						0.109**
						[0.026]
GDP Growth	-0.017	-0.081**	-0.004	-0.118*	-0.011	0.020**
	[0.010]	[0.029]	[0.022]	[0.046]	[0.034]	[0.005]
MSCI	0.388**	1.066**	0.018	1.096**	0.893**	0.196**
	[0.030]	[0.099]	[0.070]	[0.163]	[0.111]	[0.018]
Self Employment	-0.001	0.011+	-0.000	-0.001	0.041**	0.008**
	[0.002]	[0.006]	[0.005]	[0.009]	[0.009]	[0.001]
Personal – Corporate Tax	-0.002	0.013**	0.010**	0.018*	-0.002	-0.003**
	[0.002]	[0.005]	[0.004]	[0.008]	[0.005]	[0.001]
Inverse Mills Ratio	-0.490**	-1.559**	-0.010	-1.656**	-1.035**	-0.170**
	[0.026]	[0.084]	[0.069]	[0.123]	[0.099]	[0.012]
Year fixed effects	YES	YES	YES	YES	YES	YES
Industry fixed effects	YES	YES	YES	YES	YES	YES
# of Observations	12,977	4,099	2,546	1,947	2,686	13,467
R ²	0.29	0.39	0.11	0.37	0.39	0.21

Hypothesis 3A (3B) predicts that VC ownership decreases (increases) the positive relationship between higher quality legal systems and the use of more entrepreneurial finance. The interaction term $VC * Legality Index$ is significant and positive in three models explaining the probability of entrepreneurial finance decisions (*Finance Issue*), the amount of entrepreneurial finance raised, when companies raise finance (*Ln Amount of finance Issued*) and the amount of equity raised, when companies raise equity (*Ln Amount of Equity Issued*). The coefficient of the interaction term is insignificant in the models explaining the choice between equity and debt (*Equity/Debt*), the amount of financial debt issued when companies raise debt finance (*Ln Amount of Debt Issued*) and financial debt ratios (*Leverage*). These results thus support hypothesis 3B: VC ownership complements with higher quality legal systems. The positive association between higher quality legal systems and entrepreneurial finance decisions is stronger for VC companies as compared with non VC companies. Per unit increase in legality index, VC companies report a 1.4 percent additional increase in the use of entrepreneurial finance, a 2.7 percent additional increase in the amount of finance raised and a 4.3 percent additional increase in the amount of equity finance raised, as compared with non VC companies.

Hypothesis 4 predicts that VC ownership will increase the negative relationship between less forgiving bankruptcy laws, more specifically whether a fresh start can be obtained or not, and the use of less entrepreneurial finance. The coefficient of the interaction term between *Discharge Not Available* and *VC* is therefore expected to be significantly negative. We find a significantly negative coefficient in the models explaining the amount of finance raised conditional upon the decision to raise finance (*Ln Amount of finance Issued*), and the amount of equity raised conditional upon the decision to raise equity (*Ln Amount of Equity Issued*). The coefficient of the interaction term is insignificant in the other models. These findings support Hypothesis 4. VC ownership complements with less forgiving bankruptcy laws: the negative relationship between the unavailability of a fresh start and the use of finance is stronger for VC companies as compared with non VC companies. VC companies report a 2.7 percent additional decrease in the amount of finance raised when they raise finance and a 2.5 percent additional decrease in the amount of equity raised when they raise equity finance when discharge is excluded from bankruptcy law, as compared with non VC companies.

The other variables remain robust. Increases in the quality of the legal system (*Legality Index*) have a positive effect on entrepreneurial finance decisions, bankruptcy laws which do not foresee a fresh start (*Discharge Not Available*) have a negative effect on entrepreneurial

finance decisions and VC ownership (*VC dummy*) has a positive effect on entrepreneurial finance decisions, on equity finance decisions and a negative effect on the amount of debt finance raised when VC companies raise debt finance. The coefficients of the control variables remain largely the same as in Table 3.3.

3.5.4 Robustness Checks.

Additional robustness checks were performed; the detailed results of these tests are available upon request. Overall, the robustness tests confirm that entrepreneurial finance decisions are driven by country-level differences in corporate governance systems, company-level differences in corporate governance and the interaction between both, irrespective of the construct that is used. In a first robustness test, the strength of investor protection index (Djankov et al., 2008) replaced the legality index as a measure of the quality of a country's legal system. This index measures the strength of minority investor protection laws. Much of this investor protection is also strongly associated with contract enforcement. Furthermore, the strength of investor protection index is positively associated with VC activity in European countries (Groh et al., 2010). We also find that higher values of this index result in more entrepreneurial finance so the same conclusions hold irrespective of the construct that is used for the quality of the legal system. Second, the dummy variable that measures whether a fresh start is available or not (*Discharge Not Available*) is replaced by other personal bankruptcy measures that were used by Armour and Cumming (2008): time (in number of years) to discharge (Time to Discharge), minimum capital requirements to start an entrepreneurial company (Minimum capital), the level to which assets are exempted from bankruptcy (Exemptions), restrictions on the entrepreneurs' rights after a bankruptcy (Disabilities) and the possibility and likelihood of reaching a compromise with creditors (Composition). The results are as strong or even stronger for minimum capital requirements and restrictions on the entrepreneurs' rights but are somewhat less strong for time to discharge and the possibility of forming an agreement with creditors. These findings hence suggest that providing a fresh start versus no fresh start, but also minimum capital requirements and restrictions on the entrepreneurs' rights, are important dimensions of personal bankruptcy laws that are strongly associated with entrepreneurial companies' finance strategies. In a third robustness check, we more explicitly test how VC ownership and thus differences in corporate governance mechanisms at the company-level affect finance decisions. We therefore added interaction terms between the VC dummy variable and company accounting variables to account for the fact that VC ownership may also have an impact on the reliability of financial reporting

(Beuselinck et al., 2009). Since it is further plausible that the distribution of accounting variables is different between VC and non VC companies, we identified outliers for each subsample separately. Most of the interaction terms were insignificantly different, however, Hence, there is no different relationship between company-level accounting variables and finance decisions between VC and non VC companies. For reasons of conciseness, we decided to report models without these interaction terms.

3.6 Discussion and Conclusions

Prior entrepreneurial finance research has mainly focused on either company-level governance effects or on the effects of country-level institutional frameworks for the aggregate supply of finance. This paper expands on prior research and focuses on the joint effects of both country-level legal frameworks and company-level corporate governance. More specifically, this paper focuses on the main effects on the finance strategies of entrepreneurial companies of the quality of contract enforcement for investors which is embedded in a country's legal system and whether entrepreneurs can benefit from a discharge after a bankruptcy or not. Second, this paper focuses on the interaction of a country's legal system and personal bankruptcy law with VC ownership. For this purpose, we use a large longitudinal dataset comprising private entrepreneurial companies from six European countries.

Using the legality index as a measure of contract enforcement (Berkowitz et al., 2003) and the availability of personal discharge post-bankruptcy (Armour and Cumming, 2008) as proxies for cross-country differences in legal institutions that are relevant for entrepreneurial companies, our empirical findings increase our understanding of the role played by national legal frameworks in affecting entrepreneurial companies' finance strategies. Specifically, our results show that entrepreneurial companies raise more entrepreneurial finance when they operate in countries with a higher quality legal system or in countries with bankruptcy laws that foresee a discharge after bankruptcy. Further, we find that companies that decide to raise finance, raise more finance (both equity and debt) and have a higher leverage. Second, differences in company-level corporate governance systems also significantly affect finance decisions, as VC ownership results in a higher probability of raising finance, in a higher probability of raising equity finance when equity and debt finance are treated as mutually exclusive, in larger amounts of equity finance when VC companies engage in raising equity but in lower amounts of debt finance when VC companies engage in raising debt. Moreover,

the positive association between a country's legal system and finance decisions and between the availability of a fresh start and finance decisions is stronger for entrepreneurial companies owned by VC investors, suggesting a complementary role played by VC ownership and a country's legal system and personal bankruptcy law. Further robustness tests using different but equivalent indicators for a country's legal quality and personal bankruptcy law confirm these results.

Our research has some potential limitations that offer fruitful avenues for future research. First, as our research design deals with European entrepreneurial companies operating in highly (e.g., U.K.) to moderately developed (e.g., Spain) VC markets, we lack insight into the role played by those VC investors in less developed VC markets like Asia or South-America. Moreover, we discussed that from a world-wide perspective, the countries we study have a relatively highly developed legal system. Further exploring entrepreneurial companies' finance strategies in countries with a lower quality of legal systems and the potential role of VC investors herein also remains important. Second, our research does not consider differences in the quality of VC investors. Prior research indeed shows that the mere presence of VC investors may be enough to influence the operations and governance of companies (e.g., Hellmann and Puri, 2002; Van den Berghe and Levrau, 2002). Nevertheless, research also indicates that VC investors are heterogeneous, with high quality VC investors having disproportionate positive effects on the development of their portfolio companies through stronger monitoring and corporate governance practices (Sorensen, 2007). High quality VC investors should hence have an even stronger positive effect on the availability of finance for their portfolio companies. Further exploring the complementarity between the quality of VC investors and a country's legal system might hence be relevant. Third, the hypotheses that predict a substituting or complementary impact of VC ownership on the relationship between country-level corporate governance and entrepreneurial finance decisions assume that the impact of VC ownership is exogenous. In fact, we assume that there will be no impact of the quality of the legal system or the strictness of bankruptcy law on the probability that entrepreneurial companies attract VC finance. In reality however this might be a too strong assumption hence VC ownership (or rather the probability of) could be endogenously affected by national law. It is econometrically hard to disentangle the endogenous and exogenous effects of VC ownership, hence we report this as a limitation. Another area of future research consists of understanding the role played by different VC investors in syndicates (Devigne et al., 2013). Syndicates comprising different VC investors might differently impact their

portfolio companies' finance strategies and differently interact with the country's legal framework.

Despite its limitations, this paper sheds light on the interaction between company-level governance systems and country-level institutional frameworks for the finance strategies of entrepreneurial companies. Our findings suggest that entrepreneurial companies operating in countries with high quality and more forgiving corporate governance systems have access to more equity and debt, and this effect is even stronger in companies characterized by VC ownership. We hereby address the recent call to study the interaction between company-level corporate governance factors and national systems of corporate governance. The key implication for practice of our research is that a country's institutional environment strongly affects the finance options available to entrepreneurial companies, and that stronger company-level corporate governance practices in the form of VC ownership will enhance the positive effects of a higher quality and more entrepreneur-friendly legal environment. Policy-makers, entrepreneurs as well as investors should hence consider both how the quality of the legal system and personal bankruptcy laws on the one hand and VC ownership on the other hand may affect the finance strategies of entrepreneurial companies.

3.7 Appendix

Table 3.5: Selection model estimating the probability of attracting VC funding

Table 3.5 presents multivariate estimates of the probability that companies attract VC funding for the period under study. Company years are the unit of analysis and coefficients are corrected for heteroskedasticity and correlation across observations of a given company. The dependent variable is a binary variable equal to one from the year in which companies attract VC finance, zero otherwise. The regressions also include a constant, and control for year, country and industry effects (not reported). †, **,*** denote statistical significance at the 10 percent, 5 percent and 1 percent level correspondingly.

	Probability of VC funding
Surplus Funds	-0.018 [0.090]
Deficit Funds	1.440*** [0.149]
Size	0.145*** [0.017]
Employee Growth	0.182*** [0.017]
Log Company Age	-0.773*** [0.096]
# of Patent Applications	0.028** [0.011]
VC Inflow _{t-1}	0.049** [0.024]

Country fixed effects	YES
Year fixed effects	YES
Industry fixed effects	YES
# of Observations	18,035
R ²	0.20

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Chapter 4

Firm Valuation in Venture Capital Financing Rounds: the Role of Investor Bargaining Power¹⁰

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Abstract

This study explores the impact of venture capital (VC) firm type on the valuation of their portfolio companies. We first argue that VC firm types will have greater bargaining power vis-à-vis the entrepreneur when there is less competition between VC investors. We further argue that VC firm types with more bargaining power are expected to negotiate lower valuations. Consistent with this dual hypothesis, university and government VC firms, of whom we argued that they face comparatively less competition and thus have greater bargaining power, negotiate lower valuations compared with independent VC firms. The valuations of captive VC firms equal those of independent VC firms. Our findings suggest that differences in VC firm type reflect differences in relative bargaining power which ultimately reflects differences in valuations in the VC contract.

Keywords: venture capital (VC), bargaining power, valuation, VC firm type

4.1 Introduction

One of the major concerns of entrepreneurs seeking venture capital (VC) is the equity stake that they retain after the investment, as this equity stake determines their future financial return and their control over the venture. The retained equity crucially depends on the negotiated value of the firm. At investment, a VC firm receives an agreed-upon number of newly created shares of the investee company in return for cash. Thus, the implied value of the investee firm is determined as the price per share paid times the number of shares outstanding. Despite its importance to both entrepreneurs and investors, drivers of entrepreneurial firm value are still poorly understood. Researchers have only recently started to analyze determinants of company valuations implied in VC investment rounds. Entrepreneurial company characteristics such as company accounting information (Hand, 2005; and Armstrong et al., 2006) and market factors (Gompers and Lerner, 2000) explain a

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considerable part of portfolio company valuations in VC investment rounds. In this environment where valuations are negotiated between entrepreneurs and VC investors (rather than set by a liquid market), VC firm characteristics also affect company valuations (Cumming and Dai, 2011). For example, Hsu (2004) found that entrepreneurs accept lower valuations from more reputable VC investors, while Cumming and Dai (2011) demonstrated a convex relationship between VC fund size and valuation.

This paper extends this line of research by acknowledging that the type of VC investor and its bargaining power also influences the negotiated value. Building on former theoretical frameworks modeling the negotiation process between entrepreneurs and VC investors (Fairchild, 2004; Cable and Shane, 1997; Kirilenko, 2001), we first argue that some types of VC investors have more bargaining power than other types, either because they have a captive deal flow (such as university or captive VC firms) or because they target niche markets with low levels of competition (such as government VC firms). Second, we argue that VC investors will exploit this relatively stronger bargaining position by negotiating lower valuations in VC investment rounds.

We empirically examine the effect of differences in VC firm type on portfolio company valuations using a unique, hand-collected and unbiased sample of 362 venture capital investment rounds in 180 Belgian investee firms between 1988 and 2009. We find no differences in valuation between captive VC firms and independent VC firms. University VC firms and government VC firms, however, negotiate lower valuations than independent VC firms, after controlling for investee company characteristics (including pre-investment accounting variables, company age, size of the company, number of patent applications and whether the company is active in a high-tech industry or not), VC firm characteristics (including VC firm reputation, size and origin) and market conditions (including the Belgian market return, the inflow of capital in the VC industry and VC investment activity). These results remain robust after controlling for the potential selection bias that may exist if different types of VC firms select a different kind of companies.

We hereby provide further insight into how the heterogeneity of the VC industry affects VC firm behavior (Mayer et al., 2005; Bottazzi and Da Rin, 2002) by focusing on a highly important but rarely researched phenomenon, namely, the valuation of VC deals. As the valuation of entrepreneurial companies in VC investments is determined through negotiation between entrepreneurs and VC investors, investor characteristics such as their reputation and

size affect their relative bargaining power (Cumming and Dai, 2011; Hsu, 2004; Meuleman et al., 2009). We have extended these insights by showing that the proprietary deal flow of university VC firms and the limited competition in niche markets in which government VC firms compete will first most directly increase their bargaining power, which these VC firm types then further exploit by negotiating lower valuations compared with independent VC firms. These results are non-trivial, as independent VC firms are typically more active investors and have a higher reputation compared with government and university VC firms (Bottazzi and Da Rin, 2002), which should lead to relatively more bargaining power, and following Hsu (2004), would lead entrepreneurs to accept lower valuations. In contrast, our findings indicate that independent VC firms accept higher valuations, which is consistent with the greater competition and hence relatively low bargaining power of independent VC firms compared with university and government VC firms. Therefore, this analysis provides a more complete picture of the bargaining process between VC investors and entrepreneurs.

The remainder of the paper proceeds as follows. Section 2 provides an overview of the relevant literature and develops the hypotheses. Section 3 describes the sample and variables, including descriptive statistics. Section 4 presents the empirical results. The final section discusses the results and conclusions.

4.2 Bargaining Power in Venture Capital Investments

4.2.1 Bargaining Power in the VC Investment Process

Valuations in VC investments represent the outcome of lengthy negotiations between VC investors and entrepreneurs, rather than being determined through supply and demand in liquid financial markets. Recently, researchers have modeled the negotiation process between a VC investor and an entrepreneur, incorporating the bargaining positions of both parties. When bargaining power is unbalanced, the party with greater power attempts to achieve an advantage at the expense of the other party (Cable and Shane, 1997; Chahine and Goergen, 2011). Differences in the relative bargaining power between VC investors and entrepreneurs are hence expected to affect the outcome, namely, the valuation of the venture. At the macro-economic level, it has been demonstrated theoretically (Inderst and Mueller, 2004) and empirically (Gompers and Lerner, 2000) that an increase in the supply of VC funds positively affects valuations. A larger supply of VC funds is driven by either entry of new VC investors or by an increase in the average fund size of incumbents. Both increase competition in the VC

market and decrease the bargaining power of VC firms (Inderst and Mueller, 2004), ultimately leading to higher valuations (Gompers and Lerner, 2000).

Entrepreneurs aiming to raise VC finance compete for funding from the best possible VC investor to which they have access (Sorensen, 2007), while VC investors compete for the most promising entrepreneurial firms. For example, VC investors with the highest reputation have access to the most promising ventures, as entrepreneurs prefer to connect with them (Sorensen, 2007). Entrepreneurs thereby trade off a lower valuation and hence a lower current equity stake with higher expected future value creation (Fairchild, 2004; Hsu, 2004). Fairchild (2004) shows that economic welfare is maximized when the entrepreneur has the most bargaining power and matches with a superior value-adding VC investor in a market that is reputation-based. Furthermore, the size of a VC fund is also positively related to its bargaining power, thus affecting valuations in VC investments (Cumming and Dai, 2011).

Previous theoretical and empirical papers largely focus on independent VC firms, the dominant type of VC investor in the U.S. Independent VC firms raise money from unrelated institutional or other investors and funds are managed by an independent VC management team (Kaplan and Schoar, 2005). They define their investment strategy at fundraising and thereby choose the VC market segment in which to compete with other VC firms (Cumming et al., 2009). The VC industry is heterogeneous, however, featuring different types of VC firms depending on their dominant shareholders (Manigart et al., 2002a; Mayer et al., 2005; Bottazzi et al., 2008; Hirsch and Walz, 2013). Captive VC firms manage funds fully or partially owned by a parent organization (typically a corporation or bank) (Bertoni et al., 2013). University VC firms invest mainly university money in university spin-offs to foster innovation and to enhance the reputation of the university (Wright et al., 2006). Finally, governments intervene directly in venture capital markets by funding government VC firms (Manigart et al., 2002b; Leleux and Surlemont, 2003; Hirsch and Walz, 2013). We argue that the specific investment and deal sourcing strategies of non-independent VC firms may either create a proprietary deal flow or lead to lower levels of competition in the target investment niche. This investment strategy is expected to lead to differences in the relative bargaining power of different VC firms. Further, we expect that relative differences in bargaining power may affect valuations in VC investment rounds.

To study the joint effect of VC type and VC bargaining power on valuations, we compare the valuations of independent VC firms with the valuations of captive VC firms, university VC

firms and government VC firms. Independent VC firms are the most widespread type of VC firm and hence are used as the reference group. Independent VC firm managers typically manage funds in a standard dual structure (Kaplan and Schoar, 2005) and are incentivized to create value through carried interests on VC funds' capital gains above a pre-defined threshold. VC managers are typically compensated with a fixed management fee (e.g., 2 per cent of invested capital) and a carried interest performance fee (e.g., 20 per cent of profits). Independent VC investment managers are experts in negotiating contracts with entrepreneurs. They are highly networked value-maximizing financial professionals who are likely to be perceived as the most sophisticated investors, given their greater experience and their greater involvement with their portfolio companies (Bottazzi et al., 2008). Hence, they are an interesting point of reference. When we compare the valuations of other VC types with the valuations of independent VC firms, we are interested in the relative bargaining power of other types of VC firms compared with the bargaining power of an independent VC firm rather than the absolute bargaining power of different VC firm types versus the entrepreneur. Relative differences in bargaining power will thus determine how valuations are affected. We discuss how captive VC firms, university VC firms and government VC firms differ from independent VC firms and how these differences may affect their relative bargaining position vis-à-vis the entrepreneur which will ultimately reflect differences in valuation.

4.2.2 VC Firm Types and Valuation

Captive VC investors are strategic investors that extract benefits from exploiting synergies between the venture investments and their core business. For example, corporate VC firms set up corporate VC programs to create a 'window on new technologies' (Dushnitsky and Lenox, 2005; 2006; Bertoni et al., 2012). Bank VC firms seek to establish complementarities between venture capital investments and subsequent lending activities or they attempt to sell fee services, e.g., when assisting in acquisitions or IPOs (Hellmann et al., 2008; González, 2006). Most captive VC firms are structured as subsidiaries of a parent organization (a corporation or a bank) where investment managers are employees governed by labor contracts.

When searching for investments in unrelated companies, i.e., companies that do not originate from a parent company, captive and independent VC firms are competitive bidders (Sorensen, 2007). For example, Gompers and Lerner (1998) find that the investment targets of corporate VC firms are comparable to the investment targets of independent VC firms. Bank VC firms invest in larger investment rounds and in industries with more debt (González, 2006) compared with independent VC firms, but their larger networks allow them to have better

access to different investment opportunities (Hellmann et al., 2008). Consequently, captive and independent VC firms choose ventures from the same pool (Sahlman, 1990), broadening the supply of VC finance to entrepreneurial companies and enhancing entrepreneurs' bargaining power (Inderst and Mueller, 2004; Cable and Shane, 1997). Consequently, captive VC firms are not expected to have more bargaining power compared with independent VC firms when investing in unrelated ventures. Furthermore, given their strategic interest in their portfolio companies, captive VC firms provide portfolio companies access to the parent company's competencies and complementary assets (Dushnitsky and Lenox, 2005). Bertoni et al. (2012) have shown that in the long run, the growth of portfolio companies backed by independent and by captive VC firms is comparable, and the post-investment value-creating activities of both types of investors are also comparable. Hence, given that we do not expect relative differences in bargaining power between captive VC firms and independent VC firms, portfolio company valuations of both types of VC firms are also expected to be comparable when captive and independent VC investors compete for unrelated investment targets.

However, captive VC firms may also invest in corporate spin-outs. New products or services developed within a corporation may not be core to the parent company's strategy but nevertheless have the potential to be viably exploited by another company. Rather than selling the intellectual knowledge to another company, the corporate may transfer the intellectual property rights (and potentially invest some cash) to a spin-out company. In return for their intangible and cash investments, corporations may negotiate an equity stake in the corporate spin-out through their corporate VC firm, aiming for a superior financial return in the medium term (Dushnitsky and Lenox, 2005). In these circumstances, the deal flow of the corporate VC firm is proprietary. Without the explicit consent of the parent company, no intellectual property rights can be transferred and the new company cannot come into existence. Hence, corporate VC firms will then have much more bargaining power vis-à-vis their spin-outs as compared with unrelated portfolio companies, which will ultimately lead to lower valuations of these spin-out companies.

A corporate VC firm may therefore have a mix of unrelated investment opportunities for which it has no superior bargaining power compared with independent VC firms as well as opportunities that are generated internally for which it has more bargaining power compared with independent VC firms. Taken together, the investment strategy of a captive VC firm will on average result in more bargaining power for captive VC firms compared with independent VC firms. We further expect that captive VC firms will exploit this relatively higher

bargaining power by negotiating lower valuations compared with independent VC firms. These joint effects leads to the following hypothesis:

H1: Compared with independent VC firms, captive VC firms value investee companies at a lower level.

A second type of non-independent VC firm is a university-related VC investment fund, which typically invests exclusively in university-related startup companies. In these startups, knowledge and intellectual property rights are transferred from the university to the startup company (Wright et al., 2006). Hence, one of the main goals of university VC firms is to commercialize a university's intellectual property and to disseminate knowledge, thereby enhancing the university's prestige (O'Shea et al., 2005). University VC firms are typically managed by academic technology transfer officers who screen the technological and commercial potential of the university's inventions (Lockett and Wright, 2005). They have access to a proprietary deal flow consisting of all investments in startup companies that are based on intellectual property rights from the university. University VC firms often have the right of first refusal to invest in companies that draw upon technology developed within the university. Consequently, bargaining power shifts strongly in favor of the university VC firm during the negotiation process. Entrepreneurs of these ventures are therefore locked-in as they have no other outside options (Inderst and Mueller, 2004).

Furthermore, university VC firms are among the few VC investors willing to invest in university startup companies. University startups are a particular set of high-tech companies that focus on radically new and disruptive technologies that may create new industries and refine existing markets (Gompers, 1995). They tend to exploit technologies that are in general radical and tacit (Shane and Stuart, 2002). The technological developments on which these companies are based are mostly legally protected. Furthermore, given the early stage of development of these startups, their entrepreneurial teams often comprise former university employees who are technology experts but lack industry experience, commercial skills and financial sophistication (Wright et al., 2006). Given these characteristics, academic spin-offs may face even more difficulties in attracting VC funding than other early stage high-tech companies. These difficulties suggest that the supply of VC finance for these companies may be lower than the demand, and that the limited competition in the VC market for this type of companies further enhances the bargaining power of university VC firms.

Given that university VC firms are expected to have more bargaining power compared with independent VC investors, we further expect that they are able to appropriate more of the potential surplus from the investment and thus will be able to obtain a higher equity stake for a given amount of cash. Hence, compared with independent VC investors, we expect that university VC firms will negotiate lower valuations. Following these two effects, our second hypothesis is therefore:

H2: Compared with independent VC firms, university VC firms value investee companies at a lower level.

We finally expect differences in bargaining power between government VC firms and independent VC firms. The objectives of government VC firms can be broadly divided into two different categories. First, government VC firms may be set up as a policy response to a shortage in the supply of risk capital to new technology-based early stage firms (Murray, 1998; Manigart et al., 2002b; Leleux and Surlemont, 2003). As a result of capital market imperfections, these early stage ventures are especially vulnerable to capital constraints. They typically do not generate revenues, yet assets are in general illiquid, and the entrepreneur's flexibility is a key resource for further development (Manigart et al., 2002b). Furthermore, technology may be complex, making formal screening more difficult for the VC investors. Early stage ventures may find it difficult to obtain VC finance as VC firms prefer investments where monitoring and selection costs are relatively low and the costs of informational asymmetry are less severe (Amit et al., 1998).

Government VC firms particularly target these early stage companies and thus complement with the existing VC industry as they try to fill the market gap in the supply of VC finance (Cumming and MacIntosh, 2006). Given this particular investment focus, government VC firms typically invest in companies in which other types of VC firm have lower levels of interest and thus as such expand the pool of VC finance that is available for companies. Consequently, government VC firms will experience less competition from other non-government VC firms while searching for new investment opportunities. We argue that less competition for government VC firms will result in more VC bargaining power vis-à-vis the early stage entrepreneur, which government VC firms further will exploit to push down the valuations of their investee companies.

Second, next to providing VC finance to young, high technology companies in order to increase the supply of VC finance, government VC firms may be set up in order to increase

the regional development in a particular region (Leleux and Surlemont, 2003). If this is their major goal, government VC firms will target mature companies that need funding to sustain employment rather than that they target early-stage companies that need funding to create value. These mature companies will also be less able to raise VC finance from non-government VC firms, however, not because of the higher risk associated with these companies but because their value creation potential is limited. For these mature companies, government VC firms will often be investors of last resort, giving government VC investors more bargaining power which they may exploit through negotiating lower company valuations.

In short, given that government VC investors target two different market niches in which VC finance is in short supply; either because of the higher risk of the company, either because of the lower return potential of the company, we argue that government VC firms will have more bargaining power compared with independent VC firms. Moreover, we argue that government VC firms will use their higher bargaining power to negotiate lower valuations as compared with independent VC firms. The joint effect following these arguments leads to the third hypothesis:

H3: Compared with independent VC firms, government VC firms value investee companies at a lower level.

4.3 Data and Sample Description

4.3.1 The Research Context

The hypotheses are tested on Belgian companies that received venture capital finance between 1988 and 2009. Belgium was chosen because all firms (even unquoted ones) have a legal obligation to publish information on all capital increases in the Belgian Law Gazette, and this official information is externally validated by a third party. The obligatory nature of this information enables accurate calculation of the implied valuations, leading to highly reliable data. This unique institutional setting allows access to information that is typically confidential and unavailable in commercial databases, making the Belgian setting appropriate to test the hypotheses.

Figure 4.1: VC Investments as a % of GDP

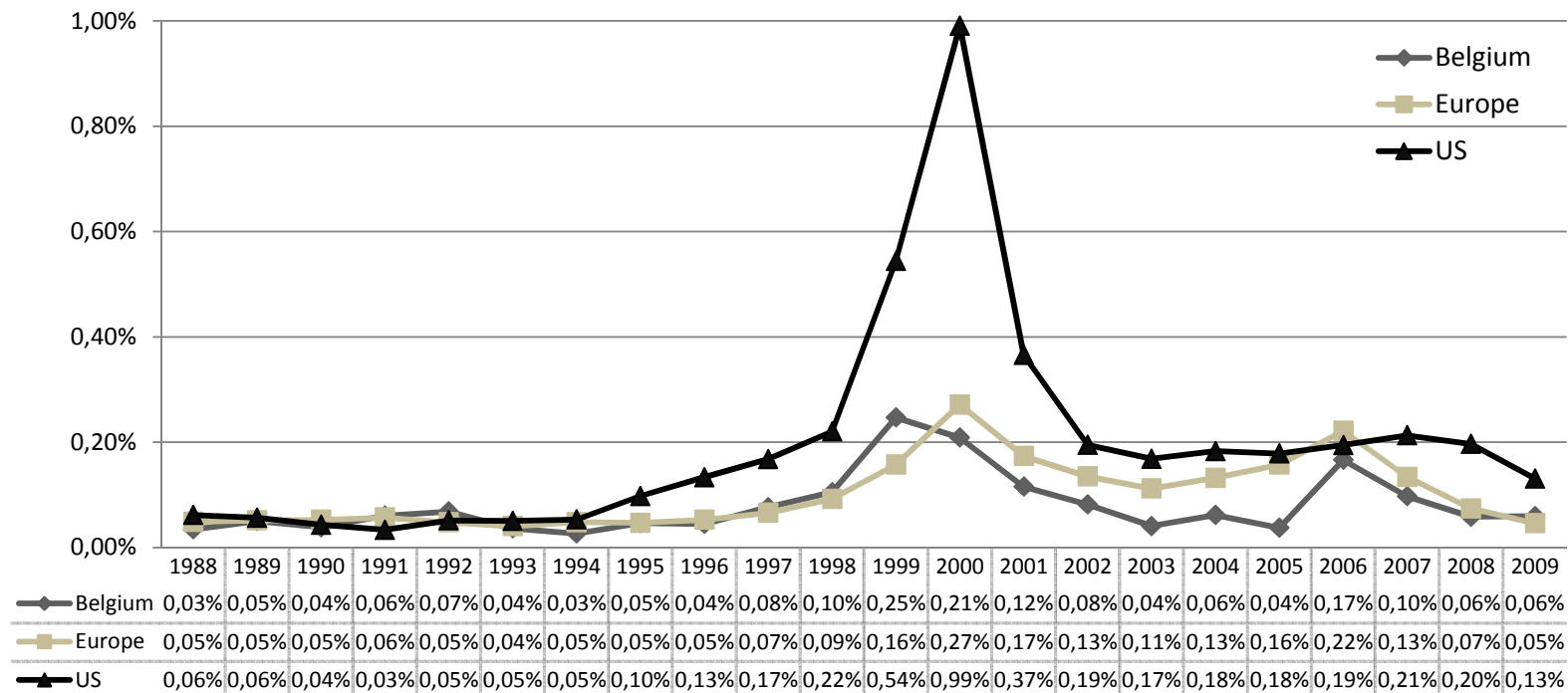


Figure 4.1 presents yearly VC investments as a percentage of GDP for Belgium, Europe and the U.S. This figure is the result of our own calculations based on publicly available data. The official European Venture Capital and Private Equity Association (EVCA) Yearbooks report VC investments in Belgium and Europe and the U.S. National Venture Capital Association Yearbook 2011 reports U.S. VC investments. Belgian and European GDP figures are from the OESO website and U.S. GDP figures are from the Bureau of Economic Analysis.

Figure 4.1 shows the investment activity of the Belgian VC industry as a percentage of GDP and comparatively to the European and U.S. VC investment activity during the period of our study. In the early years of the study, the Belgian VC industry was emergent (Ooghe et al., 1991), but it strongly developed after 1995. In these early years, the Belgian VC industry was already characterized by different types of VC investors, including independent VC firms, government VC firms and corporate VC firms (Ooghe et al., 1991; Manigart et al., 2002a). University VC firms however were at that time non-existent and emerged during the high technology bubble period (1999-2001) when VC investment activity peaked in the U.S. (1 per cent of GDP), Europe (0.27 per cent of GDP) and Belgium (0.21 per cent of GDP). After the burst, VC investment activity dropped for all types of VC investors to about between 0.10 and 0.20 per cent of GDP. In 2006, there was a small European revival in investment activity. In 2007 however, the credit crunch resulted again in a lower level of VC investment activity. Figure 4.1 suggests that the Belgian VC competition significantly increased during the bubble years. After the burst, VC competition dropped again but remained on average larger compared with the years before the bubble. Figure 4.1 further shows that VC finance (as a percentage of GDP) is relatively more important in the U.S. compared with Europe and Belgium, though Belgian VC investment activity remains quantitatively comparable with European VC investment activity. Furthermore, the VC investment activity consistently generates the same pattern over time in Belgium, Europe and the U.S. As a result, we expect that the competition between VC investors in Belgium as measured by VC investment activity will be comparable with European and U.S. VC competition and will have developed similarly over time.

4.3.2 Sample

The sample includes 362 VC investments in 180 different investee companies. The sample has three important advantages compared with previous VC valuation studies. First, previous studies mainly relied on commercial databases to collect valuation data, such as VentureOne, Venture Economics or VentureXpert (Gompers and Lerner, 2000; Cumming and Dai, 2011). While these databases allow for larger and broader samples, they give rise to concerns with respect to self-reporting biases and the reliability of the often confidential valuation data. For example, Kaplan et al. (2002) report that no valuation information is reported for between 30 per cent (VentureOne) and 70 per cent (Venture Economics) of all VC financing rounds, leading to severe biases as VC firms may self-select to voluntarily disclose this sensitive information. Furthermore, VC financing rounds that report information about company

valuations report often noisy valuation data with large average absolute errors (Kaplan et al., 2002). A second, alternative research strategy is to analyze samples from proprietary databases with rich, detailed and reliable information from one VC investor or fund-of-fund investor. The drawback of this approach, however, is that the data will be biased towards the investment strategy of that particular VC investor. Our dataset avoids this limitation and combines various sources, including commercial databases with VC investments, VC firm annual reports and websites, press releases and information from the official institution that represents the VC industry, the Belgian Venturing Association, to find VC investment information. Therefore, this dataset includes investments from different sources and from different types of VC investors, reducing the threat of biases induced by the use of a single source of data. Third, unlike some U.S. studies (e.g., Hand, 2005), our sample is not restricted to successful pre-IPO portfolio companies. Our sampling strategy was to sample companies at the first investment round and to follow them over time, unconditionally whether the VC investors eventually achieved a successful exit or not. Our sample thus includes successful (IPO companies or companies that were the target of an acquisition) as well as less successful companies (companies that are still private) as unsuccessful private companies (companies that failed or were liquidated). This database thus eliminates any potential survivorship bias. Our dataset hence is not likely to suffer from (self-) selection biases. Moreover, this dataset contains highly reliable information on the variable of interest which is the valuation of the VC companies.

Different sources of public information (press clippings, websites, annual reports of VC firms) combined with the commercial databases Zephyr and VentureXpert were consulted to identify the initial VC investment round in Belgian companies between 1988 and 2009. The main focus was on initial VC investments that occurred when the entrepreneurial companies were less than ten years old to ensure a focus on pure VC investments (rather than including more mature private equity investments). In addition to the initial VC investment rounds, all follow-on VC investment rounds were tracked in the Belgian Law Gazette to obtain a complete overview of all financing rounds until the first half of 2009. In a following step, the equity value of the entrepreneurial company in a VC investment round was calculated on the basis of the total capital increase from the VC investor and the number of newly created shares as reported in the Belgian Law Gazette. The detailed information provided by the Belgian Law Gazette further allowed to identify all VC investors in each investment round.

This strategy finally resulted in a sample of 362 different VC investment rounds in 180 different companies.

The VC investment round is the unit of analysis in this study and the dependent variable of interest is the premoney value of the company (Hand, 2005; Armstrong et al., 2006), as the postmoney value is influenced by the amount of cash invested in the focal VC investment round (Lerner, 1994). The premoney value of the company is measured as the total number of shares outstanding prior to the VC investment round multiplied by the price per share paid by VC investors in the focal investment round. Outliers of premoney valuations were separately identified for each series (first, second, third,...) of VC investment round as the median valuation per investment round plus or minus three times the standard deviation. Twelve such outliers are excluded from the multivariate analysis, but the exclusion of these outliers has no impact on the reported results.

4.3.3 Variables

Table 4.1 presents descriptive statistics of the dataset broken down by VC firm type. When more than one type of VC firms invest in an investment round (156 out of 362 rounds), the premoney valuation of the investment round is assigned to the VC firm type that is associated with the lead VC investor, i.e., the VC investor that invests the largest amount of cash in a given round. This practice was adopted on the basis of the argument that the bargaining position of lead VC investors will be more important than the bargaining position of co-lead VC investors during negotiations with the entrepreneurial management team, as the lead VC investor typically negotiates the specifics of the transaction on behalf of the co-lead VC investors (Wright and Lockett, 2003; Chahine and Goergen, 2011). To account for potential biases in the valuations of syndicated investment rounds, however, the empirical analyses are performed on both the full sample and the subsample of 206 VC investment rounds in which only one type of VC firm provides the full amount of cash.

Table 4.1: Sample Description

Table 4.1 presents the investment characteristics of different types of (lead) VC firms. Panel A reports the industry preference of each VC firm type with industries categorized according to the EVCA (2007) industry classification. The number of observations (in absolute and relative terms) refers to the number of investment rounds in companies active in those sectors. Panel B shows the number of investment rounds for different VC firm types in different time periods. The pre-bubble period covers the years from 1988 to 1998, both included. The bubble period covers the years from 1999 to 2001. The post-bubble period includes all years after 2001. Panel C records key characteristics of the investee companies for each type of VC firm. Five variables are included: the percentage of companies with patent applications before a particular Series (first (A round), second (B round,...) (a), the median age of the company (in years) at the initial investment round (Series A round) (b), the percentage of high-tech companies in the sample for each type of VC firm (c), the median growth in personnel expenses (in 1000 EUR) (d) and the inflation-adjusted (2008=100) amount (in thousands of euros) invested in a Series A finance round. The high-tech classification is based on two digit NACE industry codes which are coded as high tech by the Flemish government. Company growth is measured as the lagged, absolute growth in personnel expenses (in 1000 EUR) between year T-1 and year T-2. The corresponding number of observations is reported in brackets. Panel D refers to the status of investee companies for each type of VC firm as an indicator for the success of the investments. The number of observations (in absolute and relative terms) refer to VC investment rounds. In panel D, the sample of investee companies is further restricted to those having an initial VC investment round before 2003 and their status is representative of the period of data collection.

	<i>Captive VC</i>		<i>University VC</i>		<i>Government VC</i>		<i>Independent VC</i>	
<i>Panel A: Industry preference by VC firm type</i>								
	N	%						
Computer & Consumer Electronics	25	35.7%	9	37.5%	28	31.5%	92	51.4%
Life Sciences	15	21.4%	12	50.0%	6	6.7%	35	19.6%
Business & Industrial Products	16	22.9%	0	0.0%	22	24.7%	6	3.4%
Chemicals & Materials	3	4.3%	3	12.5%	8	9.0%	17	9.5%
Communications	3	4.3%	0	0.0%	5	5.6%	13	7.3%
Other	8	11.4%	0	0.0%	20	22.5%	16	8.9%
Total	70	100.0%	24	100.0%	89	100.0%	179	100.0%
<i>Panel B: Investment timing by VC firm type</i>								
Pre-bubble period	20	28.6%	0	0.0%	44	49.4%	25	14.0%
Bubble period	23	32.9%	6	25.0%	21	23.6%	60	33.5%
Post-bubble period	27	38.6%	18	75.0%	24	27.0%	94	52.5%
Total	70	100.0%	24	100.0%	89	100.0%	179	100.0%

Panel C: Investee company characteristics by VC firm type

Companies with patent applications (in %)	28.6%	16.7%	11.2%	27.4%
Age (in years) at Series A	3.26	2.06	4.55	1.36
High-tech companies (in %)	54.3%	79.2%	36.0%	60.3%
Company growth (in 1000 EUR) (N)	83 (56)	82 (18)	0 (71)	76 (128)
Amount invested in initial round (in 1000 EUR)	548	360	275	455
Total	70	24	89	179

Panel D: Company status by VC firm type

	N	%		%		%		%
Failure	19	28.8%	2	10.5%	14	17.1%	41	30.1%
Voluntary Liquidation	6	9.1%	1	5.3%	3	3.7%	6	4.4%
Private	28	42.4%	13	68.4%	49	59.8%	61	44.9%
Acquisitions	3	4.5%	2	10.5%	9	11.0%	16	11.8%
IPO	10	15.2%	1	5.3%	7	8.5%	12	8.8%
Total	66	100.0%	19	100.0%	82	100.0%	136	100.0%

Panel A reports the number of investment rounds in different industries for each type of lead VC firm. The industries are consistent with the definition from the European Private Equity and Venture Capital Association (EVCA) (2007) classification system. All VC firm types mainly invest in three industries (in decreasing order of importance): ‘Computer and Consumer Electronics’ industry, the ‘Life Sciences’ industry and the ‘Business and Industrial Products’ industry. University VC firms invest most in the ‘Life Sciences’ industry and the other VC firm types in the ‘Computer and Consumer Electronics’ industry.

Panel B shows the number of investment rounds for different types of lead VC firms over different time periods. For conventional reasons, we distinguish between the pre-bubble, bubble and post-bubble periods. In the pre-bubble period, there are no university VC firms as lead VC investors in our sample given that the emerging Belgian VC industry at that time was mainly represented by independent, captive and government VC firms. During the bubble period the VC industry grew rapidly, giving rise to new independent VC firms but also to university VC firms, with independent VC firms becoming the dominant type of VC firm in Belgium, leading a larger fraction of investments.

Panel C describes investee company characteristics. The first variable is a dummy variable that equals one if the company has at least one patent application before the investment round, zero otherwise (Lerner, 1994). Patent information is retrieved from the official European Patent Office (EPO) organization. Interestingly, companies with by a university VC firm (17 per cent) or government VC firm (11 per cent) as lead VC investor have fewer patent applications compared with investee companies with a captive VC firm or independent VC firm (28 per cent) as lead investor. Company age is measured (in years) at the first investment round. Government VC firms invest in the oldest investee companies (4.6 years), followed by captive VC firms (3.3 years). Independent VC portfolio companies are relatively younger (1.4 years) at the initial VC investment round. The high-tech dummy variable equals one if the company is active in a high-tech industry (defined by the Flemish government), zero otherwise. More specifically, companies with NACE codes 24 (chemicals), 29-35 (high-tech materials), 64 (telecommunication), 72 (computer related) and 73 (biotech) are identified as high-tech companies, all the other companies as non- high-tech. High-tech companies mainly receive VC finance from university VC firms and independent VC firms, representing 80 per cent and 60 per cent of their investments, respectively. Non-high-tech companies receive mainly VC finance from government VC firms, 64 per cent of government VC investments are in non-high-tech companies. Company growth is measured as the lagged, absolute

increase in personnel expenses one year before the investment relative to two years before the investment (Puri and Zarutskie, 2011). This information is only available for companies that were at least two years old at the time of the initial VC investment round. Personnel expenses are retrieved from the financial accounts provided by the National Bank of Belgium. Company growth is close to zero for the investee companies of government VC firms, portfolio companies of other types of VC firm report comparable, positive levels of growth in personnel expenses. Finally, the amount of cash invested in the initial VC investment round is reported from the Belgian Law Gazette. The median VC amount of cash invested is highest for captive VC firms (€ 550,000); independent VC firms invest around € 450,000, university VC firms € 360,000 and government VC firms € 275,00. Taken together, Panel C suggests that government VC firms are more likely to invest in older companies and less likely to invest in fast-growing high technology companies.

Panel D reports the status of the companies in 2009. Most companies were in 2009 still private, with percentages varying between 42 per cent (captive VC investee companies) and 68 per cent (university VC investee companies). Companies that failed or were liquidated represented in 2009 between 16 per cent (university VC investee companies) and 38 per cent (captive VC investee companies) of the portfolio companies. Between 4 per cent (captive VC investee companies) and 12 per cent (independent VC investee companies) of the portfolio companies were acquired by another company. The proportion of IPO companies was highest for captive VC investee companies (15 per cent) and lowest for university VC investee companies (5 per cent). Overall, Panel D shows that our sample is not likely to suffer from survivorship bias.

4.4 Analyses and Results

This section starts with a brief discussion of the bivariate analyses related to the main variable of interest, the premoney valuation. Thereafter, variables used in the multivariate analyses are defined and discussed. As the results might suffer from endogeneity problems, special attention is paid to potential selection effects. Finally, robustness tests are presented and potential alternative explanations discussed.

4.4.1 Bivariate Analyses

Table 4.2 presents detailed summary statistics of mean and median premoney valuations according to VC type, highlighting significant differences with independent VC firms. Panel A reports the overall premoney valuations according to VC firm type. Valuations of

university VC firms and government VC firms are significantly lower (< 0.01) than those of independent VC firms. The median premoney valuation of companies that received VC finance from independent VC firms is € 2.3 million, of investee companies of university VC firms € 828,000 and of investee companies of government VC firms € 700,000. Companies that received VC finance from captive VC firms receive the highest valuation (median value of € 4.3 million), but their value is not significantly different from of the valuation of companies that receive VC finance from independent VC firms.

Table 4.2: Summary Statistics

Table 4.2 presents summary statistics of premoney valuations according to different (lead) VC firm types and different round and company characteristics. The number of observations refers in all panels to the number of investment rounds within each category. All mean and median values are inflation-adjusted (2008=100) and reported in thousands of euros. Panel A reports mean and median premoney valuations clustered by VC firm type. The number of investment rounds is reported together with the number of different VCs that belong to the same type of VC firm. Panel B reports mean and median premoney valuations broken down by investment round and VC firm type. Panel C reports valuations negotiated during three different time periods: the pre-bubble period, bubble period and post-bubble period. The pre-bubble period covers the years 1988-1998, both included. The bubble period covers the years from 1999 to 2001 during which stock prices increased rapidly. The post-bubble period includes all years after 2001. Panel D breaks premoney valuations down according to type of VC investor both for standalone and syndicated VC investment rounds. Investment rounds where there is only one VC investor are classified as standalone rounds and rounds with more than one VC investor are classified as syndicated investment rounds. In all syndicated rounds, the type of lead VC investor is reported. Panel D reports different sectors in which the investee companies are classified. This industry classification is consistent with the EVCA (2007) industry classification system. **, *, and † denote values that are statistically different from those of independent VC firms at the 0.01, 0.05 and 0.10 levels, respectively.

	<i>Captive VC</i>			<i>University VC</i>			<i>Government VC</i>			<i>Independent VC</i>		
	<i>N</i>	<i>Mean</i>	<i>Median</i>	<i>N</i>	<i>Mean</i>	<i>Median</i>	<i>N</i>	<i>Mean</i>	<i>Median</i>	<i>N</i>	<i>Mean</i>	<i>Median</i>
<i>Panel A: Premoney valuations by VC firm type</i>												
N ^o of investment rounds	70	9,242	4,288	24	918**	828**	89	1,632**	695**	179	5,318	2,299
N ^o of different VCs	17			5			7			46		
<i>Panel B: Premoney valuations by series</i>												
Series A	25	1,930†	548†	6	798	963	52	1,327**	486**	65	2,062	1,250
Series B	23	6,236	4,321	14	868**	651**	26	1,412**	894**	50	3,880	2,763
Series C	12	9,316*	8,367*	3	1,205†	1,213†	10	3,428	4,084	32	4,467	3,479
Series D	4	17,947*	16,041*	1	1,491	1,491	0	/	/	17	6,827	2,881
Series ≥ E	6	45,273*	43,757*	0	/	/	1	5,216	5,216	15	24,326	12,904
<i>Panel C: Premoney valuations by investment period</i>												
Pre-bubble period	20	3,024†	509*	0	/	/	44	1,308**	505**	25	3,894	1,872
Bubble period	23	11,049	6,709	6	659**	601**	21	1,976**	860**	60	4,935	2,703
Post-bubble period	27	12,308**	4,613**	18	1,005*	855*	24	1,925†	902*	94	5,941	1,891
<i>Panel D: Premoney valuations by number of investors</i>												
Standalone rounds	29	5,792	655*	16	874**	808**	74	1,352**	553**	87	2,937	1,851
Syndicated rounds	41	11,681*	6,776*	8	1,007*	855**	15	3,016	1,800†	92	7,570	3,164

Panel E: Premoney valuations by industry

Computer & Consumer	25	10,477	4,352	9	891**	1,075**	28	1,084**	664**	92	5,677	2,271
Life Sciences	15	14,409*	9,596*	12	653*	744*	6	2,689	2,864	35	5,659	1,872
Business & Industrial Products	16	5,719	1,215	0	/	/	22	1,874†	511	6	6,917	3,609
Chemicals & Materials	3	4,612	1,160	3	2,062	2,265	8	1,559*	1,288	17	5,718	4,034
Communications	3	9,650	4,810	0	/	/	5	3,806	1,008	13	3,141	3,409
Other	8	4,320	1,799	0	/	/	20	1,301*	553	16	3,253	2,059

Panel B reports the mean and median premoney values according to VC firm type for each investment round. Investee companies receive lower valuations from a captive VC firm in an initial investment round (Series A) compared with valuations from independent VC firms, but captive VC firms value their investee companies significantly higher in all third (Series C) and later rounds (Series D, E and higher). University VC firms value their investee companies significantly lower than independent VC firms in second (Series B) and third rounds, government VC firms value their investee companies lower in the first and second investment rounds. These differences in premoney valuation between non-independent VC firms and independent VC firms are statistically significant and economically large.

Panel C reports premoney valuations within different time periods. Valuations in the pre-bubble period were lower than in the bubble period for all VC firm types. During the bubble years from 1999 to 2001, stock prices increased rapidly and VC valuations were inflated. Interestingly, valuations remain equally high in the post-bubble period. Companies that received VC finance from captive VC firms report lower valuations compared with those that received VC finance from independent VC firms in the pre-bubble period and higher valuations in the post-bubble period. Valuations by university and government VC firms are significantly lower in each period compared with those of independent VC firms.

Panel D compares valuations between VC firms differentiating between standalone and syndicated investment rounds. Valuations in syndicated investment rounds are higher for all types of lead investors compared with valuations in standalone investment rounds. Interestingly, captive VC firms value companies lower compared with independent VC firms when they invest alone but higher when they invest as the lead investor in a syndicated deal. University and government VC firms always report lower valuations compared with independent VC firms.

Panel E reports premoney valuations according to VC type and industry. Captive VC firms value biotech and pharmaceutical companies ('Life Sciences' industry) higher compared with independent VC firms. University VC firms report significantly lower valuations for companies in the 'Computer and Electronics' industry and in the 'Life Sciences' industry, while government VC firms report lower values relative to independent VC firms for companies in the 'Computer and Electronics' industry. In some industries, the low number of observations may mask significant differences in valuation.

Taken together, Table 4.2 shows that university and government VC firms value companies lower compared with independent VC firms. These differences are both statistically significant, consistent with the predictions of Hypotheses 2 and 3 and the size of these effects

is considerably large. The differences between the valuations of captive and independent VC firms are smaller and less consistent.

4.4.2 Variables Used in the Multivariate Analyses

The main independent variable in this study is the type of lead VC firm. Dummy variables are included in the regression models for captive, university and government VC firms. Independent VC firms are the base category and hence excluded from the models. In syndicated deals, only the firm type of the lead VC investor is taken into account.

Company variables that may influence the premoney valuation are included as control variables. Four variables measure differences in company characteristics: the number of patent applications before the investment round, company age at investment, a high-tech dummy variable and the inflation-adjusted amount of cash invested by VC investors in previous rounds (2008=100). The year 2008 is the year of data collection and therefore chosen as the base year. We do not control for differences in industries beyond differences between high-tech and non-high-tech companies as we are limited by a relatively small number of degrees of freedom. Moreover, the absolute growth variable is not included because of the non-availability of these data for startup companies.

Lagged financial statement variables are also included. Although it is often argued that financial statement information of unquoted companies will be in general less informative compared with quoted companies (Ball and Shivakumar, 2008), financial accounting information remains informative and relevant in investors' valuation expectations, even in extreme settings, such as for Internet IPO firms during the high-tech bubble (Bhattacharya et al., 2010). These variables are recorded in the year before the investment is made (Hand, 2005) and are taken from financial statements supplied by the National Bank of Belgium¹¹. All financial statement variables (in thousands of Euros) are inflation-adjusted (2008=100). Including the accounting variables results in a loss of 87 observations, as no prior accounting information is available for investments in start-up companies (77 rounds) and companies report no previous accounting information in ten investment rounds. Consistent with Hand (2005), balance sheet data and income statement data () are included. We include cash assets and non-cash assets as measures of company size and liquidity, intangible assets are included as a measure of innovativeness, accumulated gains or losses, operating revenues and

¹¹ While the financial statement information of unquoted companies is in general of lower quality than that of quoted companies, Beuselinck et al. (2009) have shown that the quality of the financial statement information significantly improves once firms start searching for VC finance.

operating costs are measures of profitability. Long term debt is an indicator of the company's capital structure.

Investment round variables are included as control variables for investment round characteristics. First, the investment round number is included, as investments in higher rounds typically occur in more mature and hence more valuable companies (Hand, 2005). Furthermore, the number of VC investors or a syndication dummy variable are included in the analyses of the full sample, as syndication may lead to a better selection process (Brander et al., 2002; Meuleman et al., 2009) and therefore potentially to higher valuations. We further control for VC investor characteristics. A dummy variable indicates whether the (lead) VC investor is not a Belgian VC investor. Most VC investors prefer to invest locally to reduce asymmetric information and moral hazard problems (Cumming and Dai, 2010; Devigne et al., 2013), hence competition between local VC investors is expected to be higher which will negatively affect their bargaining power. Moreover, VC firms located in another country typically have more investment options and hence more bargaining power compared with local VC investors. Furthermore, cross-border investors are also likely to be more reputable investors (Cumming and Dai, 2010). All arguments suggest that local VC investors will have less bargaining power compared with cross-border VC investors and thus we further expect that valuations of companies will be lower if companies receive VC finance from cross-border VC firms as compared with local VC firms. Another proxy for VC reputation is the VC IPO market share (Nahata, 2008; Cumming and Dai, 2011; Chahine and Goergen, 2011). We define the IPO market share of VC firm X at the time of investment as the proportion of Belgian IPO investments of VC firm X in the total number of Belgian VC backed IPOs over a period of five years preceding the investment. This information is collected from all Belgian IPO prospectuses between 1983 and 2008. Following Cumming and Dai (2011), an inverse U-shaped relationship between VC IPO market share and valuations is expected. We also control for VC firm size as Cumming and Dai (2011) report a convex relationship between VC fund size and valuations. VC firm size is measured as the inflation-adjusted cumulative amount of capital managed by the VC firm in VC funds that are less than ten years old. This information is available in VentureXpert. For VC firms without a closed-end fund structure, VC firm size is identified from the EVCA directories as the inflation-adjusted market value of all portfolio companies at the time of investment. To control for changes in the macro-economic environment, the inflation-adjusted inflow of capital in the VC industry the year before the investment (following Gompers and Lerner, 2000) and the Belgian Industry Index

as a capital market index are included, suggesting that private company valuations follow public company valuations. We explicitly control for the inflow of capital in the VC industry to exclude the potential macro-level impact of cyclical movements in the VC industry on VC investors bargaining position (Inderst and Mueller, 2004).¹² Finally, we add a pre-bubble dummy variable in our regression model to control for the lower valuations during the pre-bubble years and to control for the fact that university VC firms were non-existent during that period.

¹²Although we acknowledge that the characteristics of an entrepreneur may also affect VC bargaining power (e.g., Cumming and Johan, 2008; Han et al., 2009) and hence may affect company valuations, we unfortunately lack information on the characteristics of the entrepreneur and so we cannot take different characteristics into account.

Table 4.3: Correlation Matrix

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21
<i>Dependent variables</i>																					
1 Premoney value																					
2 Successful exit	0.14*																				
<i>Type of VC firm</i>																					
3 Captive VC	0.22**	-0.05																			
4 University VC	-0.11*	0.10	-0.13*																		
5 Government VC	-0.19**	0.02	-0.28**	-0.15**																	
6 Independent VC	0.05	-0.02	-0.48**	-0.26**	-0.57**																
<i>Company Characteristics</i>																					
7 N° of patent apps.	0.42**	0.15*	0.04	-0.02	-0.09	0.05															
8 Age (in years)	0.07	-0.02	0.08	-0.03	0.19**	-0.22**	0.04														
9 High-tech	0.06	0.20**	-0.00	0.13*	-0.21**	0.12*	0.19**	-0.06													
10 Previous investment	0.75**	0.08	0.13*	-0.09	-0.17**	0.08	0.38**	0.12*	0.03												
<i>Financial Statement Variables</i>																					
11 Cash Assets	0.77**	0.19**	0.16**	-0.06	-0.17**	0.05	0.48**	-0.06	0.12*	0.66**											
12 Non-Cash Assets	0.32**	0.06	0.09	-0.08	0.08	-0.10	0.04	0.23**	-0.13*	0.34**	0.20**										
13 Long Term Debt	-0.00	0.10	0.23**	-0.07	-0.05	-0.10	-0.00	0.16**	-0.16**	-0.04	-0.02	0.30**									
14 Operating Revenues	0.17**	0.06	0.20**	-0.07	-0.02	-0.11	0.03	0.30**	-0.09	0.11	0.07	0.58**	0.47**								
15 Operating Costs	0.42**	0.08	0.25**	-0.10	-0.11	-0.06	0.26**	0.20**	-0.04	0.39**	0.35**	0.57**	0.41**	0.91**							
16 Accum. Gains/Loss	-0.71**	-0.04	-0.13*	0.07	0.21**	-0.12*	-0.53**	0.04	-0.07	-0.82**	-0.63**	-0.17**	0.06	-0.05	-0.39**						
17 Intangible Assets	0.35**	-0.03	0.12*	0.03	-0.16**	0.03	0.36**	0.05	0.15*	0.45**	0.27**	0.15*	-0.00	0.08	0.22**	-0.47**					

Table 4.3 (Continued)

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21
<i>Control Variables</i>																					
18 Series	0.60**	0.07	0.06	-0.03	-0.24**	0.17**	0.44**	0.23**	0.15**	0.71**	0.43**	0.23**	-0.01	0.11	0.31**	-0.65**	0.50**				
19 Number of investors	0.52**	0.17**	0.15**	-0.07	-0.27**	0.15**	0.45**	-0.08	0.12*	0.56**	0.53**	0.13*	-0.05	0.01	0.27**	-0.61**	0.32**	0.48**			
20 Syndication	0.27**	0.06	0.15**	-0.05	-0.30**	0.17**	0.25**	-0.08	0.17**	0.31**	0.28**	0.07	0.05	0.01	0.16**	-0.34**	0.29**	0.35**	0.75**		
21 Cross-border VC	0.21**	0.13*	0.04	-0.08	-0.17**	0.16**	0.10	-0.05	0.05	0.25**	0.19**	-0.03	-0.07	0.00	0.11	-0.28**	0.05	0.20**	0.33**	0.26**	
22 IPO Market Share	0.16**	0.06	-0.04	-0.07	0.01	0.06	0.04	-0.07	0.14**	0.13*	0.18**	0.16**	0.01	0.01	0.10	-0.16**	0.09	0.08	0.16**	0.13*	-0.06
23 VC Firm Size	0.38**	-0.05	0.18**	-0.11*	0.07	-0.14**	0.09	0.05	-0.01	0.32**	0.26**	0.12	-0.04	0.09	0.19**	-0.30**	0.18**	0.21**	0.17**	0.10*	0.26*
24 Inflow of capital	0.04	-0.15*	0.03	0.01	-0.14*	0.08	-0.09	-0.12*	-0.03	-0.06	-0.03	-0.05	0.04	0.00	-0.00	0.05	0.04	-0.01	-0.07	-0.03	0.03
25 Belgian Ind. Index	0.10	0.27**	0.04	0.23**	-0.17**	-0.00	0.41**	-0.00	0.24**	0.06	0.23**	-0.05	-0.07	-0.09	-0.02	-0.11	0.15*	0.11*	0.23**	0.19**	0.06
26 Pre-Bubble	-0.15**	-0.05	0.05	-0.15**	0.33**	-0.24**	-0.17**	0.09	-0.06	-0.20**	-0.16**	-0.10	0.06	0.03	-0.07	0.25**	-0.21**	-0.33**	-0.23**	-0.24**	-0.07
	22	23	24	25																	
23 VC Firm Size	0.19**																				
24 Inflow of capital	-0.06	0.09																			
25 Belgian Ind. Index	-0.02	-0.08	0.02																		
26 Pre-Bubble	0.12*	-0.01	-0.43**	-0.20**																	

Pearson correlation coefficients (reported in Table 4.3) indicate that there exist some high pairwise correlations between a few independent variables. For example, the correlation between operating costs and operating revenues is 0.91 and the correlation between accumulated gains/losses and the amount of cash already invested by VC investors is -0.82. These particularly high correlations indicate that multicollinearity problems may arise when these variables are simultaneously included in one regression model. We therefore also calculated Variance Inflation Factors (VIF) for all regressors (unreported analyses). In fact, VIF are an indicator of the correlation between each independent variable and all the other independent variables together which gives a better indication of potential multicollinearity problems than the correlation between two independent variables. The highest VIF is 4.8, far below the suggested threshold for multicollinearity of ten (Gujarati, 2003). Hence, although there exist some high correlations between some of independent variables, VIF indicate that these high correlations will not likely affect our results. Table 4.3 indicates that premoney valuations are positively correlated with successful exits. Captive VC firms report higher valuations while university and government VC firms report lower valuations. Furthermore, premoney valuations are positively correlated with company characteristics such as with measures of innovation (number of patent applications and intangible assets), the amount of cash already invested by VC investors in the company, company size (cash and non-cash assets), liquidity (cash assets) and profitability (operating revenues and accumulated gains (+) or losses (-)). Premoney valuations are also positively correlated with investment round characteristics (round series and number of VC investors) and with VC investor characteristics (cross-border VC (dummy variable), IPO market share as a measure of VC reputation and VC firm size). Pre-bubble valuations are lower compared with bubble and post-bubble premoney valuations.

4.4.3 Results of the Multivariate Regressions

To test the hypotheses in a multivariate regression framework, a log-linear OLS-regression model is used. A log-linear model replaces all continuous variables by their natural logarithm and is relevant when dealing with non-linearities between the dependent variable and independent variable(s).

Table 4.4 presents the results of the multivariate regressions with standard errors clustered on the investee company level (Petersen, 2009). The dependent variable is the log-transformed premoney value. Model I and Model IV include only company characteristics. Model II and Model V add dummy variables for each non-independent VC firm type, with independent VC

firms serving as the base category. Model III and Model VI include all explanatory variables. Given the loss of observations, the company accounting variables are only included in the final models. To fairly control for the potential confounding impact of non-lead VC investors in syndicated deals, especially when the type of VC investor differs between lead and other VC investors, we repeat all multivariate analyses for a subsample of 206 standalone investment rounds and report them in Model IV-VI. In standalone investment rounds the lead VC investor can be unequivocally determined as there is only one VC investor.

Table 4.4: Multivariate OLS Regression Model Explaining Premoney Valuations

Table 4.4 reports the results from log-linear OLS regressions of premoney valuations on VC investor dummies, investee company characteristics, financial statement variables and control variables. The first three models (Models I-III) present the results for the full sample including 362 standalone and syndicated investment rounds. Models IV-VI present the results for the subsample of 206 investment rounds with only one VC investor. All standard errors are clustered on the investee company level. **, *, and † denote significance at the 0.01, 0.05, and 0.10 levels, respectively. Captive VC investors, government VC investors and university VC investors are expected to value companies lower compared with independent VC investors. The log-transformed company characteristics (number of patent applications before the investment round, age (in years) and the inflation-adjusted amount of cash invested by VC investors in previous rounds) are expected to be positively related to the value of the company. High-tech is a dummy variable equal to 1 if the company is active in the high-tech industry, zero otherwise. The value of high-tech companies is expected to be higher. (Non)-Cash assets, Operating Revenues, Accumulated Gains/Losses and Intangible Fixed Assets are expected to have a positive sign; Long Term Debt and Operating Costs a negative sign. Several control variables are included: the investment round (a), a syndication dummy variable (b), a cross-border dummy variable (c), IPO market share (d), VC firm size (e), the inflow of capital in the venture capital industry the year before the investment (t-1) (f), the Belgian Industry Index as a capital market index (g) and a Pre-Bubble Dummy variable. The Pre-Bubble variable is equal to one in the investment years before 1999, zero otherwise. Syndicated VC investments are often the result of a better selection process (Brander et al., 2002), therefore higher valuations are expected in syndicated VC investment rounds. Cross-border VC investors may have less competition and therefore more bargaining power compared with domestic VC investors leading to lower valuations. Cumming and Dai (2011) report a concave relationship between IPO market share and valuations and a convex relationship between VC fund size and premoney valuations. Gompers and Lerner (2000) show that higher inflows of capital in the venture capital industry result in inflated valuations of these funds' new investments. We therefore include the inflation-adjusted inflow of capital in Belgium (in euros) at time (t-1) from the EVCA Yearbooks. The Belgian Industry Index is retrieved from the Thomson Datastream database and added as a capital market variable following Armstrong et al. (2006), suggesting that private company valuations follow public company valuations. In the pre-bubble years, the Belgian VC industry was nascent and mainly dominated by captive and government VC firms, potentially leading to more bargaining power for those VC firm types in the pre-bubble years relative to the bubble and post-bubble years.

	Exp. Sign	Full sample			Standalone investment rounds		
		Model I	Model II	Model III	Model IV	Model V	Model VI
<i>Constant</i>		7.428 **	7.821 **	2.821	7.573 *	7.787 *	4.413
Type of VC firm (dummy)							
<i>Captive VC</i>	-		0.247	0.048		-0.202	-0.609
<i>University VC</i>	-		-0.636 *	-0.626 *		-0.755 *	-0.899 *
<i>Government VC</i>	-		-0.572 *	-0.717 **		-0.676 *	-0.876 *
Company Characteristics							
<i>Ln (1+ n° of patent applications)</i>	+	0.212	0.204	0.242	0.261	0.257	-0.149
<i>Ln (1+ Age) (in years)</i>	+	-0.167	-0.116	-0.131	-0.037	0.033	0.031
<i>High-tech (dummy)</i>	+	-0.199	-0.222	0.051	-0.213	-0.284	-0.036
<i>Ln (1+ Amount invested in previous rounds)</i>	+	0.049 *	0.042 *	0.030	0.033	0.027	0.017

Financial Statement Variables

<i>Ln (1+ Cash Assets)</i>	+			0.084 **			0.100 **
<i>Ln (1+ Non-Cash Assets)</i>	+			0.449 **			0.416 **
<i>Ln (1+ Long Term Debt)</i>	-			-0.022			-0.026
<i>Ln (1+ Operating Revenues)</i>	+			-0.006			-0.020
<i>Ln (1+ Operating Costs)</i>	-			-0.086			-0.025
<i>Ln (1+ Accumulated Gains/Losses)</i>	+			-0.001			0.005
<i>Ln (1+ Intangible Fixed Assets)</i>	+			-0.034 †			-0.038 †

Control Variables

<i>Ln (1+ Series)</i>	+	1.237 **	1.284 **	0.767 †	0.762	0.833	0.799
<i>Syndication (dummy)</i>	+	0.206	0.058	-0.021			
<i>Cross-border VC(dummy)</i>	-	0.830 *	0.610 †	0.661 *	1.119 **	0.756 †	0.105
<i>VC IPO Market Share</i>	+	1.949	0.576	1.792	5.373 **	2.930	-2.694
<i>VC IPO Market Share squared</i>	-	-0.031	1.712	-1.861	-3.732 †	-1.232	9.578
<i>Ln (1+ VC Firm Size)</i>	-	-0.135	0.125	0.088	-0.769	-0.086	0.167
<i>Ln (1+ VC Firm Size) squared</i>	+	0.055	0.007	0.016	0.140 †	0.049	0.015
<i>Ln (1+ Inflow of capital)</i>	+	0.253 *	0.236 *	0.252 †	0.289 *	0.277 †	0.180
<i>Ln (1+ Belgian Industry Index)</i>	+	0.033	0.044	0.042	-0.023	0.002	-0.014
<i>Pre-Bubble (dummy)</i>	-	0.130	0.118	0.241	-0.185	-0.165	-0.050

N° of observations		<u>362</u>	<u>362</u>	<u>275</u>	<u>206</u>	<u>206</u>	<u>154</u>
N° of companies		<u>180</u>	<u>180</u>	<u>153</u>	<u>135</u>	<u>135</u>	<u>108</u>
Adjusted R ²		32.8%	35.2%	48.3%	24.7%	27.1%	41.2%
F-statistic		52.0	34.0	25.4	200.8	155.4	104.2
p-value (F-statistic)		0.000	0.000	0.000	0.000	0.000	0.000

A later investment round (<0.01 in Models I-II), a cross-border VC investor (<0.01 in Model IV) and a higher inflow of capital in the VC industry the year before the investment (<0.05 or <0.10) are associated with significantly higher valuations in all models except Model VI. VC reputation measured by IPO Market Share shows the anticipated inverted U-shape relationship with company valuations in Model IV. The effects are also economically significant. Valuation increases approximately 130 per cent with each investment round. Cross-border VC investors value investee companies at least 61 per cent (Model II) higher compared with Belgian VC investors, all else remaining equal. If the inflow of capital increases by 10 per cent the year before the investment then valuations increase between 2 and 3 per cent. The significant impact of the inflow of capital in the VC industry is in line with Gompers and Lerner (2000): higher competition between VC firms leads to increased valuations. In Model IV, a one per cent increase in VC reputation first increases valuations by 5 per cent. More reputable VC investors select better and hence more valuable companies. Consistent with Cumming and Dai (2011) and Hsu (2004), we find that beyond a certain threshold, highly reputable VC investors exploit their higher bargaining power and invest at lower prices. We then find a 3.7 per cent discount per one per cent increase in VC reputation. The value in syndicated investment rounds is not significantly higher, changes in the Belgian stock market index are not associated with changes in private company valuations and pre-bubble valuations are not significantly lower compared with bubble and post-bubble valuations, controlling for other factors. Furthermore, the coefficients of cash assets and non-cash assets (Model III and Model VI) are significantly positive (< 0.01), while the coefficient of intangible fixed assets is marginally significantly negative (< 0.10). These results are broadly consistent with previous research (Hand, 2005; and Armstrong et al., 2006), but these effects are small. Ten per cent more cash leads to valuations that are 0.8 per cent higher¹³. Ten per cent more non-cash assets leads to valuations that are 4 per cent higher, and 10 per cent more intangible assets lowers valuations by 0.3 per cent.

There is a significant increase in model fit moving from Model I to Model II (< 0.01) and moving from Model IV to Model V (< 0.10), indicating that VC investor type is an important determinant of premoney valuations regardless of whether they invest alone or in a syndicate. The first hypothesis proposes that captive VC firms value companies lower relative to independent VC firms, but no significant differences are found between the valuations of independent and captive VC firms. Hypothesis 1 is hence not supported. The second

¹³ Economic effects relate to the full model (Model III) unless otherwise specified.

hypothesis proposes that university VC firms value companies lower relative to independent VC firms. The coefficient is negative and significant in all Models (< 0.05), providing support for the second hypothesis. The premoney value of an average company who received VC finance from university VC firm, is estimated as €922,305, while the same company would have received a premoney value of € 1,498,804 by an independent VC firm. Hypothesis 3 proposes that government VC firms value companies lower relative to independent VC firms. All Models show a negative and significant coefficient for government VC firms (< 0.01 or < 0.05), supporting hypothesis 3. The premoney value of an average company receiving VC finance from government VC firms, is estimated as € 888,044, while the same company would have received a premoney value of € 1,202,067 by an independent VC firm. Finally, all these effects remain qualitatively unchanged when including company growth (measured in personnel expenses) as an additional company characteristic (unreported analyses). Lagged company growth is not a significant driver of portfolio company valuation, moreover it reduces the number of observations. Therefore, we prefer to focus on the previously reported models that do not control for company growth.

4.4.4 Potential Impact of VC Selection

The finding that university and government VC firms value their portfolio companies lower relative to independent VC firms may suffer from endogeneity problems. Following Eckhardt et al. (2006), the matching between a VC investor and the entrepreneur is a two-stage selection process where VC investors select entrepreneurial companies from a population of entrepreneurs that first selected themselves as candidates for VC financing. It is impossible to determine whether the selection bias occurs in the first stage or second stage of the selection process between the entrepreneur and the VC investor (Hellmann et al., 2008). What really matters in relation to the endogeneity concern is that the self-selection between venture capital firms and investee firms is taken into account. We deal with potential selection biases in two different ways: first, a Heckman two-stage approach is estimated, and second, a probit regression predicting the likelihood of a successful outcome of the investment is applied. The Heckman procedure is an ex-ante correction method while probit regressions are ex-post analyses analyzing the outcome of the VC investment.

Heckman (1979) suggests a correction for potential endogeneity problems in two steps. In the first step, a selection regression equation predicts the probability that university and government VC firms will invest. The empirical specification of this regression is a probit model including explanatory variables that are expected to determine the investment decision

of university and government VC firms. In the second step, the inverse Mills ratio obtained from the selection regression is incorporated as an additional regressor in the log-linear regression model to control for potential endogeneity. A significant coefficient of the inverse Mills ratio suggests that selection bias exists in the sample and hence that the correction is needed. The unreported results of the first step (selection regression) of the Heckman procedure are discussed in the following paragraphs.

Two probit regression specifications model the likelihood that university and government VC firms invest, including investee company characteristics, VC investment round characteristics, VC firm characteristics and a time dummy variable. Two investee company characteristics are included that proxy for the maturity of the company which is an indicator of the investment risk for the VC: the inflation-adjusted cumulative amount of cash invested by VC investors (in millions of euros) and company age (in years). Early stage companies are more risky than later stage companies, as they have no track record and few tangible assets. VC firms specifically targeting early stage (or later stage) companies may therefore, all else equal, apply lower (or higher) valuations. Furthermore, investee company risk may be reflected by the number of patent applications. Intellectual property is often an important asset for companies that receive VC finance. Specifically, patents are often the most effective way for these companies to protect their intellectual property (Lerner, 1994). Therefore, companies with more patent applications are expected to have a higher chance of survival. Bigus (2006) further argues that patents limit VC bargaining power in the VC finance process because it protects the entrepreneur from the risk that VC investors may steal the idea for their own purposes. Finally, a dummy variable indicating whether the company is active in a high-tech industry is included. Again, the relatively small sample does not allow to control for differences in industry beyond the difference between high-tech and non-high-tech companies. Compared with non-high-tech companies, high-tech companies have more growth potential but also present a higher investment risk for a VC investor.

Two VC investment round characteristics are included in this analysis. VC firms may invite other VC firms to join the equity syndicate for the most promising investment opportunities to ensure improved future access to more and better quality deals (Sorenson and Stuart, 2001). Moreover, having more VC investors involved in VC investment round is expected to improve the quality of the investment decision and thus to lower the risk of the investment. Therefore, the number of VC investors in the investment round is included as an indication of the quality of the company and the risk of the investment. Furthermore, the amount of cash

invested by VC investors in the actual investment round (expressed in million euros) is included. High growth companies also have large financing needs. However, not all VC firms are equally willing or able to invest large amounts of cash in a company. As a result, VC firms may forego interesting investment opportunities because they are not able to invest the required amount of cash (Brander et al., 2002). Hence it is relevant to include the amount of cash invested in the current VC investment round.

We further add VC IPO Market Share as a proxy for VC reputation and VC firm size (expressed in billion euros) as VC firm characteristics. More reputable VC investors may attract better companies either because of improved screening mechanisms or because of the entrepreneurs' preference to be linked with the most reputable VC investors. VC firms with more uncommitted cash may also have better access to high-quality deals given that they reduce the risk for an entrepreneur that a VC investor will be incapable to invest more cash when this is needed (Cumming and Dai, 2011). Finally, the pre-bubble dummy variable controls for the emerging nature of the Belgian VC industry.

Unreported results of these first step selection regressions show that university VC firms are more likely to invest in companies that did not yet receive VC finance. University VC firms were started in the bubble years (1999-2001) and have on average less cash available compared with other types of VC firms. Government VC firms are also more likely to invest in companies that did not receive VC finance so far but also in older, non-high-tech companies. Government VC firms are further less likely to co-invest with many other VC investors. Government VC firms have more cash relative to other VC firms and they invest also larger amounts of cash in their companies. Finally, government VC firms were more likely to invest in the pre-bubble period.

Table 4.5 presents the results of the second stage of the Heckman procedure. The second stage represents a log-linear regression of inflation-adjusted (2008=100) premoney valuations on the VC firm type, investee company characteristics and control variables, adding the inverse Mills ratio as an additional regressor. Models I and II report results for the full sample. Models III and IV report results for the subsample of investment rounds with one VC investor. Models II and IV include the financial statement control variables. Standard errors are clustered on the investee firm level (Petersen, 2009).

Table 4.5: Multivariate OLS Regression Controlling for Potential Selection Bias

Table 4.5 shows the results of the second stage of the Heckman correction procedure. Models I and II present the results for the full sample including both standalone and syndicated investment rounds. Models III and IV present the results for the subsample of investment rounds with only one VC investor. All standard errors are clustered on the investee firm level. **, *, and † denote significance at the 0.01, 0.05, 0.10 levels, respectively. The second stage represents a log-linear regression of inflation-adjusted (2008=100) premoney valuations on the VC firm type, investee company characteristics and control variables. The inverse Mills ratio is estimated from the first stage regression and added as an additional regressor. A significant coefficient of the inverse Mills ratio indicates that a significant selection bias exists and correction for this bias is required.

	<i>Exp. Sign</i>	<i>Full sample</i>		<i>Standalone investment rounds</i>	
		<i>Model I</i>	<i>Model II</i>	<i>Model III</i>	<i>Model IV</i>
<i>Constant</i>		8.271 **	4.070	8.638 **	5.501
<i>Type of VC firm (dummy)</i>					
<i>Captive VC</i>	-	0.012	-0.104	-0.273	-0.664
<i>University VC</i>	-	-0.540 *	-0.588 †	-0.703 *	-0.889 *
<i>Government VC</i>	-	-0.678 *	-0.649 *	-0.798 *	-0.891 *
<i>Company Characteristics</i>					
<i>Ln (1+ n^o of patent applications)</i>	+	0.142	0.197	-0.016	-0.309
<i>Ln (1+ Age) (in years)</i>	+	-0.120	-0.089	-0.242	-0.173
<i>High-tech (dummy)</i>	+	0.282	0.222	1.057 †	0.786
<i>Ln (1+ Amount invested in previous rounds)</i>	+	0.045 *	0.032	0.015	0.012
<i>Financial Statement Variables</i>					
<i>Ln (1+ Cash Assets)</i>	+		0.082 **		0.098 **
<i>Ln (1+ Non-Cash Assets)</i>	+		0.384 **		0.370 **
<i>Ln (1+ Long Term Debt)</i>	-		-0.011		-0.019
<i>Ln (1+ Operating Revenues)</i>	+		-0.004		-0.020
<i>Ln (1+ Operating Costs)</i>	-		-0.081		-0.001
<i>Ln (1+ Accumulated Gains/Losses)</i>	+		-0.001		0.005
<i>Ln (1+ Intangible Fixed Assets)</i>	+		-0.032 †		-0.037
<i>Control Variables</i>					
<i>Ln (1+ Series)</i>	+	0.465	0.352	0.714	0.649
<i>Syndication (dummy)</i>	+	0.128	-0.073		
<i>Cross-border VC (dummy)</i>	-	0.400	0.584 *	0.452	-0.003

<i>VC IPO Market Share</i>	+	4.421 *	4.229	9.198 **	1.083
<i>VC IPO Market Share squared</i>	-	1.311	-2.888	-1.044	10.490
<i>Ln (1+ VC Firm Size)</i>	-	-1.196 **	-0.650	-2.088 **	-1.327
<i>Ln (1+ VC Firm Size) squared</i>	+	-0.017 *	-0.004	-0.020	-0.007
<i>Ln (1+ Inflow of capital)</i>	+	0.232 *	0.223 †	0.304 *	0.186
<i>Ln (1+ Belgian Industry Index)</i>	+	0.039	0.047	-0.013	-0.009
<i>Pre-Bubble (dummy)</i>	-	-0.127	0.167	-1.024 †	-0.611
<i>Inverse Mills ratio University VC</i>		0.675 **	0.332 †	1.116 **	0.693
<i>Inverse Mills ratio Government VC</i>		-0.435	-0.084	-1.969 *	-1.231
N° of observations		<u>349</u>	<u>263</u>	<u>205</u>	<u>153</u>
N° of companies		<u>179</u>	<u>152</u>	<u>134</u>	<u>107</u>
Adjusted R ²		36.7%	46.2%	26.6%	38.1%
F-statistic		19.1	20.5	12.2	10.5
p-value (F-statistic)		0.000	0.000	0.000	0.000

The inverse Mills ratio for university VC firms is positive and significant in most models (< 0.01 in Models I and III), indicating that there is a positive correlation between the unobserved factors that determine whether a university VC firm will invest and the unobserved factors that determine company valuation. The significant inverse Mills hence indicates that selection bias is present for this type of VC firm and a correction is needed. For government VC firms, the inverse Mills ratio is only significant (< 0.05) and negative in Model III, suggesting that no severe selection bias exists. After controlling for the selection effect, university VC firms (< 0.05 or < 0.10) and government VC firms (< 0.05) still value companies lower than independent VC firms. Moreover, the effects of the control variables are not affected by the inclusion of the inverse Mills ratio.

A second strategy to analyze the endogeneity problem is to study VC investment outcomes as a measure for the investment risk, acknowledging that there may be some unobserved factors that may affect the risk of investee companies of different types of VC firms. More specifically, an overall higher risk investment strategy may for example explain the lower company valuations observed for university VC firms and government VC firms. If these types of VC firms mainly select companies with a higher risk, we expect to see ex-post a higher proportion of successful investments (or unsuccessful investments). IPO companies and companies that were the target of an acquisition are classified as successful outcomes of a VC investment, while bankrupt or liquidated companies are classified as unsuccessful outcomes of the VC investment. Furthermore, companies that do not fall into one of those categories are considered as successful VC investments if their value increased constantly over all follow-on VC investments rounds. Twenty-five companies are as such classified as successful investments. In a similar vein, companies are considered as unsuccessful VC investments if their value constantly decreased over follow-on VC investment rounds. Twenty-one companies are as such classified as unsuccessful VC investments. Companies with only one VC investment round or companies with valuations going up and down are removed from the sample for this analysis. To reduce the potential misclassification of companies as successful or unsuccessful investments, the sample is further limited to companies with an initial VC investment before 2003. This limitation follows the assumption of a typical average holding period for the VC investment of six years. As a result of this limitation, 59 VC investment rounds in 30 companies were excluded. Given these restrictions and the ensuing reduction in sample size, we are unable to present results for the subsample of standalone investment rounds, as the resulting size of the sample is too small.

Table 4.6: Probit Regression Modeling on Successful VC investments

Table 4.6 reports the probit regression models that predict the likelihood of a successful VC investment outcome. All standard errors are clustered on the company level. **, *, and † denote significance at the 0.01, 0.05, and 0.10 levels, respectively. The dependent variable is a dummy variable equal to 1 for all IPO companies, companies that are acquired by another company and companies with valuations increasing in time, zero otherwise. Companies with only one VC investment round or with valuations going up and down are excluded from this analysis. Furthermore, companies with an initial (Series A) VC investment after 2002 are excluded from the analysis. The cumulative amount of cash invested by VC investors in earlier rounds (in millions of euros), financial statement variables, the inflow of capital in the VC industry (in 100 millions of euros) and VC firm size (in billions of euros) are inflation-adjusted (2008=100) variables. The type of VC investor is measured by dummy variables, and none of these dummy variables is expected to be significant in the absence of a sample selection bias with respect to type of VC firm.

	<i>Model I</i>	<i>Model II</i>	<i>Model III</i>
<i>Constant</i>	-0.595	-0.741	-0.868
<i>Type of VC firm (dummy)</i>			
<i>Captive VC</i>		-0.076	-0.179
<i>University VC</i>		0.312	0.472
<i>Government VC</i>		0.477	0.244
<i>Company Characteristics</i>			
<i>Number of patent applications</i>	0.058	0.054	0.121
<i>Age (in years)</i>	0.018	0.011	0.014
<i>High-tech (dummy)</i>	0.421	0.476 †	0.686 *
<i>Amount invested in previous rounds (in mil euros)</i>	0.012	0.016	-0.026
<i>Financial Statement Variables (in mil euros)</i>			
<i>Cash Assets</i>			0.676 *
<i>Non-Cash Assets</i>			0.017
<i>Long Term Debt</i>			0.255
<i>Operating Revenues</i>			0.225
<i>Operating Costs</i>			-0.246
<i>Accumulated Gains/Losses</i>			-0.043
<i>Intangible Fixed Assets</i>			-0.604
<i>Control Variables</i>			
<i>Series</i>	-0.158	-0.165	-0.173
<i>Number of investors</i>	0.155 †	0.195 *	0.224 †
<i>Cross-border VC(dummy)</i>	0.467	0.648	0.474
<i>VC IPO Market Share</i>	0.945	1.104	0.809
<i>VC Firm Size (in bil euros)</i>	-0.239	-0.372	-0.381
<i>Inflow of capital (in 100 mil euros)</i>	-0.033	-0.031	-0.009
<i>Belgian Industry Index</i>	0.164 *	0.160 *	0.065
<i>Pre-Bubble (dummy)</i>	-0.006	-0.071	-0.022
N° of observations	<u>228</u>	<u>228</u>	<u>173</u>
N° of companies	<u>109</u>	<u>109</u>	<u>92</u>
Adjusted R ²	12.6%	14.1%	18.3%
χ ² -statistic	23.2	28.9	30.6
p-value (χ ² -statistic)	0.026	0.016	0.105

Table 4.6 shows the results of the probit regression models predicting the likelihood of a successful VC investment. Model I includes only company characteristics. Model II adds dummy variables for non-independent VC firm types, with independent VC firms as the base category. Model III includes all explanatory variables, including company accounting variables. All standard errors are clustered on the investee company level (Petersen, 2009). The results suggest that high-tech companies have a higher probability of being a more successful VC investment (<0.05 or <0.10) compared with non-high-tech companies. Companies that are considered as successful investments also have more cash (<0.05). The probability of a successful VC investment also increases with a higher number of VC investors (<0.05 or <0.10). Finally, more successful investments are made when the Belgian economy is stronger (< 0.05). However, none of the VC type dummy variables has a significant effect. Ex-post, there are on average neither more unsuccessful VC investments (companies that fail, that are liquidated or companies with valuations that only go down), nor successful VC investments (IPO companies, acquired companies or companies with valuations that only go up) from captive, university or government VC firms compared with independent VC firms. Thus, there is no significant ex-post selection bias with respect to VC firm type. Before the investment, a selection bias exists for university VC firms but the probability of success after the investment is not significantly different between different types of VC firms. Therefore, the observed differences in valuations between different VC firm types are unlikely to be driven by selection bias.

4.4.5 Robustness Checks

Several robustness checks were performed. First, the results remain robust when the syndication dummy variable in the regressions is replaced by the logarithm of the number of VC investors in each investment round. Second, including company growth in relative or absolute terms has no impact on the reported results. Third, VC IPO market share as a measure of VC reputation was defined from the VentureXpert database as the market equity value of all IPO companies that received finance from that VC investor proportional to the market equity value of all public companies that received VC finance over a period of five years (Cumming and Dai, 2011; Nahata, 2008). The conclusions for this alternative measure of VC reputation remain unaffected. Fourth, standard errors are clustered on the VC firm level rather than on the portfolio company level, as the same VC investor may be lead investor in multiple investment rounds. The results remain robust. Alternatively, rather than clustering standard errors on the VC firm level or portfolio company level, Generalised Estimating

Equations (G.E.E.) are used (Ballinger, 2004). G.E.E. are an extension of Generalised Linear Models in which the structure of the within-panel correlation can be modeled. In a first model, the within-subject observations are expected to be equally correlated; in a second model, all possible correlations are included. Neither G.E.E. model has an impact on the reported results.

4.4.6 Alternative Explanations

Recent research has highlighted two phenomena in venture capital investing that could potentially explain our results: overvaluation (Cumming and Walz, 2010) and style drift (Cumming et al., 2009). We discuss both of these issues and relate them to our results. Overvaluation occurs when a VC investor pays a price that is higher than the economic value of an investment. In general, overvaluation is more prevalent when stock market conditions are weak and when investments are made during the company's early stage but are less prevalent in syndicated VC investments (Cumming and Walz, 2010). Our models control for these variables. Cumming and Walz (2010) further suggest that VC firm characteristics are also associated with overvaluation: VC firms tend to overvalue their investments when they have an incentive to signal their quality with higher valuations. We find that independent VC firms assign higher valuations compared with university and government VC firms. Independent VC firms are typically more reputable investors with more reputational capital at stake (Bottazzi et al., 2008) as they need to raise follow-on funds. Furthermore, the investment managers of independent VC firms are compensated with stronger profit-based incentives compared with government or university VC firms (Leleux and Surlemont, 2003). Both arguments suggest that independent VC firms have fewer incentives to overvalue investments compared with university or government VC firms, as overvaluation would hamper the future performance of the VC fund and subsequently their personal incentives and their ability to raise future funds. It is hence unlikely that overvaluation drives our results.

Second, some VC investment managers deviate from their initially stated investment preferences in a phenomenon termed 'style drift' (Cumming et al., 2009). Style drifting is typically associated with higher valuations and with a higher probability of an IPO of the company, suggesting that VC investment managers only drift away from their traditional investment style for VC investments in companies that are more likely to have favorable outcomes and thus companies which are on average also more valuable (Cumming et al., 2009). Style drift could thus account for higher valuations in independent VC firms, as university and government VC investment managers often have strict investment policies. The former invest solely in university spin-off companies while the latter are often prohibited

to invest in companies that do not correspond to specific investment criteria. The greater freedom of independent VC firms to invest in companies outside their initial target segment could explain their relatively higher valuations. The impact of this phenomenon on valuations in our sample will be limited, however. If style drift were a frequent phenomenon among independent VC firms, independent VC firms would have a higher proportion of successful investments and exits. However, Table 4.6 shows that independent VC firms do not have more successful investments compared with university and government VC firms, nor do they invest more frequently in companies that eventually go public through an IPO (Table 4.1-Panel D).

4.5 Discussion and Conclusions

This study provides a joint test of how differences in VC firm type and VC bargaining power may affect company valuations. We first argue that the investment strategy of different types of VC firms will affect the level of competition between VC investors which will further affect their bargaining position versus the entrepreneur. Second, utilizing bargaining models (Kirilenko, 2001; Cable and Shane, 1997; Fairchild, 2004), we argue that differences in relative bargaining power between different types of VC investor will affect the valuation of investee companies. More specifically, we argue that VC firm types that compete less with other VC investors will have more bargaining power versus the entrepreneur which they will exploit to obtain higher equity stakes for a given amount of cash, or equivalently, VC firm types with relatively more bargaining power are expected to value companies lower compared with VC firm types with less bargaining power.

The hypotheses are tested on a sample including 362 investment rounds in 180 Belgian investee companies. The results indicate that, all else equal, university and government VC firms value companies lower than independent VC firms. The valuations of captive VC firms are not significantly different from those of independent VC firms. We further test whether the differences in valuation are the result of a different selection process. The lower valuations of university VC firms are partially driven by the selection behavior of the entrepreneur and/or university VC investor. After controlling for this selection bias, however, university VC firms still value companies lower compared with independent VC firms. For government VC firms no significant selection behavior was reported. The empirical results suggest that different types of VC investors shape different valuations in VC investment rounds.

The findings of this paper are consistent with the arguments that competition between VC investors affects the bargaining power of a VC investor versus the entrepreneur and that VC bargaining power affects company valuation. VC firms with more bargaining power as a result of less competition exploit this power to negotiate lower valuations. A higher bargaining power may be embedded in the strategy of the VC firms, e.g., by relying on a captive deal flow as university VC firms do. Targeting niche markets with low levels of competition from other VC firms is an alternative strategy for VC investors to increase their bargaining power. This strategy is followed by government VC firms, who either target high technology seed investments or more mature, less growth-oriented companies. Our results hence provide an indirect empirical test of the theoretical bargaining model developed by Fairchild (2004). While we expected that corporate VC firms would also exploit the captive deal flow that they have when investing in their spin-out companies, our results do not suggest that they do so. This result may be because the major portion of their investments occurs in unrelated companies, in which they face the same competition as independent VC firms. The bivariate analyses indicate that captive VC firms value investee companies lower compared with independent VC firms when they invest with no other VC investors and value companies higher when they invest as a lead VC investor together with other VC investors. These bivariate analyses may hint that for captive VC firms, VC investments in unrelated companies have a higher probability of being syndicated, while captive investments have a higher probability of being standalone VC investments. A more fine-grained analysis of captive VC firm investments may help to understand their investment and valuation processes in greater detail.

Our findings are far from trivial, as there are various reasons to expect higher valuations from university and government VC firms. First, earlier research has established that VC firms with a higher reputation negotiate lower valuations (Hsu, 2004; Cumming and Dai, 2011). However, independent investors are in general more sophisticated and more reputable investors (Bottazzi et al., 2008; Hirsch and Walz, 2013). Solely focusing on VC investor reputation as a determinant of valuation would therefore suggest that university and government VC firms have a lower bargaining power, leading to higher valuations. Our results point in the opposite direction, suggesting that VC reputation is only one element that shapes a VC firm's bargaining power. Next to reputation, a VC firm may enhance its bargaining power by creating captive deal flow or by targeting low-competition niche markets. While the present study focused on specific types of VC firms that are shielded from

competition given their reason of existence, independent and captive VC firms may also consider alternative strategies to enhance their bargaining power in addition to building a strong reputation in the VC market. For example, building strong links with research institutions, intermediaries or potential VC syndicate partners may provide a first view on deal flow that is originated by or passes through these organizations. Reputation is difficult and takes time to develop; alternative bargaining power strategies may thus be especially important to enable young VC firms to establish themselves in the VC market.

Second, the goals of university and government VC firms are not only to earn a financial return but also to enhance a university's reputation or to sustain economic development (O'Shea et al., 2005; Murray, 1998; and Manigart et al., 2002a). One might hence expect that those firms would trade off financial returns against their other goals, and hence accept higher valuations. We have shown that this is not the case: these investors fully exploit their higher bargaining power and negotiate lower valuations.

Third, university and government VC firms are less well equipped to provide high level services to their portfolio companies compared with independent VC firms. The incentive schemes in the former are less geared towards active involvement (Hirsch and Walz, 2013; and Murray, 1998). Furthermore, given their lower level of expertise, it is even argued that it is optimal for university and government VC firms to remain rather inactive and limit their engagement to monitoring activities. As a result, these VC firms' contracts incorporate fewer mechanisms that induce active intervention (Hirsch and Walz, 2013). The lower levels of post-investment services provided by government and university VC firms make their funding less valuable, which would induce entrepreneurs to negotiate higher valuations. Our findings suggest that valuations are lower, however, again corroborating the bargaining power theory rather than the value-adding and reputation theories.

In general, we contribute to the VC literature by showing that VC investor heterogeneity goes beyond differences in value-added support and governance structure but also affects valuations in investment rounds (Bottazzi et al., 2008; Mayer et al., 2005). We further show that bargaining power in the VC industry is not determined only by a VC firm's reputation or by whether the firm is a local or cross-border investor, but also by its investment strategy. We also add to the finance literature by analyzing determinants of the valuation of private companies that, in contrast to public companies, are often neglected in the current finance

literature and show that not only company characteristics but also investor characteristics determine the value of private companies.

Our results are important not only for VC firms but also for entrepreneurs. We highlight that it is important that entrepreneurs try to maximize their bargaining position in order to negotiate a higher value for their company. If entrepreneurs are locked in or if they are unable to generate sufficient interest from diverse VC investors, then they are unable to negotiate high valuations, which will ultimately affect their potential financial returns and the control that they may retain over their company. Furthermore, entrepreneurs should understand that VC firms are not willing to accept higher valuations because they have other non-financial goals in addition to realizing a financial return. Again, securing sufficient financing options from other VC investors is crucial for entrepreneurs to increase their bargaining power and ultimately to increase the value of their company.

As with all research, this paper has some limitations. First, the external validity of the results may be limited given the focus on Belgium. However, the focus on Belgian companies allowed access to the Belgian Law Gazette, which reports official information on all capital increases, even for unquoted companies. Hence, the reliability and completeness of the data are excellent, which is often a serious concern for most other studies relying on commercial databases. Furthermore, the development of the Belgian VC industry is likely to be comparable to the development in other Continental European countries, supported by Figure 4.1 showing that the Belgian VC investment activity developed similarly over time as compared with the European VC activity. Second, the Belgian VC industry functions in a broadly comparable legal and institutional setting. Belgian VC investors also frequently co-invest with international VC firms, enabling them to learn from best practices abroad and incorporate these into their functioning. Therefore, it is likely that our findings extend at least to other VC firms in Continental Europe. Whether our results are transferable to Anglo-Saxon or Asian markets remains an empirical question. Anglo-Saxon markets are more active and mature and are governed by a more investor-friendly institutional environment. In contrast, Asian markets are under development and their institutional environment is very different. VC valuation and negotiation processes may hence be different in those parts of the world.

Second, our data do not allow accounting for other factors that may affect differences in valuation. For example, the differences between venture capital investor type may be influenced by differences in the complexity of the contracts they negotiate in addition to

differences in relative bargaining power. Our approach is nevertheless consistent with earlier studies on the valuation of VC investments (e.g., Hand, 2005; Armstrong et al., 2006; Cumming and Dai, 2011). Furthermore, we control for the significantly greater likelihood of larger VCs in Europe to implement sophisticated contractual terms, including liquidation preferences, anti-dilution protections, vesting provisions and redemption rights (Chahine et al., 2007). Further, the characteristics of the entrepreneur (education, experience, age, gender,...) may also affect their bargaining position (Cumming and Johan, 2008; Han et al., 2009) and thus affect company valuations in VC investment rounds. Unfortunately, we do not have information about the entrepreneur to control for these effects. Likewise, next to such unobserved factors, the relatively small number of observations imposes some restrictions on the level of detail included for some of the control variables. For example, industry differences are measured as the difference between high-tech companies and non-high-tech companies. Including dummy variables for each industry separately would be a better and more precise way to control for industry differences; however the sample size did not allow us to include industry dummy variables. In a similar way, we would have been better able to control for time-dependent effects if we could have included year dummy variables instead of dummy variables for the pre-bubble, bubble and post-bubble period. As a result, there may be some other factors that are unobserved or insufficiently controlled for that may explain why valuations are different, next to differences in VC investor type.

The shortcomings discussed above suggest interesting avenues for future research. Furthermore, many other questions remain that are related to VC portfolio firm valuation. It would be interesting to understand which other factors affect the bargaining outcome in the entrepreneur-venture capitalist relationship. As already mentioned before, Cumming and Johan (2008) find that more experienced entrepreneurs are more likely to receive cash from a VC investor in return for common equity instead of preferred equity, suggesting that they have more bargaining power. It would hence be interesting to know for example if VC firms are willing to pay a premium for the experience of an entrepreneur or if a more experienced entrepreneur is able to negotiate better investment terms? It might also be interesting to extend the insights from this study to other settings where the value of a company is negotiated between a limited number of parties, for example in mergers or acquisitions of unquoted companies.

4.6 References

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Chapter 5

Conclusions

5.1 Introduction

The goal of this PhD dissertation is to study the impact of VC ownership on finance decisions and capital structure in entrepreneurial companies. VC investors are typically confronted with large potential agency problems when they invest in entrepreneurial companies and try to mitigate these agency problems through several mechanisms. For example, it has often been argued that VC investors have better screening and monitoring skills compared with other investors (Tyebjee and Bruno, 1984; Amit et al., 1993). A closely related stream of research argues further that VC investors are more active investors (Hellmann and Puri, 2002; Sapienza et al. 1996) and that they have more reputational capital at stake (Megginson and Weiss, 1991; Barry et al., 1990). However, there exists currently a lack of insight whether these particular features which are typically associated with VC finance can also reduce agency problems for other investors before these are involved in entrepreneurial companies. More specifically, it remains unclear whether the information generated by VC investors helps other investors in their decision making process or from a more general point of view, whether VC investors are able to increase the supply of finance for entrepreneurial companies given that investors are expected to have more and better information to decide whether or not to invest in companies that have VC ownership. The aim of this dissertation is to fill this gap and hence to contribute to the literature that has already focused on the non-financial aspects associated with VC finance beyond providing VC capital.

The first study of this dissertation uses an agency framework to study empirically if VC investors are better able to reduce agency problems in entrepreneurial companies and what the impact of this effect may be for other investors who have the potential to invest in these companies. I first argue that VC ownership will have a positive effect on internal corporate governance mechanisms and that this positive effect will result into a greater access to finance for entrepreneurial companies. I further argue more specifically that VC ownership will result into corporate governance mechanisms which are more protective and beneficial for equity investors which may result into a larger positive effect of VC ownership on equity investment decisions. For financial debt investment decisions, I likewise first argue that VC ownership will result into a reduction of the agency costs for debt investors and hence that VC ownership will have a positive effect on debt finance decisions. However, I also argue that

VC ownership may have a negative effect on debt finance decisions as VC corporate governance mechanisms will be less beneficial and protective for debt investors and the staging of VC finance may increase the downside risk of a company which is a higher concern for debt investors. To study these effects empirically, I compared between the finance decisions of VC companies and non VC companies. The second study of this dissertation extended the first study by combining an agency theory perspective with an institutional theory perspective to study the joint effect of VC corporate governance mechanisms and country-level institutional frameworks on entrepreneurial finance decisions and capital structure. We argue that VC corporate governance at the company-level may both substitute for or complement with institutional standards at the country-level. We empirically studied this moderating effect of VC ownership from the interaction between measures for VC ownership at the company level and measures for the quality of the legal system and the strictness of bankruptcy law at the country level. As such, combining the insights from the first and second study, we gain a thorough understanding of the impact of VC ownership on entrepreneurial finance decisions and capital structure which is not limited to one particular country-specific institutional setting. Specifically, we shed light on the question in which institutional settings the impact of VC ownership on finance decisions will be greatest. In the third paper, we relax the assumption that all VC finance is equal. Specifically, building on bargaining theory, we study in a joint framework how the relative bargaining power of a VC investor may depend upon VC firm type and how relative differences in VC bargaining power may affect company valuation in VC investment rounds. We therefore study empirically how differences between independent VC firms and different types of non-independent VC firms affect company valuation. This study contributes to a growing stream of literature that acknowledges VC heterogeneity. VC investors have different skills and incentives which may have important consequences for their distinguished role as expert financial intermediary.

In this final chapter, I focus on the main findings of this PhD dissertation and the contributions and practical implications of these findings. I further focus on some limitations of these studies and suggest some avenues for future research.

5.2 Main findings

First, the first and second study of this dissertation generally look at the effect of VC ownership for potential investors in entrepreneurial companies. Specifically, these studies empirically study for entrepreneurial companies the effect of having received VC finance on

subsequent finance decisions. The goal of these empirical studies is to analyze whether VC ownership, as such, is able to reduce the information asymmetries that exist between investors and entrepreneurs before the investment.

The first study found that VC ownership results into a larger supply of finance for the focal entrepreneurial company. This result supports the argument that VC investors have a positive effect on reducing agency problems in entrepreneurial companies, which also benefits other investors that are searching for investment opportunities. More specifically, I argue that VC investors are qualified as expert monitors and highly-involved investors and that VC investors can credibly signal company quality to potential investors that are less informed than the entrepreneur. Hence, I argue that entrepreneurial companies will become more attractive for potential investors if they have VC ownership. Second and more specifically, I find that VC ownership results into an even larger positive effect on capital investment decisions from equity investors. This indicates that VC investors typically implement good governance practices in entrepreneurial companies which are especially beneficial for equity investors. Third, I do not find that VC ownership results into a positive or negative effect for financial debt investors. Although I expected or a positive, or a negative impact on financial debt investment decisions, I suggest that for financial debt investors the benefits associated with VC ownership, more specifically a higher reduction in agency costs, will be offset by the disadvantages associated with VC ownership, more specifically the implementation of an equity-oriented corporate governance system and the higher downside risk. Nevertheless, I show that debt investments from financial debt investors are equally important for companies that raise VC finance as compared with companies without VC finance. Hence, although VC ownership has been typically associated with equity finance, the results of this first study demonstrate that debt is equally available for these companies. Another important finding of this first study, is that there is a stronger effect associated with repeated VC finance versus non-repeated VC finance. Specifically, additional or repeated VC finance results into a greater access to entrepreneurial finance and has a larger effect on equity investment decisions as compared with non-repeated VC finance. Repeated VC finance has no effect on financial debt investment decisions. In fact, these results may indicate that the certification effect of VC finance for entrepreneurial companies will be considerably larger if VC investors commit to further finance the company, so that it can make entrepreneurial companies even more attractive for investors, especially for equity investors. Finally, in a robustness test, we show that these effects of VC ownership on entrepreneurial finance decisions are not significantly

different between bank-affiliated VC investors and other types of VC investors. Choosing for a bank-related VC as shareholder will hence not remedy for the insignificant effect of VC ownership on financial debt investment decisions. Having a VC investor as shareholder is thus much more important for an entrepreneur than having a specific type of VC investor when searching for entrepreneurial finance.

In the second study, we studied whether VC ownership had a smaller or larger effect on entrepreneurial companies' finance decisions in countries with a better legal system or in countries with a more forgiving 'personal' bankruptcy law. Specifically, we studied the joint effects of VC ownership and the quality of law enforcement or the possibility to obtain a fresh start after bankruptcy on finance decisions and capital structure in entrepreneurial companies. First, the results of this study indicate that entrepreneurial companies are able to raise more entrepreneurial finance and indicate that they have a higher financial leverage in countries with a better law enforcement or in countries in which bankruptcy law foresees a fresh start for the entrepreneur. Second, we find that there is a complementary effect between VC ownership at the company-level and the quality of law enforcement and/or forgiveness of bankruptcy law at the country-level. Specifically, the effect of VC ownership on entrepreneurial finance decision is larger in countries with a better quality of law enforcement and in countries in which bankruptcy law foresees a fresh start. We argue that VC investors are more effective in reducing agency problems in countries with a better legal system which may also lead to a higher reduction of the agency costs for potential investors. Likewise, the attractiveness of a fresh start will be higher for an entrepreneur that raised VC finance as VC investors typically adopt a more savage attitude in divesting from underperforming investments (Mason and Harrison, 2002). In short, although the effect of VC finance is not limited to one specific institutional context, its impact on entrepreneurial finance decisions will be stronger in countries with a better legal system measured as the quality of law enforcement and also stronger in countries with a more forgiving bankruptcy law measured as the possibility to obtain a fresh start after bankruptcy.

The third study relaxes the assumption that all VC finance is equal and explores differences between different types of VC firms. In this study, we study the joint effect of VC firm type and VC bargaining power on company valuation. First, we argue that different types of VC firms have different investment strategies which will affect VC bargaining power versus the entrepreneur. Second, we argue that these differences in bargaining power will ultimately affect company valuations in VC investment rounds. VC bargaining power may be important

because company valuations are the outcome of negotiations between the VC investor and the entrepreneur rather than set by supply and demand conditions in the financial market. Specifically, we claim that when there is less competition between VC investors, VC investors will have more bargaining power and we further claim that they will exploit this benefit by negotiating lower company valuations. Our results support these arguments. University and government VC firms which are expected to have comparatively more bargaining power negotiate lower company valuations compared with independent VC firms. Hence, with this study we show the relevance of VC heterogeneity for the entrepreneur. Although differences in VC firm type (specifically bank-affiliated VC investors versus other VC firms) do not affect entrepreneurial finance decisions, they do affect the equity stake that entrepreneurs will retain after the VC investment.

5.3 Contributions and practical implications

5.3.1 Contributions to theory

In this paragraph, I discuss the main contributions to the three theoretical frameworks that are used in this dissertation: agency theory, institutional theory and bargaining theory.

Contributions to agency theory

The basic idea underlying agency theory is the existence of information asymmetries between a principal and an agent. Agents have more information than the principal and are not always acting in the principals' best interest. Such a principal-agent framework has been used to explain a wide variety of relationships such as between car sellers and potential car buyers (Akerlof, 1970), insurance companies and insured persons (Arrow, 1963), between employers and employees (Lepper et al., 1973), VC investors and entrepreneurs (Sapienza and Gupta, 1994; Sahlman, 1990)... The first and second study of this dissertation use such an agency framework to study finance decisions in private, entrepreneurial companies. In general, we contribute to agency theory because we show that it is not only a relevant theoretical framework to study the relationship between a VC investor and an entrepreneur but also a relevant framework to study the effect of VC ownership on the supply of finance from less informed investors that have the potential to invest in these companies. Specifically, we show that VC ownership reduces the agency problems that exist between an entrepreneur and other potential investors. A second contribution to agency theory, is our integration of an agency framework together with an institutional framework in the second study. Most studies relying on an agency framework alone assume that companies operate within an institutional vacuum

and typically ignore the impact of different institutional frameworks (Filatotchev and Boyd, 2009) while we show that there exists a combined effect of both on entrepreneurial finance decisions.

Contributions to institutional theory

The first contribution to institutional theory is again the integration of an institutional perspective with an agency perspective to explain entrepreneurial companies' finance decisions and capital structure. Many studies that rely on institutional theory typically focus on cross-country differences assuming that all other factors are stable. Hence, these studies typically assume that the relationship between entrepreneurs and investors remains stable over different institutional contexts. A second contribution to institutional theory is that we measure the effect of a particular aspect of 'personal' bankruptcy law, namely whether bankruptcy law foresees a fresh start or not which is a rather new, unexplored measure to assess the impact of differences in national laws and which has been argued to be particularly relevant in the context of entrepreneurial companies (Armour and Cumming, 2008).

Contributions to bargaining theory

The most important contribution to bargaining theory is the fact that we use a bargaining theoretical framework to empirically study valuations in venture capital financing rounds. Valuations in VC investment rounds are the outcome of lengthy negotiations between the VC investor and the entrepreneur, rather than the outcome of supply and demand conditions in the financial market. The relative bargaining power of the VC investor is thus expected to be an important determinant for the outcome of this negotiation process (Hellmann, 1998; 2006). Hence, valuations in VC investment rounds are a particularly relevant empirical setting to test such a bargaining theoretical model. Moreover, to the best of our knowledge, we are the first to empirically test the theoretical model by Fairchild (2004) that uses such a bargaining framework to explain differences in the financial contract between the VC investor and the entrepreneur. Second, our results are consistent with a bargaining theoretical model. Company valuations in VC investment rounds are not only driven by company- and project characteristics (which would be rational), but also by relative differences in VC bargaining power. Hence, we add to the growing stream of literature (e.g., Cumming and Dai, 2011; Fairchild, 2004) that acknowledges the usefulness of bargaining theory in order to explain VC investment behavior.

5.3.2 Contributions to the literature

This PhD dissertation contributes to the literature in a number of ways. First, we contribute to the *entrepreneurial finance* literature as we were able to avoid some limitations from prior studies. Firstly, entrepreneurial research typically has a strong focus on U.S. based datasets. Secondly, entrepreneurial research is often confronted with the problem that data is incomplete or subject to significant biases. For example, Kaplan et al. (2002) find that commercial databases (e.g. VentureOne and Venture Economics) suffer from self-reporting biases and that confidential data like for example the amount of cash invested by VC investors or valuations in VC investment rounds are often noisy. To avoid such biases, empirical entrepreneurial research often uses surveys to collect information that is less subject to biases however these datasets typically cover a much smaller number of observations over a shorter period of time. Hence, the external validity of these survey-based results may be questionable. In this dissertation, we tried to avoid these limitations. First, the hypotheses in the first and second study are tested on a large, European longitudinal dataset covering nearly 7,000 entrepreneurial companies. Moreover, the data is stratified by country and was collected by the joint effort of local research teams which reduces the risk of misclassification due to language barriers or a lack of knowledge about local laws or regulations. As such, the external validity of our findings will be large compared with other entrepreneurial studies thereby contributing to the above-mentioned gaps in the entrepreneurial finance literature.

Second, we contribute to the *venture capital finance* literature as we focus on one particular aspect of VC finance which has received considerable less attention. Specifically, we focus on the effect of VC finance on entrepreneurial finance decisions and thus as such contribute to the existing VC literature that has studied the effect of VC governance. Further, most of our knowledge on finance decisions in entrepreneurial companies is limited to the financial investment structure between venture capitalists and entrepreneurial companies. Specifically, particular attention has been given to the staging of capital infusions (Neher, 1999; Gompers 1995) or the type of securities used (Kaplan and Strömberg, 2003) when VC investors invest. The basic argument underlying these studies is that such VC arrangements will limit the potential of agency conflicts. However, it is far less clear how such VC arrangements may affect the finance decisions in entrepreneurial companies that follow *after* the VC investment and which are not limited to additional VC (equity) finance. Moreover, the first two studies study the effects from the mere fact of having received VC finance. A growing stream in the VC literature focuses on aspects in which VC investors are different and how these

differences may affect VC investment strategies. Although focusing on such VC heterogeneity is obviously extremely important, academics should not forget that VC ownership as such already generates a significant effect. Finally, Study 3 of this dissertation focuses on a rarely researched phenomena in the VC literature, namely the valuation of companies in VC investment rounds. Valuation data are often unavailable or subject to significant reporting biases in the VC literature (Kaplan et al., 2002) given that most of this research is based upon datasets that rely on commercial databases. We were able to retrieve VC valuation data from a reliable and externally validated data source, the Belgian Law Gazette, which ensures high-quality data which is unlikely to suffer from potential biases reported in the limitation section of many other studies. Additionally, we predict company valuations based on expected differences in VC bargaining power between different types of VC investors. Empirical research that uses a bargaining theory perspective is rather new in the VC literature (with some notable exceptions such as e.g. Hsu, 2004) and we deliver some new insights from such a theoretical perspective that are non-trivial. Hence, defining the negotiation process between VC investors and entrepreneurs from the joint perspective that different VC types have different bargaining power which results into a different valuation of their portfolio companies contributes to a more complete understanding of this negotiation process.

Third, we contribute to the *financial intermediation* literature. Since the seminal work of Diamond (1984) and Boyd and Prescott (1986), it is well-accepted that financial intermediaries have an important information production task which is able to mitigate the information asymmetries that exist between insiders and outsiders. However, a large part of this literature focused on some heterogeneous aspects of financial intermediaries within one particular category. For example, Billett et al. (1995) study how banks are different in monitoring borrowers; likewise Chaney et al. (2004) and Bottazzi et al. (2008) study how respectively auditors and VC investors may have a different value-adding effect for their companies. An important limitation of these studies is that the reported effects are contingent upon a certain selection of companies, for example only companies that received bank finance or VC finance. In this dissertation, we take a different approach. Specifically, we focus on the ‘information production’ effect of VC finance and how it may affect the agency costs of a potential investor and thus the supply of entrepreneurial finance. Hence, we are able to shed some light on the role of VC investors as unique financial intermediaries on finance decisions in entrepreneurial companies while limiting the risk that these effects are the result of any

self-selection behavior. A second contribution to the financial intermediation literature is that we study the effect of VC ownership as a special kind of financial intermediary for potential investors in private, entrepreneurial companies who are particularly confronted with agency problems when they consider an investment. Much of the literature has focused on the effect of financial intermediaries on public companies however information asymmetries are expected to be much lower in public companies as compared with private companies for investors who have the potential to invest. Hence, a sample of private companies provides a highly relevant environment to examine which effects financial intermediaries, and VC investors in particular generate. Finally, the results of the second study of this dissertation contribute to a more complete understanding of the cross-country differences in financial intermediation.

Fourth, we contribute to both the *law* and *finance* literature. Since the work of La Porta et al. (1997, 2000), it is widely accepted that higher quality legal systems lower the costs associated with monitoring an entrepreneur after an investment and reduce the scope for the entrepreneur to maximize private benefits. We contribute to that literature by showing that the quality of a legal system will not only affect financing decisions directly but also indirectly by affecting the effectiveness of financial intermediaries like VC investors in reducing agency problems. Second, we focus on the effect of a particular dimension of *personal* bankruptcy law, namely whether bankruptcy law foresees a fresh start or not. Personal bankruptcy law has been argued to be particularly relevant for influencing entrepreneurial activity (Armour and Cumming, 2008). However, most of the empirical research studies *corporate* bankruptcy law which is different in some dimensions (White, 2011) or studies only the effect of personal bankruptcy law on financial debt investment decisions (White, 2011). This dissertation further adds to the finance literature in four different ways. First, we contribute by presenting an in-depth analysis of the finance decisions of private companies. Other studies that focus on finance decisions studied mainly public companies (Leary and Roberts, 2005; Pagano et al., 1998; Fama and French, 2002); or study both public and private companies but do not distinguish between private companies with VC finance and private companies without VC finance (Brav, 2009). Second, other related research in the finance literature (e.g. Puri and Zarutskie, 2012) studies differences between U.S. VC and non VC entrepreneurial companies with respect to their life-cycle dynamics and their performance. This dissertation adds to this study as financing decisions will be an important driver of the eventual success or failure, and thus the performance, of VC and non VC entrepreneurial companies. Third, Cosh et al. (2009)

differentiate between different sources of entrepreneurial capital and analyze factors that drive the decision to raise VC finance (amongst other sources). This dissertation adds to their work by studying finance decisions after the companies have raised VC finance. Finally, in the third study, we add to the finance literature by analyzing how investor bargaining power will affect the valuation of private companies. These effects are often neglected in the current literature. Using different VC firm types as a measure of differences in VC bargaining power, we show that differences in bargaining power will determine the negotiated value of private companies in VC investment rounds.

5.3.3 Practical implications

The practical implications of this dissertation are multi-fold. This paragraph describes the implications for entrepreneurs, VC investors, and policy makers.

Implications for entrepreneurs

Probably the most important implication for entrepreneurs is the fact that VC ownership will result into a greater access to entrepreneurial finance. We show that VC ownership is positively associated with more entrepreneurial finance and even more so if VC investors provide additional VC finance. Further, VC ownership results into a greater access to capital from equity investors and repeated VC finance again further increases this positive effect. These implications are important for entrepreneurs who are typically wealth-constrained and for whom access to finance is therefore crucial. First, entrepreneurs who are able to choose between VC finance and other sources of finance should take the strong certification effect of VC finance into account. Choosing for VC finance at an early stage will have a high, positive effect on the supply of additional finance. Second, entrepreneurs that attract VC finance as a last resort source of finance for example because they fear losing control should realize that VC ownership will have a large, positive effect on the supply of equity finance. Hence in the long run, raising VC finance may result into an even higher dilution of their equity stake and thus a greater loss of control. Third, entrepreneurs that do not consider raising VC finance, should be aware that this may result into a lower supply of outside finance in the long run. This might have important consequences for the future growth of their company, especially when this company turns out to be successful and large amounts of finance are needed to sustain further development. In a nutshell, when entrepreneurs consider raising VC finance, they should realize that the VC investor will bring in cash but also will have a strong certification and reputation effect, making their company more attractive to other potential

investors, especially equity investors. Moreover, the entrepreneur should try to attract a VC investor who has sufficient cash to invest again later on or a VC investor that is well-connected with VC investors who can take over its role at a later moment as additional VC finance will have a larger, positive effect on access to finance.

A second implication for entrepreneurs is that the 'price' they will have to pay for VC certification will depend upon their bargaining position during the negotiation process with a VC investor. Our findings indicate that it is important that entrepreneurs have a good bargaining position before they start the negotiation as this will result into a higher valuation of the company and thus a smaller number of shares the entrepreneur will have to give up in return for certain amount of cash. If the entrepreneur is locked-in or if she is unable to generate sufficient interest from VC investors, she will receive a lower valuation with adverse negative effects for the control that she may retain over her company. Moreover, it is important for entrepreneurs to know that VC investors are not willing to accept higher valuations just because they have other non-financial goals in addition to realizing financial returns. Hence, entrepreneurs should try to have access to sufficient different sources of VC finance before starting the negotiation with one particular VC investor in order to increase their bargaining power.

A third implication for the entrepreneur is that the positive effect of VC ownership on finance decisions will depend upon the institutional context in which they operate. We show that a country's legal framework and the forgiveness of bankruptcy law in a particular country may act as a complement for VC ownership. Specifically, entrepreneurs that operate in countries with a better law enforcement and in countries with a more forgiving bankruptcy law will benefit comparatively more from VC ownership compared with entrepreneurs that operate in countries with worse legal systems or less forgiving bankruptcy laws. Moreover, entrepreneurs already have comparatively greater access to finance in countries with a better legal system and in countries with a more forgiving bankruptcy law, unconditional whether they receive VC finance or not. Hence, the positive effect of VC ownership on entrepreneurial finance decisions may be strongest in countries in which entrepreneurs are on average least financially-constrained. Entrepreneurs should therefore first consider the institutional context in which their company is located before raising VC finance from the purpose of having a greater access to finance, especially when they are located in lower quality institutional contexts, as VC finance will be less effective in reducing agency problems for other potential investors in these environments.

Implications for VC investors

Some of the implications for entrepreneurs are equally important for VC investors.

A first implication for VC investors is that they should try to increase their bargaining power when they start to negotiate with the entrepreneur as this will result into a lower valuation of the company and hence positively affect their future financial return. Further, we show that VC reputation is only one factor that may affect their bargaining power. Specifically, we argue that VC investors can also increase their bargaining power by creating a captive deal flow or by targeting niche markets with low levels of competition from other VC investors. Hence, young, less established VC investors that still need time to develop a strong reputation may consider such an investment strategy. Another strategy that might prove fruitful for young VC firms to increase their bargaining power is to join a VC syndicate in which the lead VC investor has relatively more bargaining power. In a VC syndicate, lead VC investors are typically charged with the negotiation of the investment terms and conditions. Non-lead VC investors are much less involved in this negotiation process but typically invest at the same conditions as the lead VC investor was able to negotiate. Hence, young VC firms may then benefit in a similar way from the high bargaining power of the lead VC investor.

A second implication for VC investors is that the institutional context in which they invest will also be important for them. For example, for cross-border VC investors, it may be an optimal strategy to invest in countries with a better legal system. First, better legal systems may allow them to be more effective in reducing agency problems through contractual monitoring. Second, as we show, cross-border VC investors will have in these countries a higher positive impact on the supply of finance from other potential investors. Third, better legal systems will also increase the likelihood of providing additional VC finance and we have shown that additional VC finance will further increase the positive effect of VC ownership on the supply of entrepreneurial finance. Fourth, entrepreneurial companies that have better access to finance may grow more rapidly and hence offer the best exit opportunities for a VC investor. VC investors should also take the ‘forgiveness’ of personal bankruptcy law in a particular country into account. We show that entrepreneurs may be more reluctant to raise finance in countries which do not foresee a fresh start. Moreover, we show that entrepreneurs will become even more reluctant to raise finance in such countries if they first raise VC finance. Hence, VC investors that invest in countries with a less forgiving personal bankruptcy law should realize that entrepreneurs will be, more concerned about

going bankrupt and therefore more likely to take decisions that avoid risk-taking. As a consequence, investments in countries with a less forgiving bankruptcy law may have, all else equal, a lower return potential for a VC investor. In short, VC investors should understand that they will have the highest positive impact on the supply of finance from potential investors in countries with a better legal system and a more forgiving personal bankruptcy law.

A third implication is that VC investors should realize that they become inside investors after they have invested in entrepreneurial companies that are able to send a strong and credible positive signal about the quality of the entrepreneurial company to other potential investors that are not yet involved in these companies, especially if VC investors provide additional VC finance. Such a certification effect that stems from repeated VC finance is likely to benefit the success of their portfolio companies and thus may help VC investors to establish a reputation in the VC industry. VC investors should therefore set aside enough cash to invest in follow-on financing rounds and build a strong network with other VC partners as this will increase the likelihood of providing additional VC finance in entrepreneurial companies.

Implications for policy makers

Entrepreneurial companies received greater attention from policy makers since it became widely accepted that entrepreneurial companies are important for job creation, economic innovation and growth. Moreover, since access to finance is often an important barrier for the development of these companies, the findings of this dissertation have some important implications for policy makers.

First, policy makers may influence most directly the venture capital industry by investing funds into government VC firms. Government VC firms are typically set up as a policy response to capital market imperfections. First, they may be a response to a shortage in the supply of risk capital to new technology-based early stage companies as these companies typically find it difficult to obtain finance from other VC investors. Second, they may also target mature companies that need funding to sustain employment rather than to create value. These companies will be unable to raise VC finance from other VC investors as their value creating potential is limited. We argue that this investment strategy of government VC firms will increase their bargaining power which they, as we show, exploit by negotiating lower valuations. Hence, government VC firms will receive ex-ante a compensation for targeting companies that are on average more risky or less attractive. Policy makers should be aware of

this effect. Policy makers should further also understand that this compensation comes in the form of a lower valuation and will be acquired in the very beginning of the investment process rather than having to wait for a compensation until the exit from these companies.

Second, VC finance has a strong, positive effect on the supply of finance for entrepreneurial companies. Policy makers should hence understand that VC finance is not only important in terms of financing companies that are denied financing from other sources of finance but also that VC finance will further increase access to finance. Hence, VC finance will not only alleviate financing constraints for entrepreneurial companies directly but also indirectly. Policy makers may therefore make strong efforts to create an institutional environment that further encourages VC finance. For example, governments may create an environment that permits institutional investors to invest in venture capital funds without very high costs. Likewise, governments may implement some changes in their taxation system, thereby especially focusing on a more favorable taxation of income and profit relating to venture capital investments. Finally, governments should realize that there is an increasing trend within the VC industry to carry-out cross-border VC investments. Hence, it may be interesting to compare between different legislations across countries and to think about how to improve the current domestic legislation in order to attract more cross-border VC investors.

Third, national law strongly impacts the access to finance in entrepreneurial companies. Specifically, governments may create a more friendly entrepreneurial environment for potential investors if they further improve the enforcement of law so that these investors are confronted with less agency problems when they consider to invest or create a more investor-friendly environment for entrepreneurial companies if they relax bankruptcy laws so that these laws foresee a 'fresh' start for entrepreneurs. Perhaps even more important, there is a larger effect of VC finance on the access to finance in countries with a better legal system and countries with a more forgiving bankruptcy law. Hence, it is for governments crucial to understand how future changes in national law will turn VC finance into a more powerful and effective tool that will stimulate access to finance for entrepreneurial companies. Finally, from a more general perspective, it is for policy makers important to understand how laws determining investor protection or the consequences of a bankruptcy event will affect the attractiveness of their country for investors and entrepreneurs.

5.4 Limitations and avenues for further research

In this dissertation, I studied the effect of VC finance on entrepreneurial finance decisions. Although the results of the three studies included in this dissertation provide some important and new insights, these studies are not without limitations that offer potential avenues for further research.

First, there are some limitations with respect to the arguments that are used for the hypotheses as we make some important assumptions. For example, the hypotheses that predict a substituting or complementary impact of VC ownership on the relationship between law enforcement or bankruptcy laws and entrepreneurial finance decisions assume that the impact of VC ownership will be exogenous. In fact, we assume that there will be no impact of the quality of law enforcement or forgiveness of bankruptcy law on the probability that entrepreneurial companies will attract VC finance. In reality however this might be a too strong assumption. However, it is from a purely econometric point of view difficult to control for this potential endogeneity problem and to disentangle between the endogenous and exogenous effects of VC ownership. Therefore, I report this as a limitation of this dissertation. Another limitation is the fact that our hypotheses in the third study predict the joint effect of differences in VC firm type and differences in VC bargaining power on company valuation. Specifically, we predict that different types of VC firms have different bargaining power which results into different company valuations. In fact, one may argue that the relationship between VC firm type and VC bargaining power is less trivial as we claim. We do acknowledge that this is a limitation of this dissertation. First, we used VC firm type as a construct to measure differences in VC competition and differences in VC bargaining power for reason that we did not have other information that could capture differences in VC bargaining power in a better way. In an ideal world, we would for example have information about the number of VC investors that were competing with each other to invest in the most promising companies as this would be a much more unimpeded measure for differences in VC bargaining power. However, we only see which VC investor ultimately won the bid. Second, there are some limitations with respect to the datasets that are used. The dataset that is used in the first and second study of this dissertation is a large, longitudinal dataset including nearly 7,000 entrepreneurial companies from six European countries (Belgium, Finland, France, Italy, Spain and U.K.). Although this is a comprehensive and valuable database, especially in the context of entrepreneurial studies, it still imposes some challenges to the external validity of these results. For example, we studied the effect of VC finance in

countries with a relatively well-developed VC market and in countries with a relatively good legal system. We did not consider the effect of VC finance in countries with a less mature VC market such as for example in Asian or South-American countries nor do we consider the effect of VC finance in countries with a lower quality of the legal system like for example in some East-European countries. Related empirical work that investigated other countries does not seem to fully support our findings. Lerner and Schoar (2005) for example studied private equity (PE) investments in developing countries and found that PE investors rely in the developing countries with a better legal system more on specific contracting contingencies and securities that allow PE investors to separate between cash flow and control rights. Hence, the complementary effect between VC ownership (which is a subtype of PE finance) and the quality of the legal system on finance decisions has also been shown in totally different institutional contexts. However, the findings from other studies arouse some questions about the external validity of our findings. Cumming et al. (2010) for example studied differences in VC governance structures in 39 countries and found that the effect of VC ownership that we found in our countries with a relatively high quality legal system may be less strong in countries with a worse legal system. In short, it remains unclear whether our findings can be extrapolated to totally different institutional contexts. It may therefore be interesting to replicate our analysis on datasets that focus on such countries.

A second limitation of the data is the fact that we used Belgian data in the third study which poses challenges to both the external validity and the internal validity of our findings. For example, one might argue that the Belgian VC industry is significantly different from VC markets in other countries and thus that the relationship between VC bargaining power and company valuations that we find in a Belgian context will be different in other countries. We believe however that the *internal* validity is warranted. First, as shown in the study, the Belgian VC investment activity developed similarly over time as compared with the European VC activity. Second, the Belgian VC industry functions in a broadly comparable legal and institutional setting. Third, Belgian VC investors frequently co-invest with VC firms from other countries, enabling them to learn from best practices abroad and to incorporate these practices into their functioning. Therefore, the Belgian VC industry is likely to be comparable to VC markets in the other European countries that are studied in the first and second study. Whether the *external* validity of our findings is warranted remains again an empirical question and an interesting avenue for further research. U.S. VC markets for example, are more mature and more active and are governed by a more investor-friendly institutional environment. In

contrast, Asian markets are under development and their institutional environment is very different. VC negotiation processes may hence be different in those parts of the world.

A third limitation exists with respect to the variables that are used. For example, in the first and second study, we use a VC dummy variable to study the effect of VC finance on entrepreneurial finance decisions. A growing stream of VC literature however argued and empirically showed that VC investors are heterogeneous (Hsu, 2004; Bottazzi et al., 2008). Hence, one may argue that a VC dummy variable is a too simplistic construct to measure the effect of VC finance because it ignores an important part of the VC literature and imposes significant limitations on the level of detail that is included in the empirical analysis. Although we acknowledge that this is a limitation of this dissertation, we also argue that it still remains highly interesting and relevant to show that raising VC finance, with whatever characteristics, makes entrepreneurial companies more attractive for investors. Academics that focus on VC heterogeneity often underestimate the fact that such a generic effect of VC finance still exists. We hence argue that it is equally important to study whether the mere presence of a VC investor is able to generate a significant effect on entrepreneurial finance decisions as to study whether different VC characteristics generate different effects. Moreover, we do study whether the effect on finance decisions is different between bank-affiliated VC investors and other VC investors but we do not find that finance decisions are significantly different. However, we do acknowledge that it would be interesting to study whether for example more experienced VC firms or international VC firms have a different effect on finance decisions. We propose this as another interesting avenue for further research. Another limitation with respect to the variables is the fact that we were not able to control for some other factors that may affect our findings. For example, in the third study, we were not able to account for clauses in the VC investment contract that may however affect differences in valuation (Kaplan and Strömberg, 2003). As a result, the differences in valuations between independent VC investors and non-independent VC investors may be influenced by differences in the complexity of the contracts they negotiate in addition to differences in relative bargaining power. Our Belgian data is based on official information from the Belgian Law Gazette and therefore offers reliable and complete information, but unfortunately it does not allow to account for the complexity of the VC contract. To address this potential shortcoming, we control for VC firm size. Larger VC investors are more likely to implement sophisticated contractual terms, including liquidation preferences, anti-dilution protections, vesting provisions and redemption rights (Chahine et al., 2007). Hence, VC firm size will

indirectly control for contract complexity. In short, to limit the impact of all other factors beyond differences in VC bargaining power that might affect valuations in VC investment rounds, we have tried to control for all observable and relevant company-level and VC firm-level variables. Nevertheless, unobserved heterogeneity between different VC firm types may still exist and explain why valuations are different.

Obviously, the avenues for further research are not limited to these shortcomings only. There still remain some other interesting questions left unanswered in this dissertation. As a first example, it would be interesting to know which of the entrepreneurial companies without VC finance applied for VC finance but without success and which of these companies never searched for VC finance. Entrepreneurial finance decisions may be different between these two categories. Specifically, given that VC finance has a strong, positive effect on finance decisions, we may see a negative effect on finance decisions after a rejection of an investment proposal by VC investors. If this is the case, VC finance would have a double-sided effect on finance decisions: a positive effect when VC investors accept to finance companies and a negative effect when VC investors reject an investment proposal. Second, another interesting avenue would be to expand the datasets that are used in this PhD dissertation with observations from more recent years. For example, it may be interesting to explore the impact of the current financial crisis on our findings. Recent studies on SME financing (Mac an Bhaird, 2013; Chor and Manova, 2012) have shown that access to finance has become more critical since the financial crisis but also that the demand for finance has become significantly lower. Hence, it would be interesting to study if VC ownership has a different effect during the financial crisis compared with before that crisis. Further, given that this crisis has a large impact on the global financial market system (Claessens et al., 2010), it would be interesting to study how cross-country differences in law would affect finance decisions during those years. Finally, as VC investment activity is highly subject to boom and bust cycles in the economy (Kaplan and Lerner, 2010), competition between VC investors may be significantly different during the financial crisis as compared with before and hence significantly affect VC bargaining power. As a third example of future research questions, scholars that focus on finance decisions of entrepreneurial companies may still observe some other gaps in the literature. For example, there currently exists such a gap between this dissertation and the study from Cosh et al. (2009). Specifically, Cosh et al. (2009) differentiate between different sources of finance for entrepreneurial companies, including VC finance amongst other sources (angel financing, bank credit, trade credit,..). Due to the limitations of our data, we do

not have such information about the origin of investors that financed the entrepreneurial companies. Hence, we were not able to study the effect of VC finance on different sources of investors although this would be a highly interesting research question. Finally, as a last, more general avenue for further research, it may be interesting to study whether our findings can be extrapolated to other settings. For example, it might be interesting to study how the relative bargaining power of an investor may affect other settings where the value of the company is negotiated between a limited number of parties, for example in mergers and acquisitions of unquoted companies.

5.5 References

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