

Essays on Venture Capital Investments

by

Senem Alkan

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Senem Alkan

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Prof. Stefano Caselli (President)

Prof. Stefano Bonini (Advisor)

Prof. Stefano Gatti (Member)

Prof. Pedro Santa-Clara (UCLA)

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Abstract

This dissertation examines two different topics related to venture capital (VC) investments. The objective of the first essay is to identify the main determinants of VC investments around the world. We test macro factors from the VC literature such as Initial Public Offerings (IPO), labor market rigidities, technological opportunities, stock market, Gross Domestic Product (GDP), interest rates, inflation, and corporate income taxation. We use a combination of data from 16 countries from 1995 to 2002. Plus, using risk ratings of the International Country Risk Guide (ICRG), we add political risk variables to our analysis. We examine relevant hypotheses in addressing the impact of macroeconomic and political risk factors on VC investments. In our between, fixed and random effects models, we discover that one of the most important determinants of VC investment is the total value of stocks traded. In contrary to Jeng and Wells (2000), we can only provide evidence for the significance of IPO in our fixed effects model and for only early stage VC investments. We also present that corporate income tax rate, total entrepreneurial activity, inflation, labor market rigidities, GDP growth and some of the political risk variables-investment profile, socioeconomic conditions and corruption-affect both all stages (early and expansion) investments used as a broader definition of VC, and early stage investments used as a narrower definition.

The second essay examines the effects of venture capitalists on the governance of firms. Using a unique hand-collected survey data from 164 VC-backed companies in US, UK, Germany, France and Spain; we explore the relationship between the proportion of VC funding and VC influence on Chief Executive Officer (CEO) hiring, human resource (HR) practices, executive compensation, employee incentives, board decisions, board appointments, strategy direction and investment plan. In our full sample linear regressions, we furnish evidence that as VC proportion of funding into the company increases, VC influence on CEO hiring, executive compensation, board decisions, and board appointments increases tremendously; while the proportion of VC funding does not affect the variations in VC influence on HR practices, strategy direction and investment planning of portfolio companies. Comparing European and American VC-backed companies, we discover that European and American counterparts differ strikingly. In Europe, VC proportion is significant and positively related to VC influence in only CEO hiring, and investment planning decisions; while in US, the proportion of VC funding is significant and positively related to VC influence in CEO hiring, executive compensation, employee incentives, board decisions, and board appointments. Hence, we go further than existing studies and examine the relationship between the proportion of VC funding and the VC influence on firm's governance. Plus, we apply a wider dataset including not only US companies but also companies that are located in four European countries.

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To my loving parents
GULTEN - MEHMET ALKAN

and

My angel grandmother
MELEK DUZGUN

Who have given me everything without expecting anything in return . . .

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Chapter 1

Preface

1.1 History of Venture Capital¹

While no usual definition of venture capital exists, we accept it is as an important financial intermediary providing capital to young firms associated with large growth potentials and high levels of uncertainty. Before starting the discussion of venture capital (VC) topic in this dissertation, we suppose that it is helpful to review the history of VC investments. American Research and Development (ARD) was the first known VC firm and was created in 1946 by Georges Doriot, a professor at Harvard University, together with Karl Compton;

¹ For more detailed information on nature of venture capital, one can refer to Chapter 1 in Gompers and Lerner (1999).

president of the Massachusetts Institute of Technology, Merrill Griswold; chairman of Massachusetts Investors Trusts, and Ralph Flanders; president of the Federal Reserve Bank of Boston. ARD was formed to raise funds from wealthy individuals to finance entrepreneurial startups in technology-based manufacturing. After ARD's success, other venture funds were also established similar to ARD structure (publicly traded closed end funds), but this form attracted retail investors with short-term prospects, whose desires conflicted with the long-term returns of venture capital investments.

During the late 1970s and 1980s, VC industry has grown significantly. One of the most important reasons for this rapid growth was the 1979 revision of the "prudent man" rule, which allowed pension funds to invest in risky assets including venture capital. As a result, almost all pension funds invested directly in venture capital. Nevertheless, since VC constituted a small proportion of their portfolios, they allocated little resources for monitoring these investments. During mid-1980s, investment advisors entered the VC market to advise institutional investors about VC investments through monitoring the progress and evaluating the VC investments. Only in the late 1980s were Small Business Investment Companies (SBICs) and closed-end funds outdated by the limited partnership as the prevailing organizational form of American VC firms. In a VC limited partnership, venture capitalists are general partners and control the fund's activities. The investors serve as limited partners by monitoring fund's progress and attending meetings but cannot get involved in fund's everyday management. In the late 1980s, the intensity in the VC industry has diminished due to a decline

in VC returns because of overinvestment in various industries and the presence of inexperienced venture capitalists. However, in recent years, many inexperienced venture capitalists exit the VC industry which led to a growth in VC returns. Hence, VC investment intensity has risen once again. Although until the early 1990s, venture capital remained as an American movement; the growth and success of VC firms in US made investors to look abroad for further opportunities. In Europe, most VC activity started in the 1970s. Yet, in the mid-1980s, due to lack of an adequate setting, VC investors have withdrawn from early-stage investments. Instead, they devoted investment to buy-outs and later stage investments. Consequently, a new image of investments- private equity - emerged as most European investors preferred it in their operations. In fact, Europeans define venture capital as a general notion involving any investment commitment to unquoted firms at any stage from seed to later stage. Although American and European definition of venture capital is diverging, similar organizational forms of VCs were employed in both continents. For instance, since 1980s, limited partnerships and close-end funds have accounted for 75 to 80 percent of the total funds under management in most countries of Europe.

With regards to VC investment intensity across countries, we can indicate that the VC industry has grown most in the US and followed by other countries such as United Kingdom and Israel. According to academicians, Europe is still an emerging market in the VC industry (Black and Gilson 1998). Also, there exist immense diversities even across developed countries in the relative amounts

invested in VC -high in the US and Canada for instance; whereas it is low in Japan (Table 2.1 shows an international evaluation).

Finally one should understand that VC industry emerges as a tremendously important financial intermediary with a growing global recognition. According to the MoneyTree Survey by Pricewaterhouse Coopers, Thomson Venture Economics and the National Venture Capital Association; over the past two years, quarterly VC investing has ranged from \$4.6 billion to \$6.1 billion. VC investing rises 19% to 5.8 billion in the second quarter of 2005. Also, many successful companies such as Apple Computer, Intel, Lotus, and Microsoft have been funded by VCs.

1.2 Scope and Objectives

This dissertation deals with two issues concerning VC investments around the world. The first essay attempts to identify the macro and political determinants of VC investments. Some scholars have studied the main determinants of VC investments across countries. One of the most important studies, Black and Gilson (1998), argues that the key source of the U.S. competitive advantage in VC is the existence of a strong Initial Public Offering (IPO) market. After repeating Black and Gilson's results on IPO strength, Jeng and Wells (2000) finds that labor market rigidities, government programs for entrepreneurship and bankruptcy procedures also play significant roles in explaining part of cross-country differences in VC investments. On the other hand, in their empirical analysis, Gompers and Lerner (1998) cannot find any significant impact of IPO. Yet, other macroeconomic factors such as the general

state of the economy, which could be proxied by GDP growth, stock market returns, and R&D expenditures can also affect VC fundraising. Similarly, interest rates may shape the supply of VC investments since bonds are considered as alternative investments to venture capital.

Following these existing approaches and considering the fact of mixed results, we analyze the macro factors from the VC literature. Particularly, we study the following factors in our panel data cross-section specifications: Initial public offerings (IPO), labor market rigidities (EPL), technological opportunities, total value of stocks traded (ST), gross domestic product (GDP), real interest rates (IR), inflation (INF), and corporate income tax rate (CITR). In addition, we are first to add political risk factors (composed of political risk index from International Country Risk Guide) into this research stream. Mainly, we examine the related hypotheses in addressing the impact of macroeconomic and political risk factors on VC investment intensity. With a panel data from 16 countries from 1995 to 2002, using non linear specifications of all variables in our between, fixed (within) and random effects models; we discover that one of the most important determinants of VC investment intensity is the total value of stocks traded (ST). In line with Gompers and Lerner (1998), we also demonstrate that GDP growth (GDP) is significant in explaining the variances in VC investments. In addition, we present evidence that corporate income tax rate (CITR), total entrepreneurial activity (TEA), inflation (INF), labor market rigidities (EPL), and some of the political risk variables –investment profile (INV), socioeconomic conditions (SOC), corruption (CORR)- are other important determinants of VC investments

in all stages (early and expansion) of development (Table 2.10). On the other hand, we do not totally agree with Jeng and Wells (2000) on great IPO effect, since we can provide evidence for its significance only for early-stage VC investments in our fixed effects model. Eventually, we present new opportunities for further research and empirical investigation by contributing new potential variables such as political risk variables, inflation, technological opportunities and entrepreneurial environment to current VC literature.

The second essay deals with the effects of venture capitalists (VCs) on the governance of their portfolio firms. In most of the related literature, there has been agreement among academicians and practitioners that VCs provide not only financing but also value-added services to their portfolio companies. The new stream of research has given much attention on the value-added mission of VCs beyond their financing function. Particularly, value-added activities of VCs include helping portfolio firms to shape strategies, providing technical and commercial advice, and attracting key personnel such as new CEOs (Bygrave and Timmons (1992), Gorman and Sahlman (1989), Hellmann and Puri (2002)).

In this essay, we empirically analyze VCs' effects on the governance of firms; mainly, VCs' effects on the development of portfolio firms, which are located in US and Europe are considered. We use a unique hand-collected survey data from 164 VC-backed companies in five countries; US, UK, France, Germany, and Spain. We are first to explore the relationship between the proportion of VC funding and VC influence in the following governances of portfolio companies: CEO hiring, human resource (HR) practices, executive

compensation, employee incentives, board decisions, board appointments, strategy direction and investment planning. Our full sample linear regressions demonstrate that as VCs' proportion of funding into the companies increases, VC influence in CEO hiring, board decisions, board appointments, executive compensation, and employee incentives increases. Conversely, VC influence on other governance variables such as HR practices, strategy direction and investment planning does not have significant relationship with the proportion of VC funding received. We also go further and compare European and American VC-backed companies. In this case, our evidence indicates that European VC-backed companies' CEO hiring, and investment planning decisions are positively influenced by VCs' proportion of funding. On the other side, in our American sub-sample, we furnish evidence that the proportion of VC funding is significant and positively related to VC influence in CEO hiring, executive compensation, employee incentives, board decisions, and board appointments. In contrary to European VC-backed companies, the proportion of VC funding is not meaningful in explaining the variance of VC influence in investment planning. In this essay, following a different strategy than Hellmann and Puri (2002) in examining the influence of VCs on the governance of portfolio firms, we analyze the relationship between the proportion of VC funding and VC influence. Unlike the results of Hellmann and Puri (2002), we provide no evidence of significance for a link between VC influence on HR practices and the proportion of financing. Besides, we apply a wider dataset including not only US companies but also European companies from UK, Germany, France and Spain; countries that hold

the highest VC investment activity in the last five years when normalized by GDP levels.

1.3 Structure of the Thesis

This dissertation is composed of two essays and is divided into four chapters. In Chapter 1, the history of venture capital is introduced followed by the objectives of this study, and a statement of the thesis structure. The two essays are examined in different chapters, Chapter 2 and 3, successively. After summarizing the origins of venture capital research, Chapter 2 examines the first essay: *The macro and political determinants of VC intensity around the world*. The development of the conceptual framework, research hypotheses, research methodology, empirical results and the related conclusions for the first essay are all presented within Chapter 2. Then, Chapter 3 follows a similar structure in examining the second essay: *The effects of venture capitalists on the governance of firms*. After reviewing the existing literature on the role of venture capitalists, Chapter 3 describes the hypotheses formation, research methodology, empirical results and the related conclusions. Finally, Chapter 4 summarizes and concludes the findings of the two essays, explores the limitations of this study, and suggests recommendations for future research.

Chapter 2

The Macro and Political Determinants of Venture Capital Investments around the World

2.1 Introduction

Although venture capital (VC) is recognized as an important source of funding for countries' entrepreneurial activities, there appear huge differences across countries in the relative amounts invested in VC. For instance, VC intensity is relatively high in the US and Canada while it is very low in Japan (See Table 2.1 for comparisons).

Table 2.1 The venture capital intensity in 21 nations

Country	Total Venture Capital under Management
Australia	54
Austria	0.4
Belgium	8
Canada	182
Denmark	4
Finland	1
France	35
Germany	116
Ireland	1
Israel	550
Italy	60
Japan	11
Netherlands	100
New Zealand	1
Norway	7
Portugal	9
Spain	24
Sweden	9
Switzerland	1
United Kingdom	36
United States	3,651

Source: Jeng and Wells (2000)

First and foremost, we would like to point out that venture capital is described differently in US and Europe. In the latter, venture capital refers to private equity investments, which are investments by institutions or wealthy individuals in both publicly traded and privately held companies. On the other side, in the US, venture capital refers to one specific type of private equity investing. American type of VC involves three stages of investing—seed, startup and expansion—excluding buyouts. These various stages of investing are related to the stage of development of the portfolio company receiving the investment. For instance, seed capital is usually used to finance initial product research and development, whereas startup investments are offered to companies that have

passed the idea stage and are moving into production, and marketing stage. Together seed and startup stages are referred as early stage investments. After early stage, a company enters expansion stage where the company needs additional capital to finance its growing manufacturing, distribution and research and development (R&D). On the other side, buyouts are usually applied to more mature companies. In private equity investments, there are different types of buyouts such as leveraged buyouts and management buyouts. The former is used as to acquire a company and reduce its equity base, where as the latter refers to a specific type of leveraged buyout where current management takes control of the company. Our primary goal is to understand venture capital investments, not private equity. Thus, in all our analyses, we use the US definition of venture capital including only early and expansion stages of VC investments.

Before considering the driving forces of venture capital intensity across countries, it is also important to review why meeting financial needs through traditional mechanisms is difficult for VC-backed companies. There are four main factors that limit a young company to receive financing: uncertainty, asymmetric information, intangibility of firm assets, and the conditions in the relevant financial and product markets (Gompers and Lerner 2002). The uncertainty will be high in the case that investors cannot easily expect that the company will succeed in the future. If investors are risk averse, it will be difficult to persuade them to finance projects with high uncertainty, which affects not only the contribution of capital but also the timing of investments. Asymmetric information emerges when an entrepreneur knows more about the company than

investors. For example, entrepreneurs may take actions that investors cannot observe and this may end up at investor's expense. Asymmetric information may also lead to adverse selection problem where it is difficult for investors to differentiate between efficient and inefficient projects and entrepreneurs. The third factor is the intangibility of company's assets. If a company's assets does not rely on physical assets and are mainly intangible such as ideas, it may be more challenging to find financing for company's projects. Lastly, market conditions play important roles in the rigidity of financing companies. To fill in this gap, VC firms emerge as financial intermediaries to bring lenders and borrowers together where adverse selection, asymmetric information, uncertainty costs exist.

On the topic of the determinants of VC investments, previous papers have examined various variables like Initial Public Offerings (IPO), Gross Domestic Product (GDP) growth, market capitalization growth, capital gains taxes, private pension funds and so on. As there are other potential factors affecting VC investment intensity, the diversity of financial systems is perhaps one of the most important determinants underlying the differences across countries. Along this line, Black and Gilson (1998) find a linkage between countries' financial system and VC intensity. In sum, they demonstrate that active stock market is more appropriate to strong venture capital market than bank market because of the potential for VC exit through an IPO. Other possible determinants of VC investment intensity are analyzed by Gompers and Lerner (1998), Jeng and Wells (2000) and Sherlter (2003). With a panel dataset of 21 countries, Jeng and Wells (2000) shows that labor market rigidities, the level of Initial Public Offerings

(IPO), government programs for entrepreneurship, and bankruptcy procedures explain a significant share of cross-country variations in VC intensity (See Table 2.2 for survey).

The aim of this essay is to contribute to this recent stream of research in several ways. To begin with, we use panel data techniques on data from 16 countries. We analyze the key macro factors from the literature including GDP growth (GDP), interest rates (IR), IPO, total value of stocks traded (ST), stock turnover (STURN) and corporate income tax rate (CITR). To this analysis, we also add new variables such as inflation rate (INF), technological opportunities, entrepreneurial environment and political risk; which have not been seen in the literature. We discover that one of the most important determinants of VC investment intensity is the total value of stocks traded (ST). In line with Gompers and Lerner (1998), we also demonstrate that GDP growth (GDP) is significant in explaining the variances in VC investments. In addition, we present evidence that corporate income tax rate (CITR), total entrepreneurial activity (TEA), inflation (INF), labor market rigidities (EPL), and some of the political risk variables – investment profile (INV), socioeconomic conditions (SOC), corruption (CORR)- are other important determinants of VC investments in all stages (early and expansion) of development (Table 2.10). On the other hand, we do not agree with Jeng and Wells (2000) since our analyses do not show that IPO is a critical determinant of VC investments intensity. We provide little evidence for the significance of IPO for only early stage VC investments in our fixed effects model. Eventually, we present new opportunities for further research and

empirical investigation by contributing new potential variables such as political risk variables, inflation, technological opportunities and entrepreneurial environment to existing VC literature. Finally, almost all of our analyses involve an international setting that help us to examine differences among countries which has been an issue of growing significance for internationalization of entrepreneurship studies (McDougall and Oviatt 1997).

The remainder of this chapter is organized as follows. Section 2.2 surveys the different approaches to venture capital fundraising, identifying the main factors focused by their different authors. Section 2.3 describes the hypothesis formation of what determines the VC investment intensity. Section 2.4 discusses the structure of the model, explaining the variables, methodology, and data. Section 2.5 provides the empirical results obtained on the different specifications tested. Section 2.6 contains this chapter's conclusion.

2.2 Literature Review

This section reviews the relevant literature concerning the determinants of VC investments. First, we assess the macro determinants of VC activity involving factors dealing mainly with the general economy, technological opportunities, and entrepreneurial environment. Next, we study the existing literature on political risk from related fields.

2.2.1 Macro determinants of VC activity

First, this section does not address the many studies that examine various aspects of VC on a micro-level basis. However, we want to point out that some

articles have examined the determinants of VC performance on a micro-level basis (Gompers and Lerner (1999), Kaplan and Stromberg (2003), Das et al. (2001), Hege et al. (2003), Manigart et al. (2002)). Kaplan and Stromberg (2003) studies actual contracts between VCs and entrepreneurs to compare the characteristics of actual financial contracts to their counterparts in financial contracting theory. They find that various aspects of VC contracts have the effect of helping VCs in screening out good entrepreneurs and companies from bad ones. Relying on VentureXpert database, Das et al. (2001) provides a detailed study of VC deal characteristics in US. Hege et al. (2003) carries out a comparative study of the determinants of the venture financing success between Europe and US. They find that American VCs perform better than European counterparts under type of exits and internal rate of return measures of the deals. Hege et al. (2003) also suggests that either American VCs are more sophisticated than their European equivalents or the network effects are especially important.

As stated previously, this section primarily focuses on the existing literature concerning the determinants of VC investments at macro level. Only few articles have so far focused on the determinants of VC at macro level. Poterba (1989) is the first to theoretically describe venture capital investment changes in supply and demand. He argues that many of changes in financing could occur from changes in either supply of or demand for venture capital. Similarly, the impact of variations in the capital gains tax rate has received particular consideration from Poterba (Poterba 1987, 1989). Poterba's suggestion is that; since VC funds are from tax-exempt investors, they are affected by the variations

in capital gains tax rates. Poterba also describes this impact as it affects not those who supply the funds but rather prompts the employees to become entrepreneurs leading to more VC demand. Following Poterba (1987, 1989) model, in their empirical study, Gompers and Lerner (1998) finds that lower capital gains tax rates have strong effect on the amount of VC investments supplied. On the other side, Jensen (1991) and Sahlman and Stevenson (1986) argue that institutional investors are prone to over or under invest in markets like venture capital. They discuss that this irrational pattern of investing can explain the variances in fundraising. Moreover, they propose that these divergences can delay entrepreneurship in American economy.

To the best of our knowledge, only four articles have attempted to quantitatively evaluate the main forces that lie behind venture capital investments. Among these papers, Black and Gilson (1998) find a relationship between countries' financial system and VC market. They argue that the key source of the US competitive advantage in VC industry is the existence of a strong IPO market. Active stock market requires a liquid stock market and is more appropriate to strong VC market than bank market because of the potential for VC exit through an IPO. Along a similar line, Jeng and Wells (2000) develops a model aiming at identifying the determinants of VC and testing them on a cross-section of 21 countries over a period of 10 years. They find that labor market rigidities, the level of IPOs, government programs for entrepreneurship, and bankruptcy procedures explain a significant part of cross-country variations in VC investments. On the other hand, Gompers and Lerner (1998) focuses on American

economy over the period 1969-1994 and take IPO as a proxy for fund performance and find no significant impact in their analyses. Seemingly, IPO is strongly correlated with the expected returns on the alternative investments and with GDP. Therefore, Gompers and Lerner (1998) find significant impact of GDP on VC, but no impact of IPO. The opposite is the case in Jeng and Wells (2000); GDP is part of the impact of IPO and thus appear to be not significant for Jeng and Wells (2000). Recently, Schertler (2003) analyzes the driving forces of VC activity with data from fourteen Western European countries for the time period 1988 to 2000. This paper shows that liquidity of stock markets, human capital endowment, and labor market rigidities do not affect expansion stage VC investments but affect early stage VC investments. In contrast to Jeng and Wells (2000), Schertler (2003) finds that liquidity of stock markets has a significant positive impact on early stage investments. These opposing results could be because of their different treatment of proxies. For instance, Jeng and Wells (2000) takes the market value of IPO where as Schertler (2003) uses stock market capitalization as a proxy for liquidity of stock markets.

Table 2.2 Survey Literature for Potential Macro Determinants of VC investments

Main Determinants of VC investments	Gompers and Lerner (1998) over US between 1972 and 1994	Jeng and Wells (2000) over 21 countries between 1986 and 1995	Schertler (2003) over 14 European countries between 1988 and 2000
Initial Public Offerings (IPO)	Not Significant	Positive (not for early stage)	NA
Gross Domestic Product (GDP) growth	Positive	Not Significant	NA
Stock Market	Positive	Not significant	Positive (for early VC)
Interest Rates	Positive	NA	NA
Labor Market Rigidities	NA	Negative (for early VC)	Positive (for early VC)
Private Pension Funds	Positive(proxied by changes in ERISA prudent man rule)	Positive (only across time) proxied by level and growth of pension funds	NA
Capital Gains Tax Rate	Negative	Not significant	NA
Accounting Standards	NA	Negative	NA
Technological Opportunities	NA	NA	NA
Research & Development (R&D)	Positive	NA	Positive

Another variable that has been studied in VC literature is the level of pension funds in the economy; given that they are allowed to devote in venture capital. Since pension funds involve great deal of money, their contribution affects the supply of venture capital (Gompers and Lerner (1998), Jeng and Wells (2000)). Although, this variable may have great importance in US; this is not the case in European countries, because pension funds in Europe do not deal with large sums of money or do not prefer investing in unquoted firms. The main results of these four existing quantitative studies are summarized in Table 2.2.

2.2.2 Political determinants of VC activity

Despite the recent attention on the determinants of VC intensity, there is substantial lack in academic studies dealing with political determinants of VC investments. Yet, VC professionals include political stability among the important determinants of receiving VC funding. For instance, Markus Ableitinger, a director of Capital Dynamics says: “Successful private equity needs macro-economic and micro-economic factors. These include political stability, sophisticated capital markets, corporate governance, strong entrepreneurial structure, and proper benchmarking. Other factors include fragmented markets, low competition, and comparability of funds. If some of these criteria are not there it makes it a high risk and volatile proposition, so Russia has problems” (EVCA (2005)). Moreover, according to Kolesnikov-Jessop, venture capitalists and investors are growing in Singapore taking advantage of the country's political stability, highly educated workforce and strategic location (Kolesnikov-Jessop (2003)).

Despite the fact that micro, macro and even legal determinants of VC financing have more or less been analyzed; changes in political stability of countries have not received any attention. This lack of attention is possibly due to measurement difficulties of political stability (Jodice (1985)). Indeed, some researchers have studied the link between political stability and foreign direct investments (Literature survey can be found in Gastagana et al. (1998) and Busse (2004)). Dealing with private investment, Brunetti and Weder (1998) demonstrates that there is a negative link between institutional uncertainty and private investment. Along a similar line, we argue that VCs would prefer to invest

in countries with low political risk (politically more stable). In the remainder of this section, we attempt to provide a short description of political risk. We also review the existing literature from related fields.

We believe that “political risk” is best described as the likelihood of an event occurring over a given time period and is typically related to major alterations in government policies precipitated by striking periods such as war, insurrection or political violence (Jodice (1985)). Besides, Prast and Lax (1982) argues that political risk is the probability that the goals of a project will be affected by changes in the political environment. These changes of political environment can involve various characteristics such as expropriation or nationalization of property or resources; inconvertibility of currency; actions against personnel, government intervention with contractual terms; discriminatory taxation; and politically based regulations on operations (Howell and Chaddick (1994)).

This existing literature on political risk relies on institutional economics and positive political theory to assess the outcome on investors’ strategies (e.g., Henisz and Williamson (1999), Henisz (2000a), Henisz (2000b)). More often than not, firms tend to avoid investments high in uncertainty (Cyert and March (1963)). Furthermore, political institutions are key determinants of this uncertainty of a location from the perspective of a foreign investor.

Political risk occurs when the government’s rules and regulations for doing business in the country such as product and price regulations and relative taxation can be quickly altered (e.g., Henisz and Williamson (1999), Henisz

(2000a)). Henisz (2000a, 2000b) empirically analyze political risk as a structural characteristic of countries that may change over time. In this essay, using political risk ratings of international country risk guide (ICRG), we propose a similar analysis of political risk as a structural attribute of countries. Further empirical evidence also proves that firms favor to make business in countries with low political risk (Henisz and Delios (2001)). While the literature on political risk related to VC does almost not exist; following this related literature, we argue that VCs invest more in countries with low political risk.

2.3 The question and formulation of hypotheses

Following Poterba (1989), Gompers and Lerner (1998) and Jeng and Wells (2000); we argue that variations in VC investments around the world emerge from either supply or demand of VC investments. The demand of VC comes from entrepreneurs' desire to start up innovative firms, whereas the supply exists as the share of risk capital provided by private investors. Along this line, our macro and political factors in the formulation of hypotheses are mainly general economy, technological opportunities, entrepreneurial environment, and political risk.

The relevant questions and hypotheses of key determinants in macro and political sceneries of venture capital investments intensity are presented in the following sub-sections.

2.3.1 The macro question

This section develops the hypotheses dealing with macro factors affecting the intensity of VC investments. Mainly the question, "What macro factors

determine the intensity of VC investments around the world?” is analyzed. Nine different hypotheses are examined in addressing the macro question.

2.3.1.1 General Economy

It is expected that the general health of the economy affects the amount of VC investments. Gompers and Lerner (1998) argue that if an economy is growing, there may be more opportunities for venture capital investments. More specifically, GDP growth, stock market returns and greater R&D expenditures may increase the demand for VC. If the economy is growing quickly, then there may be more attractive opportunities for entrepreneurs to start new companies, thus, increases the demand for VC. To infer the impact of general economy, we examine the initial public offerings, GDP growth, stocks traded, inflation and interest rates.

2.3.1.1.1 Initial Public Offerings (IPO)

Since VC literature shows that the most attractive option for exit is through an IPO, we select IPO for our analysis. IPOs affect both the supply and demand of VC investments (Jeng and Wells (2000)). Through IPOs, VC-backed companies can signal their experience to the market and get additional financing through the issuance of new stock. On the other side, IPOs are one of the most profitable means of exit for venture capitalists. Similarly, venture capitalists build reputation when they successfully exit through IPOs (Schertler (2003)).

Hypothesis One: Higher levels of Initial Public Offerings (IPO) in a country will lead to more venture capital investments.

This hypothesis deals with the effect of IPO on the intensity of VC investments in 16 countries around the world. Black and Gilson (1998) considers IPO as being a very important determinant of VC. Similarly, according to Jeng and Wells (2000), IPO is the strongest driver of VC financing. Berlin (1998) also finds that new funds enter the venture capital market when the IPO market is outstanding. However, Gompers and Lerner (1998) cannot find any significant effect of IPO when they take it as a proxy for fund performance in their multivariate regressions. It emerges that IPO variable is strongly correlated with the expected return on alternative investments and with the Gross Domestic Product (GDP) which is also a proxy for exit opportunities. Similarly, Gompers and Lerner (1998) find positive impact of equity market return and GDP on VC but no impact of IPO. In our hypothesis, we expect a positive relationship between IPO and VC investments. Mainly, as the level of IPOs increases in a country, more VC investments will be present.

2.3.1.1.2 GDP, Stocks Traded and Inflation

We argue that countries with high GDP growth, low inflation and high value of stocks traded are more likely to be associated with a strong demand for VCs.

Hypothesis Two: Higher Gross Domestic Product (GDP) growth will lead to more VC investments.

Hypothesis Three: Higher levels of inflation (INF) pose a hindrance to venture capital investments.

Hypothesis Four: As total value of stocks traded (ST) in a country increases, venture capital investments increase.

Hypotheses two, three, and four deal with the impacts of GDP growth, inflation and total value of stocks traded on VC investments in 16 countries around the world. Hypothesis two is interconnected with the hypothesis one dealing with the IPO impact, where it appears that IPO is strongly correlated with the expected return on alternative investments and with the Gross Domestic Product (GDP). Since GDP and market capitalization growth are part of the impact of IPOs, Jeng and Wells (2000) finds these variables to be insignificant in their analysis. On the other hand, Gompers and Lerner (1998) find the reverse: a positive impact of equity market return and GDP on VC but no impact of IPOs.

Similar to our stocks traded determinant in hypothesis four, Gompers and Lerner (1998) includes stock market return variable in their regression analysis arguing that VC investments should be positively affected by the value of stocks traded. They use CRSP value of weighted stock market return and find no significance impact of stock market return. Surprisingly, inflation variable in hypothesis three has not yet been analyzed in VC literature. However, we argue that it could emerge as an important determinant of a country's general health of economy.

2.3.1.1.3 Interest Rates

As the cost of capital for alternatives increases, entrepreneurs are more likely to switch to venture capitalists. Hence, increases in interest rates may lead to a decrease in the supply of venture capital funds. While Jeng and Wells (2000) does not take this factor into account, Gompers and Lerner (1998) argues that VC funding is positively affected by interest rates. They underline bonds as an alternative to VC investments and use short-term interest rates in their analysis. However, economic theory would suggest a negative relationship. Thus, if the interest rates rise, the level of VC investments should fall. The positive impact found by Gompers and Lerner (1998) is possibly due to their use of short-term interest rates. As short-term interest rates increase, the attractiveness of VC financing vs. credit through usual financial institutions increases from entrepreneur's viewpoint. Hence, we assume that different types of interest rates can affect the entrepreneurs in different ways. For our analysis, we prefer to use the real interest rates since this data is available for all countries over our sample-period allowing us to keep a balanced panel data. On the other hand, short-term and long-term interest rates are available only for eleven countries from 1996 to 2002. Then, our hypothesis is as follows:

Hypothesis Five: Higher real (short or long) interest rates will lead to lower VC investments.

2.3.1.2 Technological Opportunities

For Gompers and Lerner (1998), VC growth in the late 1990s can be due to increases in technological opportunities. We prefer to proxy the technological

opportunity by two variables: business expenditures on research and development (BERD) and the number of triadic patent families (PAT). The first indicates a country's research motivation where as the latter can describe the innovation in a country. Nevertheless, we discover that these two variables are very strongly related with each other (table 2.7); therefore, we decide to omit the number of triadic patent (PAT) variable from our estimation analysis. In that case, we construct only one hypothesis for the effect of technological opportunities, including only business expenditures on R&D (BERD).

Hypothesis Six: As the business expenditures on R&D increases, the venture capital investments in a country increase.

2.3.1.3 Entrepreneurial Environment

We measure the entrepreneurial environment by three variables: the level of corporate tax rate, the level of total entrepreneurial activity, and labor market rigidities.

2.3.1.3.1 Corporate Tax Rates

The general level of tax rates will probably reduce the rate of entrepreneurship, therefore the demand for VC investments.

Hypothesis Seven: Higher levels of corporate income tax will lead to lower levels of venture capital investments.

This hypothesis deals with the impact of corporate income tax rate (CITR) on VC investment activity. Poterba (1989) argues that corporate tax system is important since it determines the revenue and profit of entrepreneurship; and lower capital gains tax rates would increase the quantity of VC commitments. In

their empirical analysis, Gompers and Lerner (1998) confirms the result of Poterba's model by finding that a decrease in capital gains tax rate has a positive and important impact on VC commitments. A reduction in capital gains tax rate often encourages entrepreneurship and thus the desire of people to create their own firm and to engage in R&D activities. By contrast, higher corporate income tax rate leads to lower levels of entrepreneurial activity in an economy; and thus, lower levels of demand for venture capital. This relationship between capital gains tax and new funds raised is also seen in countries such as China, where venture capital development is limited. In China, VC funding follows a steeply rising trend as investors keep taking advantage of tax incentives.

2.3.1.3.2 Labor Market Rigidities

Labor market regulations affect entrepreneurial activity as well. An employee has lower motivation to start his own company in countries with rigid labor markets than in countries with soft markets. The reason for this is that an employee who plans to start his own business evaluates his expected pay-off in the entrepreneurial activity with his/her actual income as an employee. Thus, the higher the rigidities in labor markets are, the lower the expected pay-off of the entrepreneurial activity. This is because in the case of a failure of the new business, the adaptation of the former entrepreneur into employment would be more difficult in a rigid labor market than a soft one.

Within VC literature, labor market rigidities are often described as one of the important determinants of why venture capital is not more established in Europe and Asia compared to US. Sahlman (1990) argues that the labor market

rigidities in Germany and Japan hinder the growth in VC investing. For Black and Gilson (1999), restrictions on lay-off procedures enforce costs on startup companies and as a result this may lower the emergence of new companies. Such as the case of Germany, where there is greater protection against lay-off, there emerges little VC activity; while in US and UK with more flexible labor markets, VC activity is much greater. According to Schertler (2003), an employee has lower incentives to start his own enterprise in economies with rigid labor markets than in economies with flexible markets. Therefore, we expect that labor market rigidity should impact the demand for VC funds negatively, meaning that higher labor market rigidity leads to less demand for VC funds (Jeng and Wells (2000)). We proxy labor market rigidities by the employment protection legislation (EPL), taken from OECD (2003) index, and is based on the strength of the legal framework governing hiring and laying off employees. It is a measure for labor market rigidities ranking countries from 1 to 20 with 1 being the least regulated. On the other hand, this indicator is fixed over time. Therefore, we also consider this variable in interaction with GDP in our fixed-effects regressions.

Hypothesis Eight: Labor market rigidities (EPL) will affect negatively the intensity of VC investments.

2.3.1.3.3 Total Entrepreneurial Activity

We argue that the level of entrepreneurship in a country affects positively the amount of VC investments. We consider the total entrepreneurial activity (TEA) variable by itself in our between and cross-section random effects regressions, but also introduce it in interaction with business expenditures on

R&D (BERD) variable in our fixed-effects regressions since this index is only available for one year in our data.

Hypothesis Nine: Total entrepreneurial activity (TEA) will affect positively the intensity of VC investments.

2.3.2 The political risk question

This section develops four hypotheses dealing with political risk factors affecting demand and supply of VC investments. Mainly the question, “What political risk factors determine the intensity of venture capital investments around the world?” is analyzed. We provide the hypotheses and empirical results dealing with only four categories of political risk. After pre-analyzing all sub-categories of political risk that are calculated by International Country Risk Guide (ICRG), we select mainly the “investment profile, socioeconomic conditions, internal conflict and corruption” categories, which we believe that manipulate the VC intensity the most. They are also strongly correlated with VC investment intensity. In addition, out of all other sub-categories, these four components of political risk contributed to our model’s explanation power the most.

2.3.2.1 Socioeconomic Conditions

This is an assessment of the socioeconomic pressures at work in society that could constrain government action or cause social dissatisfaction. Our “socioeconomic conditions” variable is the sum of three subcomponents’ rankings: unemployment, consumer confidence, poverty.

Hypothesis Ten: Countries with higher ratings in “socioeconomic conditions” receive higher amounts of VC investments compared to the countries with lower ratings in “socioeconomic conditions”.

2.3.2.2 Investment Profile

Investment profile is an assessment of factors affecting the risk of investment that are not covered by other political, economic and financial risk components. Our “investment profile” indicator is the sum of three subcomponents’ rankings: Contract viability/ Expropriation, profits repatriation, payment delays.

Hypothesis Eleven: Countries with higher ratings in “investment profile” obtain higher amounts of VC investments than countries with lower ratings in “investment profile”.

2.3.2.3 Internal Conflict

Internal conflict is an assessment of political violence in the country and its actual and/or potential impact on governance. This “internal conflict” factor is constructed by totaling the ratings of three subcomponents’: civil war/coup threat, terrorism/political violence, civil disorder.

Hypothesis Twelve: Countries with higher ratings in “internal conflict” obtain lower amounts of VC investments than countries with lower ratings in “internal conflict”.

2.3.2.4 Corruption

This is an assessment of corruption within the political system. Such corruption is a threat to foreign investment for several reasons: it distorts the

economic and financial environment; it reduces the efficiency of government and business by enabling people to assume positions of power through patronage rather than ability; and, last but not least, introduces an inherent instability into the political process.

The most common form of corruption met directly by business is financial corruption in the form of demands for special payments and bribes connected with import and export licenses, exchange controls, tax assessments, police protection, or loans. Such corruption can make it difficult to conduct business effectively, and in some cases may force the withdrawal or withholding of an investment.

Although our measure takes such corruption into account, it is more concerned with actual or potential corruption in the form of excessive patronage, nepotism, job reservations, 'favor-for-favors', secret party funding, and suspiciously close ties between politics and business. In our view these insidious sorts of corruption are potentially of much greater risk to foreign business in that they can lead to popular discontent, unrealistic and inefficient controls on the state economy, and encourage the development of the black market.

Hypothesis Thirteen: Countries with higher ratings in “corruption” obtain lower amounts of VC investments than countries with lower corruption.

2.4 Methodology

This section concentrates on the techniques that we apply for analyzing the key determinants of VC investment intensity in 16 countries around the world.

Our research strategy is as follows. First, we provide an overview of panel data estimation, and then discuss our panel data methodology, which is employed

in this essay. Second, we start our analysis with the assumption that VC activity does not have to be a linear function of the determinants because of venture capitalists' investment behavior. Above all, VCs form their portfolios at particular development stages and/or particular industries. Therefore, in all our regression analyses, we work with nonlinear specifications of all dependent and independent variables. Next, we introduce between, cross-section fixed-effects (within) and cross-section random-effects models; however, we principally treat individual cross-section effects as random and rely on the results from random-effects model. Yet, we offer other possibilities such as fixed-effects and between regression results to compare our empirical findings.

2.4.1 Panel Data Analysis

Panel data analysis is an increasingly popular form of longitudinal data analysis among researchers in various fields. Panel data analysis endows regression analysis with both cross-sectional and temporal dimension. The cross-sectional dimension involves our set of 16 countries. The temporal dimension pertains to annual observations of a set of variables characterizing these cross-sectional units over 1995-2002. In other words, our panel is a cross-section of 16 countries, which are surveyed annually from 1995 to 2002. With repeated observations of enough cross-sections, panel analysis permits us to study the dynamics of change with short time series. The combination of time series with cross-sections can enhance the quality and quantity of data in ways that would be impossible using only one of these two dimensions (Gujarati (2003)). In this case,

panel analysis provides a rich and powerful study of our 16 countries, since we want to consider both the space and time dimension of the data.

In order to estimate whether the general economy, technological opportunities, and entrepreneurial environment have significant explanatory impacts on the intensity of venture capital investments, the panel data methodology is employed. As mentioned, our panel data set is composed of 16 countries, for which there are the same explanatory variables dealing with general economy, technological opportunities and entrepreneurial environment, and the data is collected annually for eight years from 1995 to 2002. Thus, our time series cross-sectional data contains a total of 128 (16×8) observations. Plus, our panel data set is a balanced panel since we do not have any missing years or countries.

In this context, the use of panel data methodology offers several advantages. First, having panels of information allows a more efficient handling of data than individual cross-section or time series analyses. The major advantage is that it permits to control for the individual heterogeneity. Basically, we control for the effects of variables that specifically influence the VC intensity of each country but are unobservable. There are relevant factors like, total entrepreneurial activity (TEA) and employment protection legislation (EPL), which are different for each country (but stable in time) and can be causing a different effect on VC intensity. The problem is that this type of variables is complicated to measure and the exclusion of these variables may lead to bias the parameter estimates. Consequently, the panel data methodology let us to control for this kind of

individual heterogeneity. Hsiao (1986) and Arellano and Bover (1990) provide a more comprehensive review of topics related to panel data estimation.

2.4.2 Panel Data Estimation

The panel data regression is based on the following model:

$$Y_{it} = \beta_0 + \beta X_{it} + \mu_{it} \quad i = 1, 2, \dots, N \quad ; \quad t = 1, 2, \dots, T \quad (1)$$

With i denoting the cross-section dimension (countries) and t denoting the time series dimension (years). We denote X_{it} as the it th observation on K explanatory variables.

Our estimation strategy is as follows. In a first step, we estimate a between regression (4). Secondly, we estimate a cross-section fixed effects (within) model, i.e., we estimate (3) by using the OLS (ordinary least squares) estimator. Lastly, we estimate a cross-section random effects model, i.e., we estimate (6) by using EGLS (estimated general least squares)².

Statistically, fixed effects models always give consistent results, but they may not be the most efficient model to estimate. Random effects give us more accurate p-values as they are a more efficient estimator. Although both models are described in this section, we rely more on random effects because according to our Hausman test, it is also statistically justifiable to rely on random-effects model.

² For all of our panel estimations, we use Eviews 5.1 program.

2.4.2.1 Fixed Effects Model

The standard fixed effect model assumes that all members of the panel have the same variance (homoskedastic error terms) and that there is no correlation over time neither across nor within the members of the panel. Fixed effects methods are increasingly used with longitudinal data because they make it possible to control for all constant characteristics of an individual (or other unit of analysis such as countries in our case), including those characteristics that are not observed or measured. The unobserved or unmeasured component is commonly referred to as “individual heterogeneity.” In recognized modeling, we represent unobserved heterogeneity a_i in a model as follows:

$$Y_{it} = \beta_0 + \beta_1 X_{1it} + \beta_2 X_{2it} + \dots + \beta_k X_{kit} + a_i + u_{it} \quad i = 1, 2, \dots, N; t = 1, 2, \dots, T \quad (2)$$

where Y_{it} represents the VC investment intensity for each country i over time t , the β_s are the coefficient estimates for X_{kit} which represents K explanatory variables (the determinants of VC investment intensity) changing over countries and time, the a_i represents unobserved heterogeneity that is fixed over time. Since its effect is fixed over time, the a_i is not subscripted with t . The error term (what is unaccounted for in the model) is thus the time-varying (or idiosyncratic) error and represents the unobserved factors that change over time and affect our dependent variable.

An alternative modeling approach is within-groups regression, which includes “fixed effects”:

$$Y_{it} = \beta_0 + \beta_1 X_{1it} + \beta_2 X_{2it} + \dots + \beta_k X_{kit} + a_i + c_1 D_{1it} + c_2 D_{2it} + \dots + c_k D_{kit} + u_{it} \quad (3)$$

$i = 1, 2, \dots, N$ and $t = 1, 2, \dots, T$

where Y_{it} represents the VC investment intensity for each country i over time t , X_{kit} represents K explanatory variables (the determinants of VC investment intensity) changing over countries and time, a_i is again the observed heterogeneity and is fixed overtime, u_{it} is the underlying disturbance of the model. Lastly, in this equation, the D 's represent dummy variables marking every country. Thus, we have a panel dataset of 16 countries which are observed over 8 years, we have $N*T=128$ observations, and we have 15 fixed effects³. The “within” estimator uses only the variance in X that varies over time; it ignores variation across groups. Therefore, the fixed effects estimator cannot be used to estimate the effects of time-invariant independent variables⁴.

The opposite of within-groups regression is between-groups regression. In equation (4), we demonstrate that each of the 16 countries is collapsed over time, so that all of the variables represent each country's eight year average. The resulting regression would ignore temporal variance and focus solely on cross-sectional comparisons:

$$Y_i^* = \beta_0 + \beta_1 X_{1i}^* + \beta_2 X_{2i}^* + \dots + \beta_k X_{ki}^* + a_i + u_i \quad i = 1, 2, \dots, N; t = 1, 2, \dots, T \quad (4)$$

where Y_i^* represents the mean value of VC investment intensity for each country i , X_{ki}^* represents K explanatory variables (the determinants of VC investment intensity), a_i is again the observed heterogeneity and is fixed overtime, u_i is the underlying disturbance of the model.

Fixed effects models have some drawbacks. For instance, the fixed effects models may often have too many cross-sectional units of observations requiring

³ We must exclude one category, when using dummy variables.

⁴ In this case, we need to introduce our interaction terms (e.g. EPL*GDP and BERD*TEA) since we cannot use the time invariant forms of EPL and TEA variables.

too many dummy variables for their specification. Too many dummy variables such as in our case may lessen the adequate number of degrees of freedom for powerful statistical tests. Moreover, a model with many such variables may be overwhelmed with multicollinearity, which increases the standard errors and thereby depleting statistical power to test the parameters. Although the residuals are assumed to be normally distributed and homogeneous, there could easily be unit-specific heteroskedasticity or autocorrelation over time that would further deteriorate the estimation.

2.4.2.2 Random Effects Model

Some studies have argued whether the cross-section effects should be treated as fixed or random variables. In fact, we can always treat the cross-section effects as random variables without loss of generality (Arellano and Bover 1990). In fact, what is essential is to decide whether these individual effects are correlated with the observed variables X_{it} or not. To test for the existence of this correlation we use the Hausman test (1978). If the Hausman test does not reject the null hypothesis that the cross-section effects are not correlated with the explanatory variables, the most suitable estimation would then be the random effects model. Although we do not report, in all the regressions we ran, the Hausman test did not reject the null hypothesis. Therefore, we treat the specific effects as being random and apply the Swamy and Arora estimator, which we believe is the most efficient one in our case. Even though we rely on random-effects model while drawing our conclusions, we also discuss the estimation results from fixed-effects and between regressions.

Now, we describe random-effects model where we additionally assume that the unobserved effect a_i is uncorrelated with each explanatory variable. Wooldridge (2002) writes this assumption as:

$$\text{Cov}(x_{kit}, a_i) = 0 \text{ for each time period } t \text{ and variable } 1 \dots k$$

The random effects model is also sometimes described as a regression with a random constant term. In other words, it is assumed that the intercept is a random outcome variable that is a function of a mean value plus a random error. A “combined” error term is formed as follows:

$$v_{it} = a_i + u_{it}$$

where a_i denotes the unobservable individual effect and u_{it} denotes the underlying disturbance, which can be thought of as a zero-mean white noise process. Mainly, we assume both u_{it} and a_i have zero means:

$$E(a_i) = 0 \quad E(u_{it}) = 0$$

And our random effects model estimated is:

$$Y_{it} = \beta_0 + \beta_1 X_{1it} + \beta_2 X_{2it} + \dots + \beta_k X_{kit} + v_{it} \quad (5)$$

Note that the combined error term v_{it} is subscripted with both i and t . Because a_i is in the combined error for each time period t , the error term v_{it} is serially correlated across time (i.e., the error terms are correlated with each other over time). The random effects estimators used in Eviews approximate the degree of serial correlation (or its importance in the model) and compute estimates accordingly.

The following equation is our complete random-effects model, which will describe the intensity of VC funds in an economy i in period t and it can be written as:

$$\begin{aligned} \text{Log(VC)}_{it} = & \beta_0 + \beta_1 \log(\text{IPO})_{it} + \beta_2 \log(\text{GDP})_{it} + \beta_3 \log(\text{INF})_{it} + \beta_4 \log(\text{IR})_{it} + \\ & \beta_5 \log(\text{ST})_{it} + \beta_6 \log(\text{BERD})_{it} + \beta_7 \log(\text{CITR})_{it} + \beta_8 \log(\text{TEA})_{it} + \beta_9 \log(\text{EPL})_{it} + \\ & \beta_{10} \log(\text{SOC})_{it} + \beta_{11} \log(\text{INV})_{it} + \beta_{12} \log(\text{INT})_{it} + \beta_{13} \log(\text{CORR})_{it} + v_{it} \quad (6) \end{aligned}$$

In equation (6), the parameters that are to be estimated are identified as follows:

- β_1 : The impact of IPOs (+)
- β_2 : The impact of GDP growth (+)
- β_3 : The impact of inflation (-)
- β_4 : The impact of real interest rates (-)
- β_5 : The impact of stocks traded (+)
- β_6 : The impact of business expenditures on R&D (+)
- β_7 : The impact of corporate income tax rate (-)
- β_8 : The impact of the total level of entrepreneurial activity (+)
- β_9 : The impact of labor market rigidities (-)
- β_{10} : The impact of socioeconomic conditions (+)
- β_{11} : The impact of investment profile (+)
- β_{12} : The impact of internal conflict (-)
- β_{13} : The impact of corruption (-)

As explained in previous sections, we believe that the following factors will influence the supply of VC investments: Initial Public Offerings (IPO), GDP growth (GDP), inflation (INF), real interest rates (IR), stocks traded (ST), corporate income tax rate (CITR), socioeconomic conditions (SOC), investment profile (INV), internal conflict (INT), and corruption (CORR). We also introduced the factors that are important in affecting the demand for VC

investments: Initial Public Offerings (IPO), GDP growth (GDP), interest rates (IR), stocks traded (ST), inflation (INF), technological opportunities—business R&D expenditures (BERD), entrepreneurial environment—total entrepreneurial activity (TEA), corporate income tax rate (CITR) and labor market rigidities (EPL). Further detail on these variables can be seen in descriptive statistics section and in Table 2.5.

2.4.3 Data

The data set contains annual data from 16 countries for the time period starting from 1995 to 2002. The countries are selected according to availability and accessibility of databases and are as follows: Australia, Canada, Denmark, Finland, France, Germany, Ireland, Italy, Japan, New Zealand, Norway, Poland, Spain, Sweden, United Kingdom and United States. One can refer to Table 2.3, Figure 2.1 and Figure 2.2 to compare all stages (early and expansion) VC investment activity across our countries and time span.

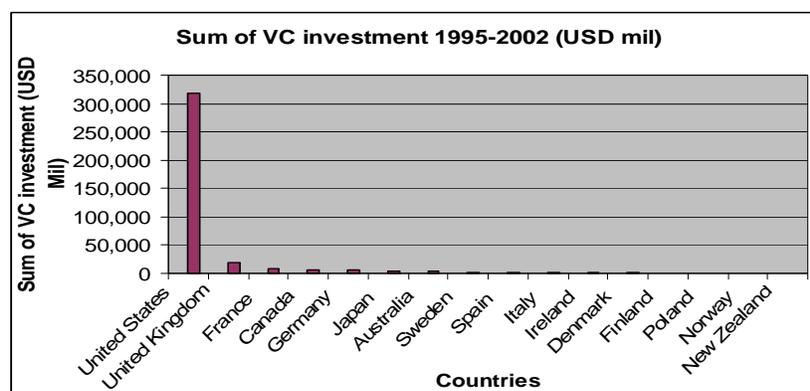
We identify US as the chief player in VC industry as the most VC activity takes place in the US. It is by far ahead of other countries; however, when we disregard US data, there is no significant change in our results. United Kingdom is another major actor with a considerable amount of VC activity. Other countries such as France, Germany and Canada are also important locations for the existing VC investment action. On the other side, some European countries such as Norway fall behind in the VC investment growth.

Table 2.3: Total VC investment activity across 16 countries in 1995-2002

Company Nation	Number of VC Deals	Sum VC (in Mil)	GDP level (in Mil)	Sum VC /GDP(Mil)
United States	37,770	317,427.69	7340000	0.043246
United Kingdom	2,944	18,345.73	1130000	0.016235
France	1,445	7,636.63	1550000	0.004927
Canada	1,018	6,545.72	581600	0.011255
Germany	1,610	5,923.44	2460000	0.002408
Japan	537	4,258.61	5280000	0.000807
Australia	1,083	3,188.51	372700	0.008555
Sweden	579	2,242.85	248000	0.009044
Spain	297	1,684.04	584000	0.002884
Italy	254	1,540.96	1100000	0.001401
Ireland	295	1,419.85	66500	0.021351
Denmark	235	1,160.26	180200	0.006439
Finland	458	566.67	130000	0.004359
Poland	265	548.54	136000	0.004033
Norway	103	388.29	148000	0.002624
New Zealand	94	208.74	60800	0.003433

Source: Thomson Venturexpert 1995-2002

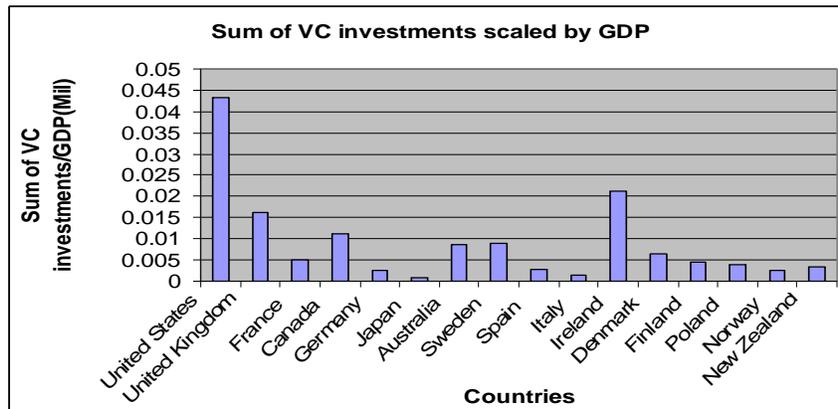
Figure 2.1 The sum of VC investments (USD Mil) across 16 countries in 1995-2002



Source: Thomson Venturexpert 1995-2002

As a measure of VC activity, we use the sum of all stages (early and expansion) VC investments (in USD millions) as a broader definition of VC investments. Since the countries differ considerably in size, we normalize the sum of VC investments by each country's GDP level approximating the overall size of economy (See Table 2.3 and Figure 2.2). After the normalization, US is again leading, but this time followed by Ireland and UK. VC investment data is obtained from Thomson Venturexpert Investment Analytics Report from 1995 to 2002 for the 16 nations. Further definition and sources of all other variables are summarized in Table 2.4.

Figure 2.2 The sum of VC investments scaled by GDP (USD Mil) in 1995-2002



Source: Thomson Venturexpert 1995-2002

Table 2.4 Data Definitions and Sources⁵

Variable	Description	Source
VC	Sum of venture capital investments (US\$)divided by GDP levels	VentureXpert Database
GDP	Gross Domestic Product Growth as annual percentage (%)	World Bank: World Development Indicators (WDI) (1995-2002)
IR	Real Interest Rates as annual percentage (%)	World Bank: World Development Indicators (WDI) (1995-2002)
ST	Total value of stocks traded as a % of GDP	World Bank: World Development Indicators (WDI) (1995-2002)
STURN	Stock turnover rate	World Bank: World Development Indicators (WDI) (1995-2002)
IPO	Initial public offerings: annual data of the number of newly listed companies	World Federation of Exchanges (1995-2002)
CITR	Corporate income tax rate: annual data	Office of Tax Policy (1995-2002)
INF	Inflation: consumer prices as annual percentage (%)	World Bank: World Development Indicators (WDI) (1995-2002)
BERD	Business expenditures on research and Development	OECD, Main Science and Technology Indicators (1995-2002)
TEA	Total entrepreneurial activity index of the proportion of adults involved in the creation of emerging firms and the proportion involved in new firms	The Global Entrepreneurship Monitor (2003)
EPL	Employment protection legislation strength of the legal structure for hiring and laying off employees	OECD, Employment Protection Legislation (2003)
PAT	Patent: Number of triadic patent families	OECD, Main Science and Technology Indicators (1995-2002)
SOC	Socioeconomic Conditions: rating (1-12)	International Country Risk Guide (PRS database)
INV	Investment Profile: rating (1-12)	International Country Risk Guide (PRS database)
CORR	Corruption: rating (1-6)	International Country Risk Guide (PRS database)
INT	Internal Conflict: rating (1-12)	International Country Risk Guide (PRS database)
POL	Political Risk: sum of all 12 political risk Components, (max 100 points)	International Country Risk Guide (PRS database)

Among the variables defining the state of general economy; we use GDP growth (annual %), Inflation (consumer prices (annual %)), total value of stocks traded as a percentage of GDP, stock turnover rate (%) and the real interest rates (%). This annual macroeconomic data is obtained from World Bank, World Development Indicators (WDI) - the World Bank's primary database for cross-

⁵ This table shows not only the variables in our complete random-effects model but also other (excluded) variables such as STURN, and PAT that we use in other analyses.

country comparable development data- between 1995 and 2002 for our 16 countries. Although we expect that different types of interest rates impact VC investment intensity differently; in our analysis, we prefer to employ real interest rates. The reason is that, long-term and short-term interest rates (taken from World Federation of Exchanges) are available only for 11 countries in the period of 1996-2002, while the real interest rates are available for all the countries in our sample between 1995 and 2002. Due to showing no meaningful differences in our pre-analysis, we prefer to include only real interest rates in reporting our empirical results. As a measure of IPO, we use annual data of the number of newly listed companies, which is obtained from World Federation of Exchanges for the 16 countries between 1995 and 2002.

Our proxies for the technological opportunities are the business expenditures on R&D and the number of triadic patent families⁶. Both these measures are obtained from OECD, Main Science and Technology Indicators) for 16 countries from 1995 to 2002.

As a measure of entrepreneurial environment, we use the corporate taxation, total entrepreneurial activity, and labor market rigidities. As a measure of corporate taxation, we use annual corporate income tax rate data, which is obtained from the Office of Tax Policy Research (OTPR) from 1995 to 2002 for the 16 countries. Total entrepreneurial activity data is available as an index computed by adding the proportion of adults involved in the creation of emerging firms and the proportion involved in new firms. This data is gathered from The

⁶ Since the number of triadic patent families (PAT) is highly correlated (about .9) with business expenditures on R&D (BERD) and some other explanatory variables; we later omit PAT variable from the regression analyses in our parsimonious and complete models.

Global Entrepreneurship Monitor for the year 2003. We treat this variable as the expected total entrepreneurial activity in a country. This variable ranks from 1 to 20, 1 having the least entrepreneurial activity. Since it is only available for one year, it varies only across countries⁷. Labor market rigidities data is rather difficult to obtain. As a measure of labor rigidities, we use OECD's employment protection legislation (EPL) which is based on the strength of the legal structure for hiring and laying off employees. Our 16 countries are ranked from 1 to 20 with 1 being the least regulated. Such as TEA indicator, EPL variable is fixed overtime⁸.

The independent variables dealing with political risk in our empirical analysis include the measures from Political Risk Services (PRS)' International Country Risk Guide (ICRG). Political Risk Services ICRG index is not widely available in universities' databases and therefore is difficult to obtain⁹.

PRS political risk rating includes 12 weighted variables covering both political and social features. The intention of the political risk rating is to provide an approach of assessing the political risk of the countries.

This is done by assigning risk points to a pre-set group of factors, termed political risk components. The minimum number of points that can be assigned to each component is zero, while the maximum number of points depends on the

⁷ TEA is also introduced in an interaction with BERD variable (TEA*BERD); however because of strong correlation of (TEA*BERD) with other variables, we omitted this interaction in our complete random-effects model.

⁸ EPL is also introduced in an interaction with GDP variable (EPL*GDP); however because of strong correlation of (EPL*GDP) with other variables, we omitted this interaction in our complete random-effects model.

⁹ The PRS data is gathered through Prof. Mahmut Yasar and Mehmet O. Karabag from Emory University; we thank you for helping us to enrich our analysis on political determinants.

fixed weight that component is given in the overall political risk assessment. In every case the lower the risk point total, the higher the risk, and the higher the risk point total the lower the risk.

Table 2.5 Political Risk Components¹⁰

Component	Points (max)
Government Stability	12
Socioeconomic Conditions	12
Investment Profile	12
Internal Conflict	12
External Conflict	12
Corruption	6
Military in Politics	6
Religious Tensions	6
Law and Order	6
Ethnic Tensions	6
Democratic Accountability	6
Bureaucracy Quality	4
Total	100

Source: Political Risk Services, ICRG

2.4.3.1 Descriptive Statistics

Descriptive statistics for all macro and political variables are presented in Table 2.6. The mean value of the dependent variable VC investment intensity in all stages -early and expansion VC- (which is scaled by dividing the sum of VC investments by GDP levels) varies from 122.760 (USD Mil) in Japan to 4254.172 (USD Mil) in US, as shown in the third column in Table 2.6. On average, over all periods, VC investment intensity in only early stage (Early VC) (which is scaled by dividing the sum of early VC investments by GDP levels) is about 7.634 (USD Mil) in Japan, while it is 1628.009 (USD Mil) in US. Thus, in US, all stages

¹⁰ In our analyses, we treat each component of political risk as separate independent variables. In our parsimonious and complete models, we include the investment profile (INV), internal conflict (INT), socioeconomic conditions (SOC), corruption (CORR) and the overall political risk (POL).

(early and expansion) VC investments are about 2.5 times as high as early stage VC investments; where as in Japan, all stages (early and expansion) VC investments are about 7 times as high as early stage VC investments. The countries also differ substantially with respect to the total value of stocks traded (ST) as a percentage of GDP. In Poland, ST is as low as 4.84 per cent of GDP, while in US, it is as high as 187.059 per cent of GDP. US is also far ahead of other countries with regard to business expenditures on R&D (BERD). Other descriptive statistics confirm that on average, labor market is most rigid in Spain, where as it is most flexible in US. Generally, GDP is growing in Ireland the most, where Japan shows the slowest growth. Finally, the lowest corporate income taxation rate is found in Sweden, Norway and Finland with about 28%. The number of observations for all variables is 128, except for stock turnover (STURN) variable, in which we have 127 observations.

2.4.3.2 Correlations

Pairwise correlations that are presented in Table 2.7 offer a first clue for the relationship between venture capital investments and macro and political determinants. The correlation coefficients between venture capital investments in all stages (VC) and the total value of stocks traded (ST), socioeconomic conditions (SOC), investment profile (INV) are comparatively high (about .5, .5, .6, respectively). By contrast, correlation coefficients between VC and IPO, STURN, INF, CITR, IR, GDP, CORR are below .20. Thus, the correlation coefficients between VC and INV, SOC, ST are much stronger than the correlations between VC and IPO, STURN, INF, CITR, IR, GDP, CORR.

Many economic variables have the property that they are correlated. This is not surprising, given the natural links between almost all facets of economic activity within any given economy. However, this feature of most economic data suggests that within the context of regression, not only are the independent variables related to the dependent variable in a regression model, but the independent variables are also correlated with one another.

Table 2.6 Descriptive Statistics in 16 countries

COUNTRIES	Sum/C		Sum/C+1/GDP (VC)		EarlySum/C		arlySum/C+1/GDP (Early VC)		BERD		CITR		EPL		GDP		INF		TEA		POL	
	Mean	Std. Dev.	Mean	Std. Dev.	Mean	Std. Dev.	Mean	Std. Dev.	Mean	Std. Dev.	Mean	Std. Dev.	Mean	Std. Dev.	Mean	Std. Dev.	Mean	Std. Dev.	Mean	Std. Dev.	Mean	Std. Dev.
AUS	400.064	324.455	1029.225	854.254	36.349	55.830	36.349	55.830	3.678	0.719	33.875	2.642	1.500	0.000	3.778	1.004	2.710	1.722	13.400	0.000	86.224	2.416
CAN	797.334	734.909	1159.966	1022.793	23.021	19.409	23.021	19.409	8.595	1.772	38.000	0.000	1.100	0.000	3.598	1.471	1.950	0.578	8.900	0.000	85.755	3.117
DEN	145.033	145.335	876.629	872.474	21.766	44.017	21.766	44.017	1.976	0.578	33.000	2.619	1.800	0.000	2.344	0.687	2.305	0.322	5.300	0.000	89.333	3.405
FI	70.835	90.543	584.254	753.387	4.320	5.037	4.320	5.037	2.523	0.790	28.000	1.309	2.100	0.000	3.803	1.661	1.608	0.910	4.400	0.000	90.281	4.060
FR	984.054	1047.879	718.595	779.175	62.046	89.805	62.046	89.805	20.207	2.461	33.300	0.000	2.900	0.000	2.296	1.038	1.430	0.575	6.000	0.000	80.141	0.856
GER	742.251	915.775	385.611	494.597	55.593	75.163	55.593	75.163	32.199	4.843	32.500	8.018	2.500	0.000	1.471	0.855	1.422	0.474	4.500	0.000	85.214	2.404
IRE	176.440	198.755	1806.377	2022.911	11.094	9.550	11.094	9.550	0.800	0.137	30.000	9.071	1.300	0.000	9.018	1.879	3.104	1.662	7.700	0.000	87.490	2.731
IT	238.929	285.827	214.748	262.096	8.524	13.688	8.524	13.688	7.253	0.791	36.625	0.518	2.400	0.000	1.831	0.879	2.834	1.202	4.300	0.000	79.583	4.296
JPN	533.196	687.764	122.760	154.375	7.634	14.700	7.634	14.700	66.689	8.919	33.375	3.739	1.800	0.000	1.132	1.616	-0.033	0.878	1.500	0.000	82.656	3.326
NO	48.435	58.457	292.043	345.861	4.896	6.098	4.896	6.098	1.282	0.232	28.000	0.000	2.600	0.000	3.313	1.442	2.285	0.691	7.000	0.000	87.026	2.790
NZ	26.599	25.181	492.397	455.918	0.500	0.903	0.500	0.903	0.292	0.167	33.000	0.000	1.300	0.000	3.094	1.522	2.037	1.198	14.700	0.000	87.078	2.504
PL	70.900	41.127	423.859	232.992	2.530	2.231	2.530	2.231	0.871	0.182	34.250	5.600	2.100	0.000	4.385	2.264	12.440	8.430	8.800	0.000	80.380	3.541
SP	207.165	240.121	343.188	382.089	11.419	28.754	11.419	28.754	3.547	0.997	35.000	0.000	3.100	0.000	3.361	0.934	3.055	0.966	5.200	0.000	77.813	3.773
SW	280.613	319.340	1204.651	1417.155	13.314	18.240	13.314	18.240	6.193	1.237	28.000	0.000	2.600	0.000	2.919	1.418	1.167	1.034	3.700	0.000	86.953	3.580
UK	2394.010	2216.306	1662.681	1518.518	190.455	250.158	190.455	250.158	17.223	2.491	31.375	1.408	1.100	0.000	2.786	0.666	2.544	0.788	6.300	0.000	86.370	4.372
US	39727.180	35219.760	4254.172	3531.651	1628.009	1059.379	1628.009	1059.379	171.761	27.285	35.000	0.000	0.700	0.000	3.245	1.397	2.450	0.654	11.300	0.000	84.432	3.711

COUNTRIES	IPO+1/GDP (IPO)		IR		ST		INV		INT		SOC		CORR		STURN		BERD*TEA		EPL*GDP		PAT	
	Mean	Std. Dev.	Mean	Std. Dev.	Mean	Std. Dev.	Mean	Std. Dev.	Mean	Std. Dev.	Mean	Std. Dev.	Mean	Std. Dev.	Mean	Std. Dev.	Mean	Std. Dev.	Mean	Std. Dev.	Mean	Std. Dev.
AUS	237.617	103.108	6.721	1.629	48.681	15.440	8.542	1.787	11.292	0.683	8.292	1.242	4.927	0.175	53.524	14.710	49.280	9.632	0.590	0.030	299.625	59.649
CAN	193.313	66.448	4.637	1.393	55.169	16.897	8.885	2.273	11.229	0.947	8.302	0.838	5.792	0.525	63.780	7.919	76.498	15.772	0.717	0.061	557.625	106.426
DEN	47.396	22.400	6.034	1.134	33.757	14.111	8.625	1.948	11.760	0.444	8.729	1.285	5.865	0.252	61.293	12.725	10.472	3.061	0.308	0.016	220.125	16.591
FI	104.605	67.219	3.514	1.547	81.434	63.152	9.146	2.077	11.979	0.059	8.135	1.295	6.000	0.000	60.451	21.920	11.099	3.478	0.265	0.009	465.875	100.327
FR	60.652	49.221	5.369	0.625	49.330	25.631	9.042	1.845	10.365	1.086	7.323	1.162	3.531	0.508	79.790	29.659	121.241	14.768	4.158	0.260	2279.625	198.381
GER	157.609	168.952	8.579	0.649	43.861	19.156	8.911	2.007	11.792	0.402	7.521	1.401	4.813	0.762	133.616	37.954	144.898	21.793	5.288	0.543	6254.500	936.026
IRE	74.461	61.558	0.963	1.950	27.824	14.711	9.490	1.813	11.630	0.361	8.875	1.816	3.323	1.218	54.563	28.529	6.163	1.058	0.117	0.023	44.750	14.290
IT	20.617	12.362	5.011	1.710	35.875	22.841	8.583	2.134	10.938	1.224	7.323	0.812	3.208	0.492	80.325	26.174	31.187	3.399	2.769	0.141	764.125	83.352
JPN	19.185	11.382	3.311	0.715	35.623	11.782	7.813	2.198	11.938	0.177	7.505	0.862	3.531	1.167	52.100	15.863	100.034	13.378	7.997	0.817	11573.750	1259.296
NO	161.413	101.190	4.209	5.483	27.968	6.341	8.599	1.772	11.891	0.205	9.188	1.229	5.188	0.372	74.954	11.609	8.972	1.621	0.423	0.036	95.000	10.212
NZ	283.400	145.491	8.598	1.851	16.380	3.070	8.938	1.925	11.792	0.388	8.188	1.014	5.260	0.371	40.940	9.738	4.300	2.455	0.076	0.008	36.250	7.517
PL	172.908	136.027	8.927	5.303	4.840	2.169	9.396	1.772	11.167	1.073	5.458	0.718	3.927	1.232	54.940	21.863	7.668	1.599	0.347	0.037	10.000	6.845
SP	41.122	25.396	2.441	1.857	106.026	57.447	9.719	2.318	8.344	1.316	6.792	1.557	4.120	0.703	162.000	60.731	18.442	5.183	1.840	0.093	186.625	208.162
SW	136.164	70.893	5.079	1.303	90.897	41.898	8.255	2.165	11.474	0.707	7.885	1.478	5.927	0.175	82.619	20.945	22.913	4.576	0.639	0.037	916.750	112.775
UK	208.765	81.326	3.160	1.232	95.572	45.469	9.958	1.899	10.115	1.038	9.396	1.962	4.854	0.193	68.000	31.026	108.507	15.692	1.507	0.159	1809.375	254.042
US	52.785	25.849	5.951	1.425	187.059	93.594	9.641	1.706	10.911	0.459	8.958	1.425	4.240	0.446	139.501	52.515	1940.903	308.316	6.249	0.771	15296.000	2590.828

When the independent variables are correlated with one another, then we may have what is termed "multicollinearity". As table 2.7 shows our following independent variables are highly correlated with each other: Business expenditures on R&D (BERD), Number of Triadic Patent Families (PAT), our interaction variables- employment protection legislation * gross domestic product levels (EPL*GDP), and total entrepreneurial activity * business expenditures on R&D (TEA*BERD). To deal with a possible multicollinearity problem, we attempt to use two methods; applying the first differences method and omitting highly correlated variables.

One simple remedy is to omit one of the variables that is highly multicollinear, as the informational content of this variable is essentially the same as that of other variable(s), anyways. Another common solution is to log difference the data. This often removes much of the multicollinearity among regressors, particularly since the multicollinearity may have arisen because the regressors were all trending upwards over time. The advantage is that 'changes' in natural logarithm of the venture capital investments may not be as highly correlated as their 'levels'. However, applying first differences method reduces the explanation power considerably. Therefore, instead of relying on first differences, we prefer to omit both of our interaction variables (EPL*GDP and TEA*BERD) and one of our technological development proxy, PAT. We believe that the number of triadic patent families (PAT) has essentially the same informational content and could be represented by Business expenditures on R&D (BERD) variable. Although, the interaction terms are also omitted, we include the

variables Employment Protection Legislation (EPL) and Total Entrepreneurial Activity (TEA) without their interactions in our between and random-effects regressions, where applicable. On the other side, Table 2.7 includes four components of political risk. Socioeconomic conditions and investment profile variables appear to be strongly and positively correlated to venture capital investments (VC); .5, .4, respectively, where as the other two variables, internal conflict (INT) and corruption (CORR) show weaker and negative correlations with VC; -.26, and -.07, successively.

2.4.4 Panel Regression Results

In this section, we provide empirical results from our panel estimations. First, we report our results for all stages- early and expansion- of VC investments in our between, fixed (within) and random-effects panel models. Then, to analyze whether the determinants of early stage VC investments differ from other stages, we also run between, fixed (within) and random-effects regressions with only early-stage VC investments as the dependent variable.

In order to estimate whether the identified driving forces have a significant impact on the level of VC activity, we employ panel data techniques. We provide results from between, fixed-effects (within) and random-effects estimations for our parsimonious and complete models. For all our analyses; we use Eviews panel estimation capabilities.

Table 2.8 shows the panel estimation regression results from between regressions of venture capital investments on macro and political variables. First, we include all macro variables in our regression analysis (OLS 1). Then, we add

our single political variables (SOC, INV, INT, CORR) into the model, which also increases the explanatory power (OLS 2). The next model includes the combined political risk variable (POL) instead of single political risk components, which seems to reduce the model's explanatory power (OLS 4). We also try to replace stocks traded (ST) variable by stock turnover (STURN) to observe whether or not stocks traded is a more significant determinant (OLS 5). In the last two models (OLS 6 and 7), we run the regressions only with 'entrepreneurial environment' variables (CITR, EPL, TEA) and 'general economy' variables (GDP, INF, IPO, ST, IR), respectively.

Table 2.9 demonstrates the results from fixed-effects (within) models. Here, our models differ from between regressions since we are obliged to use the interaction variables due to the time-invariant characteristic of EPL and TEA. Also, we prefer to include single political risk components (SOC, INV, INT, CORR) in our fixed-effects models since they raise the models' power extensively. First, we use no interaction variable, but we add our single political variables (OLS 1). In OLS 2, we include BERD*TEA interaction¹¹ and in OLS 4, we analyze EPL*GDP interaction. On the other hand, OLS 3 examines no interactions but combined political risk variable (POL). The last model in fixed-effects replaces stocks traded (ST) with stock turnover (STURN).

Finally Table 2.10 illustrates cross-section random effects. The modeling strategy is the same as in between regressions since we do not have interaction variables. In fact, all three models provide similar results for some explanatory

¹¹ We do not want to include both EPL*GDP and BERD*TEA interaction variables in a model at the same time since they appear to be strongly correlated. Instead we prefer to analyze them separately in our within models.

variables. In our final conclusions, we consider all regression analyses; however, we depend more on our random-effects since this model provides better estimators than the others as we discussed previously in the panel estimation section. For robustness check of our results, we perform a robustness test by excluding US data and running the cross-section random-effects regressions for all stages and early stage VC investments excluding US. The results for robustness check regressions are provided in Table 2.11.

Table 2.7 Pairwise Correlation Matrix

This table provides a pairwise correlation matrix of the variables used in the empirical analysis. The measure sumVC is the sum of all-stages(early and expansion) VC investments divided by the corresponding GDP levels of each country. The measure GDP is the annual % of gross domestic product of each country. The measure INF is the annual % of consumer prices. The measure IR is the annual % of real interest rates. ST is a measure of the total value of stocks traded (%of GDP). CITR is the measure of corporate income tax rate. BERD is the measure of business expenditures on R&D. PAT is the measure of the number of triadic patent families. GDP*EPL is an interaction measure of employment protection legislation index (EPL) multiplied the corresponding annual GDP levels of each country. BERD*TEA is an interaction measure of total entrepreneurial activity (TEA) multiplied by BERD variable. STURN is a measure of annual % of stock turnover. IPO is a measure of initial public offerings plus 1 divided by corresponding GDP levels of each country. SOC, INV, INT, and CORR are all political risk component measures. All variables are in their natural logarithmic forms. *, ** describe significance level of pairwise correlations at 5% and 1%, respectively.

	GDP	INF	IR	ST	CITR	VC	BERD	PAT	GDP*EPL	BERD*TEA	STURN	SOC	INV	INT	CORR	IPO
GDP	1															
INF	0.201 *	1														
IR	-0.201 *	-0.076	1													
ST	-0.094	-0.319 **	-0.275 **	1												
CITR	0.081	0.066	0.212 *	-0.054	1											
VC	0.150	0.184 *	-0.154	0.477 **	-0.141	1										
BERD	-0.366 **	-0.300 **	0.016	0.566 **	0.167	0.121	1									
PAT	-0.427 **	-0.492 **	0.030	0.605 **	0.065	0.036	0.939 **	1								
GDP*EPL	-0.437 **	-0.255 **	0.055	0.383 **	0.236 **	-0.109	0.911 **	0.834	1							
BERD*TEA	-0.267 **	-0.195 *	0.093	0.578 **	0.225 *	0.271 **	0.948 **	0.859 **	0.822	1						
STURN	-0.167	-0.003	-0.158	0.591 **	0.130	0.194 *	0.439 **	0.366 **	0.468 **	0.441	1					
SOC	0.000	-0.082	-0.345 **	0.529 **	-0.261 **	0.540 **	0.133	0.219	-0.093 *	0.184	0.105	1				
INV	-0.071	0.108	-0.195 *	0.402 **	-0.212 *	0.640 **	0.069	-0.004	-0.026	0.127 **	0.306 **	0.494 **	1			
INT	-0.076	-0.089	0.219 *	-0.396 **	-0.120	-0.265 **	-0.134	-0.007 **	-0.248	-0.159 **	-0.385 **	0.006	-0.399 **	1		
CORR	0.206 *	-0.113	0.236 **	0.112	0.080	-0.072	-0.172	-0.078 **	-0.306	-0.129	0.041	0.071	-0.184 *	0.208 *	1	
IPO	0.410 **	0.079	0.171	-0.067	0.071	0.176 *	-0.331 **	-0.319 **	-0.434 *	-0.186	-0.157	-0.026	-0.076	0.115	0.454 **	1

Before starting the regression analyses, we want to emphasize several issues. First, to date, researchers have focused on linear regressions in their empirical analyses. Making linear assumptions, they have documented the results for the main determinants of VC investments. In fact, VC activity does not have to be a linear function of the determinants identified in this essay because of venture capitalists' investment behavior. Hence, we believe that the VC investments follow nonlinear mechanisms. One of the advantages of non linear models is that almost any function that can be written in closed form can be incorporated in a nonlinear regression model. Unlike linear regression, there will be very few limitations on the way parameters can be used in the functional part of a nonlinear regression model. By transforming our original data into natural logarithm of all variables, we encounter nonlinear specifications¹².

Second, in the complete models (Table 2.8, 2.9 and 2.10), we include all general economy variables –gross domestic product growth (GDP), initial public offerings (IPO), stocks traded (ST), inflation (INF), real interest rates (IR). As a proxy for technological opportunities, we take in only the business expenditures on R&D (BERD)¹³. The entrepreneurial environment consists of corporate income tax rate (CITR), labor market rigidities (proxied by the employment protection legislation (EPL)) and total entrepreneurial activity (TEA)¹⁴. On the political side, our model includes four components of political risk; investment

¹² Descriptive statistics is calculated by using original data points instead of their natural logarithms. Yet, in all panel estimation analyses, we regress the nonlinear specifications of the data.

¹³ Due to strong correlations between the two variables, we omit the number of triadic patent families (PAT) which was the other proxy for technological opportunities.

¹⁴ Instead of interaction variables (EPL*GDP and TEA*BERD), we include only employment legislation (EPL), and total entrepreneurial activity (TEA by themselves because of strong correlations between the variables.

profile (INV), socioeconomic conditions (SOC), corruption (CORR), and internal conflict (INT). Among other components of political risk, these four variables are correlated to VC activity the most. Plus, they increase the explanation power of the model the most.

We also want to make sure that the stocks traded (ST) variable is a good proxy. By replacing stocks traded (ST) with stock turnover (STURN) in our OLS 4 in Table 2.8 and Table 2.10, and OLS 5 in Table 2.9, we confirm that stocks traded (ST) is a better proxy and show that stock turnover (STURN) is not a significant determinant of VC investments for our sample countries. As we demonstrate; stocks traded (ST) is a very important explanatory variable in explaining the variance in VC investment intensity (Tables 2.8, 2.9, and 2.10). Since ST and STURN are strongly correlated with each other, we omit STURN variable for the most part in drawing our conclusions.

Next, instead of considering the components of political risk separately in our model, we also combine them into one variable and run the regressions with only political risk (POL) variable to see if it would make a difference and/or fit better (OLS 3 in Tables 2.8, 2.9, 2.10). Political risk variable (POL) is the sum of all twelve components' ratings represented in Table 2.5. The R-squares have fallen considerably when we replace political risk components with the combined POL variable. Still, political risk (POL) variable appears in some cases to be significant at 1%, which highlights its importance once more in determining the variance in VC investments across countries and therefore making our results more robust.

Lastly, we sub-sample the data for only early stage VC investments instead of including all stages (early and expansion) of VC investment. The reason for us doing that is the mixed results provided in the VC literature regarding early stage VC investments. Interestingly enough, we observe some divergence from the all-stages VC sample. The results for the early stage VC investments regressions are represented in the last columns of Tables 2.8, 2.9 and 2.10.

At this time, we start presenting our regression results from between, fixed effects (within) and random-effects models, successively. Table 2.8 reports results from the between regressions of venture capital investments on Business expenditures on R&D (BERD), corporate income tax rate (CITR), employment protection legislation (EPL), gross domestic product growth (GDP), inflation (INF), Initial public offerings (IPO), stocks traded (ST), interest rates (IR), stock turnover (STURN), investment profile (INV), internal conflict (INT), socioeconomic conditions (SOC), corruption (CORR), and political risk (POL). The explanatory power of all regressions is high, with R^2 s ranging from 54% to 95.4%. In our complete models (OLS 1-4) for all stages VC sample (VC) and early stage VC sample (Early VC), all of our independent variables are insignificant. Still, in our more parsimonious models (OLS 5 and 6); we find some of our macro variables being important. For instance, in OLS 5, we see that labor market rigidities (EPL) variable is significant in explaining the cross sectional variances in all stages VC sample (VC). Also, with respect to general economic variables, we observe that GDP growth and stocks traded are

statistically significant for both all stages VC sample (VC) and early stage VC sample (Early VC). The interesting result here is that two of our entrepreneurial environment proxies (CITR and TEA) are very important in illuminating early stage VC intensity but not significant in determining all stages VC sample investment intensity across our 16 countries. In other words, CITR and TEA together with GDP growth and stocks traded help to explain the discrepancies in early stage VC investment intensity in 16 countries, while GDP growth, stocks traded and labor market rigidities seem to explain the difference in all stages VC investment intensity across these countries. Between regressions analysis is important for the purposes of our study since it does not involve time-period dimension so that it is relevant to compare the variation of VC investments only across countries.

In overall between regression results, we can conclude that stocks traded variable is the most important determinant of VC intensity across countries. This lends support to the hypothesis advanced in previous sections that ‘high levels of stocks traded in a country will lead to more VC intensity’. Plus, all of the significant explanatory variables have their signs as we expected. For instance; as the total value of stocks traded in a country increases, the VC intensity in that country also increases. Also, labor market rigidities variable, which is proxied by employment protection legislation (EPL) is negatively related to VC investment activity. As expected in our hypothesis on labor market rigidities; when labor market in a country becomes more rigid, VC activity in that country diminishes.

In fixed-effects (within) regressions (Table 2.9), our models' explanatory powers still remain high ranging from 70.4% to 82.3 %. We confirm that the total value of stocks traded (ST) is again one of the most important determinants of VC investment intensity for our all stages VC sample (VC) investments. Yet, stocks traded variable is less significantly important for our early stage VC (Early VC) investments. The socioeconomic condition emerges to be another important determinant of VC investments for both our all stages sample and early stage VC investments. Corruption is also statistically significant and negatively associated with both all stages VC sample and early stage VC investments. Remarkably, we find that internal conflict is only significant for our early stage VC investments, which shows that early stage VC investment activity is highly influenced by the condition of internal conflict in a country. Perhaps, VC investors evaluate the internal conflict conditions of relevant countries more when the firms requiring financing are at early stage. On the other hand, such as in expansion stage, the firms' characteristics together with economic conditions in the related countries may be more prominent in the eyes of VC investors.

Another striking result shown in Table 2.9 appears to be that the coefficient of IPO is positive and statistically significant for only early stage specifications (EarlyVC OLS 1, 2, 4 and 5). On the other hand, we find that IPO is not significant for all stages VC sample. Regarding to our early stage results, we could provide another explanation for why the coefficient on IPO is positive. This alternative explanation involves reverse causality. Since VC investments end up as IPOs, a higher level of early stage VC investments will lead to higher level

of IPOs eventually. In other words, our coefficient is positive and significant not because more IPOs lead to more VC investments, but because higher levels of early stage VC eventually show up as greater amounts of IPOs.

In addition, in line with Gompers and Lerner (1998), we find that interest rates are significant determinants in explaining the variances in the early VC investments. Our result confirms that the real interest rate is positively and significantly related to early stage VC investments (EarlyVC 1, 2, 4, and 5).

Table 2.8 Venture Capital Investments, Between Regressions

Between regressions of 16 countries. The dependent variables are VC (all stages) investments and Early VC (only early-stage) investments. The independent variables are (1) Business expenditures on R&D (BERD); (2) Corporate Income Tax Rate (CITR); (3) Employment Protection Legislation (EPL); (4) GDP growth; (5) Inflation (INF); (6) Initial Public Offerings (IPO); (7) Real Interest Rate (IR); (8) Stocks Traded (ST); (9) Total Entrepreneurial Activity (TEA); (10) Investment Profile (INV); (11) Internal Conflict (INT); (12) Socioeconomic Conditions (SOC); (13) Corruption (CORR); (14) Political Risk (POL); (15) Stock Turnover (STURN). T-statistics for coefficients are in parentheses. Asterisks indicate significant differences at 1%***; 5%**; and 10%* levels.

	Dependent Variable											
	VC	VC	VC	VC	VC	VC	Early VC	Early VC	Early VC	Early VC	Early VC	Early VC
	(OLS)	(OLS)	(OLS)	(OLS)	(OLS)	(OLS)	(OLS)	(OLS)	(OLS)	(OLS)	(OLS)	(OLS)
	1	2	3	4	5	6	1	2	3	4	5	6
Constant	7.245 (0.784)	-28.379 (-0.936)	-19.725 (-0.423)	-32.782 (-1.075)	15.424 ** (2.357)	1.388 (0.927)	16.696 (1.043)	-48.913 (-0.785)	-97.054 (-1.486)	-54.589 (-0.879)	20.233 ** (2.277)	-2.912 (-1.416)
BERD	0.182 (1.040)	0.057 (0.197)	0.255 (1.145)	-0.074 (-0.244)			0.071 (0.233)	0.123 (0.207)	0.379 (1.216)	0.011 (0.018)		
CITR	-1.220 (-0.489)	5.167 (1.150)	-0.104 (-0.032)	5.671 (1.205)	-2.626 (-1.408)		-5.156 (-1.193)	4.860 (0.526)	-0.446 (-0.098)	5.230 (0.546)	-5.208 * (-2.055)	
EPL	-0.722 (-1.423)	-0.594 (-0.820)	-0.319 (-0.368)	-0.716 (-0.751)	-1.244 ** (-2.689)		-0.345 (-0.392)	0.683 (0.459)	1.354 (1.115)	0.777 (0.400)	-0.773 (-1.231)	
GDP	1.583 (1.701)	6.140 (2.665)	1.486 (1.487)	5.978 (2.510)		1.503 * (2.192)	0.619 (0.384)	6.331 (1.338)	0.209 (0.149)	5.771 (1.190)		1.753 * (1.861)
INF	-0.127 (-0.276)	-1.122 (-1.573)	0.020 (0.036)	-0.975 (-1.524)		-0.037 (-0.081)	0.310 (0.388)	-0.728 (-0.497)	0.930 (1.211)	-0.406 (-0.312)		0.048 (0.076)
IPO	-0.043 (-0.150)	0.242 (0.533)	-0.073 (-0.237)	0.387 (0.830)		0.022 (0.079)	-0.107 (-0.215)	0.056 (0.060)	-0.234 (-0.541)	0.185 (0.195)		0.175 (0.445)
IR	0.557 (1.005)	4.408 (2.235)	0.402 (0.625)	4.445 (2.088)		0.603 (1.264)	0.286 (0.297)	4.684 (1.156)	-0.369 (-0.409)	4.441 (1.024)		0.677 (1.033)
ST	0.316 (1.025)	-0.305 (-0.453)	0.276 (0.829)			0.660 ** (2.745)	0.595 (1.115)	-0.507 (-0.366)	0.428 (0.917)			0.751 ** (2.272)
TEA	0.090 (0.128)	-4.112 (-1.851)	0.256 (0.322)	-4.290 (-1.730)	0.521 (1.521)		1.046 (0.857)	-3.893 (-0.853)	1.748 (1.565)	-3.734 (-0.739)	1.120 ** (2.411)	
INV		5.807 (1.266)		5.418 (1.098)				9.279 (0.984)		9.290 (0.924)		
INT		-7.521 (-1.498)		-6.194 (-1.515)				-7.394 (-0.717)		-4.911 (-0.590)		
SOC		10.952 (2.092)		10.676 (1.959)				15.303 (1.422)		14.240 (1.283)		
CORR		-3.303 (-1.276)		-3.961 (-1.427)				-2.464 (-0.463)		-2.956 (-0.523)		
POL			5.164 (0.592)						21.779 (1.782)			
STURN				0.159 (0.197)						-0.145 (-0.088)		
F-statistic	3.512	3.202	2.854	2.949	5.616	4.066	1.657	1.172	2.349	1.094	4.703	3.366
R-squared	0.840	0.954	0.851	0.950	0.584	0.670	0.713	0.884	0.824	0.877	0.540	0.627
Sample size	128	128	128	127	128	128	128	128	128	127	128	128

Table 2.9 Fixed Effects (Within) Regressions

Cross-section fixed (within) effects OLS regression for 16 countries. The dependent variables are VC (all stages) investments and Early VC (only early-stage) investments. The independent variables are (1) Business expenditures on R&D (BERD); (2) Corporate Income Tax Rate (CITR); (3) GDP and Employment Protection Legislation Interaction (GDP*EPL); (4) GDP growth; (5) Inflation (INF); (6) Initial Public Offerings (IPO); (7) Real Interest Rate (IR); (8) Stocks Traded (ST); (9) BERD and Total Entrepreneurial Activity Interaction (BERD*TEA); (10) Investment Profile (INV); (11) Internal Conflict (INT); (12) Socioeconomic Conditions (SOC); (13) Corruption (CORR); (14) Political Risk (POL); (15) Stock Turnover (STURN). T-statistics for coefficients are in parentheses. Asterisks indicate significant differences at 1%***, 5%***, and 10%* levels.

	Dependent Variable									
	VC (OLS) 1	VC (OLS) 2	VC (OLS) 3	VC (OLS) 4	VC (OLS) 5	Early VC (OLS) 1	Early VC (OLS) 2	Early VC (OLS) 3	Early VC (OLS) 4	Early VC (OLS) 5
Constant	-0.539 (-0.101)	-2.698 (-0.508)	2.525 (0.168)	-0.532 (-0.101)	1.374 (0.249)	3.841 (0.795)	4.209 (0.872)	-4.116 (-0.267)	5.652 (1.229)	5.253 (1.093)
BERD	1.185 (1.542)		2.665 *** (3.755)		1.549 * (1.938)	-0.202 (-0.289)		1.422 * (1.951)		0.118 (0.169)
CITR	-0.465 (-0.476)	-0.465 (-0.476)	-1.732 * (-1.826)	-1.135 (-1.107)	-0.083 (-0.081)	-0.004 (-0.005)	-0.004 (-0.005)	-1.633 * (-1.677)	-0.923 (-1.031)	0.362 (0.408)
EPL*GDP				-2.175 * (-1.938)					-3.088 *** (-3.152)	
GDP	0.054 (0.294)	0.054 (0.294)	0.025 (0.135)	0.053 (0.289)	-0.014 (-0.073)	0.138 (0.822)	0.138 (0.822)	0.223 (1.183)	0.136 (0.846)	0.059 (0.344)
INF	0.098 (0.485)	0.098 (0.485)	-0.036 (-0.175)	0.119 (0.611)	0.059 (0.278)	0.311 * (1.690)	0.311 * (1.690)	0.155 (0.741)	0.165 (0.977)	0.279 (1.521)
IPO	0.160 (1.085)	0.160 (1.085)	0.011 (0.070)	0.170 (1.166)	0.262 (1.734)	0.305 ** (2.283)	0.305 ** (2.283)	0.064 (0.417)	0.289 ** (2.270)	0.395 *** (2.994)
IR	0.070 (0.312)	0.070 (0.312)	-0.157 (-0.691)	0.075 (0.336)	0.000 (-0.000)	0.583 *** (2.868)	0.583 *** (2.868)	0.266 (1.143)	0.565 *** (2.913)	0.470 ** (2.191)
ST	0.800 *** (2.866)	0.800 *** (2.866)	1.252 *** (4.846)	0.868 *** (3.180)		0.426 * (1.679)	0.426 * (1.679)	1.159 *** (4.367)	0.399 * (1.675)	
BERD*TEA		1.185 (1.542)					-0.202 (-0.289)			
INV	0.979 (1.184)	0.979 (1.184)		1.639 ** (2.301)	1.618 * (1.929)	0.415 (0.552)	0.415 (0.552)		0.343 (0.551)	0.890 (1.218)
INT	-1.404 (-0.903)	-1.404 (-0.903)		-0.905 (-0.585)	-2.892 * (-1.898)	-4.927 *** (-3.486)	-4.927 *** (-3.486)		-4.562 *** (-3.379)	-5.785 *** (-4.357)
SOC	2.643 *** (2.740)	2.643 *** (2.740)		3.179 *** (3.435)	3.073 *** (3.074)	4.248 *** (4.848)	4.248 *** (4.848)		4.375 *** (5.414)	4.421 *** (5.075)
CORR	-1.394 ** (-2.141)	-1.394 ** (-2.141)		-1.337 ** (-2.067)	-1.440 ** (-2.055)	-1.507 *** (-2.547)	-1.507 *** (-2.547)		-1.463 *** (-2.590)	-1.356 ** (-2.223)
POL			0.060 (0.017)					1.143 (0.320)		
STURN					0.066 (0.187)					-0.298 (-0.977)
F-statistic	14.273	14.273	13.127	14.515	12.871	16.151	16.151	10.734	18.104	16.213
R-squared	0.786	0.786	0.744	0.789	0.770	0.806	0.806	0.704	0.823	0.808
Sample size	128	128	128	128	127	128	128	128	128	127

Finally, in our cross-section random-effects, we verify that the total value of stocks traded (ST) is one of the most significant determinants in explaining the divergences of VC intensity in early and all stages (OLS 1, 2, 3, and 6). Again, repeating the within regression results, real interest rate (IR) is also important for early stage VC investments but not for all stages. One of the remarkable results here is that inflation appears to be very important (significant at 1% in most cases) for both early stage VC and all stages VC sample. Yet, despite the fact that we expect a negative relationship between inflation rate and VC investments, we find that they are positively linked. Since inflation has not been taken into account in VC literature, we expect that this economic variable should be observed more in VC studies. For now, we cannot find any reasoning for the positive relationship between inflation and VC investments. We also find that total entrepreneurial activity (TEA) is almost equally important for all stages of VC investments (OLS 1-5). As the total amount of entrepreneurial activity in a country increases, VC investment activity also moves up. GDP growth is important for early stage VC investments but less important for all stages (OLS 2, 4), which proves that VC investors scrutinize general economy more when screening out early stage firms than they do in the case of expansion stage firms. As expected, labor market rigidities appear to negatively affect VC investments intensity in both early and all stages (OLS 2, 4, 5).

On the political side, we discover that for all stages, investment profile (INV) and socioeconomic conditions (SOC) are the most important political risk components that determine the discrepancy in VC investment intensity in 16

countries (OLS 2 and 4). Yet, corruption is another factor which is negatively linked and significant at 5% level for all VC stages in our complete models (OLS 2). As expected in our corruption hypothesis, VC investments are deteriorated with an increase in corruption in the associated country.

When we run the EGLS (estimated or feasible general least squares) on all and early stages VC investments including only the combined political variable (POL) instead of single political components; we find that combined political risk (POL) is tremendously important and with a positive sign. As mentioned previously, political risk variable is constructed by adding the total risk points of 12 components. The minimum number of points that can be assigned to each component is zero, while the maximum number of points depends on the fixed weight that component is given in the overall political risk assessment (Table 2.5). In every case the lower the risk point total, the higher the risk, and the higher the risk point total the lower the risk. This may be why we obtain a positive relationship between overall political risk (POL) and VC investment intensity (VC). We believe that this result is not surprising and as a result, we confirm that political risk factors can be important determinants of VC investments in 16 countries across time.

Validating between and within regression results, we furnish no evidence of importance for stock turnover. We are also disappointed with the insignificance of business expenditures on R&D (BERD) variable since this variable was one of the first determinants, which came into our minds at the start of this work. This surprising result illustrates that the demand for VC investments is not much

sensitive to business research actions. Perhaps, in a later study, one can attempt to analyze this variable using another proxy.

On the other hand, in our random effects setting, we also provide evidence of employment protection legislation (EPL) for being significant in all stages VC investments, where as it shows little less importance in early stages of VC investments. At last, IPO seems to be not significant in most models, but in only one parsimonious model for early stage VC investments, it is significant at 10% (Early VC OLS 6).

Finally, as a robustness check of our results, we analyze a sub-sample of 15 countries (excluding US) over 1995 to 2002 in random-effects settings. We exclude US data since it seems to be an outlier in the case of the dependent variable, VC investment intensity, and some other explanatory variables. Excluding this outlier data does not change most of our results. Table 2.11 presents our robustness check results.

2.5 Conclusions

The VC industry around the world has been growing in the last two decades. This growth has received particular attention from academicians and professionals. Yet, the macro and political determinants of VC intensity around the world have drawn little consideration. In this essay, we focus on various macro and political factors that may possibly influence the VC intensity around the world. We contribute to the existing literature by introducing traditional determinants of VC investments as well as new potential indicators such as inflation, entrepreneurial environment and technological opportunities. On the

political side, this essay is the first to analyze political risk factors to explain the variance in VC intensity across time and countries. To achieve that, we use International Country Risk Guide's political risk database.

Table 2.10 Random Effects Regression Results

Cross-section random effects EGLS regression for 16 countries. The dependent variables are VC (all stages) investments and Early VC (only early-stage) investments. The independent variables are (1) Business expenditures on R&D (BERD); (2) Corporate Income Tax Rate (CITR); (3) Employment Protection Legislation (EPL); (4) GDP growth; (5) Inflation (INF); (6) Initial Public Offerings (IPO); (7) Real Interest Rate (IR); (8) Stocks Traded (ST); (9) Total Entrepreneurial Activity (TEA); (10) Investment Profile (INV); (11) Internal Conflict (INT); (12) Socioeconomic Conditions (SOC); (13) Corruption (CORR); (14) Political Risk (POL); (15) Stock Turnover (STURN). T-statistics for coefficients are in parentheses. Asterisks indicate significant differences at 1%***, 5%**; and 10%* levels.

	Dependent Variable											
	VC	VC	VC	VC	VC	VC	Early VC	Early VC	Early VC	Early VC	Early VC	Early VC
	(OLS)	(OLS)	(OLS)	(OLS)	(OLS)	(OLS)	(OLS)	(OLS)	(OLS)	(OLS)	(OLS)	(OLS)
	1	2	3	4	5	6	1	2	3	4	5	6
Constant	6.712 ** (2.312)	-4.139 (-0.904)	-25.943 ** (-2.152)	0.019 (0.004)	15.971 *** (4.016)	-0.170 (-0.215)	7.464 *** (2.611)	-1.158 (-0.279)	-30.228 ** (-2.567)	2.265 (0.565)	13.182 *** (3.894)	-2.650 *** (-3.122)
BERD	0.122 (0.794)	0.007 (0.054)	0.226 (1.359)	0.210 (1.583)			-0.072 (-0.491)	-0.138 (-1.203)	0.075 (0.501)	0.035 (0.307)		
CITR	-2.283 *** (-2.826)	-1.251 * (-1.742)	-1.795 ** (-2.127)	-1.594 ** (-2.130)	-3.226 *** (-2.913)		-3.140 *** (-3.917)	-2.449 *** (-3.771)	-2.489 *** (-3.015)	-2.681 *** (-4.112)	-3.525 *** (-3.722)	
EPL	-0.536 (-1.210)	-0.626 * (-1.907)	-0.095 (-0.189)	-0.659 * (-1.735)	-1.505 *** (-2.604)		-0.715 * (-1.780)	-0.466 (-1.583)	-0.227 (-0.544)	-0.469 (-1.418)	-1.077 ** (-2.360)	
GDP	0.063 (0.390)	0.329 ** (2.280)	0.042 (0.259)	0.328 ** (2.175)		0.210 (1.343)	0.385 ** (2.389)	0.624 *** (4.778)	0.380 ** (2.365)	0.615 *** (4.681)		0.448 *** (2.794)
INF	0.496 *** (2.924)	0.412 *** (2.781)	0.458 *** (2.642)	0.229 (1.575)		0.794 *** (4.600)	0.444 *** (2.627)	0.374 *** (2.787)	0.449 *** (2.673)	0.224 * (1.766)	0.612 *** (3.426)	
IPO	-0.144 (-1.193)	0.048 (0.459)	-0.117 (-0.940)	0.030 (0.280)		-0.121 (-1.235)	-0.121 (-1.013)	0.043 (0.460)	-0.103 (-0.869)	0.028 (0.295)		-0.203 * (-1.891)
IR	-0.105 (-0.531)	0.250 (1.331)	-0.184 (-0.903)	0.082 (0.407)		0.110 (0.544)	0.327 * (1.657)	0.737 *** (4.322)	0.227 (1.138)	0.590 *** (3.376)		0.375 * (1.786)
ST	1.261 *** (7.525)	0.690 *** (3.639)	1.078 *** (5.596)			1.457 *** (9.175)	1.101 *** (6.704)	0.572 *** (3.340)	0.827 *** (4.593)			1.320 *** (7.857)
TEA	1.448 *** (3.590)	0.738 ** (2.425)	1.642 *** (3.759)	0.887 *** (2.681)	0.990 ** (2.287)		1.153 *** (3.077)	0.656 ** (2.398)	1.356 *** (3.650)	0.787 *** (2.730)	1.425 *** (4.169)	
INV		3.188 *** (5.718)		3.444 *** (5.798)				1.422 *** (2.814)		1.638 *** (3.164)		
INT		0.487 (0.437)		-1.282 (-1.239)				-0.387 (-0.384)		-1.897 ** (-2.104)		
SOC		1.315 * (1.898)		2.191 *** (3.227)				3.270 *** (5.221)		4.037 *** (6.826)		
CORR		-0.871 ** (-2.089)		-0.229 (-0.550)				-0.820 ** (-2.177)		-0.260 (-0.715)		
POL			6.964 *** (2.768)						8.025 *** (3.323)			
STURN				0.083 (0.300)						0.022 (0.093)		
F-statistic	12.943	17.489	12.564	15.350	9.496	14.820	13.572	18.764	14.503	16.921	16.314	11.539
R-squared	0.497	0.666	0.518	0.638	0.187	0.378	0.471	0.681	0.553	0.661	0.283	0.321
Sample size	128	128	128	127	128	128	128	128	128	127	128	128

Table 2.11 VC investments Random-Effects Regressions Robustness Check

Cross-section random-effects EGLS regression for 15 countries for our subpanel . The dependent variables are all stages VC (VC) and Early VC (only early-stage) investments. The independent variables are (1) Business expenditures on R&D (BERD); (2) Corporate Income Tax Rate (CITR); (3) Employment Protection Legislation (EPL) (4) GDP growth (GDP); (5) Inflation (INF); (6) Initial Public Offerings (IPO); (7) Real Interest Rate (IR); (8) Stocks Traded (ST); (9) Total Entrepreneurial Activity Interaction (TEA); (10) Investment Profile (INV); (11) Internal Conflict (INT); (12) Socioeconomic Conditions (SOC); (13) Corruption (CORR). T-statistics for coefficients are in parentheses. Asterisks indicate significant differences at 1%***; 5%**; and 10%* levels.

	Dependent Variable					
	VC (OLS) 1	VC (OLS) 2	VC (OLS) 3	Early VC (OLS) 1	Early VC (OLS) 2	Early VC (OLS) 3
Constant	7.532 (2.659)	-4.633 (-0.927)	-23.549 (-1.925)	9.692 (3.730)	-2.709 (-0.665)	-32.458 (-2.745)
BERD	0.155 (1.121)	0.049 (0.346)	0.245 * (1.740)	-0.104 (-0.917)	-0.188 * (-1.967)	0.010 (0.084)
CITR	-2.581 *** (-3.248)	-0.850 (-1.064)	-1.971 ** (-2.379)	-3.759 *** (-5.108)	-2.040 *** (-3.197)	-2.634 *** (-3.285)
EPL	-0.886 ** (-2.022)	-0.575 (-1.202)	-0.436 (-0.937)	-0.820 ** (-2.362)	-0.233 (-0.763)	-0.196 (-0.481)
GDP	0.045 (0.260)	0.192 (1.131)	0.050 (0.289)	0.359 ** (2.169)	0.517 *** (3.778)	0.339 ** (2.018)
INF	0.568 *** (3.324)	0.369 ** (2.245)	0.570 *** (3.334)	0.489 *** (3.054)	0.352 *** (2.633)	0.487 *** (2.971)
IPO	-0.050 (-0.384)	0.242 * (1.805)	-0.072 (-0.555)	0.015 (0.123)	0.336 *** (3.131)	-0.020 (-0.163)
IR	-0.090 (-0.446)	0.202 (0.972)	-0.153 (-0.747)	0.313 (1.629)	0.731 *** (4.282)	0.182 (0.916)
ST	1.229 *** (7.247)	0.690 *** (3.095)	1.013 *** (5.456)	1.019 *** (6.656)	0.495 *** (2.822)	0.798 *** (4.609)
TEA	1.574 *** (3.893)	0.722 * (1.662)	1.692 *** (4.205)	1.086 *** (3.269)	0.245 (0.843)	1.296 *** (3.646)
INV		2.792 *** (4.617)			1.571 *** (3.178)	
INT		-0.189 (-0.148)			-0.822 *** (-0.820)	
SOC		2.102 *** (2.640)			3.843 *** (6.043)	
CORR		-1.356 *** (-2.773)			-1.207 *** (-3.165)	
POL			6.598 *** (2.621)			8.663 *** (3.604)
F-statistic	10.696	14.431	10.442	13.338	17.972	13.375
R-squared	0.467	0.639	0.489	0.522	0.688	0.551
Sample size	120	120	120	120	120	120

Our main results can be summarized as follows. With an annual data from 16 countries between 1995 and 2002 in non linear specifications in our between, fixed (within) and random effects models, we discover that the most important determinant of VC investment intensity is the total value of stocks traded (ST). Not too much in line with Jeng and Wells (2000), we can only provide evidence for the significance of IPO in our fixed effects model and for only for early stage VC investments. In line with Gompers and Lerner (1998), we also demonstrate that GDP growth (GDP) is significant in explaining the variances in VC investments. In addition, we present evidence that corporate income tax rate (CITR), total entrepreneurial activity (TEA), inflation (INF), labor market rigidities (EPL), and some of the political risk variables –investment profile (INV), socioeconomic conditions (SOC), corruption (CORR)- are other important determinants of VC investments in all stages (early and expansion) (Table 2.10). Finally, we believe that by introducing new potential variables such as inflation, technological opportunities (BERD) and entrepreneurial environment (EPL, CITR, TEA); we present new opportunities for further research and empirical investigation.

Chapter 3

The Effects of Venture Capitalists on the Governance of Firms

Introduction

Venture Capital (VC), sometimes called also risk capital, is an important financial intermediary providing capital to young, high growth entrepreneurial companies that may otherwise have trouble of receiving financing. Venture capitalists (VCs) have been associated with many of the most successful corporate successes such as Apple Computer, Ariba, Cisco, EBay, Intel, Lotus, Microsoft,

and Yahoo (Gompers and Lerner (1999)). Such VC-backed firms have generated substantial returns to their investors. Recent growth in the VC industry has given way to new academic research exploring mainly the form and the function of VCs. While we know much more than earlier studies, several research questions still wait for answers including the role and effects of VCs on the governance of firms. Authorities agree on that VCs monitor not only the progress but also the strategy of firms. They are represented in the board of directors of their portfolio firms, give advice to these firms and maintain significant control rights to interfere when needed.

Undoubtedly, since Jensen and Meckling (1976), agency theory has received an important place in financial theories. Traditionally the theoretical literature argues that principals develop government structures to reduce agency costs arising from separation of ownership and control (Grossman and Hart (1986), Zingales (1995)). Likewise, financial intermediaries could reduce agency problems (Diamond (1984), Fama (1985), Stiglitz (1985), see also Bhattacharya and Thakor (1993) and Barry (1994) for theoretical literature review)). Along a similar spirit but concerning the venture capital, researchers show how VCs solve various agency problems. The empirical studies of VCs indicate that they attempt to mitigate principal-agent conflicts in mainly three ways suggested by theory: through sophisticated contracting, pre-investment screening, and post-investment monitoring and advising. Moreover, the evidence suggests that all three mechanisms are closely interrelated. As in the screening mechanism, the VCs identify areas where they can add value through monitoring and support.

Similarly, in the contracting process, the VCs allocate rights in order to facilitate monitoring and minimize the risk against the impact of a poor management. Up to date, main theoretical and empirical works dealing with these three mechanisms include the syndicating investments (Admati and Pfleiderer (1994), Lerner (1994a), Hochberg et al. (2004)), incentives to exit (Berglof (1994)), venture investment staging (Sahlman (1990), Bergemann and Hege (1998), Gompers (1995)), monitoring and advice (Cornelli and Yosha (2003), Marx (1998), Gorman and Sahlman (1989), Hellmann (1998)), screening (Chan (1983)), board structure (Baker and Gompers (2003)), CEO turnover and board composition (Lerner (1995)), incentives and control (Baker and Gompers (1999)).

In most of this literature, there has been agreement among academicians and practitioners that VCs provide not only financing but also value-added services to their portfolio companies. The new stream of research has given much attention on the value-added mission of VCs beyond their financing function. Particularly, value-added activities of VCs include helping firms to shape strategies, providing technical and commercial advice, and attracting key personnel such as new CEOs (Bygrave and Timmons (1992), Gorman and Sahlman (1989), Hellmann and Puri (2002)). Many of VCs' activities provide support in the development of their portfolio firms; however, in some cases such as in the replacement of founder by an outside CEO, a divergence between the interests of entrepreneurs and VCs may emerge. In general, VCs argue that professional top management adds value to the company whereas the entrepreneurs may not want to be replaced and pursue actions that are in their

personal interests as opposed to the company's best interest. All these activities are important and somehow interrelated.

The objective of this essay is to contribute to this recent stream of research in several ways. First, we construct an original hand-collected survey data from 164 VC-backed companies in US, UK, Germany, France and Spain to analyze the effects of VCs on the governance of portfolio firms. Second, we empirically analyze the effect of the proportion of VC funding on the development of firms.

More specifically, using a unique hand-collected survey data from 164 companies in five countries, we explore the relationship between the proportion of VC funding and the influences of VCs on the following governances of the portfolio companies: CEO hiring, human resource practices, executive compensation, employee incentives, board decisions, board appointments, strategy direction and investment plan.

Our results furnish evidence that the amount of VC funding and VC influence are positively and significantly linked. In our full sample linear regressions, we find that as VCs' proportion of funding into the companies increases, VCs influence on CEO hiring, executive compensation, board decisions, board appointments increases tremendously. VC influence on employee incentives is also positively related to the proportion of VC funding. On the other hand, our full sample results show that the proportion of VC funding is not significant in explaining VC influence on HR practices, strategy direction and investment planning. In contrary to Hellmann and Puri (2002)'s result of significant effects of VCs on HR policies; our main results demonstrate no

significant relationship between the amount of VC funding and VC influence on HR practices. By applying a different model, multinomial logistic model, we confirm the robustness in our full sample results.

Next, after splitting the data into European and American VC-backed companies, we analyze the similarities and differences in these two continents. Our striking result is that European and US VC-backed companies only coincide on the proportion of VC funding being significant and positively related to VC influence on CEO hiring. Although the proportion of VC funding is also significant in explaining the VC influence on executive compensation, board decisions, and board appointments in US VC-backed companies; we furnish evidence that in European VC-backed companies, the amount of VC funding is positive and significantly related to only VC influence on investment planning.

Overall, we go further than existing studies by examining the relationship between the proportion of VC funding and VC influence. Plus, we apply a larger dataset including VC-backed companies located not only in US but also in Europe.

The structure of this chapter is as follows. In Section 3.2, we review the existing literature dealing with active investment of VCs influencing the governance of their portfolio firms. Section 3.3 contains hypotheses formation of VC funding impacts on the governance of firms. Section 3.4 describes the hand-collected survey data methodology, the variables, and regression methodology. Section 3.5 includes empirical analysis; mainly the descriptive statistics, linear regression results from full and sub samples and multinomial regression results,

both inferring the relationship between the proportion of VC funding and VCs' influence on the human resource practices, executive compensation, employee incentive setting, CEO replacement, board composition, investment planning and strategy direction. Section 3.6 concludes the chapter.

Literature Review

As mentioned previously, venture capital investment has become an important part of the financial system, having grown enormously both in the US and across other countries (Bottazzi and Da Rin (2002), Gompers and Lerner (1999)). Yet, there has been little research on the value-added activities and the effects of venture capitalists. This section reviews the existing literature on the venture capitalists' effects on the governance of portfolio firms.

Earlier studies on the value-added services of VCs

Several papers focus on post-investment information gathering and monitoring stressing primarily the importance of VCs role in providing advice, monitoring and finding the firms' management. In the early years, Gorman and Sahlman (1989) and Sahlman (1990) suggested that the value of VC lies in providing not only money but also supplementary services, such as selecting high-growth firms, advising entrepreneurs, hiring executives, shaping strategies, and "professionalizing" companies.

Gorman and Sahlman (1989) find that VCs visit their portfolio companies on average 18.7 times per year. As mentioned previously, these active venture investors can aid their portfolio companies in many ways; giving advice, support,

helping with professionalizing the management team, creating strategic alliances, and/or exercising corporate governance¹⁵. VCs can also shape their portfolio companies' innovative strategies¹⁶.

One of the first papers employing the Venture Economics database is Lerner (1995), which looks at whether VCs' representation on the boards of the firms in their portfolios is greater when the need for oversight is larger. The board of directors is foremost place that the vital decisions are taken. Hence, VC executives confirm the importance of board of directors in the success of entrepreneurial firms. In fact, VCs require one or more non-executive directors to be present in board of directors. One of the advice mechanisms used by VCs is characterized by their presence in the firm's board of directors. Lerner (1995) observes the choice of VCs to provide this oversight. He looks at whether VCs' representation on the boards of the firms in their portfolios is greater when the need for oversight is larger.

Lerner started with the proposition by Fama and Jensen (1983) and Williamson (1983), who conjecture that the composition of the board should be shaped by the need for oversight. Main argument is that the board will allow greater responsibility for oversight when the threat of managerial divergence from value maximization is high. Therefore, assuming that VCs are significant providers of managerial oversight, their representation on boards should be more at times when there is a greater need for oversight. Following the study of outside directors of public firms by Hermalin and Weisbach's (1988), Lerner studies

¹⁵ Gompers (1995), Hellmann and Puri (2002), Hochberg (2004), Hsu (2004), Kaplan and Strömberg (2003, 2004), Lerner (1994b), Lindsey (2003)

¹⁶ Hellmann and Puri (2000), Lerner and Kortum (2000)

variations in board membership around the time that a firm's CEO is replaced. He assumes that the replacement of a top manager such as CEO at an entrepreneurial firm is expected to happen with an organizational crisis and to increase the need for monitoring. Lerner (1995) finds that VCs are more likely to join or be added to the boards of private companies in periods when the CEO of the company changes. His major results show that an average of 1.75 VCs are added to the board between financing rounds when the firm's CEO is replaced in the interval; between other rounds, 0.24 venture directors are added. No differences are found in the addition of other outside directors. This oversight involves transaction costs due to frequent visits and active involvement. Indeed, if the VC is nearby to his portfolio firms, then this transaction costs could be reduced. Consistent with this notion, he finds that organizations located within five miles of the firm's headquarters are twice as likely to be board members than those more than 500 miles distant. Moreover, over half of the firms in Lerner's sample have a venture director with an office within sixty miles of their headquarters. He interprets these results as evidence of VC monitoring, though the analysis is based on the venture economics database of VC financings.

Recent Studies on the value-added services of VCs

Following the earlier research on the effects of VCs on the governance of firms, some researchers have attempted to quantify these effects. For instance, a similar spirit on the role that VCs play in shaping the overall board of directors at the time of the initial public offering (IPO) is explored by Baker and Gompers (2003). Unlike much of the existing literature on the board of directors, they

organize the analysis around IPO rather than calendar time. They argue that the optimal choice for board structure is made at the time of the IPO since existing shareholders bear the cost of suboptimal governance. Using data from 1,116 IPO prospectuses, they describe board size and composition for a set of firms with a median age of less than six years and a median equity capitalization of \$42 million. Mainly, the authors investigate the determinants of board structures and their role in determining the overall success of the firm.

Their analysis gives further insights on the role that VCs play beyond financing, and the bargaining process between the CEO and outside shareholders. First, by comparing the composition of VC and non VC-backed boards, the authors understand better what VCs do. VCs push the board away from both inside and instrumental directors who offer advice to the firm towards independent outsiders. According to their empirical analysis, the number of insiders is 27 percent smaller in VC-backed firms, and the number of instrumental directors is 20 percent smaller. This result is consistent with the common view that VCs provide value-added services beyond financing, and are active in monitoring the management. Similar result is also found in Kroszner and Strahan (2001) using board representation by bankers.

Baker and Gompers (2003) also describe the board composition as a result of a bargain between CEO and outside investors. They follow the idea in Hermalin and Weisbach (1998); relative skill of CEO to other alternatives, which has an effect in the bargaining with outside investors. Baker and Gompers measure the bargaining power of the CEO with tenure and voting control and the

bargaining power of the outside investor with a proxy for venture firm reputation. In the sample of venture-backed firms, the results illustrate that the number of VCs' board seats falls with CEO tenure and voting control and rises with venture firm reputation. Reputation of VCs lies partially in their capability to find a skilled replacement for the CEO position. Consistently, Baker and Gompers document that the probability that a founder keeps his/her CEO position falls as venture firm reputation increases. Also, the authors follow the IPO firms in their sample for ten years after the IPO. Particularly, they investigate merger offers and firm delisting. They find no strong relation between VC backing, boards and firm outcomes. Yet, venture backing reduces the probability of failure by seven percent. And, there is evidence that non venture-backed firms are subject to higher failure rates than venture-backed firms.

Another study in similar spirit, Hellmann and Puri (2002), empirically assesses the value that is added by VCs; particularly, the role that they play in the professionalization of start-up companies. Considering the fact that data on VC is limited, the authors hand-collected and constructed an original and strong data - combination of surveys, interviews, and public information- allowing to examine the role of VC by looking at various issues. Using this unique dataset of 173 startups in Silicon Valley, the authors quantified for the first time the support of VCs in building up the internal organization of startups. Specifically, Hellmann and Puri deal with following issues. First, they investigate whether VCs provide support in developing the internal organization by looking at numerous measures such as the employment processes, the overall human resource policies, the

adoption of stock option plans, and the employing of a vice president of marketing and sales. In addition, similar to Baker and Gompers (2003), Hellmann and Puri look at the CEO position and examine whether a founder is more prone to be replaced by an outsider when a VC invests in the firm. Main results show that VCs are influential not only at the top of the organization (in terms of replacing the original founders with an outside CEO), but also in the developments further down the organization (in terms of playing a role in the key indicators of “professionalization” such as the introduction of stock option plans, the hiring of a VP of sales and marketing, and the overall human resource policies). Different than previous works, which used samples including only venture-backed firms and relying on differences within venture-backed firms, this paper compares alike companies that did and did not receive VC financing, and finds that venture-backed companies are more likely and are faster to professionalize along the mentioned dimensions. Hellmann and Puri (2002) also examines whether VCs played the same role in all companies or whether their role was modified to the stage that a startup is in. After dividing their sample of companies into those that had gone public (IPO), those that had a product on the market (product), and those that had no clear sign of success yet (nothing-to-show), they find that to attract a new CEO, VC is particularly important for early stage companies that do not have any signs of success, still important for companies with a product on the market, and no longer important by the time companies have gone public.

The two studies described above find indirect evidence of post VC activities. Kaplan and Stromberg (2000) documents direct evidence on VC actions and monitoring. This evidence relies on the investment analyses at the time of the initial investment explaining the activities that the VCs perform before investing and their expectations for further actions after investing. Also, following reports on the investments explaining the performed and expected monitoring actions are described for a split of the portfolio companies. In consistent with previous works, main finding suggests that VCs play an important role in forming and hiring the senior management. They find that in 14% of the investments, the VCs play a role in forming the management team before investing. And, in 50% of the investments, the VC expects to play a role after investing. Often, this role involves strengthening the existing management team by recruiting qualified executives. Indeed, in their analysis, they sometimes encounter the role of VCs in replacing top management. Moreover, in more than a third of the investments the VCs expect to take parts in other areas, such as developing a business plan, assisting with merger and acquisition decisions, smooth the progress of strategic connections with other companies, and/or planning employee compensation. In fact, the investment prospectuses which the authors utilize differ in the details they include and mention only the monitoring activities that are expected ex ante so that the results understate the VCs' monitoring and support activities. On the other hand, some extensive monitoring and active involvement costs appear for VCs' monitor and support of their portfolio companies. In about 20% of the investments of Kaplan and Stromberg (2000), the VCs are concerned about the

amount of time given to investments. In only two cases, this concern is from VCs being the chairman of the firm signifying that when VCs act as a monitor and advisor, they do not seek to become excessively involved in the company.

Taken as a whole, existing studies confirm the evidence that VCs exercise monitoring and helping their portfolio companies. There is evidence not only on monitoring activities for replacing management after poor performance but also on professionalizing the firms, what Hellman and Puri (2002) calls the supporting function of VCs.

A more recent contribution to the growing literature on the role played by VC in the building of new firms is Hocberg (2004); which compares governance in VC and non VC-backed IPO firms using a unique database constructed from four publicly available databases, supplemented by two hand-collected datasets. Three sets of tests comparing governance and monitoring related variables for VC and non VC-backed firms are performed. It examines directly the characteristics of the boards of directors of newly public firms at the time of IPO. Particularly, board composition, audit and compensation committee composition, and CEO/chairman duality are observed. Results show that VC backing reduces the level of earnings management in the firm (as proxied for by discretionary accruals). Related to earnings management, VC-backed firms are more likely to follow “conservative” accounting practices and are less likely to use “aggressive” accounting practices than non VC-backed firms. Also, VC-backed firms experience higher abnormal returns upon the announcement of the adoption of a shareholder rights agreement than do non VC-backed firms. Furthermore, VC-

backed firms have more independent board structures at the time of IPO and more independent board structures contribute to better monitoring of management and decision-making that follows shareholder interests. VC-backed firms involve a higher fraction of outsiders on their board and a lower fraction of insiders than do similar non VC-backed firms. The VC-backed boards are less likely to be insider dominated, and they are less likely to have a dual CEO/chairman. Still, VC-backed firms tend to have more independent audit and compensation committee structures.

To avoid conflicts of interests, VCs also use stock grants and stock options meaning that important entrepreneurs in a firm are given a significant portion of their payment in the form of equity or options. This alternative mechanism helps to align the incentives of managers and investors. This effect that VCs have on setting compensation and incentives of entrepreneurs is recently examined by Baker and Gompers (1999). They study the effect of VC on CEO equity ownership in a sample of 1,011 newly public firms. They begin with the idea that while reducing agency problems, VCs are motivated to maximize the incentive effects of equity ownership. The findings confirm that VCs lower pre-IPO CEO equity ownership. Looking at the active decisions of VCs to increase post-IPO ownership and incentives of the CEO, Baker and Gompers (1999) find that VCs lower ownership offering, increase the use of CEO options and reduce CEO equity sales at the time of IPO. All these assessments reduce the difference in post-IPO CEO ownership between VC and non VC-backed companies. This paper also documents that VCs reduce the power of CEO to control the firm and

extract private benefits. Consistent with the notion that VCs aim to improve the incentive effects while reducing the control effects. Baker and Gompers (1999) is one of the first studies looking at corporate governance and equity ownership in entrepreneurial companies.

Other controls on compensation exist such as the vesting of the stock or options over a multi-period so that the entrepreneur cannot leave the firm and take his shares. Likewise, the VC can reduce the entrepreneur's subsequent financings if the firm meets with failure or poor performance.

Until now, we highlighted mainly the effects of VCs' active investing on the governance-development of firms. Certainly, existing research has documented that there is considerable scope for active investing in VC.

Formulation of Hypotheses

In this section we present the relevant hypotheses; dealing with the effects of VCs on the development and governance of VC-backed firms. Principally, VC effects on CEO hiring, executive compensation, board decisions and appointments, human resource practices, employee incentives, investment planning and strategy direction are examined.

3.3.1 Role of VCs in building up the human resource practices, executive compensation and incentive setting

The development process of overall human resource practices such as employment security, incentive pay, promotion, skill development and training programs is scrutinized in this section. Besides, hypotheses concerning firms'

executive compensation and employee incentives are formed, successively. According to Hellmann and Puri (2002), the development of such human resource functions is an important aspect of professionalization. Here, we ask whether VCs play a role in shaping the overall human resource practices. We also want to know if VCs' proportion of funding is linked to manipulate the executive compensation and employee incentives of the firms they finance.

Hypothesis One: A higher proportion of VC funding will lead to higher VC influence on overall human resource policies.

Hypothesis Two: A higher proportion of VC funding will lead to higher VC influence on executive compensation.

Following Gompers and Baker (1999) who argue that VCs aim to improve employee incentives; we attempt to conjecture whether or not the amount of VC funding is related to VC influence on employee incentives.

Hypothesis Three: A higher proportion of VC funding will lead to higher VC influence on employee incentives.

To deal with all three hypotheses, we use hand-collected 4-point Likert scale survey data from 164 portfolio firms which have received VC funding five years ago. We complement these survey results with publicly available information. Our overall evidence furnishes that as the proportion of VC funding increases, the VC influence on executive compensation, and employee incentives increase as well; however, VC influence on HR practices does not increase.

VC effect on CEO hiring, board decisions and appointments

In this section, we analyze whether the proportion of VC backing affects the decisions at the top of the organization such as CEO hiring, board decisions and appointments. It is true that as companies develop, they may benefit from an outside CEO more than a founder-CEO. The CEO of a company is effective in all aspects of the firm. Thus, it is important to know if VCs play a role in determining the status of CEOs of their portfolio firms. Another important mechanism at the top of the firm's governance is the board of directors. We also examine the effect of VCs on the composition of board of directors. A key task for the board of directors is deciding whether and at what price the company should be sold-Takeover decision. We examine whether VCs have an effect on such key decisions of board of directors. We form the related hypotheses as follows:

Hypothesis Four: A higher proportion of VC funding will lead to higher VC influence on CEO hiring.

Hypothesis Five: A higher proportion of VC funding will lead to higher VC influence on board decisions such as takeover.

Hypothesis Six: A higher proportion of VC funding will lead to higher VC influence on board appointments.

VC influence on Investment Planning and Strategic Direction

Following the arguments of Hellmann and Puri (2000) and Kaplan and Stromberg (2000) on VCs taking parts in developing and/or improving strategies or strategic alliances; we form the following hypothesis.

Hypothesis Seven: A higher proportion of VC funding will lead to higher VC influence on strategy direction.

Also, in more than a third of the investments in Kaplan and Stromberg (2000), VCs expect to take part in developing business plan and merger and acquisition decisions; so that we form the subsequent hypothesis.

Hypothesis Eight: A higher proportion of VC funding will lead to higher VC influence on investment planning decisions.

Surprisingly, we find no evidence of significance between the proportion of VC funding and VC influence on strategy direction of portfolio companies. Yet, only in European VCs, we document that the proportion of VC funding is significant in determining VC influence on investment planning.

Research methodology

Although there has been a significant effort to quantify the effects of VCs on the firms, the academic research is still lacking. Possibly, the most obvious reason for the lack of extensive research is the difficulty in finding reliable data. The best known suppliers of data in VC industry are Venture Economics and Venture One¹⁷. Some limitations with these data sources are still present since they rely on the voluntary membership and are often incapable to acquire more sensitive and important information. Moreover, these data tend to include only easily measurable events such as who receives money from whom, how much, and when. For detailed analyses, researchers began to move towards hand-

¹⁷ One of the studies relying on Venture Economics data after it has been purchased by Securities Data Company (SDC) and become accessible to researchers in 1991, is Lerner (1995). One can refer to Lerner (1995) for further description of Venture Economics.

collecting the data and in some cases, a combination of various data sources reduces the negative effect of data on the results.

In this essay, we utilize a novel hand-collected survey data and complement that with various other data sources such as European Venture Capital Association (EVCA), National Venture Capital Association (NVCA), VentureXpert, and company own websites. The strength of this essay's research methodology is primarily in its uniqueness of data. Secondly, we perform linear and multinomial regression analyses on this original dataset. We have also selected important control variables, which allow us to achieve more robust results. Given that both types of regressions provide similar results, we can confirm the robustness of our results once more. In sum, this section describes the unique hand-collected survey data, all the variables in our empirical analyses, and the regression methodology.

3.3.1 Survey Data

Extensive theoretical literature has been developed in recent years as financial economists try to understand the mechanisms employed by VCs. Yet, there is a lack of empirical studies, particularly in examining the VCs' effects on governance of firms. Though, the value-added services of VCs appear as a new and promising stream of research in academic world linking theories from management, control, and innovation to VC literature, empirical research has fallen behind. Since there are confidentiality concerns and survey response biases, it has been difficult to collect a large sample of VC data to examine better the role of VCs on the governance of portfolio firms, including the effect on board of

directors, critical employee recruitments, CEO replacements, employee incentives and overall business development.

In this essay, we consider five countries; UK, France, Germany, Spain and US, all of which have significant and rapidly growing VC industries. In the selection process of these five countries, we first began with 20 countries in Europe, plus the United States. Then, we calculated the mean value of the sum of VC investments (in USD Mil) for the last five years divided by each country's GDP level for the same period¹⁸. In the end, we eliminated all the countries that fell below the mean VC investments value. Our elimination process allowed us to disregard the countries with below-average VC investments; hence making our analyses more robust. Besides, within Europe, Germany and the UK are particularly important for the study of the VC industry, because these two countries together account for over half of all VC investments in European continent (BVK (2000)).

Next, for the purposes of this essay, we use a novel hand-collected data set from VC-backed firms in five countries, which we complement by private database (VentureXpert), and publicly available information (EVCA, NVCA, and company websites). In executing our survey, we send out 500 questionnaires; 80% of them were send by email and 20% by fax to firms which have received venture financing five years ago. The reason for selecting a five-year period is to allow sufficient time for observing the VC influences. A complete list of these firms was acquired from Venturexpert database, which was complemented by information from National Venture Capital Association, and European Venture

¹⁸ In this calculation process, we exclude United States because it is by far an outlier.

Capital Association (EVCA). Then, the five hundred firms were randomly selected from this list. The companies which are discontinued, acquired, or publicly traded are taken out from the list of Venturexpert. Thus, in the final list of 500 randomly selected companies, we only have companies that have been VC-backed five years ago, which are still operating, not acquired and not publicly traded (Refer Figure 3.1, 3.2, 3.3 for the composition of dataset). The response rate is about 32.8% that 164 of the firms responded. The actual questionnaire that we used is described in the next section and its original structure can be found in Appendix.

In our unique data set, about 65 % of the VC-backed companies are currently in expansion stage of development, while about 24 % of the VC-backed companies are startups.

Figure 3.1 Stage of development of our sample

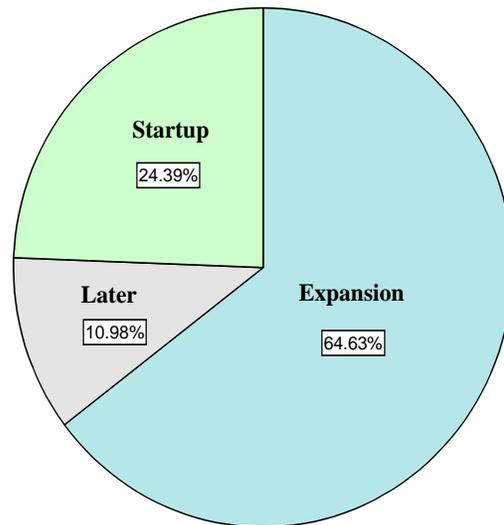


Figure 3.2 Industry classification of our sample

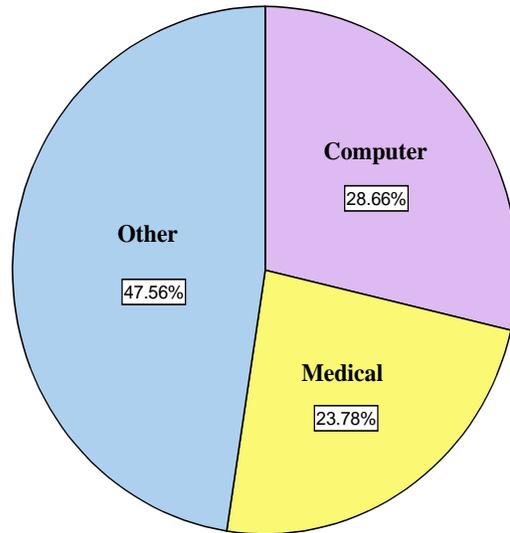
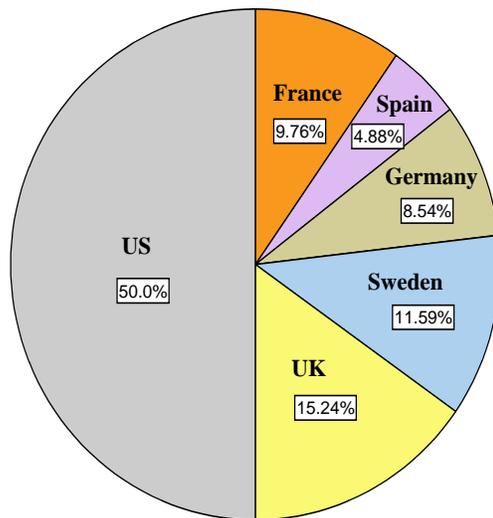


Figure 3.3 Geographic location chart of our sample

UK: 25; Sweden: 19; France: 16; Germany: 14; Spain: 8; EU: 82; US: 82

companies



Only 10% of our sample companies identify their stage of development as later stage (Figure 3.1). Our sample companies operate in various industries in

five countries (Figure 3.2). Although, this data is totally randomly selected and depends on companies' responses; we encounter that the total number of European companies (sum of all four European countries) equals to the total number of American companies (Figure 3.3). As this is entirely a coincidence of having equal number of respondents from two continents; perhaps this somehow balanced data will make our analyses more consistent.

Survey Instrumentation

Our survey instrument is consisted of a questionnaire and is contained within an email as an attached word file. These questionnaires are fast and require little technological skill to develop as they are displayed in a type in and check boxes format. Respondents are asked to reply to the email, indicate their responses in the reply message, as part of the attached file or fax it. This type of surveys require little technological skill on the part of the respondent, but researchers have found that respondents experience some difficulties such as remembering they must reply to the message before answering the survey questions and having trouble converting an attachment. In our survey, most respondents found the questionnaire to be fast and easy to complete. However, only twelve respondents either forgot to attach the completed questionnaire or have trouble in entering part of their answers. In all these cases, follow-up emails were successful in receiving the completed questionnaires. Additionally, some of the respondents were concerned about the privacy of the results. Although e-mail addresses and the company names are known, this survey deals only with aggregate results and does not disclose any private information to the public.

Our survey questionnaire is consisted of three sections. First section involves type-in and some check box questions on the company information such as the year it is founded, the industry it is in, number of employees working for the company, its geographic location, the geographic location of its venture capitalists, the number of VC investors for the last five years, and the amount of VC financing received in percentage terms. The second section consists of eight four-point Likert-scale questions that are developed to address issues regarding the influences of VCs on the governance of firms. Four point scaling will be selected since we want to get some variation in the responses. Also, we do not intend to use a five-point scale since some neutral responses would possibly appear in this type of scaling. The Likert items are written to reflect issues such as CEO hiring, board decisions, board appointments, employee incentives, executive compensation, human resource policies, strategy and investment raised in the literature and discussed earlier. Finally, the third section is included to gather information about the participants. Items in this section specifically address participants' status in the company and their suggestions about other potential influences of VCs in the company governance (Please see Appendix for original Questionnaire).

Variables

A number of independent, dependent and control variables are measured for this research. The following describes each type of variable and discusses its operationalization in the survey instrument. In addition to the following

discussion, the means and standard deviations for these variables are reported in the descriptives section.

Independent Variables

The primary independent variable in this study is the proportion of VC financing received. Since this information is confidential and not publicly available for venture-backed companies, it is derived from the survey responses on the proportion of VC financing (of total financing) received by the sample companies. While the variables dealing with size, stage, industry and location are also independent, they serve more specifically as controls, and are described in the section on control variables.

In order to measure the amount of VC financing received, we include one direct question in the questionnaire to address: “what percentage of VC financing of the total financing is received by these companies”. This item is designed as an open-ended question and respondents enter the exact amount of VC financing received in percentage terms.

The second independent variable is the number of different venture capitalists that our sample firms have received venture financing five years ago. This variable acts also as a control variable. As the number of different venture capital investors for a portfolio firm increase, we may expect a lesser amount of VC influence on the governance of firms. For instance, if a startup is financed by only one venture capital firm, VC influence on the governance of this startup can be seen more extensively. Yet, if a company is financed by many venture

capitalists, then the proportion of VC financing will be allocated which may lessen the concerns of VCs about the governance of firms.

This number of different VC investors is measured by including a direct question in the survey, which is complemented by information on VentureXpert database. Verifying survey responses by using VentureXpert database allows us to modify about ten responses. We observe that some of the survey responses contained not only the venture capital firms but also individuals-such as business angels- or corporations. By analyzing the available information on VentureXpert database carefully for each firm in our sample, we make the necessary adjustments.

Control Variables

Our primary control variables deal with company age, size, stage of operation and industry while secondary control variables include geographic location. The survey also inquires respondents to report the year that the company was founded. These years are then computed to create an age variable for each company. For the analysis, the age variable is transformed into its natural logarithmic form. For the size of the companies, respondents are asked to indicate the number of employees currently working for the company. Each respondent are also requested to select one of the twenty-four categories of industries (See Appendix Questionnaire for details). The answers are then revised by checking the companies' websites, VentureXpert database, National Venture Capital Association (NVCA) and European Venture Capital Association (EVCA) journals. For the stage of development, respondents are classified their company into one of three stages: startup/early, expansion/development and later stages.

For the purposes of our study, startup and expansion stage variables are subsequently transformed into dummy variables. To generate a ‘startup’ variable, we code companies that are Startup/early stage as 1, and 0 otherwise. To create an ‘expansion’ variable; the companies that are in Expansion/Development stage are coded 1 and 0 otherwise.

Secondary control variable is selected in order to control for geographic differences among survey respondents. By controlling for geographic location, we examine possible differences particularly between companies located in Europe and the United States. In constructing dummy variables for geographic location, we code the companies that are located in Europe as 1, and 0 otherwise to describe the “EU” variable. We also code companies that are located in US as 1, and 0 otherwise to define the “US” variable. Each of these control variables-age, size, stage, industry and geographic location- may help to explain the variation in VC influence on the governance of firms.

Dependent Variables

The dependent variables that we examine are as follows: the influence of VCs on CEO hiring, executive compensation, employee incentives, board takeover decisions, board appointments, human resource policies, investment planning, and strategy direction. Survey respondents are asked to rate the influences of VCs in a 4-point likert scale ranging from no influence to high influence. A summary of all the variables that are used in the analyses can be found in Table 3.1.

Table 3.1 Description of Variables

<i>VC%</i>	is the proportion of VC financing received (%). This variable takes a value between 0 and 100.
<i>#ofVCs</i>	is the number of different VC firms that have financed each of our sample firms for the last five years.
<i>HR</i>	is a 4-point Likert scale variable that is described by a rate going from 1 to 4 that the firm reported that venture capitalists are influential in deciding overall human resource policies (1=no influence and 4= high influence).
<i>EXE</i>	is a 4-point Likert scale variable that is described by a rate going from 1 to 4 that the firm reported that venture capitalists are influential in deciding the level of executive compensation (1=no influence and 4= high influence).
<i>EE</i>	is a 4-point Likert scale variable that is described by a rate going from 1 to 4 that the firm reported that venture capitalist are important in determining employee (other than CEO) incentives. (1=no influence and 4= high influence).
<i>BODD</i>	is a 4-point Likert scale variable that is described by a rate going from 1 to 4 that the firm reported that the venture capitalists are influential in takeover decisions of board of directors (1=no influence and 4= high influence).
<i>BODA</i>	is a 4-point Likert scale variable that is described by a rate going from 1 to 4 that the firm reported that the venture capitalists are influential in board of directors' appointments of the firms (1=no influence and 4= high influence).
<i>CEO</i>	is a 4-point Likert scale variable that is described by a rate going from 1 to 4 that the firm reported that the venture capitalists are influential in CEO hiring decisions of the firms (1=no influence and 4= high influence).
<i>INV</i>	is a 4-point Likert scale variable that is described by a rate going from 1 to 4 that the firm reported that the venture capitalists are influential in investment planning of the firms (1=no influence and 4= high influence).
<i>STR</i>	is a 4-point Likert scale variable that is described by a rate going from 1 to 4 that the firm reported that the venture capitalists are influential in strategy direction of the firms (1=no influence and 4= high influence).
<i>LnAGE</i>	is the natural logarithm of the birth date of the firm.
<i>Ln#EE</i>	is the natural logarithm of the number of employees working in the firm.
<i>Computer</i>	is a dummy variable that takes the value 1 if the company describes itself in computer related industry and 0 otherwise.
<i>Medical</i>	is a dummy variable that takes the value 1 if the company describes itself in medical industry and 0 otherwise.
<i>US</i>	is a dummy variable that takes the value 1 if the company is located in America and 0 otherwise.
<i>EU</i>	is a dummy variable that takes the value 1 if the company is located in Europe and 0 otherwise.
<i>Startup</i>	is a dummy variable that takes the value 1 if the company is currently in startup and early stage of development.
<i>Expansion</i>	is a dummy variable that takes the value 1 if the company is currently in expansion and development stage of development.

Regression Methodology

The application of linear and logistic regression methods depends largely on the measurement scale of the outcome variables and the validity of the model assumptions. Our outcome variables include continuous scale, (e.g., the proportion of VC funding, number of employees, age, and the number of different VC firms), or multinomial category (e.g. high VC influence, moderate VC influence, little VC influence, no VC influence). Linear regression analysis is applicable to the outcome variable measured on a continuous scale while multinomial logistic regression analysis works also well for the multi level categorical outcome.

In linear and multinomial logistic regression analyses, the model assumptions of normality and constant variance for the residual and the outcome data points need to be satisfied to demonstrate their appropriateness. If we wish to study the effects of explanatory variables on all levels of the ordered categorical outcome (VC influences), an ordinal regression method may also be appropriate to obtain valid results. It is also frequently used with Likert-scale ratings. It is implausible to assume the normality and homogeneity of variance for ordered categorical outcome when the ordinal outcome contains merely a small number of discrete categories. Thus, the ordinal regression model becomes a preferable modeling tool that does not assume the normality and constant variance, but require the assumption of parallel lines across all levels of the categorical outcome.

Indeed, Menard indicates that when dependent variables are measured on an ordinal scale, there are also many options for their analysis. These include, first, ignoring the categories of the variable and treating it as nominal; using multinomial logit techniques. Multinomial logistic regression exists to handle the case of dependents with more classes than two. As seen in the variables section, our dependent variables are composed of four-point likert type variables, which are ranked as 1, representing no VC influence and 4, the most VC influence.

The key problem here is a loss of efficiency. By ignoring the fact that the categories are ordered, we may fail to use some of the information available to us, and we may estimate many more parameters than is necessary. This increases the risk of getting insignificant results. But, our parameter estimates still should be unbiased.

Another option is to treat the variable as though it were continuous. In this case, we just use OLS regression for continuous variables. Certainly, this is widely done, particularly when the dependent variable has multi categories.

Since all models have some sort of drawbacks, our approach will be as follows: First, we employ Ordinary Least Squares (OLS) to understand the relationship between the proportion of VC funding and VC influence. Then, we apply multinomial regression analysis to confirm that the use of OLS does not seriously distort the findings.

Empirical results

This section provides the empirical results. Mainly, descriptive statistics, linear, multinomial logistic regression results are discussed. Plus, American and European VC-backed companies will be compared.

3.3.1 Descriptive Statistics

Table 3.2, 3.3 and 3.4 present some descriptive statistics from survey results of the main variables for our full, European and American sub-samples.

Over all respondents, the average percentage of VC funding given to companies is 70.35 % ranging from a minimum value of 1% to a maximum 100%. As the minimum and maximum values indicate, differences in the proportion of VC funding across companies are substantial. We can say that VCs are most influential in board of directors' decisions (BODD) (e.g. takeover) of their portfolio companies. It is followed by the board of directors' appointments (BODA), confirming that being involved in Board of Directors is very important for venture capitalists. The least VC influence is seen in overall human resource practices (HR). Descriptives for other variables show that the number of venture capitalists funding our sample companies in the last five years is ranging from 1 to 16, with a mean value of approximately 4. There is substantial difference in the number of employees in portfolio companies, which represents our proxy for 'company size'. Hence, we can argue that our sample of VC-backed companies differ strikingly in their sizes; ranging from 2 to 3600 employees with an average

of about 101 employees. On average, our sample companies are about 6 years of age.

Table 3.2 Descriptives for full sample

	Descriptive Statistics			
	Minimum	Maximum	Mean	Std. Dev.
VC funding (%)	1	100	70.354	27.189
Company Age	1	28	6.122	4.444
Number of Employees	2	3600	101.671	320.135
#VCs	1	16	3.738	3.274
Startup	0	1	0.245	0.432
Expansion	0	1	0.644	0.480
Computer	0	1	0.287	0.454
Medical	0	1	0.238	0.427
EU	0	1	0.500	0.502
US	0	1	0.390	0.489
CEO hiring	1	4	2.689	1.294
HR practices	1	4	1.976	0.836
Executive Compensation	1	4	3.232	0.841
Employee Incentives	1	4	2.439	0.874
BoDD	1	4	3.549	0.778
Strategy	1	4	3.018	0.818
BoDA	1	4	3.427	0.776
Invest	1	4	3.049	0.878
Total N	164			

Over the European sub-sample data set, i.e., over 82 respondents, the average percentage of VC funding given to companies is about 72.11% ranging from a minimum value of 1% to a maximum 100%. As the minimum and maximum values indicate, differences in the proportion of VC funding across companies are again substantial. In European venture-backed companies, we find that VCs are most influential again in board of directors' decisions (BODD) such as takeover. In line with our full sample, the least VC influence is also seen in human resource practices (HR) of their portfolio companies (Table 3.3).

Table 3.3 Descriptives for sub-sample of European companies

	Descriptive Statistics			
	Minimum	Maximum	Mean	Std. Dev.
VC funding (%)	1	100	72.110	28.891
Company Age	1	25	5.439	3.645
Number of Employees	3	1000	72.829	134.047
Startup	0	1	0.293	0.458
Expansion	0	1	0.573	0.498
Computer	0	1	0.329	0.473
Medical	0	1	0.268	0.446
#VCs	1	16	4.415	3.741
CEO hiring	1	4	2.732	1.352
HR practices	1	4	1.890	0.754
Executive Compensation	1	4	3.293	0.745
Employee Incentives	1	4	2.415	0.888
BoDD	1	4	3.610	0.766
Strategy	1	4	2.866	0.813
BoDA	1	4	3.451	0.740
Invest	1	4	2.988	0.896
Total N	82			

Over the American sub-sample data set, i.e., over 82 respondents, the average percentage of VC funding given to companies is about 68.6% ranging from a minimum value of 10% to a maximum 100%. As the minimum and maximum values indicate, differences in the proportion of VC funding across companies are once more substantial.

In line with their European counterparts, American VC-backed companies are affected by VCs the most in their board of director's decisions (BODD) followed by board appointments (BODA) and the least in their human resource practices (HR) (Table 3.4).

Table 3.4 Descriptives for our sub-sample of US companies

	Descriptive Statistics			
	Minimum	Maximum	Mean	Std. Dev.
VC funding (%)	10	100	68.598	25.430
Company Age	1	28	6.805	5.051
Number of Employees	2	3600	130.512	431.955
Startup	0	1	0.195	0.399
Expansion	0	1	0.720	0.452
Computer	0	1	0.244	0.432
Medical	0	1	0.207	0.408
#VCs	1	14	3.061	2.579
CEO hiring	1	4	2.646	1.241
HR practices	1	4	2.061	0.907
Executive Compensation	1	4	3.171	0.927
Employee Incentives	1	4	2.463	0.863
BoDD	1	4	3.488	0.789
Strategy	1	4	3.171	0.798
BoDA	1	4	3.402	0.814
invest	1	4	3.110	0.861
Total N	82			

Linear Regression Results

In this section, linear regression results for the full sample, European sub-sample and American sub-sample are provided. In all our OLS regression analyses, we use our survey results and our main independent variable is the percentage of VC funding given to the portfolio companies. For all regression analyses, SPSS programming is utilized.

Full Sample Results

The linear estimation results for our full sample including all data from VC-backed countries in US, UK, France, Germany, and Spain are provided in Table 3.5. All likert-type dependent variables are included separately in linear regressions to conjecture the relationship between VC influences and the percentage of VC funding. The dependent variables are as follows: VC influence on *CEO hiring (CEO)*, *HR practices (HR)*, *Executive Compensation (EXE)*, *Employee Incentives (EE)*, *Board decisions*, *Strategy direction*, *Board appointments*, and *Investment planning*, which are likert-type variables that take

values ranging from 1 to 4, 1 presenting no VC influence and 4 presenting high VC influence. The independent variables are mainly the *%VC* funding followed by some control variables such as *LnAge*, which is a natural logarithm of company's age; *Ln#Employees*, which is the natural logarithm of company's number of employees, *Startup*, and *Expansion*, which are dummy variables that take the value 1 if the company reported as being in startup/early, or expansion/develop stage of development respectively; 0 otherwise, *Computer* and *Medical*, are also dummy variables that take the value 1 if the company is in computer or medical industry respectively; 0 otherwise; *US* is also a dummy variable, which takes the value 1 if the company is located in *US*; 0 otherwise.

The main results can be summarized as follows. The percentage of VC funding is statistically significant in explaining the variances in VC influence in some governance structures in our full sample. Precisely, as the % of VC funding increases into a portfolio company, VCs' influence in CEO hiring, Executive compensation, Board decisions, and Board appointments increases tremendously. The relationship between VC influence in executive compensation and the amount of VC funding seem right, since executive compensation has been a growing issue globally. In a similar spirit, board of directors is the decision making heart of a company. VC investors frequently desire to be represented in board of directors of the companies, which they offer VC financing. In a similar vein, board rights give the venture capitalists a regular access to information and ongoing governance over the managerial decision-making. Therefore, it is not

surprising to encounter the most significant relationship between the proportion of VC funding and VC influence on board decisions and appointments.

In addition, VC influence in employee incentives in portfolio companies is statistically significant and positively linked to the proportion of VC funding received. Likewise, one can argue that venture capitalists enhance the use of employee incentive and reward systems such as job analysis and incentive plans. Since stakes for VC-backed companies are higher and the environment for failures is less forgiving than well-established firms, VCs may motivate the employee team to avoid conflicts of interest by aligning the interests of the employee team to those of the VCs. One way to achieve this alignment of interests could be to offer employee incentives such as bonuses or profit shares.

On the other side, our full sample results demonstrate that VC firms are not significantly influential in HR practices, strategy direction and investment planning of their portfolio companies. These insignificant results represent an overall belief of our survey respondents about VC influence in their HR practices, strategy direction and investment planning. Except investment planning, we can argue that HR practices and strategy direction involve many sub-categories. For instance, CEO hiring, employee incentives and executive compensation issues are also included in overall HR practices term. Therefore, the mixed results illustrate that VCs are definitely important in some parts of HR functions, mainly dealing with top executives where as they appear to be less influential in other parts of HR management. Correspondingly, strategy direction may involve many different categories such as product strategy, investment strategy, marketing strategy, and

so on. In this study, we refer to ‘strategy direction’ as an overall business strategy direction of a company. Although, VCs seem to be not important in directing the overall business strategies of their portfolio firms, they may be important in developing marketing strategies. Thus, we believe that later studies should consider different sub-categories of various governances of the VC-backed firms.

Another interesting result is that the number of employees (our proxy for company size) in the portfolio companies significantly explains the variation in VC influence in HR policies among our sample VC-backed companies in five countries. Therefore, the company size and VC influence in HR practices are negatively linked, meaning that as the size of VC-backed companies rises, VC influence in HR practices weakens. As the company size increases in a company, VC impact should be more difficult for keeping up with HR practices; hence the negative relationship should be expected. Finally, full sample results also provide that being in expansion stage and being located in US, together with the number of employees are also statistically significant in determining the divergence in VC influence in strategy direction.

Multinomial Regression Results

To confirm our linear regression results using full sample, we apply multinomial regression to analyze our data. The results are represented in Table 3.6. To keep it simple, in our multinomial analysis, we prefer to focus on category

1 (no influence) and 2 (little influence) for each dependent variable¹⁹. In almost all cases, we confirm our previous OLS results.

Considering no or little influence categories relative to high influence category, we reject the hypotheses that for no or little VC influence relative to high VC influence on CEO hiring, the regression coefficients for % VC funding has not been found to be statistically different from zero given all other variables are included in the model. In other words, for one unit change in the variable VC funding, the log of the ratio of the two probabilities; $P(\text{no influence on CEO hiring})/P(\text{high influence on CEO hiring})$, will be decreased by -0.019, and the log of the ratio of the two probabilities $P(\text{little influence on CEO hiring})/P(\text{high influence on CEO hiring})$ will be decreased by -0.032. Therefore, we can conclude that, in general, as the proportion of VC funding increases, the portfolio company will demonstrate higher VC influence on CEO hiring.

Similarly, allowing for no or little influence categories relative to high influence category, we accept the hypotheses that for no or little VC influence relative to high VC influence on HR practices and strategy direction; the regression coefficients for % VC funding has been found to be statistically different from zero given all other variables are included in the model. Therefore, we can confirm our linear full sample results that, in general, as the proportion of VC funding increases, the portfolio company does not exhibit higher VC influence in neither HR practices nor strategy direction.

¹⁹ Category 4 is the reference category. Each category represents likert-type rating for VC influences; 1 representing no influence where as 4 representing high influence. Our dependent variables are VC influences.

The model fitting statistic, namely the pseudo R-square²⁰ measured the success of the model explaining the variations in the data. Compared to full sample linear regressions, in our multinomial regressions, we obtain much better pseudo- R-squares, ranging from .115 to .297. The Wald statistics, which is commonly used to test the significance of logistic regression coefficients, are also provided in Table 3.6. It corresponds to significance testing of β coefficients in OLS regressions. We also report the log likelihood and chi-squares, where the former represents the basis for tests of logistic model and is the log of the probability that the observed values of the dependent may be predicted from the observed values of independents; the latter signifies goodness of fit, if chi-square goodness of fit is not significant, then the model has adequate fit. In most of our models, we have adequate fits.

In sum, we validate our results for other governances of the VC- backed companies in our full sample. Again, the proportion of VC funding seems to have influence in board decisions and appointments as well as in executive compensation and employee incentives.

European Sub-Sample Results

To compare our results in Europe and US, we sub-sample our survey data first into European sub-sample, including only portfolio companies that are located in Europe. The empirical results from this sub-sample are represented in Table 3.7.

²⁰ The pseudo R-square is a Aldrich and Nelson's coefficient which serves as an analog to the squared contingency coefficient, with an interpretation like R-square.

The main results from are as follows. We find that the proportion of VC funding is not significant in shaping the variance in VC influence on HR practices, executive compensation, employee incentives, board appointments, board decisions, and strategy in European portfolio companies. The proportion of VC funding appears to be positively significant only in explaining the variance in VC influence on CEO hiring and investment planning of these companies. The positive relationship is as what we have expected; but, the European results differ considerably from those of full sample. For instance, for European VC-backed companies, VC influence on investment planning is highly important. Nevertheless, European VC-backed companies do not consider board decisions, appointments, executive compensation and employee incentives as being influenced significantly by VCs.

Table 3.5 Linear Regression, parsimonious and complete models

The results from OLS regressions are presented. The dependent variables are VC influence on CEO hiring, HR practices, Executive compensation, Employee incentives, Board decisions, Board appointments, Strategy, and Investment, which are likert-type variables ranging from 1 to 4, 1 representing no influence and 4 indicating high influence. The independent variables are VC% showing the proportion of VC funding received by our sample companies; LnAge which is a natural logarithm of the company age; Ln # Employees which is a natural logarithm of the number of company employees; Computer and Medical which are dummy variables taking value 1 if the company is in the computer or medical industry respectively; 0 otherwise; # VCs which is the number of different VC investors funding sample companies; Startup and Expansion are dummy variables taking value 1 if the company is in the startup or expansion stage respectively; 0 otherwise. T-ratios are presented in parentheses. *, **, *** mean the coefficient is significant at 10%, 5% or 1% level respectively.

	Dependent Variables											
	CEO Hiring OLS	CEO Hiring OLS	CEO Hiring OLS	HR practices OLS	HR practices OLS	HR practices OLS	Compensation OLS	Compensation OLS	Compensation OLS	Incentives OLS	Incentives OLS	Incentives OLS
Constant	1.918 (6.989)	1.723 (3.383)	1.755 (3.594)	1.717 (9.497)	1.802 (5.535)	2.127 (6.746)	2.728 (15.311)	2.721 (8.287)	2.542 (8.128)	2.084 (11.089)	2.365 (6.814)	2.089 (6.327)
%VC Funding	0.230 *** (3.009)	0.238 *** (2.936)	0.242 *** (2.980)	0.119 (1.531)	0.117 (1.463)	0.112 (1.381)	0.232 *** (3.029)	0.215 *** (2.670)	0.224 *** (2.794)	0.157 ** (2.022)	0.162 ** (1.980)	0.173 ** (2.123)
Ln Age		0.061 (0.669)	0.040 (0.447)		0.090 (1.001)	0.060 (0.670)		-0.009 (-0.103)	-0.018 (-0.207)		-0.017 (-0.190)	-0.020 (-0.222)
Ln # Employees		-0.005 (-0.056)	-0.020 (-0.224)		-0.154 * (-1.721)	-0.194 ** (-2.213)		-0.044 (-0.493)	-0.038 (-0.442)		-0.092 (-1.009)	-0.076 (-0.869)
Startup		0.057 (0.652)			0.169 (1.946)			-0.030 (-0.348)			-0.072 (-0.806)	
Computer		-0.007 (-0.087)	-0.002 (-0.019)		-0.074 (-0.874)	-0.061 (-0.714)		0.067 (0.786)	0.066 (0.789)		-0.036 (-0.421)	-0.040 (-0.469)
Medical		-0.037 (-0.436)	-0.032 (-0.381)		-0.049 (-0.582)	-0.036 (-0.428)		0.069 (0.826)	0.068 (0.816)		0.069 (0.806)	0.064 (0.761)
US		0.078 (0.922)	0.092 (1.077)		-0.085 (-1.012)	-0.083 (-0.973)		0.105 (1.240)	0.122 (1.447)		-0.031 (-0.356)	-0.012 (-0.144)
# VCs		-0.054 (-0.609)	-0.062 (-0.712)		0.143 (1.641)	0.127 (1.455)		0.040 (0.461)	0.039 (0.447)		0.006 (0.069)	0.008 (0.091)
Expansion			0.057 (0.707)			-0.074 (-0.919)			0.123 (1.556)			0.148 * (1.838)
F-statistic	9.056	1.301	1.311	2.344	1.759	1.368	9.175	1.618	1.930	4.090	0.895	1.251
R-squared	0.053	0.063	0.064	0.014	0.084	0.066	0.054	0.078	0.091	0.025	0.044	0.061
N	164	164	164	164	164	164	164	164	164	164	164	164

Table 3.5 Cont'd Linear Regression, parsimonious and complete models

The results from OLS regressions are presented. The dependent variables are VC influence on CEO hiring, HR practices, Executive compensation, Employee incentives, Board decisions, Board appointments, Strategy, and Investment, which are likert-type variables ranging from 1 to 4, 1 representing no influence and 4 indicating high influence. The independent variables are VC% showing the proportion of VC funding received by our sample companies; LnAge which is a natural logarithm of the company age; Ln # Employees which is a natural logarithm of the number of company employees; Computer and Medical which are dummy variables taking value 1 if the company is in the computer or medical industry respectively; 0 otherwise; # VCs which is the number of different VC investors funding sample companies; Startup and Expansion are dummy variables taking value 1 if the company is in the startup or expansion stage respectively; 0 otherwise. T-ratios are presented in parentheses. *, **, *** mean the coefficient is significant at 10%, 5% or 1% level respectively.

	Dependent Variables											
	VC influence BoDD	VC influence BoDD	VC influence BoDD	VC influence BoDA	VC influence BoDA	VC influence BoDA	VC influence Strategy	VC influence Strategy	VC influence Strategy	VC influence Investment	VC influence Investment	VC influence Investment
	OLS	OLS	OLS	OLS	OLS	OLS	OLS	OLS	OLS	OLS	OLS	OLS
Constant	3.083 *** (18.702)	3.254 *** (10.881)	3.014 *** (10.531)	2.828 *** (17.527)	2.973 *** (10.151)	2.743 *** (9.779)	3.010 *** (16.897)	2.828 *** (8.896)	2.657 *** (8.791)	2.845 *** (14.938)	2.960 *** (8.477)	3.053 *** (9.111)
%VC Funding	0.231 *** (3.026)	0.189 ** (2.380)	0.197 ** (2.482)	0.298 *** (3.980)	0.264 *** (3.393)	0.271 *** (3.484)	0.004 (0.052)	-0.004 (-0.05)	0.005 (0.068)	0.089 (1.144)	0.084 (1.021)	0.082 (0.990)
Ln Age		-0.142 (-1.60)	-0.134 (-1.54)		-0.108 (-1.23)	-0.099 (-1.16)		-0.102 (-1.13)	-0.115 (-1.31)		-0.045 (-0.49)	-0.050 (-0.55)
Ln # Employees		-0.003 (-0.04)	0.018 (0.214)		-0.016 (-0.19)	0.005 (0.061)		0.176 ** (1.972)	0.179 ** (2.086)		-0.036 (-0.39)	-0.044 (-0.50)
Startup		-0.094 (-1.09)			-0.094 (-1.11)			-0.020 (-0.23)			0.037 (0.417)	
Computer		0.128 (1.531)	0.122 (1.467)		0.179 ** (2.173)	0.172 (2.107)		-0.083 (-0.98)	-0.082 (-0.99)		0.090 (1.033)	0.092 (1.067)
Medical		0.096 (1.161)	0.089 (1.088)		0.132 (1.629)	0.126 (1.554)		0.108 (1.294)	0.107 (1.301)		0.082 (0.957)	0.085 (0.991)
US		-0.009 (-0.11)	0.001 (0.017)		-0.026 (-0.32)	-0.017 (-0.21)		-0.188 ** (-2.24)	-0.168 ** (-2.00)		-0.123 (-1.42)	-0.125 (-1.44)
# VCs		0.125 (1.454)	0.131 (1.534)		0.070 (0.832)	0.077 (0.912)		0.130 (1.498)	0.127 (1.481)		0.044 (0.496)	0.041 (0.467)
Expansion			0.112 (1.431)			0.102 (1.326)			0.134 * (1.704)			-0.032 (-0.39)
F-statistic	9.154	2.252	2.370	15.842	3.066	3.140	0.003	1.821	2.211	1.308	0.735	0.733
R-squared	0.053	0.105	0.110	0.089	0.137	0.140	0.000	0.086	0.103	0.008	0.037	0.037
N	164	164	164	164	164	164	164	164	164	164	164	164

Table 3.6 VC influence on Venture-Backed Companies in full sample of 5 countries--Multinomial Regression Complete Model

The results from multinomial regressions are presented. The dependent variables are VC influence on CEO hiring, HR practices, Executive compensation, Employee incentives, Board decisions, Board appointments, Strategy, and Investment, which are likert-type variables ranging from 1 to 4, 1 representing no influence and 4 indicating high influence. The independent variables are VC% showing the proportion of VC funding received by our sample companies; LnAge which is a natural logarithm of the company age; Ln # Employees which is a natural logarithm of the number of company employees; Computer and Medical which are dummy variables taking value 1 if the company is in the computer or medical industry respectively; 0 otherwise; # VCs which is the number of different VC investors funding sample companies; Startup is a dummy variable taking value 1 if the company is in the startup stage ; 0 otherwise. Wald statistics are presented in parentheses. 1,2,3 represent the VC influence rating from survey responses, 4 is accepted as the reference category. *, **, *** mean the coefficient is significant at 10%, 5% or 1% level respectively.

	Dependent Variables											
	VC influence CEO Hiring			VC influence HR practices			VC influence Compensation			VC influence Incentives		
	1	2	3	1	2	3	1	2	3	1	2	3
Constant	1.275 (1.686)	1.209 (0.744)	-1.042 (0.678)	2.424 (1.509)	3.515 (3.298)	0.944 (0.191)	-2.432 (1.432)	1.536 (1.120)	1.007 (1.233)	0.641 (0.152)	1.124 (0.582)	0.997 (0.463)
%VC Funding	-0.019 ** (6.155)	-0.032 *** (9.252)	0.000 (0.000)	0.006 (0.181)	0.009 (0.387)	0.032 * (3.541)	-0.008 (0.270)	-0.037 *** (10.700)	-0.011 (2.490)	-0.026 * (3.806)	-0.014 (1.333)	-0.012 (0.984)
Ln Age	-0.292 (0.820)	0.232 (0.238)	-0.458 (1.320)	-0.527 (0.611)	-0.641 (0.958)	-0.210 (0.086)	0.657 (0.907)	-0.141 (0.081)	-0.587 * (3.785)	0.047 (0.007)	-0.111 (0.053)	-0.093 (0.037)
Ln # Employees	0.084 (0.222)	-0.317 (1.320)	0.382 * (3.440)	0.008 (0.001)	-0.275 (0.648)	-0.603 (2.393)	0.101 (0.124)	-0.078 (0.076)	0.272 * (2.793)	0.438 (2.082)	0.251 (0.809)	0.355 (1.672)
Startup	-0.205 (0.173)	-1.384 (2.307)	0.184 (0.092)	-2.030 ** (3.869)	-1.327 (1.862)	-1.120 (1.163)	-0.241 (0.041)	0.432 (0.344)	0.095 (0.044)	-0.573 (0.376)	0.928 (1.709)	-0.274 (0.135)
Computer	-0.057 (0.016)	0.624 (0.787)	-0.606 (1.035)	18.223 *** (1,008.713)	17.740 *** (1,118.611)	18.232 .	-0.035 (0.002)	-0.688 (0.784)	-0.531 (1.537)	0.799 (1.010)	0.438 (0.388)	0.720 (1.034)
Medical	0.129 (0.069)	0.952 (2.049)	-0.051 (0.006)	-0.026 (0.001)	-0.729 (0.726)	-0.679 (0.513)	-20.000 .	0.057 (0.007)	0.083 (0.035)	0.628 (0.475)	0.044 (0.003)	1.310 * (2.896)
US	-0.344 (0.656)	-1.028 (2.365)	-0.443 (0.667)	1.929 (2.574)	1.371 (1.334)	1.763 (2.038)	-1.499 (1.519)	-0.520 (0.597)	-0.128 (0.107)	-0.227 (0.097)	-0.496 (0.618)	-0.904 (2.034)
# VCs	0.021 (0.108)	0.114 (1.472)	-0.098 (1.111)	-0.135 (0.790)	0.053 (0.137)	0.058 (0.141)	0.008 (0.004)	-0.001 (0.000)	-0.044 (0.543)	-0.054 (0.194)	0.082 (0.612)	0.019 (0.031)
Loglikelihood	380.737	380.737	380.737	346.987	346.987	346.987	329.217	329.217	329.217	379.476	379.476	379.476
Chi-Square	31.484	31.484	31.484	39.944	39.944	39.944	34.195	34.195	34.195	30.767	30.767	30.767
Pseudo R-square	0.191	0.191	0.191	0.240	0.240	0.240	0.212	0.212	0.212	0.187	0.187	0.187
N	164	164	164	164	164	164	164	164	164	164	164	164

Table 3.6 Cont'd VC influence on Venture-Backed Companies in full sample of 5 countries--Multinomial Regression Complete Model

The results from multinomial regressions are presented. The dependent variables are VC influence on CEO hiring, HR practices, Executive compensation, Employee incentives, Board decisions, Board appointments, Strategy, and Investment, which are likert-type variables ranging from 1 to 4, 1 representing no influence and 4 indicating high influence. The independent variables are VC% showing the proportion of VC funding received by our sample companies; LnAge which is a natural logarithm of the company age; Ln # Employees which is a natural logarithm of the number of company employees; Computer and Medical which are dummy variables taking value 1 if the company is in the computer or medical industry respectively; 0 otherwise; # VCs which is the number of different VC investors funding sample companies; Startup is a dummy variable taking value 1 if the company is in the startup stage ; 0 otherwise. Wald statistics are presented in parentheses. 1,2,3 represent the VC influence rating from survey responses, 4 is accepted as the reference category. *, **, *** mean the coefficient is significant at 10%, 5% or 1% level respectively.

	Dependent Variables											
	VC influence BoDD 1	VC influence BoDD 2	VC influence BoDD 3	VC influence BoDA 1	VC influence BoDA 2	VC influence BoDA 3	VC influence Strategy 1	VC influence Strategy 2	VC influence Strategy 3	VC influence Investment 1	VC influence Investment 2	VC influence Investment 3
	Constant	-4.329 (2.451)	0.577 (0.146)	-1.015 (0.968)	-2.417 (0.689)	0.666 (0.220)	-0.674 (0.518)	-6.485 (3.805)	1.377 (1.435)	0.518 (5.942)	-1.535 (0.725)	-0.572 (0.238)
%VC Funding	-0.010 (0.326)	-0.030 ** (5.743)	-0.008 (1.125)	0.000 (0.000)	-0.046 *** (12.669)	-0.007 (1.040)	0.047 (2.460)	-0.008 (0.914)	-0.713 * (3.665)	0.004 (0.069)	-0.016 * (3.413)	-0.003 (0.168)
Ln Age	1.545 * (2.718)	-0.133 (0.060)	0.282 (0.660)	0.828 (0.740)	0.511 (0.877)	-0.040 (0.017)	0.518 (0.366)	0.391 (0.990)	1.144 *** (8.067)	0.069 (0.013)	0.345 (0.740)	0.080 (0.068)
Ln # Employees	-0.452 (0.927)	0.213 (0.778)	0.044 (0.059)	-0.818 (1.816)	0.145 (0.323)	0.119 (0.512)	-0.713 (1.290)	-0.407 * (3.732)	0.981 (0.264)	-0.195 (0.302)	0.197 (0.942)	0.008 (0.002)
Startup	0.997 (0.740)	0.630 (0.563)	0.251 (0.218)	1.326 (1.307)	-0.215 (0.049)	0.542 (1.358)	1.144 (1.060)	-0.147 (0.056)	-0.754 (1.355)	-0.462 (0.245)	-0.084 (0.016)	-0.046 (0.010)
Computer	-0.212 (0.026)	-1.410 * (2.757)	-0.262 (0.267)	-1.017 (0.621)	-2.167 * (3.734)	-0.312 (0.507)	0.981 (0.746)	0.515 (0.806)	2.799 ** (4.212)	-0.564 (0.472)	-0.563 (0.896)	-0.259 (0.350)
Medical	0.166 (0.022)	-20.567 (0.022)	0.139 (0.076)	-20.029 (0.022)	-0.943 (1.217)	0.020 (0.002)	-0.754 (0.255)	-0.871 (1.886)	0.004 (0.181)	-1.431 (1.485)	-0.118 (0.040)	-0.088 (0.036)
US	1.125 (1.093)	-1.144 (1.628)	-0.023 (0.002)	1.340 (1.097)	-0.372 (0.230)	-0.065 (0.026)	2.799 ** (4.540)	-6.485 (1.201)	1.377 ** (4.397)	1.395 * (3.000)	0.165 (0.088)	0.681 (2.695)
# VCs	-0.044 (0.065)	-0.161 (1.184)	-0.088 (1.312)	0.016 (0.006)	-0.155 (1.185)	0.032 (0.290)	0.004 (0.001)	0.047 (2.473)	-0.008 (0.607)	-0.009 (0.006)	-0.037 (0.218)	-0.053 (0.680)
Loglikelihood	254.693	254.693	254.693	278.831	278.831	278.831	334.101	334.101	334.101	376.492	376.492	376.492
Chi-Square	34.585	34.585	34.585	47.162	47.162	47.162	49.043	49.043	49.043	18.024	18.024	18.024
Pseudo R-square	0.230	0.230	0.230	0.291	0.291	0.291	0.287	0.287	0.287	0.115	0.115	0.115
N	164	164	164	164	164	164	164	164	164	164	164	164

By some means, in line with Botazzi, da Rin and Hellmann (2003) arguments, we can explain the mixed results as follows. European VCs play a role in monitoring their portfolio companies; however, desire not to get involved deeply in shaping executive compensation and employee incentives. VCs in Europe are more focused on the hiring of CEOs rather than other functions such as HR practices or strategy direction.

American Sub-Sample Results

In this section, the empirical results from our sub-sample of American VC-backed companies are included. Table 3.8 demonstrates these results in detail. Mainly, we can say that the proportion of VC funding is significant and positively related to VC influence in CEO hiring, executive compensation, employee incentives, board decisions, and board appointments but it is not significant to explain the variance in VC influence in human resource policies, strategy direction and investment planning.

In contrary to their European counterparts, American VC-backed companies' board of directors and employee compensation decisions get influenced importantly by the proportion of venture capitalists' investments. As discussed previously, top level issues such as board representation, composition as well as executive compensation have been attracted many attention in US. Thus, it is not surprising that VCs show significant effect in board and executive compensation decisions of their portfolio companies as VCs' stakes into the companies increase.

The different results are perhaps due to the institutionalization level of VCs in both continents. VC market in US has been existing long time before Europe entered into the VC industry.

Table 3.7 VC influence on European Venture-Backed Companies

The results from OLS regressions for European sub-sample are presented. The dependent variables are VC influence on CEO hiring, HR practices, Executive compensation, Employee incentives, Board decisions, Board appointments, Strategy, and Investment, which are likert-type variables ranging from 1 to 4, 1 representing no influence and 4 indicating high influence. The independent variables are VC% showing the proportion of VC funding received by our sample companies; LnAge which is a natural logarithm of the company age; Ln # Employees which is a natural logarithm of the number of company employees; Computer and Medical which are dummy variables taking value 1 if the company is in the computer or medical industry respectively; 0 otherwise; # VCs which is the number of different VC investors funding sample companies; Startup and Expansion are dummy variables taking value 1 if the company is in the startup or expansion stages ; 0 otherwise. T-ratios are presented in parentheses. *, **, *** mean the coefficient is significant at 10%, 5% or 1% level respectively.

	Dependent Variables											
	VC influence CEO Hiring OLS	VC influence CEO Hiring OLS	VC influence CEO Hiring OLS	VC influence HR practices OLS	VC influence HR practices OLS	VC influence HR practices OLS	VC influence Compensation OLS	VC influence Compensation OLS	VC influence Compensation OLS	VC influence Incentives OLS	VC influence Incentives OLS	VC influence Incentives OLS
Constant	2.025 *** (5.167)	1.878 *** (2.725)	2.027 *** (3.190)	1.906 *** (6.550)	1.972 *** (4.019)	2.525 *** (5.415)	2.877 *** (9.722)	3.285 *** (6.336)	2.838 *** (6.311)	2.179 *** (7.910)	2.200 *** (4.441)	2.196 *** (4.832)
%VC Funding	0.186 * (1.689)	0.226 ** (1.994)	0.211 * (1.856)	0.063 (0.566)	0.068 (0.611)	0.057 (0.503)	0.118 (1.060)	0.120 (1.046)	0.098 (0.906)	0.122 (1.101)	0.108 (0.924)	0.096 (0.824)
Ln Age		0.185 (1.459)	0.138 (1.112)		0.152 (1.235)	0.093 (0.749)		-0.078 (-0.615)	-0.111 (-0.946)		0.074 (0.568)	0.043 (0.335)
Ln # Employees		-0.104 (-0.836)	-0.135 (-1.114)		-0.192 (-1.583)	-0.255 ** (-2.102)		-0.086 (-0.690)	-0.077 (-0.672)		-0.132 (-1.031)	-0.148 (-1.195)
Startup		0.116 (0.920)			0.279 ** (2.273)			-0.085 (-0.666)			0.053 (0.409)	
Computer		-0.014 (-0.118)	0.000 (-0.149)		-0.165 (-1.457)	-0.157 (-1.347)		0.218 * (1.863)	0.239 ** (2.174)		0.076 (0.637)	0.087 (0.733)
Medical		-0.064 (-0.532)	-0.018 (-1.664)		-0.183 (-1.554)	-0.157 (-1.278)		0.058 (0.476)	0.129 (1.109)		-0.013 (-0.107)	0.023 (0.186)
# VCs		-0.157 (-1.377)	-0.191 (0.943)		0.070 (0.628)	0.049 (0.425)		-0.130 (-1.130)	-0.179 (-1.649)		0.088 (0.750)	0.062 (0.524)
Expansion			0.111 (0.943)			-0.087 (-0.743)			0.354 *** (3.182)			0.116 (0.964)
F-statistic	2.853	1.228	1.235	0.320	1.871	1.146	1.123	1.064	2.578	1.212	0.483	0.597
R-squared	0.034	0.104	0.105	0.004	0.150	0.098	0.014	0.091	0.196	0.015	0.044	0.053
N	82	82	82	82	82	82	82	82	82	82	82	82

Table 3.7 Cont'd VC influence on European Venture-Backed Companies

The results from OLS regressions for European sub-sample are presented. The dependent variables are VC influence on CEO hiring, HR practices, Executive compensation, Employee incentives, Board decisions, Board appointments, Strategy, and Investment, which are likert-type variables ranging from 1 to 4, 1 representing no influence and 4 indicating high influence. The independent variables are VC% showing the proportion of VC funding received by our sample companies; LnAge which is a natural logarithm of the company age; Ln # Employees which is a natural logarithm of the number of company employees; Computer and Medical which are dummy variables taking value 1 if the company is in the computer or medical industry respectively; 0 otherwise; # VCs which is the number of different VC investors funding sample companies; Startup and Expansion are dummy variables taking value 1 if the company is in the startup or expansion stages; 0 otherwise. T-ratios are presented in parentheses. *, **, *** mean the coefficient is significant at 10%, 5% or 1% level respectively.

	Dependent Variables (Cont'd)											
	VC influence BoDD OLS	VC influence BoDD OLS	VC influence BoDD OLS	VC influence BoDA OLS	VC influence BoDA OLS	VC influence BoDA OLS	VC influence Strategy OLS	VC influence Strategy OLS	VC influence Strategy OLS	VC influence Investment OLS	VC influence Investment OLS	VC influence Investment OLS
Constant	3.244 *** (12.869)	3.789 *** (8.818)	3.338 *** (8.562)	3.008 *** (11.681)	3.611 *** (8.350)	3.172 *** (8.196)	2.924 *** (11.471)	3.173 *** (7.015)	2.879 *** (7.059)	2.497 *** (9.358)	2.827 (6.026)	2.543 (5.849)
%VC Funding	0.114 (1.030)	0.064 (0.578)	0.056 (0.516)	0.180 * (1.633)	0.142 (1.309)	0.130 (1.237)	0.115 (1.033)	0.096 (0.825)	0.083 (0.732)	0.264 ** (2.446)	0.222 ** (1.990)	0.224 ** (1.997)
Ln Age		-0.161 (-1.293)	-0.151 (-1.262)		-0.114 (-0.938)	-0.116 (-1.009)		-0.210 (-1.627)	-0.224 * (-1.815)		-0.098 (-0.788)	-0.075 (-0.614)
Ln # Employees		-0.129 (-1.058)	-0.093 (-0.798)		-0.157 (-1.323)	-0.129 (-1.153)		0.130 (1.028)	0.143 (1.190)		-0.053 (-0.436)	-0.024 (-0.198)
Startup		-0.183 (-1.483)			-0.153 (-1.270)			-0.084 (-0.653)			-0.136 (-1.096)	
Computer		0.257 ** (2.262)	0.266 ** (2.375)		0.249 ** (2.245)	0.261 ** (2.425)		-0.073 (-0.613)	-0.060 (-0.518)		0.138 (1.210)	0.137 (1.194)
Medical		0.199 * (1.678)	0.227 * (1.924)		0.254 ** (2.188)	0.294 ** (2.580)		0.076 (0.614)	0.117 (0.957)		0.227 * (1.906)	0.223 * (1.845)
# VCs		-0.007 (-0.062)	-0.025 (-0.229)		-0.144 (-1.319)	-0.171 (-1.606)		-0.036 (-0.312)	-0.065 (-0.566)		-0.026 (-0.231)	-0.022 (-0.196)
Expansion			0.246 (2.172)			0.274 ** (2.515)			0.231 * (1.969)			0.080 (0.693)
F-statistic	1.062	1.709	2.115	2.667	2.329	3.133	1.067	0.761	1.286	5.981	1.675	1.558
R-squared	0.013	0.139	0.167	0.032	0.181	0.229	0.013	0.067	0.108	0.070	0.137	0.128
N	82	82	82	82	82	82	82	82	82	82	82	82

The development and growth of VC industry has been great in the US where as Europe is still being considered as an emerging VC market. Therefore, the institutionalization of European VC firms has been fallen behind extensively that of American. Also, until recently, venture capital in Europe was offered to needed companies by banks and large corporations. These large institutions are slightly interested in the governances of their VC investees than individual venture capital firms are. Though, we believe that the impact of VCs will be seen more on the governances of European VC-backed companies in coming years as VC money is growing considerably in European countries.

Main Remarks

In this section, we provide the main conclusions only for Chapter 3-the effects of VC on the governance of portfolio firms.

In this essay, we examine the effects of VCs on the governance of their portfolio firms. Using a unique hand-collected survey data from 164 companies in 5 countries; US, UK, France, Germany and Spain, we explore the relationship between the proportion of VC funding and the influences of VCs on the following governances of the portfolio companies: CEO hiring, HR practices, executive compensation, employee incentives, board decisions, board appointments, strategy direction and investment plan.

In our full sample linear regressions, we find that as VCs' proportion of funding into the companies increases, VCs' influence on CEO hiring, Executive compensation, Board decisions, and Board appointments increases tremendously.

VC influence on executive compensation makes sense since executive compensation has been a growing issue in US more than other countries in the world. In addition, VC influence on employee incentives in portfolio companies is also significant and positively linked to the proportion of VC funding received. On the other side, our full sample results demonstrate that VC firms are not significantly influential in HR practices, strategy direction and investment planning of their portfolio companies.

Comparing European and American venture-backed companies, we provide evidence that European venture backed companies' CEO hiring, and investment planning decisions are positively influenced by VCs proportion of funding. However, the percentage of VC funding is not significant in other aspects of portfolio companies' governances. On the other hand, in our American sub-sample from, we furnish evidence that the proportion of VC funding is significant and positively related to VC influence in CEO hiring, executive compensation, employee incentives, board decisions, and board appointments but it is not significant to explain the variance in VC influence in HR practices, strategy direction and investment planning. Along this line, European and American venture-backed companies differ in the sense of their governance structures being influenced by venture capitalists. Yet, as the proportion of VC funding increases, VCs influence on CEO hiring increases in both continents; Europe and US.

Likewise, in contrary to the results of Hellmann and Puri (2002) on the effects of VCs on HR policies, we find that as the VCs' stake increases in a

company, HR policies do not get shaped by venture capitalists. Plus, we go further and examine the relationship between the proportion of VC funding and VC influence. We apply a larger dataset including not only US companies but also companies in 5 European countries, which allows us to compare US and European VC-backed companies.

Table 3.8 VC influence on US VC-backed companies, linear regressions parsimonious and complete models

The results from OLS regressions for American sub-sample are presented. The dependent variables are VC influence on CEO hiring, HR practices, Executive compensation, Employee incentives, Board decisions, Board appointments, Strategy, and Investment, which are likert-type variables ranging from 1 to 4, 1 representing no influence and 4 indicating high influence. The independent variables are VC% showing the proportion of VC funding received by our sample companies; LnAge which is a natural logarithm of the company age; Ln # Employees which is a natural logarithm of the number of company employees; Computer and Medical which are dummy variables taking value 1 if the company is in the computer or medical industry respectively; 0 otherwise; # VCs which is the number of different VC investors funding sample companies; Startup and Expansion are dummy variables taking value 1 if the company is in the startup or expansion stages ; 0 otherwise. T-ratios are presented in parentheses. *, **, *** mean the coefficient is significant at 10%, 5% or 1% level respectively.

	Dependent Variables											
	VC influence CEO Hiring	VC influence CEO Hiring	VC influence CEO Hiring	VC influence HR practices	VC influence HR practices	VC influence HR practices	VC influence Compensation	VC influence Compensation	VC influence Compensation	VC influence Incentives	VC influence Incentives	VC influence Incentives
	1	2	3	1	2	3	1	2	3	1	2	3
Constant	1.843 *** (2.442)	1.592 ** (2.060)	1.680 ** (2.301)	1.518 *** (6.841)	1.443 *** (3.378)	1.679 *** (4.165)	2.631 *** (12.578)	2.366 *** (5.972)	2.513 *** (6.727)	1.991 *** (7.603)	2.431 *** (4.835)	2.045 *** (4.331)
%VC Funding	0.263 ** (2.442)	0.231 * (1.923)	0.233 * (1.913)	0.198 * (1.805)	0.193 (1.613)	0.178 (1.480)	0.356 *** (3.405)	0.371 *** (3.310)	0.360 *** (3.183)	0.191 * (1.742)	0.230 * (1.933)	0.253 ** (2.107)
Ln Age		-0.113 (-0.845)	-0.119 (-0.904)		-0.013 (-0.097)	-0.026 (-0.198)		-0.011 (-0.088)	-0.017 (-0.142)		-0.137 (-1.041)	-0.121 (-0.934)
Ln # Employees		0.132 (0.952)	0.120 (0.901)		-0.096 (-0.703)	-0.119 (-0.904)		0.015 (0.116)	0.004 (0.029)		-0.016 (-0.118)	0.012 (0.092)
Startup		0.037 (0.299)			0.100 (0.810)			0.055 (0.479)			-0.131 (-1.060)	
Computer		0.013 (2.060)	0.017 (0.131)		0.037 (0.287)	0.052 (0.414)		-0.094 (-0.787)	-0.084 (-0.710)		-0.190 (-1.496)	-0.212 * (-1.685)
Medical		0.087 (0.679)	0.084 (0.644)		0.127 (1.002)	0.148 (1.140)		0.137 (1.149)	0.153 (1.260)		0.082 (0.647)	0.050 (0.387)
# VCs		0.032 (0.252)	0.030 (0.236)		0.221 * (1.764)	0.207 (1.657)		0.207 * (1.765)	0.198 * (1.691)		-0.066 (-0.525)	-0.046 (-0.372)
Expansion			0.003 (0.028)			-0.108 (-0.935)			-0.080 (-0.740)			0.164 (1.425)
F-Statistic	5.963	1.048	1.034	3.260	1.236	1.270	11.592	2.842	2.900	3.033	1.267	1.410
R-squared	0.069	0.090	0.089	0.039	0.105	0.107	0.127	0.212	0.215	0.037	0.107	0.118
N	82	82	82	82	82	82	82	82	82	82	82	82

Table 3.8 Cont'd- VC influence on US VC-backed companies, linear regressions parsimonious and complete models

The results from OLS regressions for American sub-sample are presented. The dependent variables are VC influence on CEO hiring, HR practices, Executive compensation, Employee incentives, Board decisions, Board appointments, Strategy, and Investment, which are likert-type variables ranging from 1 to 4, 1 representing no influence and 4 indicating high influence. The independent variables are VC% showing the proportion of VC funding received by our sample companies; LnAge which is a natural logarithm of the company age; Ln # Employees which is a natural logarithm of the number of company employees; Computer and Medical which are dummy variables taking value 1 if the company is in the computer or medical industry respectively; 0 otherwise; # VCs which is the number of different VC investors funding sample companies; Startup and Expansion are dummy variables taking value 1 if the company is in the startup or expansion stages ; 0 otherwise. T-ratios are presented in parentheses. *, **, *** mean the coefficient is significant at 10%, 5% or 1% level respectively.

	Dependent Variables											
	VC influence BoDD 1	VC influence BoDD 2	VC influence BoDD 3	VC influence BoDA 1	VC influence BoDA 2	VC influence BoDA 3	VC influence Strategy 1	VC influence Strategy 2	VC influence Strategy 3	VC influence Investment 1	VC influence Investment 2	VC influence Investment 3
Constant	2.977 *** (13.714)	2.833 *** (6.716)	2.719 *** (6.842)	2.685 *** (13.286)	2.463 *** (6.346)	2.356 *** (6.426)	3.004 *** (12.333)	2.305 *** (5.084)	2.324 *** (5.432)	3.096 *** (11.523)	3.092 *** (5.873)	3.451 *** (6.901)
%VC Funding	0.331 *** (3.139)	0.296 ** (2.553)	0.308 *** (2.635)	0.415 *** (4.078)	0.360 *** (3.252)	0.366 *** (3.271)	-0.068 (-0.612)	-0.092 (-0.784)	-0.078 (-0.659)	-0.049 (-0.435)	-0.077 (-0.620)	-0.088 (-0.697)
Ln Age		-0.108 (-0.838)	-0.106 (-0.835)		-0.087 (-0.708)	-0.080 (-0.663)		-0.014 (-0.110)	-0.027 (-0.214)		0.028 (0.205)	0.005 (0.040)
Ln # Employees		0.109 (0.817)	0.112 (0.876)		0.114 (0.898)	0.125 (1.023)		0.229 * (1.698)	0.205 (1.580)		-0.056 (-0.393)	-0.096 (-0.696)
Startup		-0.029 (-0.244)			-0.048 (-0.420)			0.062 (0.507)			0.154 (1.206)	
Computer		-0.014 (-0.112)	-0.021 (-0.170)		0.104 (0.885)	0.097 (0.827)		-0.081 (-0.644)	-0.078 (-0.626)		0.054 (0.410)	0.075 (0.569)
Medical		0.080 (0.645)	0.062 (0.491)		0.080 (0.681)	0.072 (0.594)		0.083 (0.666)	0.062 (0.482)		-0.056 (-0.423)	-0.041 (-0.300)
# VCs		0.143 (1.173)	0.150 (1.239)		0.170 (1.466)	0.176 (1.519)		0.202 (1.640)	0.204 (1.659)		0.065 (0.502)	0.049 (0.377)
Expansion			0.081 (0.724)			0.047 (0.439)			0.078 (0.687)			-0.097 (-0.804)
F-Statistic	9.853	1.930	2.009	16.627	3.202	3.205	0.374	1.622	1.657	0.189	0.411	0.293
R-squared	0.110	0.154	0.160	0.172	0.232	0.223	0.005	0.133	0.136	0.002	0.037	0.164
N	82	82	82	82	82	82	82	82	82	82	82	82

Chapter 4

Further Opportunities

4.1 Overall Summary

Our work examines the Venture Capital investments in two different dimensions. First, we study the macro and political determinants of venture capital investments in 16 countries. While VC is recognized as an important source of funding for countries' entrepreneurial activities, there are huge differences across countries in the relative amounts invested in VC. United States has been the leading location for VC investments. Yet, both the United States and Europe have sizable and increasingly active venture capital markets. In 1996, U.S.

venture capital investments reached \$9.4 billion; where as venture capital investments in 17 European countries totaled \$8.6 billion.

In our first essay, we observe mainly the determinants of this discrepancy in 16 countries. We contribute to the existing literature by introducing new potential indicators such as inflation, entrepreneurial environment and technological opportunities. On the political side, this essay is the first to analyze political risk factors to explain the variance in VC intensity across time and countries. To achieve that, we use International Country Risk Guide's PRS political risk database. Our main results can be summarized as follows. With an annual data from 16 countries between 1995 and 2002 in non linear specifications in our between, fixed (within) and random effects models, we discover that the most important determinant of VC investment intensity is the total value of stocks traded (ST). In terms of IPO effect, we can only provide evidence for the significance of IPO in our fixed effects model and only for early-stage VC investments. In a similar vein, GDP growth is significant only in our cross-section random effects model. One of the most striking conclusions is that political risk variables (INV and SOC) are extremely important determinants of VC activity. Though surprisingly, we do not find a very important relationship between labor market rigidities (EPL) and VC investments. We believe that this study generates a new avenue by combining political risk factors with macro dynamics in a panel data to explain the VC investment discrepancies around the world.

Secondly, we focus on the effects of Venture Capitalists on the governances of their VC-backed firms. Basically, venture capital is an important source of funds and can facilitate the growth of promising small companies. Recently, there has been growing interest in studying the VC influence on various governances of portfolio companies. Yet, due to unavailability and confidentiality issues in gathering data, academic research has been lacking. Along this line, using a novel hand-collected survey data from 164 companies in 5 countries; US, UK, France, Germany and Spain, we explore the relationship between the proportion of VC funding and the influences of VCs on the following governances of the portfolio companies: CEO hiring, HR practices, executive compensation, employee incentives, board decisions, board appointments, strategy direction and investment plan. Our linear regression results confirm that as VCs' proportion of funding into the companies increases, VCs' influence on CEO hiring, Executive compensation, Employee incentives, Board decisions, and Board appointments enhances tremendously. VC influence on executive compensation makes sense since executive compensation has been a growing issue in US more than other countries in the world. On the other side, we find that VC firms are not significantly influential in HR practices, and strategy direction of their portfolio companies. Likewise, in contrary to the results of Hellmann and Puri (2002) on the effects of VCs on HR policies, we find that as the VCs' stake increases in a company, HR policies do not get shaped by venture capitalists.

In comparing European and American venture-backed companies, we provide evidence that in both continents, the VC-backed companies' CEO hiring

is positively influenced by VCs proportion of funding. However, for the other governances of portfolio firms, discrepancies in Europe and US exist. For instance, in US, we furnish evidence that the proportion of VC funding is also significant and positively related to VC influence in executive compensation, employee incentives, board decisions, and board appointments where as in Europe no similar evidence is provided. In opposition with US, VC influence on investment planning in Europe is highly related to the VC amount of financing.

In sum, we go further than existing papers and examine the macro and political determinants of VC investments around the world with a panel technique. Being first in analyzing political risk along this stream of VC research, we introduce new avenues for future investigation. Next, the relationship between the proportion of VC funding and VC effect on governances of firms is examined. Along this line, by applying a larger dataset including not only US companies but also companies in European countries, we bring out the similarities and differences of VC effect on the governances between Europe and US.

4.2 Limitations and Weaknesses

Although this study is one of the most extensive to date on the topics of the determinants of VC investments and the effects of VCs on the governance of firms, several limitations need to be taken into account when interpreting the results.

Regarding the first essay- the determinants of VC investments-, our primary data source for VC investments was based on VentureXpert database. The existing literature indicates that the VentureXpert database and the competing

Venture One databases depend on voluntary contributions of information from venture capitalists. A recent research argues that both datasets have significant exclusions²¹. However, no evident reasoning is made to let us think that these exclusions would cause ‘selection biases. Being aware of this problem, we were unable to use another database for the amount of VC investments; first, because of our inaccessibility to other private databases and second, since we believe that there is no better alternative than VentureXpert for providing this sort of information.

On the other side, in gathering information for some independent variables (e.g. labor market rigidities); we were obliged to rely on time-invariant data due to limited access and unavailability of good data sources. Yet, future investigations may collect parallel data from other sources as well and confirm their results. Though, in this work, by using different panel data models, we attempted to include all important time- varying and time-stable explanatory variables. Yet, some of our macro variables were strongly correlated with each other. To overcome a possible multicollinearity problem, we omitted the variables causing strong correlations (e.g. number of triadic patent families (PAT), and the interaction variables (EPL*GDP, BERD*TEA)). Thus, upcoming research in this topic may find other approaches to deal with multicollinearity and/or discover other proxies for technological opportunity (instead of the number of triadic patent families (PAT), and business expenditures on R&D (BERD)), and for

²¹ Kaplan et al. (2002), “How Well Do Venture Capital Databases Reflect Actual Investments”.

entrepreneurial environment (instead of employment protection legislation (EPL) and total entrepreneurial activity (TEA)).

The issues considered in the second essay give rise to a number of questions and further research issues. First of all, our sample was based on data from a randomly selected group of 500 VC backed companies in five countries; US, UK, France, Germany, and Spain. Out of 500 VC-backed companies, 164 provided us with adequate data. Since not all companies responded to our survey questionnaire, one may raise the problem of response bias-any systematic bias in our responses that might affect some of our results. One can argue that this novel data may suffer from a self-report bias since both the dependent and some of the independent variables were reported by the CEOs, CFOs or VPs of our sample companies. It could be that these executives fail or do not report sufficient information due to confidentiality concerns. However, we defend that the data is free from self-report or any response bias since we challenge the survey information with VentureXpert and publicly available websites (e.g. European VC journal, and companies' own websites) wherever applicable. In most cases, we encounter no discrepancies between executives' responses and other sources' information.

Indeed, an important limitation of the second essay is in the explanation powers of our models. In our linear and logistic regressions, we obtain very low R-squares, in some cases; they are less than 20%. One can certainly argue that we cannot draw proper conclusions from models with such low powers. However, we would like to remind that this is a common result in papers dealing with likert-

type and dummy variables. In fact, Helmman and Puri (2002)'s probit regressions resulted in similar low R-squares.

Another limitation of our second essay is in the research direction. More clearly, when analyzing the VC influence on the governances of firms, we did not take into account whether or not this influence was a positive (supportive) or a negative (destructive) one. Cognizant of this issue, we will leave this important question for future research papers. One should also keep in mind that gathering data on destructive VC influence is difficult due to confidentiality concerns of VC-backed firms. From the feedback of top executives of our sample companies, we were able to identify that there is some difference in VC influence; however, they are often not willing to disclose this information. Therefore, we are unable to determine that some survey responses were meant to point positive VC influence where as others indicated negative VC impacts.

Finally, for robustness, in our first essay, we analyzed the relationship between the determinants and VC investments by excluding the U.S. data since U.S. appears as an outlier in VC industry. As a result, we validate our previous results including all 16 countries. For the second essay, we reran all our regressions in multinomial logistic specifications. As a result, we obtain similar results confirming that our results are robust. We also considered controlling for the age, size, industry and location of the companies in an attempt to make our final results more robust. Now, one can argue about different robustness tests that could be applied as well such as using different sub-panels of data; however, for the purposes of this study, we believe that our tests are sufficient.

4.3 Future Research Avenues

While researchers know much more than they do twenty years ago, much is still not yet known about the VC industry. Concerning our both essays – the determinants of VC investments and the impacts of VC on the governance of firms, many issues would reward future investigations. These other issues are beyond the scope of this paper, but bear relevance for further research. Below, we briefly list seven potential avenues for future research in both topics; the determinants of VC investments and the effects of VCs.

First, it could be instructive to consider other types of investors and compare them with VCs. In both essays, our data are derived from only venture related deals and VC-backed companies. In practice, there are various ways how entrepreneurs can finance their early-stage investments without seeking venture capital, although not all of these sources are available to all entrepreneurs. Often, entrepreneurs rely on “friends and family” to finance the starting of the company. Others may also obtain governmental subsidies. Many other entrepreneurs prefer to work with Business Angels before approaching venture capitalists. Empirical evidence show that Business Angels invest by far in more projects than venture capitalists do but in a much smaller amount (Prowse, (1998), Freear et al. (1996), Lerner (1998), Wong (2002); Chemmanur and Chen (2002))²². Therefore, venture capitalists do not always have to enter into start-up companies in the early-stage

²² Freear et al. (1996) estimated that about 250,000 angels invested US\$ 10-20 billion in around 250,000 companies each year, which is by far more than the venture capital market. In Europe, the number of active business angels was estimated by the European Business Angels Network (EBAN) to be about 125,000.

but may choose to join in later rounds for the first time. Later studies could observe these other types of investors and attempt to compare VCs with other types of financing bodies. Also, whether or not VC participation in different rounds would make a difference in VC influence on the governance forms an important question. Along a similar line, one can compare first-round VC influences and later-rounds VC influences. Regarding our first essay, although there is no reason to believe our sample is biased by considering a sample of venture capital investments only, an analysis of the determinants of other types of investors –corporations, business angels and so on- would give a more comprehensive analysis. For instance, later research may analyze the similarities and differences in the determinants of different types of entrepreneurial financing.

Second, a further study including an extensive panel analysis investigating the path taken from early stages to later stages of development of firms will be promising. In the same way, additional research may focus on the structure and function of boards of directors in these firms given that our results show that VC influence in board decisions and board appointments are extremely important.

Third, there are different aspects of VC deal structures that could be studied in relation to VC influence other than the ones considered in this dissertation (i.e., our focus was on macro and political determinants in the first essay where as the main focus was VC proportion of financing in the second part). For instance, future papers could consider the differences in contractual terms used in different countries in explaining the VC influence on the

governances of firms, or even consider the contractual terms as a potential determinant of VC investment intensity across countries.

Fourth, it would be instructive to investigate the VC influence in relation to legality in different countries. Whether the influence of venture capitalists is closely connected to issues of legality is an unanswered question worthy of future study. Legality has also not been widely studied as a potential determinant of VC investments (e.g. Jeng and Wells (2000) and Schoar (2003)). In our first essay, we were first to consider the political risk a determinant of VC investments, but further studies should perhaps add a legality factor to their analyses.

Fifth, considering the growing importance of behavioral decisions in the area of investments, we believe that behavioral finance factors can definitely affect venture capitalist decisions (e.g., see Landier and Thesmar (2003)). In fact, the authors in VC literature control for the endogeneity of VC financing using both binary treatment models and an instrumental variables framework. In both cases, the estimates for the effect of VC-backing on governance measures increase. Yet, neither approach brings an ideal control for the endogeneity problem but they put forward that the effects are not exclusively the result of ex-ante selection. It could be possible that VC firms select entrepreneurs who have over-confidence or aggressiveness. Or else, entrepreneurs with overconfidence or aggressiveness are expected to demand venture capital financing. Perhaps further research can look at the behavioral theories to enlighten the positive or negative effects on the management of the firm. Although behavioral decision making is

beyond the scope in both of our essay, a future analysis of venture capitalists in a behavioral setting could be promising.

Sixth, considering the growing importance of venture capital financing across Europe and Asia, the scope to which the U.S. venture model will spread abroad and the degree to which the U.S. model can be successfully adapted are particularly interesting questions. In terms of the VCs' effect on governance of firms abroad, there is a promising room for both theoretical and empirical research. Following questions should be interesting to address for further research: Do VCs abroad have similar effects in forming the startups? Do American VCs have impact on the governance of the international firms they finance? One can expand this stream of research questions through describing the country of focus and/or the various forms of governance available for investigation.

Finally, the further research should highlight the characteristics of value-added services provided by international VCs and compare their effects on the governance of firms with those of their American counterparts. Although, in our second essay, we compare some of these discrepancies between Europe and U.S., one should take into account that these differences do not exist only between U.S. and Europe. In other words, there even appear some clear differences in the patterns of business organizations of European Union countries. For instance, some countries have many more forms of corporate body than does the United Kingdom. The typical patterns of financing may differ too, for instance, UK shows greater reliance on bank financing for long-term investments.

By now, we understand that venture capital is a financial intermediary with growing importance in the world. Hence, to pioneer the factor, which determine VC investments around the world is tremendously promising area for future research. On the other side, as we understand more with this dissertation that venture capitalists provide not only value-added services but also significantly influence the internal governances of their investees. This dissertation expects to set a starting point for further theoretical and empirical research on these important topics.

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Appendix — Questionnaire

Data provided here will be used to derive series of aggregate analysis for a dissertation project at Bocconi University, Milan, Italy. Please rest assured that your answers will be kept strictly CONFIDENTIAL and will not be disclosed individually to the public.

Please fill in the information as COMPLETELY as possible.

Company information

1. Firm Name _____
2. Year Founded (YYYY-MM-DD) _____
3. Where your head office is geographically located?

4. Industry classification of the Firm

- | | |
|--|--|
| <input type="checkbox"/> Agriculture/Fisheries | <input type="checkbox"/> Manufacturing -light |
| <input type="checkbox"/> Computer related | <input type="checkbox"/> Media |
| <input type="checkbox"/> Conglomerates | <input type="checkbox"/> Medical |
| <input type="checkbox"/> Construction | <input type="checkbox"/> Mining and metals |
| <input type="checkbox"/> Consumer products/service | <input type="checkbox"/> Retail/Wholesale |
| <input type="checkbox"/> Electronics | <input type="checkbox"/> Services Non-financial |
| <input type="checkbox"/> Ecology | <input type="checkbox"/> Telecommunications |
| <input type="checkbox"/> Financial services | <input type="checkbox"/> Textiles and clothing |
| <input type="checkbox"/> Infrastructure | <input type="checkbox"/> Transportation/Distribution |
| <input type="checkbox"/> Information technology | <input type="checkbox"/> Travel/Hospitality |
| <input type="checkbox"/> Leisure/Entertainment | <input type="checkbox"/> Utilities |
| <input type="checkbox"/> Manufacturing -Heavy | |
| <input type="checkbox"/> Other | |

5. Approximately how many employees working in your firm?

6. What is your firm's current stage of operation?

Start-up/Early Stage

Expansion/Development

Later Stage

7. Approximately what is the percentage amount of venture capital financing of total financing that your firm used? (e.g. 20% of total financing)

%

8. Where is your firm's source of VC funding geographically located?
9. Has your firm hired an outside Chief Executive Officer after receiving VC funding? Yes No

For questions 10-17, please use the following rating scale;

1 = No influence to 4= High influence

- | | | | | |
|---|-------------------------------|-------------------------------|-------------------------------|-------------------------------|
| 10. To what extent Venture Capital firms (VCs) are influential in your firm's CEO hiring decisions? | 1
<input type="checkbox"/> | 2
<input type="checkbox"/> | 3
<input type="checkbox"/> | 4
<input type="checkbox"/> |
| 11. To what extent VCs are influential in your firm's overall "Human Resource Practices"? | 1
<input type="checkbox"/> | 2
<input type="checkbox"/> | 3
<input type="checkbox"/> | 4
<input type="checkbox"/> |
| 12. To what extent VCs are influential in your firm's decisions on the level of Executive Compensation? | 1
<input type="checkbox"/> | 2
<input type="checkbox"/> | 3
<input type="checkbox"/> | 4
<input type="checkbox"/> |
| 13. To what extent VCs are influential in determining your employees' incentives? | 1
<input type="checkbox"/> | 2
<input type="checkbox"/> | 3
<input type="checkbox"/> | 4
<input type="checkbox"/> |
| 14. To what extent VCs are influential in your firm's board of directors' decisions such as Takeover? | 1
<input type="checkbox"/> | 2
<input type="checkbox"/> | 3
<input type="checkbox"/> | 4
<input type="checkbox"/> |
| 15. To what extent VCs are influential in your firm's overall business strategic direction? | 1
<input type="checkbox"/> | 2
<input type="checkbox"/> | 3
<input type="checkbox"/> | 4
<input type="checkbox"/> |
| 16. To what extent VCs are influential in your firm's board appointments? | 1
<input type="checkbox"/> | 2
<input type="checkbox"/> | 3
<input type="checkbox"/> | 4
<input type="checkbox"/> |
| 17. To what extent VCs are influential in your firm's overall investment decisions? | 1
<input type="checkbox"/> | 2
<input type="checkbox"/> | 3
<input type="checkbox"/> | 4
<input type="checkbox"/> |

18. Please state any other function of VCs that affects directly or indirectly any business in your firm.
.....

19. Please state your position in the firm.

Thank you for completing the questionnaire. Please return promptly by fax at (714) 523-0995 in United States or by mail to 3639 E.2nd St.. #202 Long Beach, CA, 90803, USA. You can also send the answers by replying this e-mail to senem.alkan@phd.unibocconi.it or alternatively to alkansenem@hotmail.com. Should you have any questions, please feel free to contact myself, PhD student at Bocconi University, Senem Alkan Aktuccar.