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The Relevance of Economic, Institutional and Cultural Determinants for Venture Capital Investments. A US-Europe Comparison.

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UNIVERSITY OF SAN FRANCISCO

DEPARTMENT OF ECONOMICS

MASTER'S THESIS

The Relevance of Economic, Institutional and Cultural Determinants for Venture Capital Investments. A US - Europe Comparison.

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1 Introduction

During the last decade, policymakers and researchers have wondered how the success of Silicon Valley's entrepreneurialism and venture capital finance can be replicated in other regions of the world. Whereas the success story of Silicon Valley certainly has various aspects, one critical factor seems to be the use of venture capital (Armour and Cumming, 2006).

By providing financing to new firms that may not otherwise have access to capital markets, venture capital is a very important source of funding for innovation (OECD, 2012b). Venture capital helps bring innovations to the market quickly and thereby creates not only opportunities for further technological innovation but also economic growth, economic flexibility, and jobs (Jeng and Wells, 2000). Therefore, many countries seek to improve the supply of venture capital (OECD, 2012b).

Venture capital accounts for a subset of private equity investment, differentiated by the fact that funds are provided for businesses at an early stage in their development, before any profit has been made. Venture capitalists raise their investment funds from end-investors and invest actively in their portfolio companies - that is, they develop specialized industry expertise and establish sophisticated contracts that create a place for the venture capitalist on the board of directors of the funded company (Armour and Cumming, 2006). In exchange for the capital provided to start-ups, venture capitalists receive an equity ownership stake in the financed company (Florida and Kenney, 1988). Venture capitalists normally hold their investments for three to seven years, after which returns can be realized through trade sales (mergers

and acquisitions) or initial public offerings (IPOs) on stock markets (Armour and Cumming, 2006; OECD, 2013a).

In the United States, the shift from traditional financial institutions (such as banks) to institutional sources of finance like venture capital was facilitated by the reductions in the tax rate on capital gains and the changes of federal restrictions on public pension fund investments, which created an incentive for pension funds to engage in partnership investments. Apart from that, the active sponsorship of firms by investment banks in the public securities market contributed to an increased investor confidence in the long-term sustainability of venture capital as an investment channel (Florida and Kenney, 1988).

Venture capital was the main contributor to the funding of every surge of innovation in the Silicon Valley area, e.g., the establishment of the semiconductor industry in the 1960s, the start of the personal computer industry and the biotech industry in the 1970s, of the workstation and networking industries in the 1980s, and the commercialization of the internet in the 1990s (Banatao and Fong, 2000 cited in Zhang, 2007). In the past three decades, almost every successful start-up in Silicon Valley received local venture capital funding (Zhang, 2007; Ferrary and Granovetter, 2009).

Although the growth rate of venture capital has been high in many countries, there are still large differences in the funding levels across countries (Jeng and Wells, 2000). As venture capital is demanded only in presence of entrepreneurs seeking capital for their start-ups, the differences in venture capital (VC) investments are linked to the level of entrepreneurship in a country (Freytag and Thurik, 2007).

In Europe, venture capital markets seem significantly less developed than in the US, both in terms of the amount invested and the amount per investment. The financial crisis enlarged the existing gap at the seed and early stage: bank lending to start-ups declined further and VC firms became more risk averse due to pressures on the industry and therefore preferred to invest at later stages where risks are lower, leaving gaps at the pre-seed and seed stages (OECD, 2013a).

Angel investors aimed to fill these financing gaps left by banks and VC firms and could indeed increase the total deal size for start-ups seeking early-stage financing. Angel investors individually invest "their own money predominantly in seed or start-up companies and are financially independent, i.e., a possible total loss of their business angel investments will not significantly change the economic situation of their assets" (EBAN, 2014a). Therefore, individual business angels played an essential role in building up the formal venture capital industry as they often were the primary source of external seed- and early-stage equity financing in many countries and hence served as a predecessor to venture capital (Ibrahim, 2010; OECD, 2011).

This study mainly builds on the work of Black and Gilson (1998), Jeng and Wells (2000), and Schröder (2013). Whereas Black and Gilson (1998) analyzed the significance of well-developed stock markets and initial public offerings (IPOs) for venture capital financing, Jeng and Wells (2000) expanded upon the regression by adding many other factors such as the gross domestic product (GDP) and market capitalization growth, labor market rigidities, financial reporting standards, private pension funds, and government programs. Consistent with Black and Gilson (1998) who found that stock market-centered systems which permit venture capitalists to exit through an IPO are crucial to the existence of a strong venture capital market, Jeng and Wells (2000) also found that IPOs are the most important determinant of venture capital investing. Additionally, they showed that different types of venture capital are differently affected by the independent variables included in their study: Labor market rigidities, for example, negatively affect early-stage venture capital investments, but do not impact venture capital investments at the later stage (*ibid.*).

Schröder (2013) enhances the analysis of Jeng and Wells (2000) by including the role of the banking sector in explaining diverging levels in early-stage VC investments across countries. Schröder (2013) supports the results of Black and Gilson (1998), arguing that banks are not able to duplicate the implicit contract regarding future control as a market-based system can. Schröder (2013) concludes that stock markets are complements for venture capital whereas banks are substitutes.

Further previous literature related to this study include Schwienbacher (2002), who studied exit decisions of American and European venture capitalists, and Hege et al. (2003), who conducted a comparative micro-level study of the performance of venture financing between the United States and Europe.

Schwienbacher (2002) reported that replacement of the entrepreneur, reporting requirements, and stage financing affect the venture's likelihood of an IPO. He stated that the most striking difference between European and American venture capitalists is the significantly lower use of convertible securities by European venture capitalists. Cumming (2002) found similar results in various European countries; so did Bascha and Walz (2001) in Germany.

Hege et al. (2003) demonstrated the existence of a significant gap of performance between VC firms in the US and their European counterparts, both in terms of the type of exit and the rate to return. They find that differences in the contractual relationships between venture capitalists and entrepreneurs are causing these performance differences: American venture capitalists more strongly insist on keeping contingent control rights, i.e., through the use of convertible securities (ibid.).

Bottazzi and DaRin (2002a) compared Europe's aggregate VC investment flows to the US and study the effect of VC financing on Europe's innovative companies listed on Euro.nm, the European market network that includes national stock markets from Germany, France, the Netherlands, Belgium, and Italy. They reported that venture capital does help European companies to develop and go public on the Euro.nm, which positively contributes to the growth of Europe's stock markets (ibid.).

The cultural variables introduced in this study stem from the literature linking culture to entrepreneurial activity in a country, measured by self-employment levels. Audretsch et al. (2002) and Freytag and Thurik (2007) mainly contributed to this literature.

Audretsch et al. (2002) provided a unified framework for understanding and analyzing the determinants of entrepreneurship and conducted case studies in the United States, the Netherlands, France, and Germany. They argued that national culture

may have an influence on both the supply and demand side of entrepreneurship: Individual preferences for self-employment are shaped by a country's prevailing attitude towards entrepreneurship. Further, the prevalence of entrepreneurial values in politics may influence the degree of entry regulation of new start-ups and the extent to which an innovative entrepreneurial ecosystem is encouraged through private-public partnerships (ibid.). Empirically investigating the impact of institutional and cultural factors on the individual decision to become an entrepreneur, Freytag and Thurik (2007) also found that cultural aspects constrain the behavior of would-be entrepreneurs and are thereby assumed to impact the attitudes of investors, such as the attitude towards risk and loss of control. As the supply of VC involves high risk, risk adversity is likely to negatively influence the development of the venture capital market of a country (ibid.).

Authors that used Hofstede's (1980) indices - individualism, masculinity, power distance and uncertainty avoidance - in order to link culture to entrepreneurial activity include Shane (1992, 1993), Baum et al. (1993), and Acs et al. (1994).

According to Shane (1992; 1993), lower power distance, lower uncertainty avoidance, higher masculinity and higher individualism stimulate entrepreneurship. In contrast, the findings of Baum et al. (1993) suggest that organizations in countries with higher power distance, higher uncertainty avoidance, lower masculinity and lower individualism would increase entrepreneurial activity. Similarly, Acs et al. (1994) came to the conclusion that higher uncertainty avoidance and lower individualism lead to higher levels of self-employment. Wennekers et al. (2007) and Noorderhaven et al. (1999) confirmed that higher uncertainty avoidance leads to a higher level of entrepreneurial activity in a country (and hence to a higher demand for VC investments).

The difference in the development stage of VC markets across countries is represented by a broadly asymmetric situation on the research side: The majority of research on VC is centered on North America while there has been very little empirical research conducted on the European VC market (Hege et al., 2003). Studies comparing the

US to European VC industries remain rare and mostly concentrate on economic and institutional variables explaining different levels of VC investments across countries, without taking into account several cultural aspects.

The importance of (formal and informal) institutions for the economic development of a country was particularly well analyzed by North (1994), who pointed out that “institutions are the humanly-devised constraints that structure human interaction. They are composed of formal rules (statute law, common law, regulations), informal constraints (conventions, norms of behavior, and self imposed codes of conduct), and the enforcement characteristics of both” (North, 1994, p. 359).

It is essential for policymakers to understand how to effectively contribute to a vibrant VC industry. Although efforts have been made in several countries to foster entrepreneurship through the creation of public financial institutions offering funding to high-potential start-ups, government authorities often did not take into account the more informal function of VC firms, which goes far beyond the pure financing function (Ferrary and Granovetter, 2009). Hence, it is not clear which policy measures would be most appropriate and effective to nourish a country’s VC industry. Here the lack of investigation is most apparent (Hege et al., 2003).

If the long indicated gap in VC investments between the US and Europe is confirmed in the data, which institutional factors could explain it? Do North’s “informal constraints”, and hence the cultural variables, also play a role? And is the gap in amounts invested still true for the period since the late 1990s, when early-stage financing quickly increased in Europe (Hege et al., 2003)?

The purpose of this paper is to analyze the determinants of early-stage VC investments by identifying characteristics in the economic, institutional, as well as cultural framework that could explain the diverging levels of early-stage VC investments across countries. Data was assembled for 16 countries during the period from 1995 until 2013.

The economic variables used to predict the level of early-stage VC investments in this study include *GDP growth*, *openness*, the *unemployment rate*, *R&D expenditures*, and the *NASDAQ Composite Index*. The institutional variables that are expected to explain the level of early-stage VC funds invested are *government stability*, *socioeconomic conditions*, *bureaucracy quality*, and the *investment profile*. To examine the impact of cultural factors on early-stage VC investments, the study includes the four cultural indices of Hofstede (1980): *individualism*, *masculinity*, *power distance* and *uncertainty avoidance*. The study investigates empirically whether and how these characteristics contribute to the level of venture capital funding.

The main results of the study are the following: First, the data confirm that there is a significant gap in the amounts invested by VC firms between the United States and Europe for the period under study from 1995 to 2013. This gap might be attributable to several important differences in the economic, institutional, or cultural environment of both continents. The results indicate that countries that are more open to trade, measured by the variable *openness*, are associated with higher levels in early-stage venture capital. Higher *R&D expenditures* as a proxy for the technological and innovation capacity in a country as well as a higher value in the *NASDAQ Composite Index* as a proxy for general stock market conditions result in a higher amount of early-stage VC investments. Moreover, the results reveal that favorable *socioeconomic conditions* for both entrepreneurs and venture capitalists positively correlate with early-stage VC investments. In terms of the cultural environment, the results show that higher degrees of *masculinity* and *power distance* result in more early-stage venture capital invested whereas a higher degree of *uncertainty avoidance* negatively affects early-stage VC investments.

Understanding the economic, institutional, and cultural influences on the development of the venture capital industry and hence of entrepreneurial potential is essential to the internationalization of entrepreneurship theory and significantly contributes to the VC industry literature (Thomas and Mueller, 2000).

These findings help provide advice for nations aiming to develop their venture capital markets in order to encourage innovation and foster entrepreneurship.

The paper is organized as follows: Chapter 2 relates to the importance of entrepreneurship for economic growth and focuses on the entrepreneur in economic history. In chapter 3, the theoretical framework and the tested hypotheses are presented. Chapter 4 discusses the data and covers the regression methodology. Section 4.4 presents the empirical results of the study.

Taking into consideration that total angel investment is found to be much greater than overall VC investment, both in the US and in some European countries, the importance of angel investment as a predecessor of venture capital investments will be discussed in chapter 5. A special investigation of the angel investment markets in the US, France, and Germany is undertaken at this point.

Chapter 6 analyzes the venture capital industries in the United States and Europe, with particular focus on Germany and France, and tries to identify institutional and cultural framework conditions in place that may explain the different levels of VC investments in the respective countries. Apart from cultural characteristics such as national attitudes towards entrepreneurship and risk-taking, the countries' labor regulations, tax systems, type of investors working in VC funds, bankruptcy legislation, and access to stock markets will be examined. In this regard, the crucial factors contributing to the success story of the innovative cluster in Silicon Valley shall also be demonstrated and discussed. Additionally, the chapter examines current policy measures that have been implemented in the different countries to encourage entrepreneurship and nurture the national VC market. Chapter 7 concludes.

2 *Entrepreneurship as Human Action:* The Entrepreneur in Economic Theory

In their efforts to explain entrepreneurship, researchers have recently shifted their focus away from equilibrium approaches, which concentrate on certain personality types of people in society who prefer to become entrepreneurs, towards an individual-opportunity relationship (Shane and Venkataraman, 2000 cited in Acs and Varga, 2005). This relationship shows the individual response of the entrepreneur to the existence of an opportunity, his or her identification and discovery of opportunity, and the process of exploitation (Shane, 2003 cited in Acs and Varga, 2005). In the 20th century, three scholars have dominated the economics literature of entrepreneurship: Schumpeter (1912), who sees innovative entrepreneurs as the main driver to achieve economic advancement away from the static equilibrium; Knight (1921), who views the entrepreneur as someone who changes uncertainty into calculable risk; and, more recently, Kirzner (1979), who believes that the entrepreneur moves the economy towards an equilibrium state by exploiting arbitrage opportunities (Braunerhjelm and Svensson, 2010).

2.1 Schumpeter's entrepreneur as the disruptive force

Schumpeter defined the entrepreneur as destructing established routines and not falling into line with the traditional, old way of doing things. The joy of creation and the pleasure of success are what stimulate the Schumpeterian entrepreneur. He is a leader who is able to identify the right way to act. He has a well-developed will to conquer, the desire to fight, and likes to show his superiority to others (Schumpeter, 1912 cited in Brouwer, 2002). Being rather self-centered, he “has the dream and the will to found a private kingdom” (Schumpeter, 1934, p. 93). In order to introduce his innovations, he has to resist to his opponent environment, which is generally not open to non-conformist behavior and novelty (Schumpeter, 1912 cited in Brouwer, 2002).

For Schumpeter, market dynamics are in a continuous state of disequilibrium (Freytag and Thurik, 2007). Schumpeter strongly rejected the orthodox emphasis on the perfectly competitive market and stressed the entrepreneurial character of real-life dynamically competitive processes (Kirzner, 1999). Unlike the neo-classical approach, which is based on the assumption that markets are in equilibrium and entrepreneurial activity is not significantly different from innovative activity, the Schumpeterian tradition makes the entrepreneur the actual cause of pushing the economy out of equilibrium and bringing industrial dynamics and economic development into motion (Freytag and Thurik, 2007; Braunerhjelm and Svensson, 2010).

By introducing new innovations to the market, the Schumpeterian entrepreneur becomes a disequilibrating force; he distorts the “circular flow” of the economy. Schumpeter describes the “circular flow” as the prevailing equilibrium of the economy, in which economic processes are repetitively taking place period after period. The entrepreneur drives the economy away from existing structures and creates new, up until now unknown possibilities (Schumpeter, 1912 cited in Brouwer, 2002; Braunerhjelm and Svensson, 2010). This process, which Schumpeter called “creative destruction”, is the foundation of economic development (Hébert and Link, 1989). Therefore, Schumpeter's entrepreneurs do not simply adjust markets, they create and destroy them (Casson, 2003).

As established firms are not willing to change their routines and will engage in innovation only by the time their assets have become outdated, entrepreneurs have to start up new firms. Not being hindered by former investments, new firms will accelerate economic progress by introducing innovations before the already well-established firms would. With losses caused by the new firms on currently established firms, the process of creative destruction comes about (Brouwer, 2002).

The Schumpeterian process of economic development can be divided into three clearly separated stages: In the first stage, the invention takes place, hence the technical discovery of new products or processes (Braunerhjelm and Svensson, 2010). For Schumpeter, the invention is a scientific activity which does not necessarily result from economic advancement (Casson, 2003). In the following innovation stage, the new good or service resulting from technical discoveries will be successfully commercialized (Braunerhjelm and Svensson, 2010).

The inventor develops a technique which the innovator - the entrepreneur - tries to exploit in the second stage (Casson, 2003). Thus, the function of the entrepreneur is not to invent anything or develop the method which the venture exploits, but “it consists in getting things done” (Schumpeter, 1942, p. 132).

The entrepreneur cannot directly influence the creation of technological opportunity itself, but he can identify and exploit existing opportunities: “Economic leadership in particular must hence be distinguished from “invention” (Braunerhjelm and Svensson, 2010). Unless they are not carried into practice, inventions are economically irrelevant. To carry any improvement into effect is a task entirely different from the inventing of it, and a task, moreover, requiring entirely different kinds of aptitudes (Schumpeter, 1911, pp. 88-89 cited in Braunerhjelm and Svensson, 2010).

According to Schumpeter, the existence of opportunity needed the introduction of new knowledge which is created by changes in technology. Therefore, (technological) opportunity comes in part from the research and development (R&D) process that occurs in society. As technological change enables the allocation of resources in a different and potentially more efficient way, it is an important source of entrepreneurial

opportunity (Casson, 1995 cited in Acs and Varga, 2005). In his later editions of “The Theory of Economic Development”, Schumpeter (1911) emphasized that he was not so much interested in the individuality of entrepreneurs and in the specific causes of technological change, as in the mechanism of change itself (Ulijn and Brown, 2003).

Within the innovation process, Schumpeter sees two important functions of the entrepreneur: First, while being involved in the new firm, he has to motivate not only himself but also the other actors to undertake an extensive program of collective learning (Ulijn and Brown, 2003). To achieve this commitment by establishing formal hierarchical power is not possible; therefore, informal, effective collaboration is needed which in turn requires the same interests and social obligations of the participants (Ulijn and Weggeman, 2001 cited in Ulijn and Brown, 2003). Secondly, the entrepreneur has to guarantee certainty and acts as the center of trust. Therefore, whereas his first function consists of creating and sharing the vision of exploiting a great opportunity, the second function involves convincing all participants that this vision can actually be realized (Ulijn and Brown, 2003).

Moreover, Schumpeter differentiates among five types of innovation: (1) the introduction of a new product (or an improvement of the quality of an existing product), (2) the introduction of a new production technique, (3) the development of new markets (particularly an export market in a new area), (4) the opening up of a new source of supply of materials and (5) the creation of a new kind of industrial organization (Casson, 2003; Schumpeter, 1942).

Although Schumpeter was aware that innovation contains risk, he did not see entrepreneurs as risk-takers. In his opinion, the capitalists who financed entrepreneurial ventures were the ones who effectively took a risk (Braunerhjelm and Svensson, 2010). The entrepreneur would only bear risk if he financed his ventures himself (Casson, 2003). Therefore, he has to convince the banker who will finance him, but he also has to make an impact on the social group and convince the consumers to want new products or variations of products that they have already been using (Schumpeter, 1934 cited in Ulijn and Brown, 2003).

2.2 Knight's entrepreneur as the risk-taker

As one of the founding fathers of the famous Chicago School of Economics, Knight (1921) contrasted, but also complemented, Schumpeter's view of the entrepreneur by developing the part of entrepreneurial economics that focuses on the entrepreneur's role as a risk-taker (Braunerhjelm and Svensson, 2010; Brouwer, 2002). The Knightian tradition stresses two important functions of the entrepreneur: (1) to provide entrepreneurial inputs and (2) to bear risk (and receive a profit for it). The entrepreneur's function as a provider of entrepreneurial inputs underlines the entrepreneurial ability of foresight or correct judgment. The second risk bearer function sheds light on the presence of risk in the occupational choice decision (Freytag and Thurik, 2007).

In his work, Knight emphasizes the intuitive and mainly non-rational facets of entrepreneurship. The ability of the entrepreneur to see certain qualities in people that are not perceived by the average observer gives her prophetic traits. This is also why only the entrepreneur with above-average perception skills can make profit under the condition that capital markets are well organized (Brouwer, 2002).

Knight (1921) examined Schumpeter's disregard of uncertainty in his seminal work "Risk, Uncertainty and Profit" which contributed to the foundation of modern finance and organization theory and fully analyzed the distinction between uncertainty and risk (Brouwer, 2002; García-Ruiz and Toninelli, 2010). Whereas Knight defines risks as those uncertainties of economic life whose probability can be calculated, uncertainties cannot be measured as they involve new and unfamiliar situations (García-Ruiz and Toninelli, 2010).

For Knight, uncertainty is a situation where neither a priori reasoning nor statistical inference (as the situation is unique and does not belong to a larger group of identical events) can calculate the probabilities of alternative outcomes (Casson, 2003). In dealing with these two phenomena, the role of the entrepreneur becomes essential (García-Ruiz and Toninelli, 2010): In the business world, decisions on inputs must be made in advance so that output can be created in the future.

Factors owned by households have to be paid for immediately, even if households are unwilling to commit on future demand for the product under the anticipation of unforeseeable events (*ibid.*).

Hence, because of time lags in production, unanticipated changes in household situations, and the absence of forward markets in the product, producers have to deal with uncertainty regarding product demand. In this context, Knight shows how markets and corporations handle the problem of uncertainty by giving decision-making responsibility to those who are best at bearing uncertainty – the entrepreneurs. Foresight is the most important quality that is needed to make production decisions under uncertainty (Knight, 1921).

According to Knight, entrepreneurs do have a greater ability of foreseeing events which enables them to reduce and eventually eliminate uncertainty (Casson, 2003). Predicting possible outcomes means estimating the probabilities of the occurrence of every possible outcome. In Knight's view, this requires the entrepreneur's judgment and intuition, especially judgment about people's abilities: "Business judgment is chiefly judgment of men" (Knight, 1921, p. 291 cited in Langlois and Cosgel, 1993).

People not only differ "in their capacity by perception and inference to form correct judgments as to the future course of events in the environment" (Knight, 1921, p. 241), but also in their ability to judge other people's capacities (Langlois and Cosgel, 1993; Casson, 2003). These differences among people will lead to their specialization according to their skills (Langlois and Cosgel, 1993). In the environment of the firm this means that uncertainty will result in "the tendency of the groups themselves to specialize, finding the individuals with the greatest managerial capacity of the requisite kinds and placing them in charge of the work of the group, submitting the activities of the other members to their direction and control" (Knight, 1921, p. 269 cited in Langlois and Cosgel, 1993).

Knight believes the entrepreneurs to have the greatest capacity of judging other people's abilities. As the judgment about other people's capacities can be seen as

a judgment about outcomes directly, the accuracy of his judgment determines the amount of the entrepreneur's income (Langlois and Cosgel, 1993).

In order to deal with uncertainty about newly-emerging situations, the reliance on judgment is very important (Langlois and Cosgel, 1993). Thus, Knight considers confidence in her own judgment as one of the most important characteristics of the entrepreneur. Also, the entrepreneur should have a fairly low aversion to risk, as her judgment will be backed with her own capital. In Knight's view, the most important determinant of the level of profit and of the number of entrepreneurs is the elasticity of supply of self-confident individuals (Casson, 2003).

2.3 Kirzner's distinctively alert entrepreneur

Another more recent and quite provocative theory of entrepreneurship has been developed by Mises' former student Isreal Kirzner (Hébert and Link, 1989). By means of a distinctive alertness, the Kirznerian entrepreneur exploits profit opportunities at a different stage of the product life cycle than Schumpeterian ones (Freytag and Thurik, 2007). Whereas Schumpeter's entrepreneur disorders the equilibrium by launching major innovations, Kirzner's entrepreneur starts off from disequilibrium and by correcting inconsistencies in supply and demand, he moves the economy towards the equilibrium. Besides being prescient, bold, self-confident, creative, and innovative, the Kirznerian entrepreneur's common characteristic that makes it possible to successfully exploit arbitrage opportunities is his entrepreneurial alertness (Kirzner, 1979 cited in McMullen and Shepherd, 2006). According to Kirzner, entrepreneurial alertness is necessary for the appropriate functioning of the economy and describes a situation where the market offers a profitable opportunity that is successfully exploited by the entrepreneur (Kirzner, 1973, 1980 cited in McMullen and Shepherd, 2006).

In his lectures, Kirzner often mentioned the analogy that the entrepreneur is the one who, after noticing a \$10 bill on the floor in front of him, is alert to the presence of the money and grabs it. The more alert individual will grab the money rapidly whereas the less alert will take more time to observe this opportunity and benefit from it (Rothbard, 1985). “Without knowing what to look for, without deploying any deliberate search technique, the entrepreneur is at all times scanning the horizon, as it were, ready to make discoveries” (Kirzner, 1997, p. 72). Therefore, alertness enables individuals to interfere in the market process by changing the price while others will react merely by alternating their buying or selling behavior in relation to the most recent price (Casson, 2003).

In a dynamic economy, knowledge cannot be complete or perfect so that markets are always in disequilibrium, which opens opportunities to the entrepreneur. These profit opportunities are the result of former entrepreneurial errors that led to shortages, surpluses or misallocated resources (Kirzner, 1997). The entrepreneur’s function is hence to attain the adjustment of prices that is required to move the economy toward an equilibrium state (Hébert and Link, 1989).

If different prices exist in the same market, the entrepreneur could take advantage of an arbitrage opportunity as there will be a buyer or seller who is willing to pay a higher price or accept a lower one for some product. Thus, entrepreneurs will sell where prices are too high and buy where prices are too low. Also, in case prices of inputs do not coincide with the prices of outputs, the entrepreneur could expand production of some products while cutting the creation of others (Casson, 2003). This will cause prices to adjust and steer output and input qualities towards values coherent with the market equilibrium (Casson, 2003; Kirzner, 1997).

Kirzner’s approach to entrepreneurship was highly influenced by three important ideas: (1) Mises’ principal view of the market as an entrepreneurial process, (2) Hayek’s understanding that the market creates a learning process, and (3) the belief that entrepreneurship is part of creative discovery (Kirzner, 1985, cited by Hébert and Link, 1989).

Mises taught Kirzner that the market is driven by the entrepreneurs: “The driving force of the market process is provided neither by the consumers nor by the owners of the means of productions – land, capital goods, and labor – but by the promoting and speculating entrepreneurs” (Mises, 1949, p. 325 cited in Kirzner, 1997). For Mises, the market process is determined by the speculative actions of entrepreneurs who recognize profit opportunities in the state of disequilibrium. Mises stated that entrepreneurship is human action when considering the uncertainty that every action contains (Mises, 1949 cited in Kirzner, 1997). This means that all decisions made by economic agents must necessarily have a speculative character which is fundamental to entrepreneurship (Kirzner, 1997). Kirzner also sees the aim of economic theory in explaining behavior in terms of intentional human action, and to reflect in how far intentional human actions can interact to bring about unexpected outcomes (Casson, 2003).

Hayek sees the empirical content of economics in the process of adjustment towards an equilibrium. During this process that he calls competition, the market agents acquire and communicate knowledge (Casson, 2003). Wishes and desires of consumers, for instance, cannot properly be considered as given facts but are rather reflecting problems that competition could solve. Before competition starts, consumers lack the knowledge they are supposed to possess in a state of competitive equilibrium. Only during the process of competition do they develop their knowledge of alternatives as a result of what happens on the market (Hayek, 1946). Hence, humans cannot only acquire, but also convey, knowledge and abilities through the process of competition without even being aware of the existence of that knowledge in the first place (Hayek, 2003). The market process enables society to explore the unknown and to discover new ways of improving their actions and choices (Hayek, 1946). Markets support people in communicating their discoveries to others so that the inherent dissemination of information ensures the use of dispersed knowledge (Casson, 2003; Hayek, 2003). This makes it possible for market agents to coordinate their decisions and therefore move the economy towards a state of equilibrium (Casson, 2003).

Kirzner appreciated from Hayek the role of knowledge and its improvement through the market process where agents constantly interact with each other to finally arrive at the equilibrium state (Kirzner, 1997). The price information to which Kirznerian entrepreneurs respond is information created by the market itself through the learning and discovery process originated from Hayek (Casson, 2003).

Kirzner's inspiration of the Austrian economists' belief that entrepreneurship is part of creative discovery becomes particularly clear when looking at this learning process of acquiring new knowledge: During the discovery process, market participants become better informed about the entrepreneurial plans of others; thus they can also observe which courses of action turn out to be successful and which do not (Kirzner, 1997). Some plans will not work out as a result of initial entrepreneurial error and will systematically be eliminated as such an erroneous decision will be corrected (Kirzner, 1997).

Further, "the profit opportunities created by earlier entrepreneurial error do tend systematically to stimulate subsequent entrepreneurial discovery. The entrepreneurial process so set into motion, is a process tending toward better mutual awareness among market participants" (Kirzner, 1997, p. 72). Thus, profit does not particularly arise out of entrepreneurial error, but most importantly out of the compelling incentive to lessen the occurrence of it (Kirzner, 1997).

As Kirzner limits entrepreneurial activity to the usage of arbitrage opportunities, he does not attribute a high importance to uncertainty in human decision-making (Hébert and Link, 1989). With his notion of alertness, Kirzner emphasizes the quality of perceiving a profit opportunity that really exists. This was highly criticized by his contemporaries such as Lawrence White (1976) or Murray Rothbard (1985). They argued that in practicing arbitrage, the entrepreneur copes with present and known opportunities to take advantage of price differences that surpass transaction costs over time, yet uncertainty does only exist in relation to the future (Hébert and Link, 1989).

Hence, any profit opportunity is in reality uncertain (Rothbard, 1985). Kirzner later asserted that uncertainty is indeed essential to the notion of entrepreneurship but still believes that the link is more indirect than assumed by former writers on entrepreneurship theory. For Kirzner, entrepreneurs who practice arbitrage do discover past error whereas entrepreneurs who face uncertainty have to make market decisions in numerous periods using their imagination and creativity. Therefore, Kirzner reckons that time and uncertainty may change the form of entrepreneurial action but they do not affect its substantial function (Hébert and Link, 1989; Rothbard, 1985).

3 Theoretical Framework and Hypotheses

This empirical analysis is based on theoretical approaches that enable the derivation of testable hypotheses which are then examined in the empirical work.

In this section, the theoretical framework and testable hypotheses of the analysis are outlined. A range of important factors that can possibly affect the level of early-stage venture capital (VC) investments will be discussed, especially focusing on economic, institutional and cultural differences across countries.

An important economic matter in the theoretical venture capital literature points to the technological and innovation capacity of a country (proxied by R&D expenditures), highly incentivizing venture capitalists to invest in young and promising businesses (Gompers and Lerner, 1998). Institutional factors are expected to influence VC investments in several ways: Through the legal environment for businesses, the socioeconomic conditions businesses and investors operate in, the administrative quality of a country and through a country's investment profile (Audretsch et al., 2002). Additionally, levels of VC investments are assumed to differ according to various cultural characteristics of a country (Hofstede et al., 2004).

3.1 Economic Influences on Venture Capital Investments

The VC industry is affected by the state of a country's economic environment. Aspects such as macroeconomic fluctuations and stock market conditions influence start-up activity and thus have an impact on VC funds as more start-ups increase the demand for VC investments in an economy (Acs and Audretsch, 1994; Jeng and Wells, 2000).

Consistent with past literature, *GDP growth* and *openness* are included in this regression to capture a country's economic state (Jeng and Wells, 2000). If the country is growing quickly, there may be better opportunities for entrepreneurs to start new ventures and a higher survival rate of potential portfolio companies (Gompers and Lerner, 1998; Schröder, 2013). Similarly, openness to trade provides access to a wider variety of goods and hence to new technology, which may bring about more business opportunities for potential entrepreneurs (Harrison, 1996).

As *GDP growth* represents a measure for macroeconomic fluctuations in this study, *GDP growth should be positively correlated with the level of early-stage VC investments* (Hypothesis 1.1.). An economy that is more open to trade, reflected by higher values in imports and exports, is assumed to experience faster technological progress and productivity growth (Romer, 1990), resulting in more opportunities for innovative start-ups that demand venture capital. Therefore, *openness should go along with more early-stage VC investments* (Hypothesis 1.2.).

Unemployment was also regularly used in past research as an important economic factor variable explaining the differences in entrepreneurship across countries. Analyzing the casual relationship between unemployment and the level of entrepreneurship, bidirectional ramification may appear plausible: on the one hand, unemployment is likely to reduce entrepreneurship since unemployment is associated with economic decline, decreasing the availability of business opportunities. Therefore, self-employment becomes less profitable, resulting in fewer start-ups created and hence fewer VC investments demanded. On the other hand, unemployment may have a "push effect",

increasing entrepreneurship as unemployed persons become self-employed sooner if opportunity costs are comparatively low (Hofstede et al., 2004). As the view of *unemployment* as an indicator of a general weakness in the economy appears to be more convincing regarding the VC industry, *a negative relationship between unemployment and early-stage VC investments is expected in this study* (Hypothesis 1.3.).

In order to control for a country's technological and innovation capacity, related research included *R&D expenditures* within the business enterprise sector as a relevant explanatory variable for early-stage VC investments (Gompers and Lerner, 1998; Romain and van Pottelsberghe de la Potterie, 2003; Kortum and Lerner, 2000; Schröder, 2013). In countries with strong dynamics of research activities, the discovery of new technology becomes more likely and so does the arrival of entrepreneurial opportunities (Kortum and Lerner, 2000). As outlined in chapter 2, Schumpeter also sees the introduction of new knowledge as fundamental for entrepreneurial opportunities as it enables the allocation of resources in a different and potentially more efficient way (Casson, 1995 cited in Acs and Varga, 2005). Therefore, a higher R&D expenditure in one country than another may bring about a larger number of potential entrepreneurs with promising ideas which would increase the demand for venture capital (Gompers and Lerner, 1998). Thus, *R&D expenditures are assumed to be positively correlated with early-stage VC investments* (Hypothesis 1.4.).

Since the main risk faced by investors and venture capitalists is to not get a return on their investment, viable IPO markets are extremely important for the venture capital industry. Black and Gilson (1998) cited in Jeng and Wells (2000) state that the IPO exit mechanism financially incentivizes equity-compensated managers to increase their effort in the portfolio company. Additionally, it offers them a corporate control option, since venture capitalists have to renounce their control rights at the time of the IPO (ibid.). Recognizing that there are various options to liquidate a fund, the literature suggests that exit through an IPO seems to be among the most attractive mechanisms (Jeng and Wells, 2000).

The nature of the exit markets for VC-backed firms is strongly affected by the ability of banks to own stock in public and private companies. In Germany, for example, banks owning firms' stocks may become part of the supervisory board. In the United States though, stock ownership is largely dispersed compared to Europe and banks may not own companies' stocks. As VC firms in bank-centered systems (such as Germany) are completely or partially owned by banks (Ooghe et al., 1991 cited in Bruton et al., 2005), banks tend to invest less in early-stage deals due to inherently higher risk they are unwilling to take (Bruton et al., 2005). Historically, high-tech firms had little opportunity to go public in Europe. Yet, in the late 1990s, Europe's main countries (Germany, France, the Netherlands, Italy, and Belgium) created technology-angled stock markets that made the IPO exit markets between the US and Europe more similar (Hege et al., 2009).

A better performing stock market increases the liquidity of IPO exit markets for VC investments and hence also the expected returns to investment. Given more liquid exit markets, venture capitalists require a lower rate of return on their investments (as they are exposed to less risk) and therefore are likely to increase the number of early-stage investments (Gompers and Lerner, 2000 cited in Cumming et al., 2005).

To provide a proxy for general stock market conditions, the *NASDAQ Composite Index* at the end of the investment year is included in this statistical analysis. A higher NASDAQ Index is supposed to have a positive effect on both the demand and supply of early-stage VC funds. On the demand side, the profitability of an IPO exit mechanism due to favorable stock market conditions additionally incentivizes entrepreneurs to start a business. Similarly, on the supply side, investors are more likely to supply funds to venture capital firms under the perspective of recouping their investment later on (Hege et al., 2009). Hence, the *NASDAQ Composite Index is expected to be positively associated with the level of VC investments* (Hypothesis 1.5).

3.2 Institutional Influences on Venture Capital Investments

As institutions build the framework within which all businesses operate, they often have an important impact on the position of start-ups in the economy. Even though macro-economic policies like income policy, labor market regulation or taxation are not directly targeted to influence the level of entrepreneurship, they are assumed to have an effect on the level of business ownership and hence the demand for VC investments (Audretsch et al., 2002).

The balance of entry and exit of firms fundamentally shapes the level of entrepreneurship. In order to monitor the number and quality of young businesses, governmental institutions control entry and exit flows of entrepreneurial ventures through specific legislation.

As a proxy for the legislative environment for businesses, the *government stability index* is included in this empirical analysis. The index assesses a government's ability to carry out its declared programs, measures a government's unity as well as the legislative strength of a country. It shall therefore also enclose the legislative conditions for businesses, including bankruptcy and establishment regulation for potential entrepreneurs.

If a country's legislation procedures for starting a business are very burdensome, time consuming, complex, and costly, there are no incentives for entrepreneurs to found their own company which results in lower demand for VC investments. Since a high score in the *government stability index* implies that the legislative environment for young businesses does not experience frequent changes and can be considered as favorable in terms of transparent and affordable establishment regulation as well as fair bankruptcy legislation, more start-ups are expected to emerge in the economy that would demand venture capital. Hence, *a positive relationship between the government stability index and early-stage VC investments is assumed* (Hypothesis 2.1.).

Through macro-economic policies, governments shape socioeconomic conditions that have a significant impact on the trading position of start-ups. Taxation, labor market regulation, social security or income policy are examples of the policies that determine the socioeconomic conditions for businesses (Audretsch et al., 2002).

The OECD (1998) states that high tax rates decrease the profitability of entrepreneurship and hinder the foundation of new businesses as well as the expansion of established companies. Since taxes are based on the firms' profits, a high tax burden exhausts the incomes of start-ups, resulting in a potential discouragement of entrepreneurs to start new ventures.

A flexible labor market is also essential for small businesses to operate well. A strongly regulated labor market is associated with high costs to "hire and fire" employees which results in higher risks of business-ownership. Founders will not be able to easily adjust their team in correspondence to market fluctuations in a rigid labor market.

Further, governments have an impact on the socioeconomic conditions for entrepreneurs through their social security policies as well as their influence on wages and the relative gross returns of owning a company. Differences in social security programs between wage earners/unemployed people and business owners can discourage entrepreneurs from starting up.

In order to assess the socioeconomic pressures that could constrain businesses, an index for *socioeconomic conditions* is used as another institutional variable in this study. Subcomponents of this index include unemployment, consumer confidence as well as poverty which are all influenced by the macro-economic policies outlined above. Assuming that macro-economic policies that reduce the risk for entrepreneurs of starting up and therefore increase the demand for venture capital result in advantageous socioeconomic conditions for both entrepreneurs and venture capitalists, *the socioeconomic conditions index is supposed to have a positive relationship with early-stage VC investments* (Hypothesis 2.2.).

The third institutional factor that is assumed to influence the entrepreneurial activity and therefore the VC investments included in this research is the *bureaucracy quality*. When registering a business, entrepreneurs have to go through different administrative procedures that are costly in terms of monetary and temporal considerations, and might also be very complex. The costs, time, and complexity of this administrative process for new start-ups should have an effect on the willingness of entrepreneurs to start their own business (OECD, 1998 cited in Audretsch et al., 2002).¹

A high quality in bureaucracy would imply that the administrative procedures of starting a business are first of all not burdensome to entrepreneurs, but also that the public administration is efficient to process business applications quickly. Furthermore, a country's bureaucracy should have the strength and expertise to govern autonomously from political pressure and be able to adapt to frequent policy changes (for instance in the tax system) without complications or efficiency losses.

Thus, *efficient bureaucracy in a country should decrease the procedural costs of implementing a business, therefore encouraging entrepreneurial activity and leading to a higher demand of early-stage VC investments* (Hypothesis 2.3.).

Audretsch et al. (2002) provide the foundation for Hypotheses 2.1., 2.2. and 2.3.

Finally, a proxy for the investment environment is included in the regression using the *investment profile index*. This index assesses the factors influencing the risk to investment that are not covered by political, economic and financial risk components, and includes aspects such as contract viability/expropriation, profit repatriation as well as payment delays. Since VC funding for start-ups involves contracts using securities and contract instruments allocating contingent control rights to venture capitalists, contract viability and profit repatriation are essential components affecting the risk to invest in start-ups (Hege et al., 2003). A secure contracting environment with low expropriation hazards highly reduces the risks and costs related to transactions between venture capitalists and entrepreneurs.

¹Additionally, entrepreneurs who have to spend more time and energy on administrative duties in the establishment process of the business will have less time for their actual entrepreneurial activities, negatively affecting their company (EZ, 1999 cited in Audretsch et al., 2002).

Venture capital contracts for different types of entrepreneurial firms can involve different securities (common equity, convertible preferred equity etc.) or other specific contractual provisions relating to control rights, veto rights or board seats (Cumming, 2002). Due to the complexity of contracts between venture capitalists and entrepreneurs, the investment environment of the country needs to be well-regulated, reliably safe and stable. Assuming that a safe and well-regulated investment profile will encourage more venture capitalists to engage in funding deals with entrepreneurs, the *investment profile index is supposed to be positively correlated with early-stage VC investments* (Hypothesis 2.4).

3.3 Cultural Influences on Venture Capital Investments

Although the related literature has found that economic and institutional factors influencing the level of entrepreneurship and hence the demand for VC investments are very important, one can still find a high level of unexplained variation across countries. Therefore, the empirical literature on entrepreneurship tries to explain this variation by including cultural factors in the investigation (Hofstede et al., 2004).

With the assumption of an “entrepreneurial spirit”, Max Weber, along with economists from the Austrian and German schools, represent crucial early contributors to the literature of entrepreneurship, taking cultural differences across nations into account (Max Weber, 1904 cited in Thomas and Mueller, 2000). Underlining the society’s acceptance of the Protestant work ethic, Weber (1904) claimed that cultural and religious factors could explain differences in entrepreneurial activity.

The Puritan aspects of the Calvinist moral code, emphasizing personal responsibility for one's actions and interpreting success as a sign of grace, caused people to aim for profit, which in turn led to wealth accumulation through reinvestment of profit (Thomas and Mueller, 2000; Hofstede et al., 2004). On the basis of Weber's work ethic thesis, McClelland (1961) cited in Thomas and Mueller (2000) argued that an entrepreneurial tendency is created by aspiring success, often determined by parental education or other socialization factors. Societies that emphasize values like achievement, recognition, and competition (masculine values) would also show greater levels of entrepreneurship than societies that rather value relationships and quality of life (feminine values) (ibid.). Etzioni (1987) cited in Hofstede et al. (2004) thinks that diverging values and beliefs in a society and hence among potential entrepreneurs explain the variation in entrepreneurial activity across countries.

Research on the relationship between culture and entrepreneurship refers to the four indices of Hofstede (1980) as a measure of culture which will also be included in this study. For Hofstede (1980, p. 25), culture is "the collective programming of the mind which distinguishes the members of one human group from another and includes systems and values". People develop and strengthen "mental programs" through their experiences. These behavior patterns that are "programmed" into the individuals of society are consistent with national culture (Hofstede, 1980 cited in Pheng and Yuquan, 2002; Hofstede et al., 2004).

Having analyzed data from more than 40 countries, Hofstede (1980) finds four underlying value dimensions in these mental programs that can classify countries into different cultural areas: Individualism, power distance, masculinity and uncertainty avoidance. Representing fundamental elements of common structure in various cultures, these four dimensions offer an important framework for investigating the effects of cultural differences on management and organizations (Pheng and Yuquan, 2002).

Using Hofstede's (1980) indices, Shane (1992) examined the relationship between culture and the level of inventions in a society and finds that cultures with less power distance and high individualism are more inventive than others. These cultural characteristics can be found in the United States, Norway, Ireland, or the Netherlands. A year later, Shane (1993) investigates the effect of culture on innovation rates which he measures with the per capita number of trademarks. In that analysis, he concludes that the level of innovations is negatively correlated with the occurrence of uncertainty avoidance (Hofstede et al., 2004). Acs et al. (1994) examine the correlation of culture and self-employment. Contrary to Shane (1992, 1993), they come to the conclusion that higher uncertainty avoidance and lower individualism lead to higher levels of self-employment.

Reviewing the existing literature on culture and entrepreneurship using Hofstede's (1980) indices, there appear to be several contradicting hypotheses. According to Shane (1992; 1993), lower power distance, lower uncertainty avoidance, higher masculinity and higher individualism stimulate entrepreneurship. This approach, namely the "aggregate psychological traits approach", underlines that the more people that carry entrepreneurial values (such as the aim for autonomy, competition and success) are in a society, the more there will be entrepreneurial activity (Shane, 1993). These values therefore serve as "pull factors" that account for individuals to choose self-employment, fulfilling their expectation to be better off as entrepreneurs (Wennekers, 2006). A second approach refers to the "moral approval" of entrepreneurship within a society, which is manifested through more encouragement of and attention to entrepreneurship within the educational system, more tax incentives to support start-ups, as well as a higher social status of entrepreneurs (Etzioni, 1987; Freytag and Thurik, 2007). These social norms and institutions favoring the role of the entrepreneur at a society-level result in higher demand for and supply of entrepreneurship (Etzioni, 1987 cited in Uhlaner and Thurik, 2007).

In contrast to that, the findings of Baum et al. (1993) suggest that organizations in countries with higher power distance, higher uncertainty avoidance, lower masculinity and lower individualism would increase entrepreneurial activity.

Countries with higher uncertainty avoidance among the population tend to have organizations that do not satisfy the needs of an entrepreneurial personality. While being dissatisfied in mainstream organizations and pursuing more autonomy, potential entrepreneurs are more likely self-employed. Thus, dissatisfaction of would-be entrepreneurs in corporate organizations serves as a “push factor” to entrepreneurial activity in these countries (also named as the “dissatisfaction approach”) (Hofstede et al., 2004; Wennekers, 2006; Etzioni, 1987; Noorderhaven et al., 2004). Starting from the assumption that different levels of entrepreneurial activity are the consequence of disparities in values and beliefs of potential entrepreneurs and non-entrepreneurs in a society, it is the clash of values between these two groups that pushes the potential entrepreneurs away from the mainstream organization and into self-employment (Baum et al., 1993 cited in Freytag and Thurik, 2007).

The results of Acs et al. (1994) (higher uncertainty avoidance and lower individualism) confirm this “dissatisfaction approach” and explain the differences in self-employment across cultures (Hofstede et al., 2004).

Consistent with past literature, especially Shane (1992; 1993), *individualism is assumed to be positively related to early-stage VC investments in this study* (Hypothesis 3.1.). In a culture where people perceive themselves as independent and where autonomy is considered as an ideal, entrepreneurs are more likely to emerge and hence more VC investments will be demanded (Abraham, 2009).

Additionally, Morris et al. (1994) cited in Beugelsdijk (2007) showed that entrepreneurship decreases the more collectivism (hence the less individualism) is emphasized in a society. In cultures in which group-thinking offsets individual initiatives, few potential entrepreneurs would actually follow their ambition and start a business (ibid.).

As countries with a high score on power distance value centralized decision structures and more concentration of authority, people might be more averse to starting their own business since this would imply the loss of being directed by authoritative leadership (Abraham, 2009). Leading to a lower level of entrepreneurial activity and hence to

fewer VC investments, *power distance is expected to have a negative relationship with early-stage VC investments* (Hypothesis 3.2.).

More masculine cultures put emphasis on values like achievement, competition, success, and advancement (Abraham, 2009). According to McClelland (1961), an important characteristic of an entrepreneur is a desire and drive for success. Schumpeter (1912) described the entrepreneur as being highly stimulated by the joy of creation and the pleasure of success as well as to be eager to show his superiority to others (see chapter 2). Entrepreneurial activity and therefore the demand for VC investments is assumed to be higher in more masculine cultures (Shane, 1992; 1993); thus, *masculinity should be positively related to early-stage VC investments* (Hypothesis 3.3.).

Starting a new company involves a high level of risk for the entrepreneur. That is why entrepreneurs are commonly pictured as being able to effectively deal with uncertain, vague, and unclear situations (Scheré, 1982 cited in Freytag and Thurik, 2010). As discussed in chapter 2, Knight (1921) sees one of the most important functions of the entrepreneur in bearing risk and underlines that entrepreneurs are best at coping with uncertainty. Similarly, investing in a young business also bears a lot of uncertainty about the return on investment. A society that fears unknown situations will most likely not produce many entrepreneurs. Thus, venture capitalists in a highly uncertainty- and therefore risk-averse society will invest less in start-ups since they cannot be sure whether their investments will actually pay off in the end (Shane 1992; 1993). Consequently, in accordance with Shane (1992; 1993), *countries with higher uncertainty avoidance will have a lower level of early-stage VC investments* (Hypothesis 3.4).

Table 3.1. provides an overview of all the discussed hypotheses to be tested.

In summary, this analysis extends previous research by identifying economic, institutional, and cultural factors that affect the level of VC investments. The eventual findings can help by providing additional information to decision makers and advice for policy makers looking to develop their venture capital markets in order to encourage innovation and foster entrepreneurship.

Table 3.1: Hypotheses to be tested

Hypotheses linking Economic Variables and the level of VC Investments	
<i>Hypothesis 1.1.</i>	A positive relationship between <i>GDP growth</i> and early-stage Venture Capital investments is predicted.
<i>Hypothesis 1.2.</i>	A positive relationship between <i>openness</i> and early-stage Venture Capital investments is predicted.
<i>Hypothesis 1.3.</i>	A negative relationship between <i>unemployment</i> and early-stage Venture Capital investments is predicted.
<i>Hypothesis 1.4.</i>	A positive relationship between <i>R&D expenditures</i> and early-stage Venture Capital investments is predicted.
<i>Hypothesis 1.5.</i>	A positive relationship between the <i>NASDAQ Index</i> and early-stage Venture Capital investments is predicted.
Hypotheses linking Institutional Variables and the level of VC Investments	
<i>Hypothesis 2.1.</i>	A positive relationship between <i>government stability</i> and early-stage Venture Capital investments is predicted.
<i>Hypothesis 2.2.</i>	A positive relationship between <i>socioeconomic conditions</i> and early-stage Venture Capital investments is predicted.
<i>Hypothesis 2.3.</i>	A positive relationship between the <i>bureaucracy quality</i> and early-stage Venture Capital investments is predicted.
<i>Hypothesis 2.4.</i>	A positive relationship between the <i>investment profile</i> and early-stage Venture Capital investments is predicted.
Hypotheses linking Cultural Variables and the level of VC Investments	
<i>Hypothesis 3.1.</i>	A positive relationship between <i>individualism</i> and early-stage Venture Capital investments is predicted.
<i>Hypothesis 3.2.</i>	A negative relationship between <i>power distance</i> and early-stage Venture Capital investments is predicted.
<i>Hypothesis 3.3.</i>	A positive relationship between <i>masculinity</i> and early-stage Venture Capital investments is predicted.
<i>Hypothesis 3.4.</i>	A negative relationship between the <i>uncertainty avoidance</i> and early-stage Venture Capital investments is predicted.

4 Methodology

4.1 Data

In order to test the central hypotheses about the impacts of economical, institutional and cultural variables on the level of VC investments and hence the entrepreneurial activity in a country, this study refers to the European Private Equity and Venture Capital Association (EVCA) for European data as well as to the National Venture Capital Association (NVCA) for US data. As used in this research paper, the level of entrepreneurial activity is measured by the sum of the annual VC investments at the early stage, presented as a share of GDP (gross domestic product at market prices). Early-stage VC investments are defined as the sum of seed and start-up VC investments. For the period under study, 1995-2013, the data are available for 16 countries (see Table 4.1).

Table 4.1: The 16 countries studied in this research (in alphabetical order) with their OECD abbreviations

Austria	AUT	France	FRA	Italy	ITA	Spain	ESP
Belgium	BEL	Germany	DEU	Netherlands	NLD	Sweden	SWE
Denmark	DNK	Greece	GRC	Norway	NOR	United Kingdom	GBR
Finland	FIN	Ireland	IRL	Portugal	PRT	United States	USA

The economic variables used to predict the level of entrepreneurial activity in this study include *GDP growth*, *openness*, the *unemployment rate*, *R&D expenditures*, and the *NASDAQ Composite Index*. These variables are available for the 16 countries listed in Table 4.1 in the underlying period from 1995-2013. The main sources include the World Development Indicators from the World Bank and national accounts data for *GDP growth* and *openness*; Key Indicators of the Labor Market database by the International Labor Organization and OECD National Accounts data files for the *unemployment rate*; the UNESCO Institute for Statistics for the *R&D expenditures* and the Yahoo! Finance database for the *NASDAQ Composite Index*.

The institutional variables that are expected to explain the level of VC funds are *government stability*, *socioeconomic conditions*, *bureaucracy quality* and the *investment profile*. These institutional variables are derived from the International Country Risk Guide (ICRG) and are part of the political risk rating. Points are assigned by ICRG editors on the basis of a series of pre-set questions for each risk component.

Measures for the cultural variables are derived from Hofstede et al. (2010). IBM collected the original data in the period from 1967 to 1973. In Hofstede's work since 2001, and notably in the third edition of his work from 2010, scores are recorded for 76 countries and regions. Scores were available for all the 14 countries used in this study. Since culture supposedly changes slowly over time, the scores can be regarded as up to date. The authors confirm that the scores have been proven to be relatively stable over time. The data is obtained from Geert Hofstede's website ¹.

¹www.geert-hofstede.com

4.2 Definition of Variables

To examine the bivariate relationships between economic indicators and the level of early-stage VC investments (as a share of GDP), the economic variables are defined as follows: *GDP growth* gives the annual growth rate of GDP at market prices based on constant local currency; *openness* represents the sum of exports and imports of goods and services measured as a share of GDP; *unemployment rate* is the share of the labor force that is without work but available for and seeking employment; *R&D expenditures* are current and capital expenditures (both public and private) on creative work undertaken systematically to increase knowledge, including knowledge of humanity, culture, and society, and the use of knowledge for new applications, measured as a share of GDP, and the *NASDAQ Composite Index* is the NASDAQ Index at the end of each investment year, adjusted for dividends and splits.

The institutional variables include: *Government stability*, which is an assessment both of the government's ability to carry out its declared programs, and its ability to stay in office. As subcomponents, it includes government unity, legislative strength, and popular support. *Socioeconomic conditions* is an assessment of the socioeconomic pressures at work in society that could constrain government action or fuel social dissatisfaction. Unemployment, consumer confidence, and poverty are its subcomponents. The rating of *bureaucracy quality* assesses the institutional strength and ability of the bureaucracy to act as a shock absorber that tends to minimize revisions of policy when governments change. High points are given to countries where the bureaucracy has the strength and expertise to govern without drastic changes in policy or interruptions in government services. In these low-risk countries, the bureaucracy tends to be somewhat autonomous from political pressure and to have an established mechanism for recruitment and training. Countries that lack the cushioning effect of a strong bureaucracy receive low points because a change in government tends to be traumatic in terms of policy formulation and day-to-day administrative functions. The *investment profile* is an assessment of factors affecting the risk to investment that are not covered by other political, economic and financial

risk components. Its subcomponents are contract viability/expropriation, profits repatriation, and payment delays.

The indices can reach a maximum score of 4 points and a minimum score of 0 points. For the *government stability*, the *socioeconomic conditions*, and the *investment profile*, the risk rating assigned is the sum of the three subcomponents. A score of 4 points equates to very low risk and a score of 0 points to very high risk.

For a measure of culture, the study includes Hofstede's (2001) indices on *individualism*, *masculinity*, *power distance* and *uncertainty avoidance*, all taken in log. According to Hofstede (2001), *individualism* represents the degree of interdependence a society maintains among its members. The index is computed based on the standardized scores of the 15 work goal questions shown in Figure 4.1.

Figure 4.1: Work Goal Questions for the *Individualism Index* Calculation

Work goals		
Number	Short name	Full questionnaire wording
D1 ^a	Personal time	Have sufficient time left for your personal or family life
D2 ^a	Challenge	Have challenging tasks to do, from which you can get a personal sense of accomplishment
D3	No stress	Have little tension and stress on the job
D4 ^a	Physical conditions	Have good physical working conditions (good ventilation and lighting, adequate work space, etc.)
D5 ^a	Manager (superior)	Have a good working relationship with your direct superior
D6 ^a	Employment security	Have security of employment
D7 ^a	Freedom	Have considerable freedom to adopt your own approach to the job
D8 ^a	Cooperation	Work with people who cooperate well with one another
D9	Be consulted	Be consulted by your direct superior in his/her decisions
D10 ^a	Contribution	Make a real contribution to the success of your company or organization
D11 ^a	Earnings	Have an opportunity for higher earnings
D12 ^a	Desirable area	Live in an area desirable to you and your family
D13 ^a	Promotion (advancement)	Have an opportunity for advancement to high-level jobs
D14	Variety	Have an element of variety and adventure in the job
D15	Company	Work in a prestigious, successful company or organization
D16	Help others	Have an opportunity for helping other people
D17	Clear requirements	Work in a well-defined job situation where the requirements are clear
D18 ^a	Benefits	Have good fringe benefits
D19 ^a	Use of skills	Fully use your skills and abilities on the job
D20 ^a	Recognition	Get the recognition you deserve when you do a good job
D21 ^a	Training	Have training opportunity to improve your skills and knowledge or to learn new skills and knowledge
Note: ^a Questions used by Hofstede (1980)		

Source: Pheng and Yuquan, 2002, p. 12.

Hofstede (2001) found that almost one-half of the variance in country mean scores on the 15 questions could be accounted for by just two factors that he called “individual-collective” and “masculinity-femininity”. The “individual-collective” is mainly composed of the work goals: personal time, freedom, challenge, use of skills, physical conditions and training whereas the country factor scores on the “masculinity-femininity” factor include the work goals: manager, cooperation, desirable area, employment security, challenge, advancement, recognition, and earnings (Hofstede, 1980 cited in Pheng and Yuquan, 2002).

Therefore, *masculinity* represents the extent of roles division between sexes to which people in a society put different emphasis on success and assertiveness (masculine) as opposed to relationships and quality of life (feminine) (Hofstede, 2001).

Hofstede (2001) defines *power distance* as the extent to which the less powerful members of institutions and organizations within a country expect and accept that power is distributed unequally. For example, in cultures with low degrees of power distance (such as in Ireland, Sweden or Norway), people relate to each other more as equals regardless of the position they hold in their professional lives. Contrary to that, people in large power distance countries (such as in France, Spain or Italy) accept the power of their fellow men solely based on hierarchical positions (Nahata, Hazarika and Tandon, 2013).

The index is calculated on the basis of the country mean scores for the following questions:

1. Non-managerial employee’s perception that employees are afraid to disagree with their managers.
2. Subordinates’ preferences perception that their boss tends to take decisions in an autocratic (1) or persuasive/paternalistic (2) way.
3. Subordinates’ preference for anything but a consultative (3) style of decision-making in their boss: that is for an autocratic (1), a persuasive/paternalistic (2) or a

democratic (4) style (Hofstede, 1980 cited in Pheng and Yuquan, 2002, p. 10).²

Finally, the index on *uncertainty avoidance* gives the extent to which the members of a culture feel threatened by ambiguous or unknown situations and have created beliefs and institutions that try to avoid these. In countries with a high degree of uncertainty avoidance (such as in France, Spain or Italy), individuals “look for structure in their organizations, institutions and relationships, which makes events clearly interpretable and predictable” (Hofstede, 2001, p. 148).

The index is calculated on the basis of the country mean scores for the following questions:

1. Rule Orientation. Agreement with the statement “Company rules should not be broken - even when the employee thinks it is in the company’s best interest”.
2. Employment stability. Employee’s statement that they intend to continue with the company (1) for two years at most, (2) from two to five years.
3. Stress. As expressed in the mean answer to the question “How often do you feel nervous or tense at work?” (Hofstede, 1980 cited in Pheng and Yuquan, 2002, p. 11).³

Table 4.2 summarizes the definitions of all the variables used in this paper as well as their sources.

²The formula used is: Power Distance Index = $135 - 25 \times (\text{mean score employ afraid}) + (\% \text{ perceived manager } 1 + 2) - (\% \text{ preferred manager } 3)$ (Hofstede, 1980 cited in Pheng and Yuquan, 2002, p. 10). Hofstede (2001) uses mean scores on a five point scale (1 = very frequently, 5 = very seldom) for question (1) and percentage values for questions (2) and (3).

³The formula used is: Uncertainty Avoidance Index = $300 - 30 \times (\text{mean score rule orientation}) - (\% \text{intending to stay less than five years}) - 40 \times (\text{mean stress score})$ (Hofstede, 1980 cited in Pheng and Yuquan, 2002, p. 11).

Table 4.2: Summary of Variable Definitions and Sources

Dependent Variable		
Variable Name	Description	Sources
Early-stage Venture Capital Investments	Venture capital investment is defined as private equity raised for investment in companies; management buyouts, management buy-ins and venture purchase of quoted shares are excluded. Early-stage VC investments are the sum of seed and start-up risk capital. The variable is scaled by gross domestic product at market prices.	European Private Equity and Venture Capital Association (EVCA), Eurostat; National Venture Capital Association (NVCA), Thomson ONE.com (VentureXpert database), Thomson Reuters.
Economic Variables		
GDP Growth	Annual growth rate of GDP at market prices based on constant local currency. Aggregates are based on constant 2005 U.S. dollars.	World Bank national accounts data, OECD National Accounts data files; World Bank World Development Indicators.
Openness	Sum of exports and imports of goods and services measured as a share of gross domestic product.	World Bank national accounts data, OECD National Accounts data files; World Bank World Development Indicators.
Unemployment Rate	Share of the labor force that is without work but available for and seeking employment.	International Labor Organization, Key Indicators of the Labor Market database; World Bank World Development Indicators.
R&D Expenditures	Expenditures for research and development are current and capital expenditures (both public and private) on creative work undertaken systematically to increase knowledge, including knowledge of humanity, culture, and society, and the use of knowledge for new applications, measured as a share of gross domestic product.	United Nations Educational, Scientific, and Cultural Organization (UNESCO) Institute for Statistics; World Bank World Development Indicators.
NASDAQ Composite Index	NASDAQ Composite Index at the end of each year and adjusted for dividends and splits. Includes all domestic and international based common type stocks listed on The NASDAQ Stock Market.	Yahoo! Finance database.

Table 4.2. *continued*

Institutional Variables		
Government Stability	Assessment of the government's ability to carry out its declared programs, and its ability to stay in office. Subcomponents: government unity, legislative strength, popular support.	International Country Risk Guide (ICRG), political risk taking.
Socioeconomic Conditions	Assessment of the socioeconomic pressures that could constrain government action or fuel social dissatisfaction. Subcomponents: unemployment, consumer confidence, poverty.	International Country Risk Guide (ICRG), political risk taking.
Bureaucracy Quality	Assessment of the institutional strength and ability of bureaucracy to act as a shock absorber when governments change.	International Country Risk Guide (ICRG), political risk taking.
Investment Profile	Assessment of factors affecting the risk to investment that are not covered by other political, economic and financial risk components. Subcomponents: contract viability/expropriation, profits repatriation, payment delays.	International Country Risk Guide (ICRG), political risk taking.
Cultural Variables		
Individualism	Degree of interdependence a society maintains among its members.	Geert Hofstede (2001).
Power Distance	Extent to which the less powerful members of organizations expect and accept that power is distributed unequally.	Geert Hofstede (2001).
Masculinity	Extent of roles division between sexes to which people put different emphasis on success and assertiveness (masculine) as opposed to relationships and quality of life (feminine).	Geert Hofstede (2001).
Uncertainty Avoidance	Extent to which the members of a culture feel threatened by unknown situations and have created beliefs and institutions that try to avoid these.	Geert Hofstede (2001).

4.3 Data Analysis

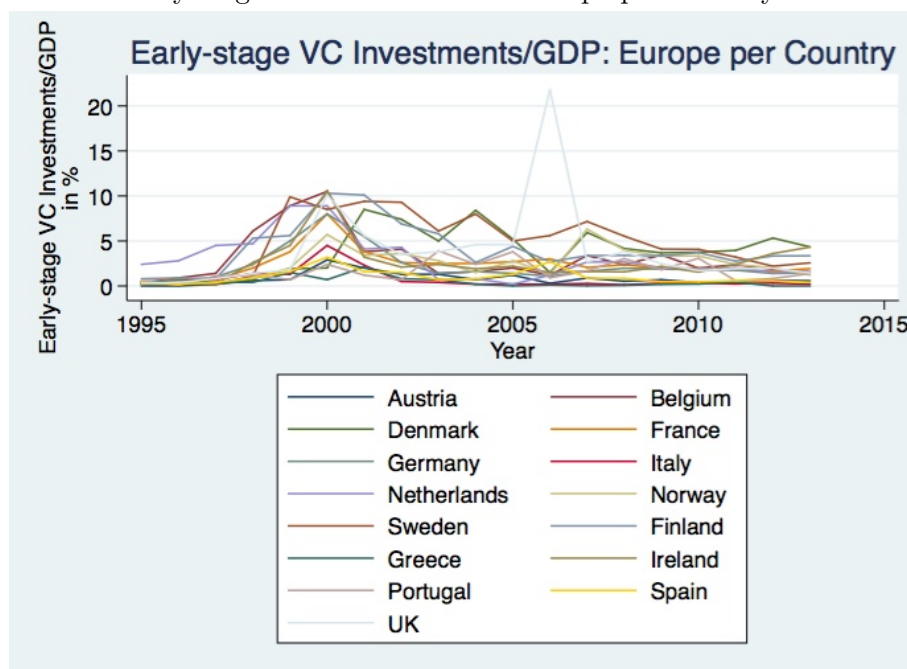
The data analysis consists of two parts. First, descriptive statistics for the level of early-stage VC investments by country are presented during the 1995-2013 time period. Second, the hypotheses for bivariate relationships between the various economic, institutional, and cultural indicators and the level of early-stage VC funds are tested and results presented. The effects of economic variables on early-stage investments are considered in different specifications. It has been controlled for fixed effects as well as for a trend in every regression analysis.

4.4 Results

4.4.1 Descriptive Statistics

To get a better idea of the differences between countries in their early-stage VC investments and hence their entrepreneurial activity, Figure 4.2 and 4.3 show the development of the early-stage VC investments of European countries and the United States in the period from 1995-2013.

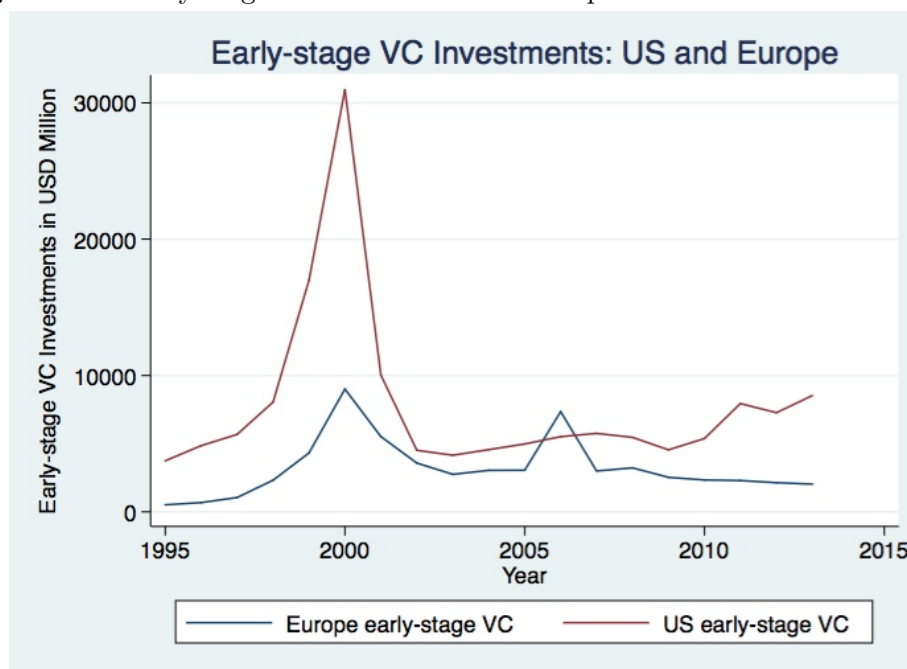
In many countries the level of early-stage VC investments shows a rather cyclical development during the underlying time period. Continuously increasing from the beginning of the period and reaching its summit in 2000 with 1,742.56 USD million, the UK's early-stage VC investments show a constant decline during the early 2000s. They could catch up again in 2003 and recover remarkably from 906.15 in 2005 to 4,582.17 USD million in 2006, while drastically decreasing again during the years of the financial crisis to 319.28 USD million in 2010. Similarly, the VC investments in France rise significantly during the dot-com boom to 1,249.28 USD million in 2000, decrease then radically up until 2004, begin to recover in the following years and decline again in 2007 to 419.72 USD million. Towards the end of the period, they keep rising and falling to 364.02 USD million in 2012, and could slightly increase to

Figure 4.2: Early-stage VC Investments in Europe per Country from 1995-2013

Early-stage VC Investments as a share of GDP.
Author's calculations using data from Eurostat.

428.8 USD million in 2013. Germany's VC investments also significantly increase in the beginning of the period up until 2000 to 1,786 USD million, decrease very much in the years after but increase again in 2007 to 426.55 USD million, and could also increase slightly towards the end of the period.

Although showing a significantly higher level of early-stage VC investments in comparison to the European countries under study (see Figure 4.3), the VC investments in the United States also show a radical increase in 2000 (from 11,480.6 in 1999 to 25,292.6 USD million in 2000) followed by a large drop from 2001 until 2003. In the years up until the financial crisis, VC investments keep constantly increasing towards 6,087.3 US million in 2007, whereas they show a rather cyclical development after 2007 until the end of the period, arriving at 9,896.0 USD million in 2013.

Figure 4.3: Early-stage VC Investments in Europe and the US from 1995-2013

Early-stage VC Investments in millions of current US Dollars.

Author's calculations using data from Eurostat.

Table 4.3 describes all the variables that are used in the regression analysis.

Table 4.3: Descriptive Statistics *1995-2013*

	Obs.	Mean	Std. Dev.	Min.	Max.
<i>Dependent Variable</i>					
VC Investments Early-stage/GDP (in %)	304	0.027	0.030	0	0.268
<i>Economic Variables</i>					
GDP Growth (in %)	304	1.972	2.690	−8.864	10.778
Openness (in %)	304	78.159	36.170	22.150	190.782
Unemployment Rate (in %)	288	7.765	3.806	2.1	25
R&D Expenditures (in %)	257	1.984	0.819	0.456	4.13
NASDAQ Index	304	2299.16	807.93	1052.13	4176.59
<i>Institutional Variables</i>					
Government Stability	272	8.489	1.393	4.25	11.083
Socioeconomic Conditions	272	8.436	1.420	5	11
Bureaucracy Quality	272	3.709	0.475	2.5	4
Investment Profile	272	10.363	1.867	5.333	12
<i>Cultural Variables</i>					
Individualism	304	66.5	16.806	27	91
Power Distance	304	41.438	16.663	11	68
Masculinity	304	44.188	23.804	5	79
Uncertainty Avoidance	304	62.813	24.762	23	100

4.4.2 Economic Variables and the Level of Venture Capital Investments

Table 4.4 shows the results of a regression of the five economic variables on early-stage VC funds for the full set of 16 countries.

When regressing the economic variables one by one on early-stage VC investments, it is noticeable that *GDP growth* is positively correlated with early-stage VC investments (as predicted in Hypothesis 1.1.) when the variables *openness*, *unemployment rate*, and *R&D expenditures* are included in the regression. Even though not significant, it shows a negative correlation as soon as the *NASDAQ Composite Index* is added.

Of these five economic variables, *openness*, *unemployment rate*, *R&D expenditures*, and the *NASDAQ Index* correlate significantly with early-stage VC investments. In this analysis, *GDP growth* is not significant for the period under study.

Reviewing the results from this section, the following can be concluded: First, there is no support for the positive relation between *GDP growth* and the level of VC investments. Thus, Hypothesis 1.1. is not supported, at least for this initial series of analyses. Second, there does appear to be a positive correlation between *openness* and early-stage VC investments, supporting Hypothesis 1.2. A country that is more open to trade will experience a faster access to new technology and hence business opportunities that demand early-stage venture capital. Third, there also is support for Hypothesis 1.3., indicating a negative relationship between the *unemployment rate* and VC investments. This result emphasizes the view of unemployment as a sign for economic decline and consequently leading to a decrease in entrepreneurial activity, as a recession hinders opportunities for businesses. Moreover, there does appear to be support for a positive correlation between *R&D expenditures* and early-stage VC investments (Hypothesis 1.4.), showing that a higher technological and innovation capacity in a country encourages early-stage VC investments.

Finally, Hypothesis 1.5 finds also support in this regression analysis, indicating that a higher value in the *NASDAQ Composite Index* as a proxy for general stock market conditions results in more early-stage VC investments.

Table 4.4: Regression of Economic Variables on VC Investments at the *Early Stage*

	<i>Dependent Variable</i>			
	VC Investments Early Stage / GDP			
<i>Economic Variables</i>				
GDP Growth	0.00082*	0.00013	0.00038	−0.00063
	(0.00048)	(0.00050)	(0.00056)	(0.00056)
Openness	0.00051**	0.00055**	0.00043*	0.00046**
	(0.00020)	(0.00022)	(0.00024)	(0.00022)
Unemployment Rate	.	−0.00214***	−0.00180***	−0.00215***
		(0.00049)	(0.00053)	(0.00052)
R&D Expenditures	.	.	0.02895***	0.02696***
			(0.00786)	(0.00714)
NASDAQ Index	.	.	.	0.02662***
				(0.00699)
Constant	0.05653***	0.07127***	0.01047	−0.17691***
	(0.01328)	(0.01550)	(0.01832)	(0.05005)
Observations	304	288	257	257
R^2	0.301	0.322	0.358	0.404

Note: * $p < 0.1$; ** $p < 0.05$; *** $p < 0.01$

4.4.3 Institutional Variables and the Level of Venture Capital Investments

In the second part of this analysis, institutional variables are added to the regression of economic variables on early-stage VC investments. Of these four institutional variables, only the *socioeconomic conditions* correlate significantly with the level of VC investments and show a positive relationship. Entrepreneur-friendly macro-economic policies like lower income tax rates and a more flexible labor market legislation result in favorable socioeconomic conditions for both entrepreneurs and venture capitalists. Therefore, the risk of starting one's own company will be reduced, which will increase the demand for venture capital.

Adding the institutional variables to the regression changes the correlation of the economic variable *unemployment rate* with VC investments. *Unemployment rate* is no longer negatively correlated with VC investments (hence no longer supports Hypothesis 1.3.), but shows an inverse relationship. Moreover, *unemployment rate* is no longer significant. Table 4.5 shows the results of this second part of the regression analysis.

The results of the regression including the institutional variables support Hypothesis 2.1. and 2.2. linking institutional factors with early-stage VC investments. The positive relationship found between *government stability* and the level of early-stage VC investments is consistent with Hypothesis 2.1. Yet, *government stability* is insignificant. Further, the direction of Hypothesis 2.2. is also supported, indicating that a higher score in the *socioeconomic conditions* leads to more early-stage VC investments: Socioeconomic conditions that reduce the risk for business ownership and investment will result in more start-ups that request VC financing.

Finally, there is no support for Hypothesis 2.3. and 2.4. The correlation between *bureaucracy quality* as well as *investment profile* and early-stage VC investments is negative, but neither is significant. Only the *socioeconomic conditions* variable is significant in the same direction to that predicted.

4.4.4 Cultural Variables and the Level of Venture Capital Investments

This section presents the results of the bivariate analyses of cultural variables and VC investments, including the economic and institutional variables in the regression.

See Table 4.5 for the results of this analysis. In reviewing the results of Table 4.5, three out of four cultural indices significantly correlate with the level of VC investments; they are *power distance*, *masculinity* and *uncertainty avoidance*. The correlation and significance levels of the economic and institutional variables do not change when the cultural variables are included in the regression.

The results reported in this section, including all the cultural indices in the regression of institutional and economic variables, do not confirm Hypothesis 3.1.: Although not significant, the correlation between *individualism* and early-stage VC investments turns out to be negative.

Moreover, there is no support for Hypothesis 3.2. In fact, the regression analysis finds a positive relationship between *power distance* and the level of early-stage VC investments. Countries where centralized decision structures and a higher concentration of authority are valued more seem to produce a higher amount of entrepreneurs that demand venture capital. Although seeming counter-intuitive, this result is consistent with the conclusions of Baum et al. (1993), finding that higher power distance leads to a higher level of entrepreneurial activity in a country (and hence to a higher demand of VC investments).

The restrictive climate prevalent in large companies and organizations of countries with high concentration of authority incentivizes potential entrepreneurs to obtain more autonomy by self-employment (the so-called "dissatisfaction approach") (Wennekers et al., 2007). High power distance countries might show more dissatisfaction in life in general which *pushes* more individuals into self-employment (Baum et al., 1993).

The positive effect of *masculinity* on VC investments found in the regression analysis is consistent with Hypothesis 3.3. As more masculine cultures promote values like

achievement, competition, and success, these cultures are likely to produce more entrepreneurs who then demand VC funding (Hofstede, 1980).

Finally, this study also finds support for Hypothesis 3.4, indicating that *uncertainty avoidance* is negatively associated with VC investments. A society that fears unknown situations will most likely not bring about a high level of entrepreneurs since starting one's own company involves a high level of risk. Likewise, risk-averse venture capitalists will be less likely to invest in start-ups since they cannot be sure whether their investment will pay off in the end (Shane, 1992; 1993).

Comparing the residuals of the United States and Europe in Table 4.6, the study finds that the mean residual for the US is approximately six times larger than the mean residual for Europe. Therefore, the explanatory variables of the regression better explain the European early-stage VC investments whereas there must be some other unexplainable factors that influence the early-stage VC investments in the United States.

Including a US country dummy in the regression reveals that early-stage VC investments in the US are by 0.05% larger than in the European countries after controlling for the explanatory variables (see Table 4.7). It also has to be noted that the cultural variables are not significant anymore in explaining the difference in early-stage VC investments between the United States and Europe whereas they still seem to matter when comparing among European countries. After unobservable factors have been controlled for, the difference in early-stage VC investments between the US and Europe seems to be better captured in the characteristics of their respective institutions rather than in their cultural differences.

Table 4.6: Residuals

	Obs.	Mean	Std. Dev.	Min.	Max.
US	16	$2.33e^{-10}$	0.047	-0.026	0.163
Europe	225	$3.90e^{-11}$	0.021	-0.064	0.177

Table 4.5: Regression of Economic, Institutional and Cultural Variables on VC Investments at the *Early Stage*

	<i>Dependent Variable</i>		
	VC Investments Early Stage / GDP		
<i>Economic Variables</i>			
GDP Growth	−0.00063 (0.00056)	−0.00053 (0.00053)	−0.00053 (0.00053)
Openness	0.00046** (0.00022)	0.00039* (0.00024)	0.00039* (0.00024)
Unemployment Rate	−0.00215*** (0.00052)	0.00044 (0.00103)	0.00044 (0.00103)
R&D Expenditures	0.02696*** (0.00714)	0.02269*** (0.00704)	0.02269*** (0.00704)
NASDAQ Index	0.02662*** (0.00699)	0.02493*** (0.00662)	0.02493*** (0.00662)
<i>Institutional Variables</i>			
Government Stability	.	0.00176 (0.00177)	0.00176 (0.00177)
Socioeconomic Conditions	.	0.01020** (0.00417)	0.01020** (0.00417)
Bureaucracy Quality	.	−0.00496 (0.00756)	−0.00496 (0.00756)
Investment Profile	.	−0.00123 (0.00182)	−0.00123 (0.00182)
<i>Cultural Variables</i>			
Individualism	.	.	−0.01371 (0.01955)
Power Distance	.	.	0.41194** (0.18674)
Masculinity	.	.	0.05700** (0.02460)
Uncertainty Avoidance	.	.	−0.24892** (0.12339)
Constant	−0.17691*** (0.05005)	−0.24071*** (0.05561)	0.98069*** (0.34422)
Observations	257	241	241
R^2	0.404	0.455	0.455

Note: * $p < 0.1$; ** $p < 0.05$; *** $p < 0.01$

Table 4.7: Regression of Economic, Institutional and Cultural Variables on VC Investments at the *Early Stage*, including a US Country Dummy

<i>Dependent Variable</i>	
VC Investments Early Stage / GDP	
<i>Economic Variables</i>	
GDP Growth	−0.00053 (0.00053)
Openness	0.00039* (0.00024)
Unemployment Rate	0.00044 (0.00103)
R&D Expenditures	0.02269*** (0.00704)
NASDAQ Index	0.02493*** (0.00662)
<i>Institutional Variables</i>	
Government Stability	0.00176 (0.00177)
Socioeconomic Conditions	0.01020** (0.00417)
Bureaucracy Quality	−0.00496 (0.00756)
Investment Profile	−0.00123 (0.00182)
<i>Cultural Variables</i>	
Individualism	0.01072 (0.01993)
Power Distance	0.04235 (0.04458)
Masculinity	0.01242 (0.01128)
Uncertainty Avoidance	0.02803 (0.04760)
<i>US Dummy</i>	0.04561* (0.02590)
Constant	−0.64944*** (0.22495)
Observations	241
R^2	0.455

Note: * $p < 0.1$; ** $p < 0.05$; *** $p < 0.01$

5 The Importance of the Angel Investment Market

Angel investment is a very important part of outside equity financing and represents an essential support for start-ups, especially at the early stage (OECD, 2011). Initial business angel investment fosters innovative entrepreneurial growth, future venture capital investment, wealth creation, as well as regional economic development (Lipper and Sommer, 2002). Therefore, individual business angels not only supported the creation of Silicon Valley through their funding of promising start-ups, but also played an essential role in building up the formal venture capital industry (Ibrahim, 2010).

A business angel is defined as an “individual investor that invests directly her own money predominantly in seed or start-up companies with no family relationships. Business angels make their own final investment decisions and are financially independent, i.e. a possible total loss of their business angel investments will not significantly change the economic situation of their assets” (EBAN, 2014a).

Angel investment is often overlooked, as angel investors are not always visible. Due to the recent financial crisis and the difficult economic situation worldwide, angel investors were filling financing gaps left by banks and VC firms (OECD, 2011). The equity financing gap between individual angel investment and venture capital is in the 500,000 to 3 million USD range in the United States (EBAN, 2010 cited in OECD, 2011). Fewer venture capitalists invest at the early stage, so that the equity funding gap between individual angel investment and venture capital has grown radically (OECD, 2011).

By investing with other angel investors through groups and syndicates, or even by co-investing in seed and/or venture funds, angel investors could increase the total deal size for start-ups seeking early-stage financing, and hence aimed to fill this gap. Therefore, it was actually angel financing that was the primary source of external seed and early-stage equity financing in many countries and not venture capital. Apart from that, investment by business angels creates a signaling effect for other investors, showing that these start-ups have succeeded a first screening of due diligence by experienced investors. As angel investors most often invest locally and in a wider range of innovation than VC firms, angel investment has much broader investment coverage both in terms of industry sectors and geography. Angels can therefore live anywhere and are not obliged to settle down in a few technology and science hubs in order to ensure a steady deal flow as venture capitalists do (OECD, 2011).

In addition to the financial support, angel investors also provide strategic and operational expertise for new ventures as well as a strong network of personal relationships (Harrison and Mason, 2010; Nahapiet and Ghoshal, 1998 cited in OECD, 2011).

VC firms raise and invest money from institutional investors in exchange for a management fee as well as a share of the companies' profits; therefore they are motivated to raise the largest amount of funds possible and generate sufficient returns for their institutional investors and themselves. Angel investors, however, are satisfied with smaller exits (Sahlman and Richardson, 2010 cited in OECD, 2011).

Angels most often invest at early stages because they lose their advantages as value-added investors with the growth of the start-up. In the early stages, angels can offer experienced advice on initial growth strategies and assistance on getting future funding whereas at the later stages, private venture capitalists have the comparative advantage in giving advice about the most profitable exit strategy and in using their network to recruit professional managers for the growing company (Ibrahim, 2010).

However, there are exceptions: angel financing alone can be sufficient for software and internet companies to reach exit because the development costs are relatively low. In life sciences and clean tech fields the costs are significantly higher, so that VC becomes necessary (Ibrahim, 2010).

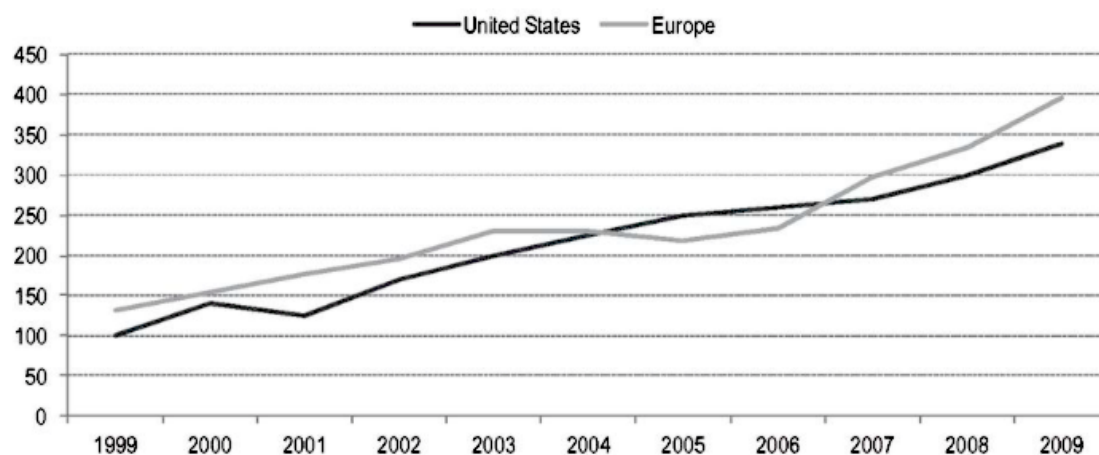
Business angel activity is estimated to be much higher in the United States than in Europe. Estimates from both the United States and the UK show that angel investment has been constantly larger than seed and early-stage venture capital investment despite some decrease following the dot-com bust in the late 1990s and during the recent financial crisis. While methods of estimating the full angel market size differ, many studies over the past decade have recognized that total angel investment is much greater than overall VC investment, not only in the United States but also in some European countries (OECD, 2011).

Angel investors typically acquire between 10-20% of the ownership share of the start-ups in which they invest (Wiltbank, 2009 cited in OECD, 2011). Venture capitalists usually request a larger share of companies as well as control rights. Angel investors often wish to remain minority shareholders as they know that the entrepreneur will need to receive further funding in order to make the company bigger (OECD, 2011).

Since most business angels do not easily find sufficient investment opportunities, the nature of the angel market is very fragmented and angels are most often invisible. Consequently, search costs for both entrepreneurs and angels were high as they tried to find each other (Mason, 2009). Through the creation of angel groups and networks in many countries around the world, the angel investment sector is becoming more formalized and organized (Ibrahim, 2008 cited in OECD, 2011). The development of angel groups/networks in the United States and Europe is presented in Figure 5.1.

Business angel networks try to make the investment process more efficient while connecting angel investors not only with other important actors in the local ecosystem (such as incubators, venture capitalists, banks, etc.), but most importantly, with entrepreneurs seeking capital (EC, 2002 cited in OECD, 2011).

Figure 5.1: Total Number of Angel Groups/Networks in Operation in the US and Europe from 1999-2009



Note: Based on groups and networks surveyed.

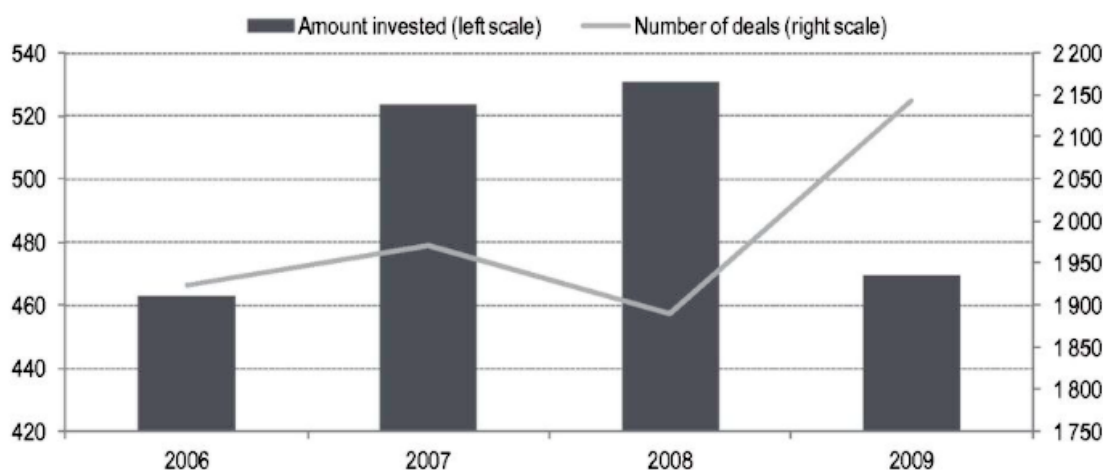
Source: OECD based on ACA (Angel Capital Association) and EBAN (The European Trade Association for Business Angels, Seed Funds, and other Early Stage Market Players), OECD (2011), p. 48.

Business angel networks make angel activity in a region visible without giving individual visibility to angels who prefer to remain anonymous and therefore facilitate the contact with entrepreneurs seeking financing (OECD, 2011). According to Shane (2009), the best policy for governments to intervene in the angel capital market is to encourage the formation of angel groups as these can invest in a more diverse portfolio at a lower net worth than individual angels.

5.1 Angel Investment in the United States

In the United States, angel investment increased significantly during the dot-com era and dramatically dropped when the dot-com bubble exploded. However, in the past decade, angel investment could grow again with a drop in investment activity during the financial crisis. The impact of the financial crisis becomes especially evident in the reduced size but increased number of deals that angel investors were involved in (see Figure 5.2). Angel investors investing through groups continued to invest following the financial crisis but at much lower amounts per deal (OECD, 2011).

Figure 5.2: Investments by Business Angel Groups in the US from 2006-2009



Note: Amount invested in USD millions.

Number of deals estimated based on number provided by ACA (Angel Capital Association).

Source: OECD based on ACA (Angel Capital Association); OECD (2011), p. 51.

The idea of angel groups originates from the United States and has considerably developed in the last decade. Angel groups can be found in nearly every US state, although the majority of angel investors are in the entrepreneurial centers on the west and east coast (OECD, 2011).

The first notable angel group, called “Silicon Valley’s Band of Angels”, was founded in 1994, followed by 150 more angel groups formed in the years after (Ibrahim, 2010).

The Kauffman Foundation financially supported the creation of the Angel Capital Association (ACA) in 2004, to which many angel groups belong to, and later the Angel Resource Institute (ARI), which is the former angel capital education foundation (ACEF). The ACA consists of 6,760 member angels (Ibrahim, 2010).

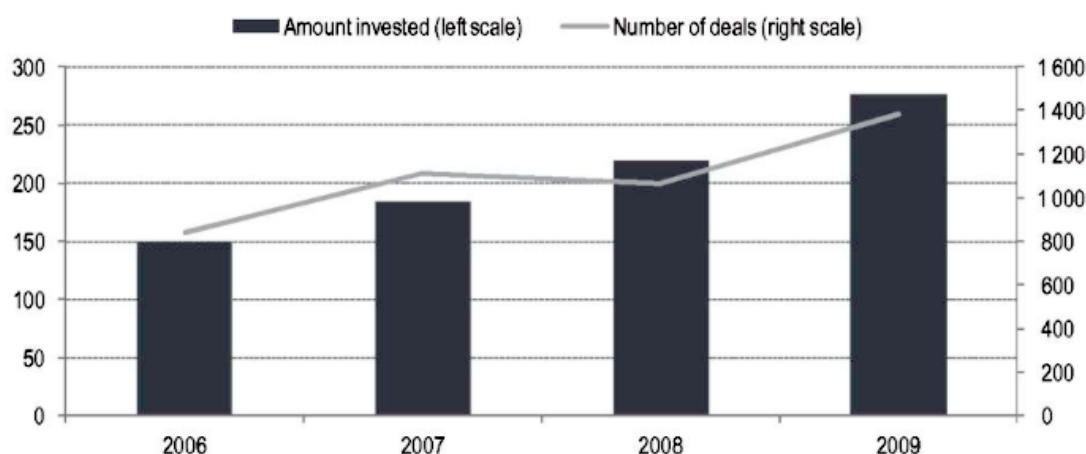
The amount of business angel investment conducted in the US in a typical year equals about USD 23 billion (Shane, 2009). About 50,700 to 57,300 companies receive funds from business angels in a typical year (ibid.). According to a study conducted for the ACA, overall returns to angel investment in the US had a factor of 2.6 in 3.5 years (Wiltbank and Boeker, 2007 cited in OECD, 2011).

The study also revealed that the rate of return improved with (1) increased due diligence prior to investment, (2) experience of the angel investors, and (3) active involvement of the angel investor in the company after the investment has taken place (OECD, 2011).

5.2 Angel Investment in Europe

With support of the European Commission, the European Business Angels Network (EBAN) was created in 1999 and brought together potential angel investors and entrepreneurs while serving as a federation of Business Angel Networks (BANs) across Europe. Many national BANs were created in the following years (OECD, 2011).

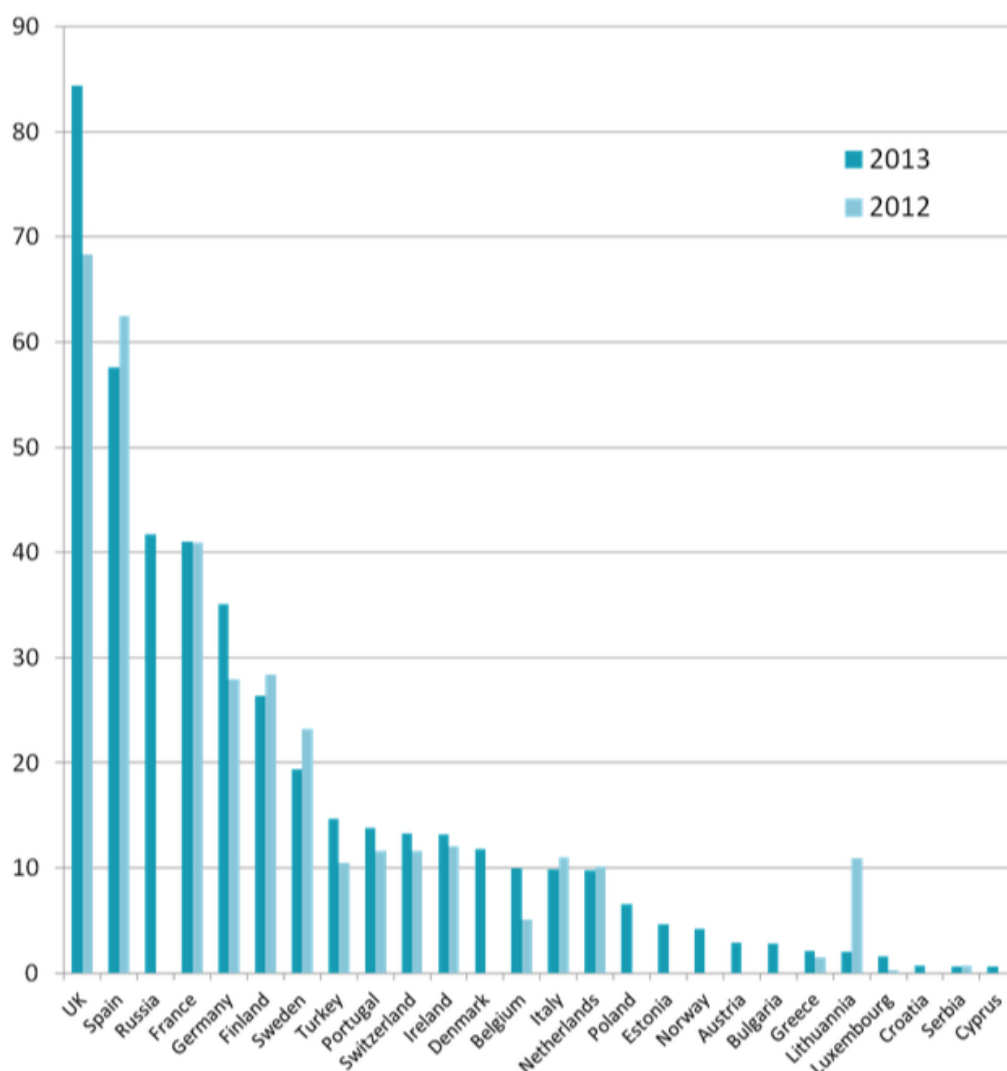
Over the past 10 years, the number of business angel networks in Europe increased to 468 in 2013, with estimated amounts invested of EUR 554 million by approximately 28,000 BAN members (EBAN, 2014b cited in Kraemer-Eis et al., 2014). The amounts invested by business angel networks in Europe from 2006-2009 are presented in Figure 5.3.

Figure 5.3: Investments by Business Angel Networks in Europe from 2006-2009

Source: OECD based on networks surveyed by EBAN (The European Trade Association for Business Angels, Seed Funds, and other Early Stage Market Players); OECD (2011), p. 51.

Individual angel investments vary considerably and account for an average investment per Business Angel of EUR 20,437 in 2013. Recently, the majority of the Business Angel activity within the EU has been centered on the UK, Spain, France, Germany, Finland, and Sweden (see Figure 5.4) (EBAN, 2014b cited in Kraemer-Eis et al., 2014).

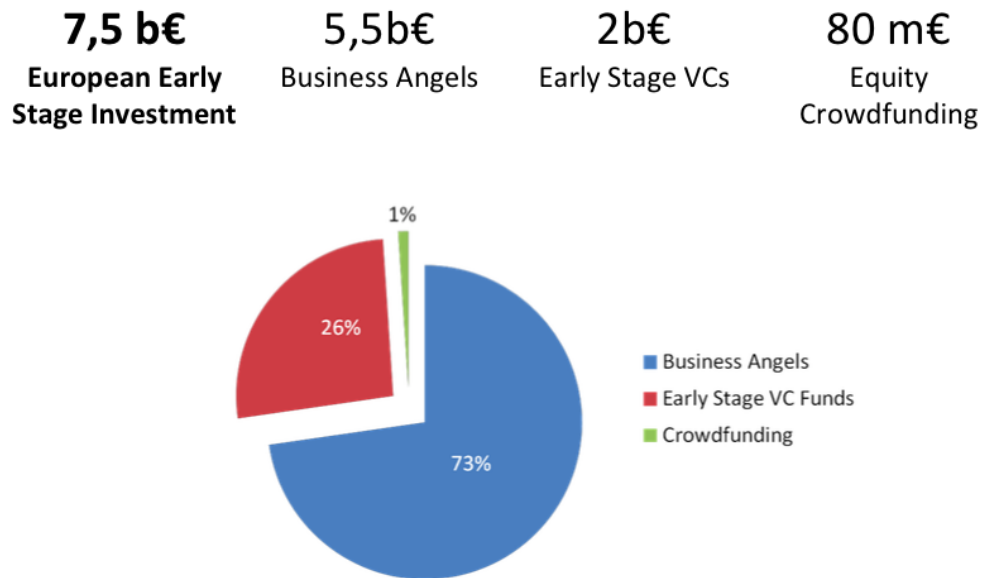
Comparing VC investment at the seed stage with the available data of the “visible” angel market in Europe, the total investment through angel networks has already exceeded seed VC investment. If the “invisible” angel market is also considered, the total angel investment in Europe, which was estimated in 2011 to be approximately EUR 4 billion and in 2014 to be EUR 5,5 billion according to EBAN, significantly surpasses VC seed and actually matches the amount of all seed-, early- and later-stage VC investments in Europe (see Figure 5.5) (OECD, 2011; EBAN, 2014b).

Figure 5.4: Evolution of Angel Investment by Country from 2012-2013

Note: Amount invested in EUR millions.

Source: EBAN, 2014b, p. 6.

The “invisible market” makes a precise estimation of the angel market very difficult. Studies claimed that the invisible European angel market is actually up to seven times greater than the visible one, while others estimate a multiplier of around ten (CSES, 2012; EBAN, 2014b cited in Kraemer-Eis, 2014).

Figure 5.5: The Three Main Areas of Early-Stage Investment in Europe

Source: EBAN, 2014b, p. 2.

5.2.1 Angels in France

The work of France Angels, a national federation for angel groups across the country, significantly developed the angel market in France and made it one of the most active angel markets in Europe. Many kinds of angel networks have established across France, including numerous university alumni groups (OECD, 2011).

In 2013, there were 82 independent networks linked to the France Angels organization, with 4292 individual investors registered. However, French business angel network activity stagnated in 2014 despite of an increase in the number of start-ups looking for funding, combined with a growing support network of incubators and accelerators. French angels invested in 4% of the close to 10,000 start-ups that were applying for funding in 2013, and provided on average EUR 132,000 per business funded (compared to EUR 114,000 in 2012) (France Angels, 2014).

The same authors said that from 2005 to 2013, total amounts invested by Business Angels in France have almost tripled from 16 to 41 million EUR. Angel investors most often invested in digital services (25%), software/mobile/internet (16%), health and bio tech (15%) as well as energy and clean tech (11%), services and transports (9%), industry and chemicals (9%), and consumer goods (7%).

5.2.2 Angels in Germany

With the help of the German government, Germany established a national Business Angel Network (BAN) as well as local BANs in the late 1990s (OECD, 2011). With 38 BANs, Germany has the second highest number of BANs in Europe after France (with 82 networks linked to the France Angels organization) (Mason, 2009; France Angels, 2014). German Business Angel associations have approximately 1400 registered members, whereas estimates about the real number of Business Angels in Germany lie between 2700 and 3400 active Business Angels (Fryges et al., 2007 cited in Kraemer-Eis and Schillo, 2011).

The annual amount invested by Business Angels in Germany is estimated to be between 100 and 300 million EUR. German Business Angels invested around EUR 100,000 per start-up (median: EUR 30,000). Since there were only a few tech companies that received relatively high amounts from German angels, the mean is high compared to the median. The high-tech sector and tech-oriented services are of particular investment interest for German angels (Kraemer-Eis and Schillo, 2011).

6 The Development of the Venture Capital Industries in the United States and Europe

Venture capital is an important source of funding for new and innovative small firms which are vital for economic growth and job creation. VC investors can realize returns from their investments in promising start-ups through trade sales (mergers and acquisitions) or initial public offerings (IPOs) on stock markets. VC industries differ considerably across countries and are very sensitive to business cycles, noticeable both in the amounts invested and in the stages of investment (OECD, 2013a). Venture capital considerably declined globally during the financial crisis in 2008/09. In 2010, venture capital funding could not yet recover to its pre-crisis level. However, high growth rates for venture capital in 2011 could be observed in Denmark (+80%), Hungary (+62%), and the Netherlands (+56%) whereas a strong decline was prevalent in Portugal (-80%), Switzerland (-37%), Sweden (-25%), and Ireland (-11%) (OECD, 2013b).

In Europe, venture capital markets seem significantly less developed than in the US, both in terms of the amounts invested and the amount per deal. Prior to the recent financial crisis, banks were already unwilling to lend to start-ups due to their perceived high risk and lack of collateral. The financial crisis enlarged the existing gap at the seed and early stage: bank lending to start-ups declined further and VC firms became more risk averse due to pressures on the industry and instead invested

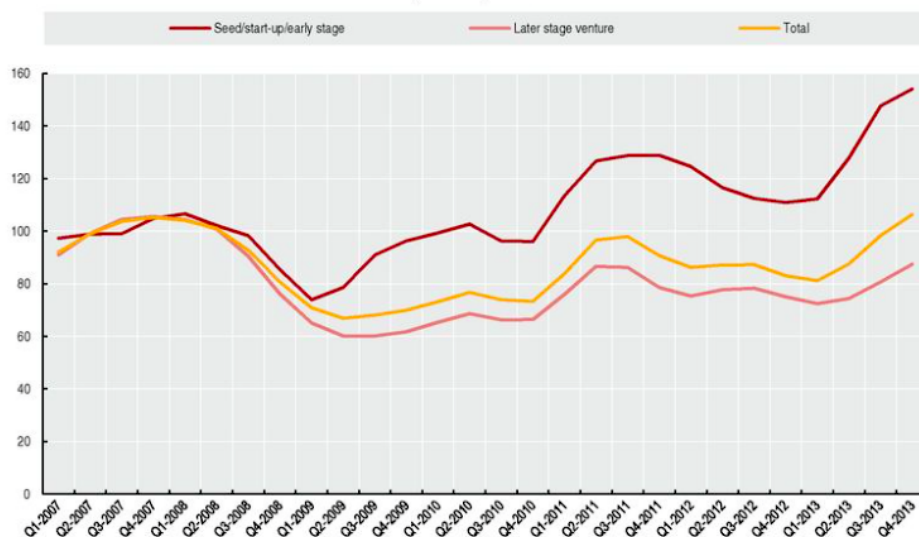
at later stages where risks are lower, leaving gaps at the pre-seed and seed stages. Furthermore, both trade sales and IPOs decreased significantly in Europe (OECD, 2013a). The development of VC investments from 2007 until 2013 in the US and in Europe is shown in Figure 6.1 and in Figure 6.2, respectively.

When Britain's industrial revolution spread to Europe in 1848, there were many young Europeans who were ambitious and who had access to capital. The majority of Europe's big companies, such as ThyssenKrupp, a German steel group; L'Oréal, the French beauty empire; or A. O. Moller-Maersk group, the Danish shipping giant; were founded around the turn of the last century. The devastation of the wars made Europeans more risk averse and markets, which were closely linked before 1914, split up. Europe listed only three big new firms funded between 1975 and 2007; two started in Britain and Ireland (The Economist, 2012).

This might be a result of the European institutional and cultural environment for entrepreneurs and venture capitalists that considerably differs from the American one: Strict labor regulations and high taxes in many European countries hinder VC investments as they are directly affecting the costs firms face. Employment protection taxes the labor adjustment margins of companies and hence hinders the overall development of the high-growth sectors. As VC investors are mainly attracted to growing and volatile sectors, these adjustment costs strongly discourage VC firms investing in Europe (Bottazzi et al., 2004).

While pension funds and endowments are the largest institutional investors in VC funds in the US, banks and corporations own a considerable number of VC firms in Europe (Bottazzi et al., 2004; Xu, 2004). As banks are assumed to be more risk averse and conservative, the amount of European VC funds stands significantly below the US level (Tyabji and Sathe, 2011).

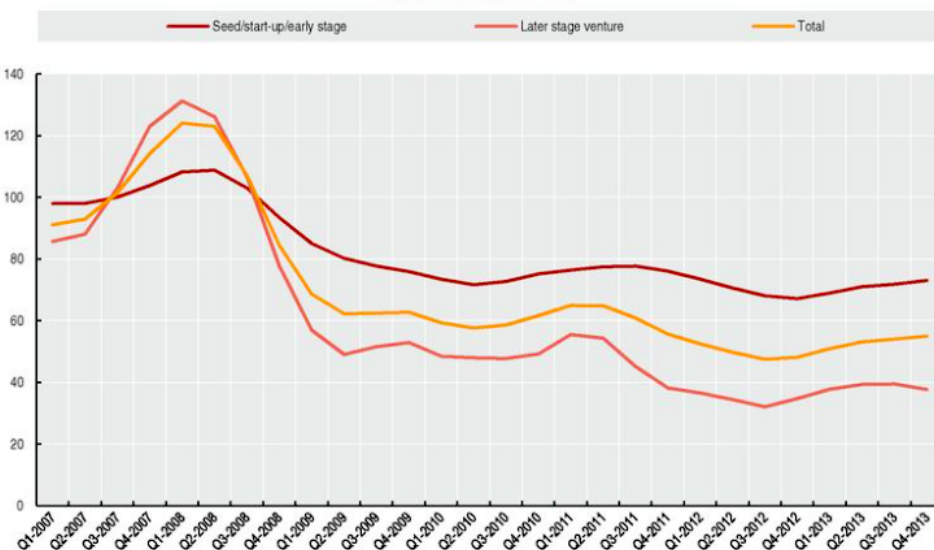
Figure 6.1: Venture Capital Investments in the US from Q1 2007 - Q1 2013



Note: Trend-cycle average 2007 = 100.

Source: OECD, 2014c, p. 23.

Figure 6.2: Venture Capital Investments in Europe from Q1 2007 - Q1 2013



Note: Trend-cycle average 2007 = 100.

Source: OECD, 2014c, p. 23.

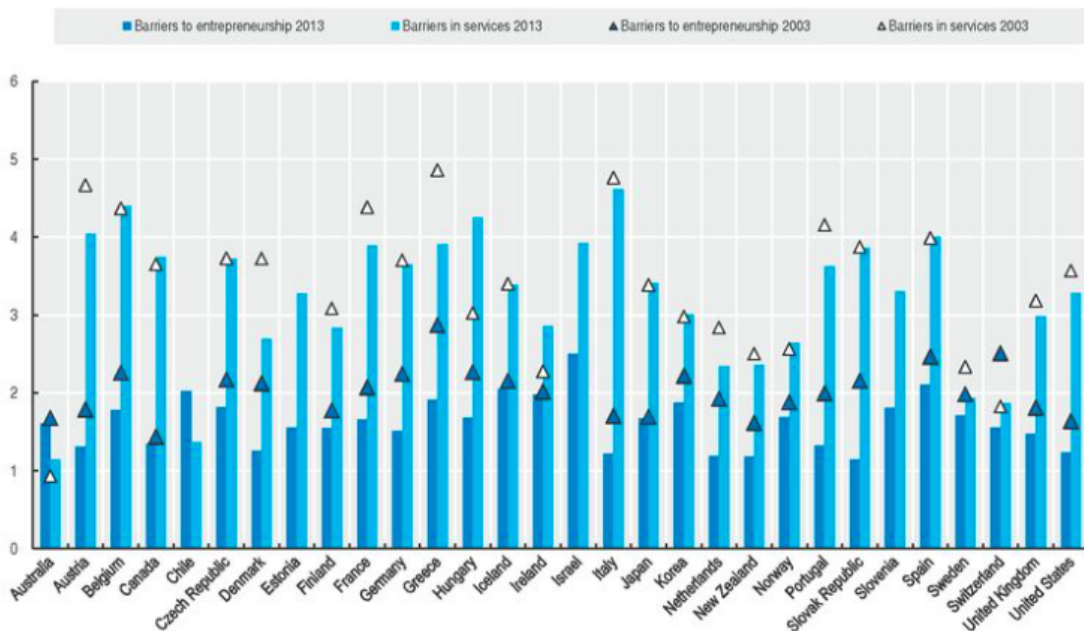
Further, VC firms in the US performed considerably better than their European counterparts mainly due to their stronger linkage to the US stock market (Xu, 2004). The European stock markets are fragmented, small and illiquid which makes the exit possibilities of VC investments difficult and hence slows down VC funding in Europe. European stock markets do not have the volume to support analysts and other professionals who offer services to firms anticipating stock market listing and to potential stock market investors (European Commission, 2005).

Given the weak public stock market for start-ups in Europe, they most often exit through a trade sale (merger or acquisition), rather than an IPO (Tyabji and Sathe, 2011). As studies have found that trade sales seem to be less lucrative than IPOs, this can be one of the reasons why VC firms in Europe cannot keep up with the performance of their American counterparts (*ibid.*).

Comparing European VC firms to VC firms in the US more carefully, it has been observed that European VC firms hold their investments for a longer period of time, use convertible debt and convertible preferred stock less frequently, replace management less frequently, invest in their own region more frequently, and co-invest with other VCs less frequently than the American VC firms. These characteristics may contribute to the explanation of the weaker performance of European VC funds compared to American ones: Longer holding periods suppose a certain hesitance of abandoning unpromising ventures; less use of convertible securities means that venture capitalists are given up control rights, while a less frequent replacement of management may imply greater tolerance towards non-performing founders. More frequent investments in one region may result in the omission of attractive opportunities elsewhere and less frequent co-investing may indicate that syndication benefits are not fully being used (Tyabji and Sathe, 2011).

Besides characteristics of European and American VC firms, barriers to entrepreneurship significantly influence the level of VC investments as they decrease the demand for VC financing. Figure 6.3 illustrates the degree of barriers to entrepreneurship across countries: Barriers to entrepreneurship remain comparatively low in the US whereas some European countries such as Spain, Greece, the Czech Republic, and France seem to have a more restrictive environment for entrepreneurs.

Figure 6.3: Barriers to Entrepreneurship



Note: Scale from 0 to 6 from least to most restrictive.

Source: OECD, 2014c, p. 87.

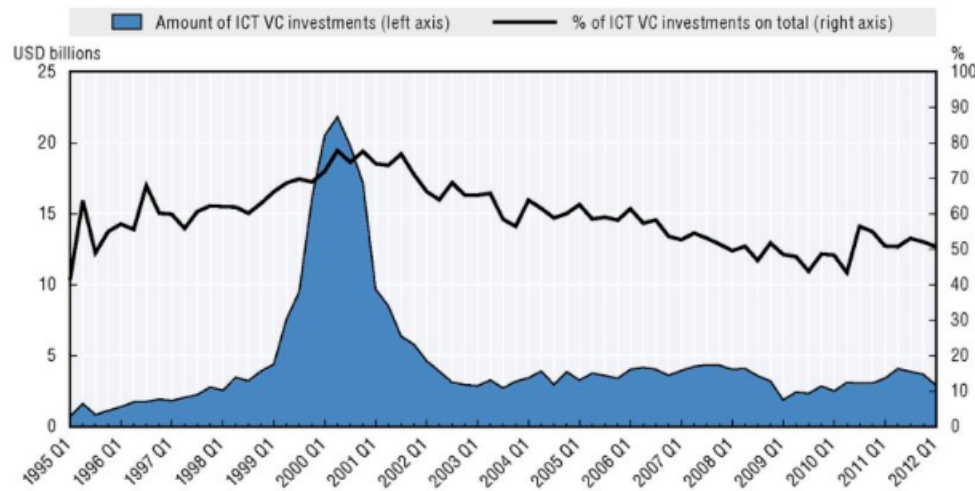
In the following, the venture capital industries of the United States and two European countries, France and Germany, will be examined in more detail. The institutional and cultural characteristics of the respective countries related to their VC industries and start-up ecosystems will be presented in order to illuminate the striking difference between the two continents.

6.1 The Venture Capital Industry in the United States and the Silicon Valley Cluster

Over the past two and a half decades, the rate of new business start-ups has been decreasing in the US (US Department of Commerce, 2012 cited in OECD, 2012a). The declining access to seed/start-up capital on which innovative entrepreneurial firms depend may be considered as one factor that presumably contributed to this tendency. Due to the “dot-com” bust in 2000, and bolstered by the economic downturn of the past three years, a greater share of venture capital is invested at the later stage of innovative firms which is less risky than investing at the start-up or seed-stage (OECD, 2012a).

Venture capital investment in the US mainly focuses on the ICT sector which accounted for more than 50% of all American VC investments in early 2012. With over USD 20 billion and almost 80% of total VC financing, the VC market reached its summit with the dot-com bubble in 2000. After the collapse in 2001, VC financing restored its steady growth that lasted for the next seven years at a moderate rate. During 2008, VC investment began to fall again but started to recover in early 2009, getting back quickly to the longer-run growth path (see Figure 6.4) (OECD, 2012b).

In the 1980s, innovation and technology were mostly related to large flagship corporations such as IBM and DEC, representing enormous power through a high number of engineers and scientists who demonstrated strong loyalty to their employers as a result of lifetime contracts and a rather paternalistic attitude. The emerging New Economy of Silicon Valley was a total contrast: people left their companies very quickly to start either new firms or even entirely new industries. While IBM’s company structure was very bureaucratic and hierarchical, Silicon Valley flourished from spontaneity, participation, openness, and a general disregard for hierarchical and regulated structures. The Managed Economy mostly valued obedience and conformity, whereas for the Entrepreneurial Economy, creativity, originality, independence, and autonomy were of utmost importance (Audretsch et al., 2002).

Figure 6.4: Quarterly VC Investments in the ICT Sector in the US, Q1 1995 - Q1 2012

Source: Based on MoneyTree Survey Report, PricewaterhouseCoopers (2012), April, OECD, 2012b, p. 52.

The endogenous growth of Silicon Valley already began to speed up with the development of the semiconductor industry in the late 1950s and the early 1960s. In the meantime, the Californian VC industry began to emerge, too. Draper, Gaither and Anderson created the first Californian VC firm in 1958 (Ferrary and Granovetter, 2009). Starting in the 1960s, the development of the VC industry corresponded to the rapid growth of high-tech industries in Silicon Valley and by 1972, more than thirty VC firms were located in the Bay Area (Zhang, 2007; Ferrary and Granovetter, 2009).¹ Confronted with serious difficulties mobilizing funds and the need to share information and expertise, these early venture capitalists progressively formed an interactive community sharing information and engaging in co-investments (Saxenian, 1991).

¹The US government also considerably contributed to the industrial fragmentation and the rapid diffusion of technical information in Silicon Valley. Between 1955 and 1968, the Department of Defense (DOD) and the National Aeronautics and Space Administration (NASA) invested almost 300 million USD in production contracts for semiconductors. A large proportion of this investment went to Silicon Valley. In addition, the US government was the largest market for new semiconductor ventures during the 1960s and a large number of start-ups in Silicon Valley were directly backed by military contracts (Kenney and von Burg, 2001).

Venture capital was the main contributor to the funding of every surge of innovation in the area, e.g., the establishment of the semiconductor industry in the 1960s, the start of the personal computer industry and the biotech industry in the 1970s, the thriving of the workstation and networking industries in the 1980s, as well as the commercialization of the internet in the 1990s (Banatao and Fong, 2000 cited in Zhang, 2007). In the past three decades, almost every successful start-up in Silicon Valley received local venture capital funding, such as Hewlett Packard, National Semiconductor, Intel, AMD, Oracle, Apple, Cisco Systems, Yahoo!, Ebay, and Google (Zhang, 2007; Ferrary and Granovetter, 2009).

From 1992 to 2001, Silicon Valley constantly attracted more than 20% of the total venture capital investment in the US. Attributable to the proximity to abundant venture capital, start-ups could not only receive capital at a younger stage, but they also completed more rounds of VC financing while raising higher amounts of money in each round (Zhang, 2007).

Oftentimes, the entrepreneurs that succeeded in the Valley were the ones who invested their returns in other technology start-ups and therefore became venture capitalists themselves. They provided young promising enterprises not only with capital, but also with their technical and managerial experience and access to their social network (Saxenian, 1991). Thus, Silicon Valley encompasses a complete and robust complex system of innovation that is strengthened by a large social network of interdependent economic agents interacting at different levels (Ferrary and Granovetter, 2009). It can be described as an innovative cluster in which ethnic ties, university ties, friendship, as well as past and current professional ties are interlinked in order to nourish innovation and entrepreneurship (Saxenian, 1994 cited in Ferrary and Granovetter, 2009).

Financial, educational, and political institutions in Silicon Valley are connected not only to technology firms, but also to one another, creating a distinct institutional framework that has become crucial for economic success (Colapinto, 2007). These social networks and personal contacts that are all located nearby highly facilitate the access to venture capital (Zhang, 2007).

Venture capitalists can better share information, make deals and quicker mobilize resources (Florida and Kenney, 1988). Geographic proximity also eases the venture capitalists' responsibilities such as monitoring and providing management advice for the start-ups they invest in (Zhang, 2007).

Several VC firms often form a syndicate to invest in a start-up in order to split the risks and to better share information. Hence, VC firms in a cluster that allows for quick investment are more likely to develop these partnerships for joint investment (Lee et al., 2000 cited in Zhang, 2007).

Apart from that, quick investment is also made possible by the emerging competition among VC firms for investment opportunities. Lee et al. (2000) point out that many VC firms located in the same area develop a rising awareness of competition, thus forcing them to invest more quickly in a promising start-up in order to guarantee a share of potentially high return.

The better access to capital in the Silicon Valley area is also a result of the well-developed innovation supporting industries that are abundant there, e.g., legal services, human resource services, investment banking, management consulting, or accounting services. These industries, together with the VC firms, establish a "clustered community" that simplifies company creation (ibid.).

Consequently, a well-developed venture capital industry may not be the only sufficient factor having generated high technology entrepreneurship in Silicon Valley, but the great variety of support mechanisms for innovation and entrepreneurship played a key role in this process (Florida and Kenney, 1988).

The institutional framework of the United States can be considered as very favorable to entrepreneurs and formed the basis for the development of Silicon Valley as a role model to other regions or communities. The outstanding innovation system in the US is mainly shaped by world-class research universities, firms that prosper in innovation-intensive sectors such as Information and Communications Technology (ICT), biotechnology, energy and agriculture, and a globally unsurpassed level of both R&D and market demand for innovative products (OECD, 2012a).

During the economic boom periods of Silicon Valley, changing jobs rapidly became a widely accepted characteristic of the labor market. Working in start-ups was even considered as an asset on the career path ever since. The flexible labor laws and the overall social respect towards entrepreneurship highly reduced risk when becoming an entrepreneur (as businesses can react quickly to changing market conditions) and hence incentivized many to become self-employed (Saxenian, 1994 cited in Kenney and Patton, 2006; Audretsch et al., 2002).

There are very few regulatory procedures to start and maintain a business and in case of failure, an entrepreneur in the US does not have to fear stigma or persecution by their creditors. Bankruptcy laws in the US offer individuals the opportunity to start over again by means of a discharge. Furthermore, as the reward for his or her innovative ideas is part of the main concerns of every entrepreneur, the US government has actively enforced the legal protection of patent and intellectual property systems. The cost of patent application in the US is lower in comparison to most European countries. Finally, American entrepreneurs benefit from a relatively low tax burden, which also affects their decision of starting a business (Audretsch et al., 2002).

Keeping in mind the institutional framework for entrepreneurs in the US, it is not surprising that US-based VC firms show higher performance than Europe-based VC firms, measured by type of exit and rate of return. Hege et al. (2003) explain this difference mainly by the contractual relationship between venture capitalists and entrepreneurs: American venture capitalists more strongly insist on maintaining contingent control rights; for example, they make use of certain financial instruments such as convertible securities that help to maintain a controlling stake in case of poor performance of the start-up. They also activate contingent control more often, which was observed in the replacement of entrepreneurs and the closure of projects (Hege et al., 2003).

The authors conclude further that overall, European venture capitalists encounter less liquid markets, not only for human resources, but also for exit markets. Additionally, they state that Europe does not contain the same web of institutions, experience,

and profound markets and networks for human resources and knowledge that exists in Silicon Valley, which may explain why the creation of a European Silicon Valley could not yet be achieved.

Recent public policy in the US continues to stimulate innovation and entrepreneurship, for example, through formal entrepreneurial education programs. The Kauffman Foundation has recently granted 20 million USD for university funding of entrepreneurship research. The Small Business Innovation Research Program also supports SMEs with government R&D funding opportunities (OECD, 2012c).

What remains a challenge for the US in the years to come is the creation of a better safety net. Individuals would be even more encouraged to start their own business if the potential costs of failure for entrepreneurs and especially their families are reduced. Notably, the Health Care Act of 2010 has made a great contribution to an improved safety net by reducing the costs of individual or small group policies, further incentivizing people to work for small firms. Encouraging small firms to offer qualified employee retirement plans for the first time (which was proposed in the Fiscal Year 2013 budget plan) will also attract more candidates to small firms (OECD, 2012a).

6.2 The VC Industry in Europe - France and Germany

6.2.1 France

Despite efforts of the French government to spark new business creation, very few of the newly created (and publicly supported) enterprises have grown significantly in their early years (OECD, 2013d). Innovative entrepreneurship in France remains fragile, reflected in patents filed by young firms that are below the OECD median (OECD, 2012c). This might be the result of the French regulatory framework that still seems to hinder business growth significantly. Administrative barriers, tax rules, rigid labor laws as well as difficulties in accessing capital as the banks have become more risk averse in lending to start-ups, especially in the aftermath of the crisis, are some of the factors that hold back entrepreneurs from starting their business, which results in a low demand for VC investments in this area (OECD, 2013d).

A very important obstacle to French entrepreneurs and hence also to VC investors is the country's rigid labor law. In order to survive mistakes or fluctuating demand, it is especially important for start-ups to be able to reduce staff rapidly and cheaply (The Economist, 2012). However, measuring the strictness of employment protection of workers with regular contracts against individual dismissal, France is placed at least one standard deviation above the OECD average (OECD, 2013c). Internal mobility and dismissal regulations (especially for collective dismissals) have been strengthened and made more complex since the 1970s. Fortunately, the French government aims to ease the dismissal regulations on permanent contracts in the near future in order to remove the resulting labor market rigidities (OECD, 2014b). The temporary contracts that count for the majority of French employees' contracts (90% of recruiting is done on temporary contracts) are often associated with higher labor market flexibility. However, it is also extremely difficult to dismiss temporary workers before the expiration date of the contract (Le Barbanchon and Malherbet, 2013; OECD, 2014b).

The contract segmentation prevalent in France's labor market hinders the businesses' capacity to adapt to shocks and allocates the needed adjustments unequally between the protected and exposed workers (OECD, 2014b).

Whereas high taxes shrink the income of small businesses, complex and opaque tax systems can discourage (potential) entrepreneurs from founding a start-up (Audretsch et al., 2002). The French tax system is very complex and contains a great number of deductions, credits, and exemptions. New tax expenditures are often established and existing ones are very frequently changed. Due to the complexity of the system, tax compliance is burdensome for economic agents and rent-seeking activities easily become attractive, generating considerable distortions (OECD, 2014b).²

Moreover, the French bankruptcy legislation might discourage entrepreneurs from starting up as people expect it to take up to nine years until insolvent entrepreneurs are fully discharged from their debts (The Economist, 2012).

The highly regulated and inflexibly structured organizations in France most likely hinder entrepreneurial opportunities, too. As the French society is generally characterized as risk averse, French businesses are strongly regulated and clearly structured vertically as well as horizontally. Since a high value is placed on loyalty, potential entrepreneurs are often discouraged to leave their wage source, resulting in low occupational mobility. Furthermore, because of the strong need of uncertainty avoidance within the French (business) culture, big firms are less likely to engage in synergies with start-ups which also contributes to the slow growth of newly created enterprises in France (Audretsch et al., 2002; Hofstede et al., 2010).

²The nominal tax rate on corporations with 34.4% is high in France and also the marginal tax rates on high incomes are very steep. The new top rate for the personal income tax, along with the exceptional tax on high incomes, the "contribution for repayment of social debt" and social contributions by workers and employers infers a marginal rate of approximately 62% to 65% (OECD, 2013d).

Inspired by the Silicon Valley role model, France has been putting great effort in the creation of innovative clusters for more than thirty years now. The French government tried to establish almost twenty “technopôles” in the 1970s, which unfortunately brought about only a few high-tech start-ups. With the state support of 67 “pôles de compétitivité”, the effort to nourish innovative clusters had been renewed in 2006. The French policymakers saw in these clusters a localized circle of universities, research laboratories and high-tech firms, without any inclusion of VC firms in this environment. Whereas 85% of these innovative clusters are not in the Paris area, 95% of the VC firms are based in Paris. Apart from that, the French government has set up a public administration with an office in almost every cluster in order to financially back start-ups. Apparently, French administrators did not take into account the more informal function of VC firms, which goes far beyond the pure financing function (Ferrary and Granovetter, 2009).

Most recently, the public support for SMEs is managed through “Bpifrance”, a newly created public financial institution which offers a personalized funding service in order to support young enterprises at every development stage. Its goal is to expand the existing credit volume and equity funds for SMEs, to bring stakeholders together and simplify administrative procedures for entrepreneurs (OECD, 2014a). However, public support of entrepreneurship is not as helpful as removing the barriers entrepreneurs face within the French institutional framework (The Economist, 2012).

Having realized this, France authorities have begun to change framework conditions for entrepreneurs in recent years. One example is the creation of a new legal status of the auto-entrepreneur, which is a form of self-employment and enables the entrepreneur to benefit from a more favorable tax system (OECD, 2012c). Furthermore, the 2012 competitiveness roadmap of the French government aims at facilitating the access to finance for SMEs. In particular, a tax reform encourages a better allocation of savings towards enterprises and the launch of a new SME stock exchange in May 2013 is expected to offer young businesses better access to capital markets in the years to come. Hopefully, this will also let the French venture capital industry grow (OECD, 2014a).

6.2.2 Germany

In Germany, limited access to finance for start-ups and SME innovation projects hinder innovation (OECD, 2012c). Banks represent the most important source of finance for the German VC industry and venture capital financing is still in a state of development (Mayer et al., 2005; Zimmermann et al., 2004).

VC investment in Germany was standing at less than 0.03% of GDP in 2011, which was lower than in France and in the UK. In order to increase VC investment, not only support for financing is required, but also better exit possibilities for investors, which is particularly problematic with regards to the absence of a stock market-oriented system in Germany (OECD, 2014c). As stock markets are particularly appropriate to the high risks of early-stage investments – because they enable the IPO exit possibility - and bank-oriented systems to later-stage investments, early-stage investments are limited among German venture capitalists (Black and Gilson, 1998 cited in Mayer et al., 2005; Bascha and Walz, 2001 cited in Zimmermann et al., 2004).

The lack of an active stock market in Germany hindered the emergence of a German venture capital industry (Black and Gilson, 1998 cited in Becker and Hellmann, 2003). In the 1990s, Germany and other European countries created national stock markets modeled after the NASDAQ that aimed to attract international and institutional investors. However, by the time the Internet bubble burst, many of these national stock markets merged with the main European stock markets that account for very little IPO activity (Kümmerle, 2001). Because of the very limited IPO exit possibilities for VC investments in Germany, big German companies have taken over the role of venture capitalists and account for most of the main investments in start-ups. Corporations like Deutsche Telekom, Axel Springer Verlag, and Rewe even have their own start-up incubators. In addition, German venture capitalists seem to be cautious as they invest more selectively and expect a high share to break even after the first 18 months (The Economist, 2013).

The German society's attitude towards entrepreneurship is still unenthusiastic, as fewer than 50% of Germans polled by the Global Entrepreneurship Monitor (GEM) thought that starting a business was an attractive idea. Apart from that, the fear of failure is an important factor that holds potential entrepreneurs back: GEM finds that failure would deter 42% of Germans from starting a business (The Economist, 2013). This is not surprising when looking at the German insolvency regime: people expect it to take six years to free a bankrupt entrepreneur from his debts. Sometimes, a bankrupt can even end in a lifetime ban on senior executive positions at big corporations (ibid.). Consequently, many ambitious entrepreneurs simply leave the country. There are now approximately 50,000 Germans in Silicon Valley where they gain the "freedom to fail" (The Economist, 2012).

Germany's labor law is another impediment for entrepreneurs. The regulation of regular work contracts is one of the strictest among OECD countries, making layoffs particularly difficult for employers. Moreover, the difference between employment protection legislation of regular work contracts and fixed-term contracts is higher than in many OECD countries. Like France, Germany should also move towards a unified job contract with the degree of protection rising with tenure (Hüfner and Klein, 2012).

Looking back through German history, the hesitancy towards entrepreneurship in Germany becomes more obvious. Whereas a generation of entrepreneurs had built up the after war economy in the fifties and early sixties, the next generation had experienced different career incentives. Young Germans wanted to join large corporations and banks in order to take advantage of lifetime employment at high wages and great benefits combined with a prestigious social status. Hence, an employee that left his company in order to start a new business would have been confronted with great difficulties to later be hired for a comparable job at another corporation. Additionally, the returns to an entrepreneurial venture were limited by high tax rates and failure would impose a negative stigma on the entrepreneur, and possibly ruin her financially (Becker and Hellmann, 2003).

In order to change this longstanding attitude among young Germans, the public sector tries to foster entrepreneurial culture in higher education with the EXIST program, which offers start-up grants and ensures technology transfer among entrepreneurs at German universities (OECD, 2012c). However, teaching methods in many of Germany's universities need to be improved by the use of more experience-based tools such as developing prototypes and learning about enterprise failures. In particular, German business schools need a considerable upgrade in order to compete with the top European business schools (OECD, 2014c).

Remarkable policy efforts have improved the credit availability for SMEs since 2008 (OECD, 2014c): The German government is supporting funds of funds that invest in local high-technology companies. This in turn helps private venture capital funds as it increases the level of equity financing but leaves investment decisions to the private fund's management. Germany has also established a national public-private high-technology start-up fund, and even at the local level did some states create equity guarantee facilities for private investment in local SMEs (OECD, 2012c).

Outside public channels, the company builder "Rocket Internet" from Berlin is one of the biggest sources of funding for start-ups. It is particularly famous for launching lots of similar companies that can share resources and for copying successful ideas from abroad (The Economist, 2013).

7 Conclusion

The paper provides an analysis of the determinants of early-stage venture capital investments by economic, insitutional, as well as cultural framework conditions that could explain the diverging levels of venture capital investments across countries. To do so, data was assembled for 16 countries during the period from 1995 until 2013. Using these data, hypotheses that relate economic, institutional, and cultural differences among countries to the level of VC investments have been tested. Specifically, these differences have been captured by the variation in *GDP growth*, *openness*, the *unemployment rate*, *R&D expenditures*, the *NASDAQ Composite Index*, *government stability*, *socioeconomic conditions*, *bureaucracy quality*, the *investment profile*, and by the four cultural indices of Hofstede (1980); *individualism*, *masculinity*, *power distance* and *uncertainty avoidance*.

The results of this work show that *openness*, *R&D expenditures*, the *NASDAQ Composite Index*, *socioeconomic conditions*, as well as the degree of *power distance*, *masculinity*, and *uncertainty avoidance* in a country appear to be the main forces behind the diverging levels of early-stage VC investments across countries. A country that is more open to trade, measured by the variable *openness*, will bring about higher levels in early-stage venture capital. Higher *R&D expenditures* as a proxy for the technological and innovation capacity in a country as well as a higher value in the *NASDAQ Composite Index* as a proxy for general stock market conditions result in a higher amount of early-stage VC investments. As Schumpeter predicted, entrepreneurial opportunities need the introduction of new knowledge created by changes in technology, which are a result of the research and development process that

occurs in society. Higher *R&D expenditures* lead to more entrepreneurial opportunities, resulting in a higher demand of early-stage VC investments. The regression results also indicate that favorable *socioeconomic conditions* for both entrepreneurs and venture capitalists will increase the demand for early-stage VC investments. Further, the paper provides evidence that higher degrees of *power distance* and *masculinity* result in more early-stage venture capital invested whereas a higher degree of *uncertainty avoidance* negatively affects the level of early-stage VC funds. Masculine societies, where the members of a society value achievement, competition, and success, show a higher level of entrepreneurship which in turn leads to a higher demand for VC investments. Moreover, the restrictive climate prevalent in large companies and organizations of countries where centralized decision structures are valued more (thus with a higher degree of *power distance*) incentivizes potential entrepreneurs to obtain more autonomy by self-employment and hence demand for more VC investments (Baum et al., 1993; Wennekers et al., 2007). As Knight (1921) pointed out, one of the most important functions of the entrepreneur is to bear risk and to deal well with uncertain situations. A society with a strong tendency to *uncertainty avoidance*, fearing and avoiding unknown situations will thus most likely not bring about a high level of entrepreneurs, resulting in less early-stage VC investments demanded.

Entrepreneurs need venture capital to make their new companies grow and hence have a critical function for economic analysis. In addition to the empirical investigation, the paper examines the role of the entrepreneur in economic history, dominated by the three scholars: Schumpeter, Knight, and Kirzner.

The results of the paper's empirical regression analysis have confirmed the importance of a country's institutional and cultural framework conditions for the venture capital industry. The paper explores the venture capital industries in the United States and in Europe, with particular focus on France and Germany, and identifies several institutional and cultural characteristics that might explain the different levels in VC investments in the respective countries. The role model of an institutional framework that is exemplary for an innovative cluster with abundant venture capital is Silicon Valley, which emerged with the help of financial, educational, and political institutions

that are connected not only to technology firms, but also to one another (Colapinto, 2007). Apart from that, the United States created a very favorable institutional environment for entrepreneurs with flexible labor laws, few regulatory procedures to start and maintain a business, as well as advantageous bankruptcy laws (Audretsch et al., 2002). In France, administrative barriers, complex and high taxes, and rigid labor laws discourage entrepreneurs from starting their own business, resulting in a lower demand for VC investments. In Germany, the lack of exit possibilities with regards to the absence of a stock market-oriented system hinders venture capitalists from investing in young German start-ups.

Representing an often overlooked predecessor for venture capital, the essential role of the angel investment market for the formal venture capital industry is also illustrated in this paper. Due to the recent financial crisis and the difficult situation worldwide, angel investors were filling financing gaps left by banks and VC firms that were more and more reluctant to invest at the early stage.

Most of the research on venture capital was concentrated on the United States so that comparative studies of the VC industries in the US and in Europe remained rare. This analysis contributes to the comparative literature on VC industries and extends previous research by identifying not only economic and institutional factors, but also cultural determinants that could affect the level of VC investments. Moreover, the most recent dataset available has been used for this regression analysis. The study therefore provides results that extend beyond the reach of the financial crisis as well as the economic downturn during the European crisis.

The evidence the paper uncovered suggests that creating institutional conditions that encourage entrepreneurship and nourish the venture capital industry should be a high priority for national authorities. Such policy measures may include, among many others, requiring fewer regulatory procedures to start and maintain a business, ensuring a lower tax burden on entrepreneurs and private equity, passing flexible labor laws and promoting education programs in universities and business schools to develop an entrepreneurial culture, as well as public-private partnerships that support

VC funding in local high-tech companies. As highlighted by Schröder (2013), a further step to expand European early-stage VC investment might also be to support a single European stock market which would make investment exits via IPOs possible and therefore achieve higher returns for VC investments in Europe.

The study encountered several limitations which need to be considered when interpreting the results. Due to data unavailability, not all European countries could be included in this study. Further, one must be very careful in transferring the conclusions found in this analysis to world-wide relationships. The results hold for the countries included in the study, which are industrialized, Western nations. Although several control variables have been included in this study, it clearly has not been controlled for all factors which may affect the level of VC investments in a country. For example, the study did not consider labor market rigidities, financial reporting standards or contractual relationship characteristics between venture capitalists and entrepreneurs (Jeng and Wells, 2000; Hege et al., 2003). It also has to be noted that empirical research between cultural characteristics of a country and the venture capital market is quite new. Measurement might therefore be often controversial while data points are usually low. As more data becomes available, this should only increase the predictive power of the model.

Finally, the present study assumes that VC firms invest only in start-ups in their own country so that the size of a country's venture capital industry depends in part on the factors explaining the emergence of new firms in need of such financing in that country. While there is at present an overwhelming evidence for such a "home bias" in venture capital financing, it has to be noted that there are some European entrepreneurs that actually obtain VC funding from American investors. If, as it is not unlikely, there were to be in the future a globalization of the venture capital market, the size of a country's venture capital industry would become relatively independent of the factors explaining the emergence of new firms in that country and would reflect mainly its comparative advantage in this kind of financial activity. Whether such financing is reported in the data for U.S. or European venture capital financing is a question we were not able to resolve.

Future research could expand the data set and include all European countries in the study in order to make a robust Europe-US comparison possible. Moreover, further research should examine whether and how the results would be affected if countries at significantly different economic development stages, such as developing and emerging economies, were included in the study. Finally, future research will tell whether the implemented policy measures by France, Germany, and other European countries will effectively foster entrepreneurship and nourish the European venture capital industry over time.

Agreeing with Landes (2000, p. 2), who argued that “If we learn anything from the history of economic development, it is that culture makes almost all the difference”, the paper confirmed that institutional and cultural characteristics are a crucial determinant of a country’s VC industry. By setting the right incentives, institutions determine the development of young innovative companies. Being aware that a change towards an entrepreneurial culture is relatively difficult for societies and certainly takes time, setting up entrepreneur- and investor-friendly institutions is one essential step towards a vital venture capital market, more dynamic high-growth start-ups, further technological innovation, and hence towards economic growth.

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Declaration

I hereby declare that this thesis is my own work and effort.

It has not been submitted anywhere for any award before.

Where other sources have been used, they have been acknowledged.

All internet sources are properly indicated, including the URL of the internet source.

Furthermore, I declare that the submitted written version corresponds to the electronic version.

San Francisco, May 15th, 2015

Nadja Beneš