Determinants of Venture Capital Investment: Evidence from Western Europe

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ABSTRACT

The aim of this thesis is to examine the determinants of venture capital investment for the case of nine Western European countries for the period between 2007 and 2017. The thesis investigates six main macroeconomic determinants of venture capital investments as well as the political risk as one of the most important determinants. Results of panel regression model under fixed effect indicate that GDP growth, interest rate, stock market capitalization, unemployment rate, financial development, and political stability have positive and statistically significant effect on venture capital investments in Western European countries.

Keywords: Venture capital, Western Europe, GDP, Interest rate, Fixed effect

ÖZ

Bu tezin amacı 2007 ve 2017 yılları arasında Batı Avrupa Ülkelerinde girişim sermayesi yatırımlarının belirleyicilerini incelemektir. Tez, girişim sermayesi yatırımlarının 6 ana makroekonomik belirleyicilerinin yanında politika riskinin bu yatırımlara etkisini araştırmaktadır. Sabit etki altındaki panel regresyon modeli sonuçlarına göre, GSYİH büyümesi, faiz oranları, borsa kapitalizasyonu, işsizlik oranı, finansal gelişme ve politik istikrarın Batı Avrupa girişim sermayesi yatırımları üzerinde pozitif ve istatistiksel olarak anlamlı bir etkiye sahip olduğu belirlenmiştir.

Anahtar Kelimeler: Girişim sermayesi, Batı Avrupa, GSYİH, Faiz oranı, Sabit etki

I would like to dedicate this thesis to my precious family who their valuable support and kindness was endless throughout my education and my whole life. To my mother, a strong and gentle soul who taught me to trust in God and believe in hard work, to my lovely father for earning an honest living for us and my brothers for encouraging me to believe in myself.

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LIST OF ABBREVIATIONS

ADF	Augmented Dickey-Fuller
ARD	American Research and Development
CONFLICT	Internal Conflict
DC	Domestic Credits Provided by Banking Sector
EVCA	European Equity and Venture Capital Association
FE	Fixed Effect
GDP	Gross Domestic Product
IPO	Initial Public Offering
INTEREST	Annual Interest Rate
LLC	Levin, Lin and Chou
PLS	Partial Least Square
PP	Phillips Perron
R&D	Research and Development
SMEs	Small and Medium Enterprises
STOCK	Stock Market Capitalization
UNEMP	Unemployment Rate
VAR	Vector Auto Regressive Model
VC	Venture Capital

Chapter 1

INTRODUCTION

In the history of business, so many attention-grabbing ideas did not get the chance to perform since they were not able to collect low-risk capital to run their businesses. Moreover, for research and development (R&D) and invention for startups in the early stage of improvement, there is a need for substantial investment and support. Typically, if startup companies want to access financing by using traditional means, they might incur higher costs and much more difficulties. Therefore, they should refer to venture capital funding (VC), which has been increasing from the 1950s in the United States. Venture capital plays a vital role in developing the process of high-tech startups in their early stages of development. In the United States, for instance, there is over 15 billion VC fund in startups every year (Wanga , Zhoua, & Anb, 2017).

Venture capital investment has existed for many years and companies which today are known as benchmarks in the market, such as 3Com, Apple, Microsoft or Intel have been financed through VC (Félix, Pires, & Gulamhussen, 2012), but despite several trials done by governments to bring it up, it just still modestly advanced outside the United States (Grilli, Mrkajic, & Latifi, 2018).

Jeng and Wells (2000) have expressed that venture capital investment growth has been countless in many countries, but the level of funding was still considerably different. Tyebjee and Vickery (1988) stated that the occurrence of the venture capital was

virtually limited to the United States, and during 1980s venture capital financing started to appear in lots of countries such as Europe. A report conducted by The European Private Equity and Venture Capital Association (EVCA), revealed that approximately 95% of the venture-backed firms could not even exist without receiving venture capital finance and also about 89% of them said that they could increase their employees after starting to get the venture capital investment (Félix, Pires, & Gulamhussen, 2012).

1.1 International Definitions of Venture Capital Investment

The internationalization of venture capital has prompted it to be defined slightly different in some markets, and also previous researchers have various explanations of VC in the literature. For instance, Jeng and Wells (2000) defined venture capital in the U.S term as three forms of funding such as seed, startup investment (both known as early-stage investments) and expansion while it does not include buyouts. The first type of financing a newly founded business is seed capitals that are mostly used to invest in initial research and development for a product and to measure the profitable probability of ideas. On the other hand, startup funding is directed to those firms that have passed from the idea phase and are getting ready to produce, marketplace and sell them although they are still using the cash more than generating it.

Schertler (2005) indicated that there are also some non-financial organizations which might deliver funds for venture capital investments so that they can support the progress of new technologies, which they think they will use in their manufacture process some later time.

Moreover, according to the definition given by Chen (2019), venture capital can be explained as a type of financing provided by investors for small businesses and startup firms which are supposed to perform the potential needed for long-term growth. Venture capital arises typically from those investors who are known as well-off, some financial organizations, and also investment banks. Although it can also be provided in the form of mechanical or managerial know-how, it is not always as a monetary form.

1.2 Important Determinants of Venture Capital

Researchers empirically investigated the relationship among important macroeconomic factors and VC investments in the last decade. The main determinants of venture capital investments which were considered in the literature can be listed as GDP growth (Gompers and Lerner, 1999; Jeng and Wells, 2000; Cherif and Gazdar, 2011; Chaabouni, 2011; Félix, Pires and Gulamhussen, 2012), Interest rate (Gompers and Lerner, 1999; Romain and La Potterie , 2004; Jagwani, 2008; Chaabouni, 2011; Félix et al. 2012), Unemployment rate (Audretsch and Acs, 1994; Cherif and Gazdar, 2011; Félix et al. 2012; Groh and Wallmeroth, 2016), Stock market capitalization (Jeng and Wells, 2000; Cherif, 2011; Félix et al. 2012), R&D expenditures (Cherif and Gazdar, 2011; Chaabouni 2011; Félix et al. 2012). As well as the main macroeconomic indicators, there are factors examined by researchers such as political risk (Porta, Lopez-de-Silanes, Shleifer and Vishny, 1998; Bonini and Alkan, 2011; Jens, 2017) and financial development (Stulz, 2000; Beck and Levine, 2002; Hellmann, Lindsey and Puri, 2008); Nwokoye, Metu and Kalu, 2015).

Most of the researchers examined effects of macroeconomic factors on VC investments in their studies. Stated in the literature, expansion in the economy attracts

more entrepreneurs as it creates further opportunities to provide funds for new firms in a country. For instance, GDP growth, as one of the most important macroeconomic indicators of venture capital funding, which also refers to the economic growth of a country, shows a positive impact on venture capital investment. Results by Chaabouni (2011) expressed that economic expansions increase the number of start-ups, which also leads to a rise in the request for VC as well. Gompers and Lerner (1999) also found a positive and statistically significant coefficient, which means that there is an increase in venture capital investments when there is a growth in GDP.

In terms of interest rate, Gompers and Lerner (1999) and also Romain and La Potterie (2004) considered it as an essential determinant in the venture capital market. Their findings displayed a positive correlation between venture capital funds and interest rate and indicates that when interest rate increases, there is considerable growth in the attractiveness of VC. Felix et al. (2012) also declared that nevertheless, the interest rate has an impact on the cost of capital and is therefore anticipated to affect the choice to become an entrepreneur.

Among the papers previously mentioned unemployment rate as another variable affecting venture capital investment indicates an ambiguous effect on these types of activities. For instance, Cherif and Gazdar (2011) and Groh and Wallmeroth (2016) found a negative and significant coefficient for unemployment rate which means the higher the rate of unemployment the less opportunity for VC funding. On the other hand, Audretsch and Acs (1994) found a positive and statistically significant coefficient for the unemployment rate and concluded that it is contributing to generate more startups and funding. Félix et al. (2012) indicated that unemployment rate could also be positively effective in encouraging entrepreneurship and

Stock market capitalization as another influencing factor for VC funding was included in Romain and La Potterie (2004), and also Jeng and Wells (2000) studies. They discussed that explanation of stock market capitalization effect on VC investment is very similar to growth in GDP. Moreover, connected to the stock market, growth in market capitalization reveals the investors' anticipations for the economy. Subsequently, any rise in market capitalization is predicted to generate a more promising location for investors as it resembles an increase in the investment existing for venture capital funding (Félix, Pires, & Gulamhussen, 2012).

As well as the existing indicators, Bonini and Alkan (2011) studied political risk as another determinant and expressed that a further promising innovative environment intensely enables VC funds. They announced a standardized set of political factors such as internal conflict and corruption as proxies to examine the effect of these elements on the progress of VC activity. Additional empirical studies also demonstrate that companies tend to do business in places with a lower political risk to make sure they will not lose their capital (Henisz & Delios, 2001). Political risk can be considered as one of the critical determinants impacting the level of development in economy and investment in a country (Porta, Lopez-de-Silan, Shleife, & Vishny, 1998). Moreover, recently a study conducted by Jens (2017) proved that political stability leads to greater volume of VC activities.

In the literature, many empirical studies including Caporale, Rault, Sova, and Sova (2015) stated that there is a link between financial development, economic growth and also investment opportunities and this relationship would be augmented through an efficient banking system. James (1987) exhibited proofs that banks deliver some exceptional service through their credits that are not accessible from other investors.

Hellmann et al. (2008), in their paper, examined the role of banks in venture capital. The evidence suggested that banks build relationships in the venture capital market that can be mutually advantageous in the loan market. Cottarelli, Dell'Ariccia, and Vladkova-Hollar (2005) asserted that credits by the banks seem to be continually growing even quicker than GDP in a few years all over the Europe.

1.3 Reasons for Choosing the Western Europe

In the Europe, venture capital marketplace is yet a promising business but with a weaker direction to technological and early-stage funding if we want to compare it to the United States (Félix, Pires, & Gulamhussen, 2012). As stated by Schröder (2009), in European countries, the effect on the overall economy is perceptible as a result of venture capital activities while it started much later than the U.S (in the 80s). Tyebjee and Vickery (1988) also have declared that the presence of venture capital is a very significant reason for entrepreneurial revitalization in Western Europe, which can grab attention. Bottazzi, Da Rin, Ours, and Berglöf (2002) have found that VC was operative in facilitating some of Europe's inventive and efficacious companies to pass credit restrictions and emerge in high place. Therefore, a lot of certified official papers in the Europe organizations and governments recommended to encourage and strengthen VC in the European nations (Bottazzi, Da Rin, & Hellmann, 2009).

As regards that VC businesses in the U.S are pioneer and advanced, it can be used as a suitable case to compare with the European venture capital industry. Megginson (2004) have also concentrated on the U.S and Western part of Europe since these countries constitute a massive part of total private equity investments in the Europe each year. For instance, statistics show that in the year 2017 share of GDP invested in venture capital was 40 percent in the U.S while for Western European countries this

number was 7.6 percent in the U.K as one the most active European countries in VC market.

1.4 Methodology of the Thesis

For the empirical analysis, a panel dataset was collected from nine Western European countries in the period of 2007-2017, and from multiple sources to test the impact of aforementioned variables through conducting the panel regression under fixed effect, which was confirmed as the most appropriate model after applying the standard likelihood ratio test. The nominated countries have been chosen for their comparable per capita income, accessible data, and the fact that there are limited numbers of analysis conducted on this sample.

1.5 Aim of the Thesis

To the best of knowledge, these variations and the reasons behind them were the subjects of a few empirical studies around the Europe while it can be a prominent place for our testing as it comprises of analogous countries with sensibly settled VC markets (Bottazzi, Da Rin, & Hellmann, 2009). Therefore, given the significant role of this industry and its overall effect on the economy in Western part of Europe as the sample, the aim of this study is to determine the relationship between macroeconomic factors and the venture capital investment along with testing the impact of further variables such as political risk and financial development on venture capital marketplace, as well as having contribution to the literature on VC determinants, specifically in the Western European countries. The involvement comprises of evolving an empirical model which announces most known determinants of VC and factors such as internal conflict as a proxy for political risk and domestic credits by banks as a proxy for financial development concurrently.

1.6 Structure of the Thesis

The remainder of this thesis is prepared as follows; Chapter 2 discusses the previous literature on the determinants of venture capital by pointing the most important studies conducted on this subject, chapter 3 represents the collected data and employed methodology, chapter 4 expresses the empirical results and interpretations, and chapter 5 concludes the thesis by providing some critical policy implications in the context of VC investments.

Chapter 2

LITERATURE REVIEW

A lot of young companies with outstanding potential for growth have a tough time to get started as they are not able to provide funds. Usually, banks do not risk on technology projects, public marketplaces hold most of the prominent companies, and programs of government are hardly adequate for their own. Thus venture capital is the appropriate answer for many firms. The venture capital exists for the capital markets arrangements and rules, and somebody with a novel technology or an idea mostly get no other organization to turn to (Cherif & Gazdar, 2011).

Entrepreneurs who need to provide fund for their innovative start-ups have demand for venture capital. Private investors, banks, and pension funds supply this venture capital matches to the risk capital (Félix, Pires, & Gulamhussen, 2012). Among these exploratory expeditions, the question is that which kind of factors absorb venture capital funding and how they might distress a country's investments in the sense of venture capital (Groh & Wallmeroth, 2016).

Prior studies in the vast literature on finance have examined how the venture capital investment of a particular country is affected by some distinct factors, and which determinants they are employing in the process of financing early-stage enterprises.

In this chapter, the previous related literature conducted on the same subject are tracked and details about the determinants based on contemporary studies on venture capital that is a subject with many aspects are provided. However, it still requires additional research as the literature is restricted, and it contains much room for more analytical proceedings.

2.1 The Importance of Venture Capital Investment

The venture capital activity assumes a vital role in financing the start-ups and the high technology small and medium enterprises (SMEs), which both are full of promises but also with substantial default risk (Chaabouni, 2011). Gompers and Lerner (2001) expressed that, VC itself is a new market that has been transforming swiftly. Therefore, while we can examine the distribution of venture capital in previous years and now, the degree to which these visions will proceed to apply to the venture capital industry remains unclear for tomorrow.

According to Jeng and Wells (2000), the National Venture Capital Association yearly survey on the effect of venture capital illuminates several job-creating capabilities of the sector. The survey exposes that from 1991 to 1995, venture-backed firms, on average, amplified their number of staffs by 34% annually. At the same time, fortune 500 firms reduced staffing by 4% annually.

As indicated by Buzzacchi, Scellato, and Ughetto (2012), innovative activities progressively yield innovation and economic development. To be more precise, a higher level of accessible VC permits for growth in productive, innovative activities, and it has directed numerous governments and local authorities around the world to perform plans that result in mobilizing VC.

Having a specific interest in VC, Jeng and Wells (2000) assumed that VC particularly values interest for numerous reasons. The earlier performance of firms supported by VC illustrates that VC has been hugely prosperous at supporting firms with innovative technologies and a significant probability of growth. Firms such as Intel, Microsoft, Sun Microsystems, Apple, and Digital Equipment were all supported by VC. In order to measure the success of the mentioned firms, their overall market capitalization, which was 369 billion U.S dollars in July 1997, can be considered. Furthermore, VC allows young founders in order to assign the financial risk to the venture capital company in case of a collapse of the business. Interchangeably, the founders capitulate a portion of their equity so that they mislay various probable returns on a possible departure of the venture (Breuer & Pinkwart, 2018).

Groh and Wallmeroth (2016) indicated that during the past century, the venture capital funding's behavior had encountered a captivating shift: the quantity of venture capital funding into developing markets has increased. This growth gives credibility to the fact that discovering the determinants of venture capital explicitly in developing markets' setting is worth following, and significant growth is expected in the coming years.

Dimov and Murray (2008) have stated that venture capital activity has developed swiftly in all leading economies and today enormous amount of risk capital are allotted yearly to enterprises with great potential and its acceptance amongst policymakers is emphasized by the fact that the speculation target for venture capital funds such as fundamental ideas and the fresh industries which they might spawn have substantial potential promise at the levels of the economy, the sector, and the discrete firm (Gompers, lerner, & scharfstein, 2005). The Wall Street Journal stated that in

September 2016, 150 unicorns existed, which are private venture-supported companies with an estimate of minimum one billion U.S dollars. In comparison with the testified 45 unicorns in January 2014, it suggests over 200% astonishing growth in no more than three years (Köhn, 2018).

On the whole, VC is known as a vital source of investment for entrepreneurial activities of countries (Kortum & Lerner, 2000), and a critical developing factor of economic growth and innovation. However, vast differences exist among countries in the approximate quantities raised and funded in venture capital (Bonini & Alkan, 2011).

2.2 Background, Definitions and Types of Venture Capital

The first proper VC company was American Research and Development (ARD), which was founded in 1946 by Karl Compton, President of MIT and General Georges F. Doriot, a Harvard Business School professor, and regional business directors. There were emerging technology-based companies established for Word War II that high-risk funding was made by that small group of founders in those companies (Gompers & Lerner, 2001).

VC is an area of investment in which encountered issues that appear less significant in public firms can become extremely important. Moreover, it requires a vigorous and inspired working relation that includes significant roles within portfolio firms taken on by venture capitalists where they have made the investment (Barry, 1994).

As indicated by Gompers (1996), the VC industry is mainly suitable for investigating the status and fundraising because the majority of VC firms raise capital in limited coalitions. These coalitions do not have infinite lifespans. Hence, a venture company

must regularly recapitalize through raising a novel limited coalition and recapitalize. Without raising a fresh fund, a VC firm would terminate operations. Moreover, Kortum and Lerner (2000) defined VC as equity-related funding in new, privately owned firms, where the venture capitalist is a financial mediator who typically acts as an administrator, a consultant, or even an executive of the company.

Jeng and Wells (2000), in their article, defined VC in the U.S expressions rather than European expressions. VC, similar to what they expressed, states the main sort of private equity funding. Private equity funding is investment by organizations or prosperous persons in both openly quoted and privately owned firms. Private equity financiers are further vigorously participated in administering their portfolio firms than normal, unassertive retail financiers.

Venture capital investments might be defined as equity funding in strictly owned private firms with no openly traded stock (termed portfolio firms) anticipated for a restricted amount of time. Moreover, financial mediators supplying venture capital typically provide administration backing and utilize control and direction (Schefczyk, 2001).

VC specializes in investment and fostering firms at the beginning of the development process that functions in technologically advanced industries (Da Rin, Nicodano, & Sembenelli, 2005). For these firms, the venture capitalist's proficiency, its understanding of the entrepreneurial procedure and markets, and its link of associates are significantly useful in order to aid reveal their development potential (Bottazzi, Da Rin, & Hellmann, 2009). In contrast, once VC is applied to firms at later phases of

their development, or in firms which function in technologically settled industries, there is a low chance for it to cause a difference (Michelacci & Suarez, 2004).

As indicated by Hand (2007), VC is a part of ordered private equity that usually capitalizes in new, high-tech companies. The regular funding made by venture capital in a firm is an illiquid desired stock which solely alters to liquid ordinary stock or money at two main withdrawal points— an IPO, or the firm's sale to another unit. Cumming (2006) also expressed that diversification, scope, and risk supervision are primarily vital for venture capital funds.

Venture capital plays a mediator role amongst donors and borrower's marketplaces, where it is unavoidable for these two to evade costs in order to become one. VC could fund the development of the product, marketing, extension, turnaround, staff buyout, and acquirement (Pintado, De Lema, & Van Auken, 2007). Cumming and Johan (2010) also specified that VC funds are refined value-added vigorous financiers that deliver strategic, financial, administrative, and marketing instruction to minor highly technological investee entrepreneurial companies.

The venture capital companies are financial intermediaries that collect funds from investors and allocate them to start-ups and small and medium enterprises. They are not only qualified financially. Many famous of them are specialized in an industry branch and have several years of experiment in their field of investment. Considering its definition, the venture capital is, first of all, a top balance sheet financing (Chaabouni, 2011). Moreover, Groh and Liechtenstein (2011) defined VC as a factor of supplying funds to companies who might not own the essential liberated monetary means, hence demanding external investment.

In the Europe, VC is defined as private equity funding, which is funding made by organizations or prosperous entities in openly traded and privately owned firms. In the U.S, VC is described as one precise sort of private equity financing. It includes three phases of startup, expansion-excluding, and investing-seed acquisitions (Bonini & Alkan, 2011).

Bottazzi et al. (2002) expressed that there are four types of VC known as seed finance as a minor investment which lets businesspersons validate whether their plan is going to be striking economically or not. Start-up finance is the one type to operationalize a company and absorbing employees, expansion finance stage in which venture financiers might help to discover further funding and suppliers, and the later stage finance is a type of investment to assist the company in becoming a leader in the marketplace.

Schertler (2003) also suggested that in the seed phase, the early business notion is shaped and samples of novel products are established and equated with the competitors' products exist in the marketplace. In the startup phase, manufacturing is initiated, and an early marketing promotion is started, the marketplace response to which is cautiously analyzed. In comparison with other phases of growth, for instance, the expansion phase, the seed and startup phase are immensely risky phases. In the extension phase, firms require huge extents of external investment since the flow of money commonly does not generate adequate liquidity for the interior investment of the firms' growth.

Venture capitalists are believed to be vigorous financiers, following activities like monitoring and impacting strategic assessments of the company by administrative

rights and holding board seats (Jeng & Wells, 2000). They venture in private firms for two to at last seven years (Cumming, Fleming, & Schwienbacher, 2005). Furthermore, Bottazzi, Da Rin and Hellmann (2009), stated that VCs perform a value-adding character in the firms they invest, both via contracting and offering hugely non-contractible inputs, for instance guidance and support.

Besides investment, the most crucial impact of a venture capitalist on a startup is to control, adding value and managing risk. Their non-monetary strategic worth is as vital as the financial value they offer (Wang, Wuebker, Han, & Ensley, 2012). The ability of a venture capitalist in order to enhance value is more replicated by the length of the financing (Cumming & Johan, 2010).

Venture capitalists concentrate their funding on firms in order to deliver rigorous monitoring services. Persistent with their role of monitoring, the venture capitalists acquire intensive equity positions, sustain their financing further than the IPO, and aid on their portfolio firms' boards (Barry, 1994). They evaluate prospective agency and monitoring expenses when deciding how often they should reassess projects and provide capital (Gompers P. , 1995), and Early-phase firms that allure venture capital investment could benefit from the venture capital's experience, network of relations, comprehension of the entrepreneurial procedure, and knowledge (Lerner, 1995).

Experienced venture capitalists have networks of associates from emerging earlier investments that could help the company in supplying materials, attaining marketing amenities or else, pinpointing clients, and classifying further sources of financing (Cumming & MacIntosh, 2015).

As specified by Cumming and MacIntosh (2015), venture capital managers are significantly specialized financiers whose abilities are three-fold. Firstly, they are specialists in assessing entrepreneurial firms and choosing only the utmost promising to finance in. Secondly, once financed, they are value-added instead of merely passive financiers. Thirdly, they have particular proficiency in selecting both the arrangement and the scheduling of their withdrawal from the funding. Moreover, Hain, Johan, and Wang (2015) stated that VCs are expert financial mediators who integrate their exclusive combination of technological capability and financial abilities, to offer both monetary and administrative aid for entrepreneurs in creative ventures.

2.3 The Spread of Venture Capital to the Europe

Notwithstanding the demonstrated usefulness of VC, there are apparent spatial differences in venture capital activities around the world. The variations are severe even between advanced countries (Groh, Liechtenstein, & Lieser, 2008). The VC industry took place in the U.S and then deployed across the world (Bruton, Fried, & Manigart, 2005). Groh and Liechtenstein (2011) asserted that while venture capitalism was initiated in the U.S, numerous countries have pursued and turned VC into a worldwide phenomenon.

As indicated by Jeng and Wells (2000), in the U.S venture capital has acted as the driving power for numerous active areas of the United States economy during the prior two decades and has been used as a mean in promoting the enormous growth of companies including Compaq, Oracle, and Sun Microsystems, which all of them started to work less than twenty years ago and became influential performers in the great technology platform.

Ooghe and Manigart (1991) declared that while the industry started to systematized in the U.S, it commenced emerging in European countries. First venture capital activity happened in the U.K at the end of the 1970s, and it started on the continent of Europe in the 1980s.

It is implausible that the U.K, as the most exceptional and sophisticated VC provider in Western Europe, is designated by a near-universal departure from finance in novel technology-based companies (Lockett, Murray, & Wright, 2001). Besides stated by Bottazzi et al. (2002), venture capital has notably prospered during the preceding decades in the U.S However, this occurred limited in the Europe where strategy creators are trying to maintain flow more equities into this sort of businesses.

Although venture capital has been advantageous to the formulation and expansion of numerous firms in the United States, and it generated a lot of employment opportunities in the few past years, the VC marketplace in European countries is less evolved (Guerini & Quas, 2015). Furthermore, Grilli, Mrkajic, and Latifi (2018) declared that the U.S is the pathfinder and the conductor of VC by far and just a few of countries such as the U.K or Sweden, have more active venture capital markets, on the opposite, continental European nations have conferred approximately limited activity.

Moreover, as stated by Groh, Liechtenstein and Lieser (2008), while in the U.S there is an active market for VC, but it’s shallow in Germany as one of the most prominent Western European economies and United Kingdom as the most active European countries in venture capital industry, and it shows that VC should be encouraged more in these countries. The Lisbon Programme reported that in the Europe, there was an

obstacle in the process of planning and developing businesses because of limited availability of finance. Also, a poll published by Eurobarometer in 2005 indicated that a lot of small and medium-sized enterprises (SMEs) face so many difficulties in order to obtain bank loans (Schröder, 2009). Cherif and Gazdar (2011) argued that while the United States has the most comprehensive and advanced VC market around the world, in European countries this industry lately started to grow, and various administrative projects exist which are anticipated to boost up the expansion of the European markets further. By providing some statistics, Grilli and Murtinu (2014) indicated that the evolution of venture capital markets in the European states was dramatically diverse from the extension that is encountered in the United States. The proportion of venture capital and private equity financings was determined to be 17 percent in the Europe and 67 percent in the U.S in the year 2009. Furthermore, in the U.S, the amount of venture capital funding raised augmented by a factor of 80 from the year 1990 to 2000. However, this number was only 12 for the Europe in the same period and compared to the U.S a less significant share of GDP is invested in venture capital in the Europe (Bottazzi, Da Rin, Ours, & Berglöf, 2002).

The dissimilarities have mainly clarified this substantial alternative in the conditions of the stock market, detailed principles, or further individual characteristics of the setting where the venture capital happens. Black and Gilson (1998) and Megginson (2004) stated that the severest dissimilarities amid the VC and secluded equity markets of the U.S and the Europe associate with how the financing vehicles. The U.S has both formal VC capitals and angel capitalists. However, across the Europe, secluded equity funds have conventionally been ordered as financing firms has been a lot similar to the responsive form of U.S. Megginson (2004) also stated that a reason which institutional

VC funding has been hugely productive historically, mostly in the U.S, is that these companies' managers have a tendency to finance solely in industries that have several competitive advantages, and also where the trademark of active involvement in portfolio firm management could generate real economic worth. Traditionally, European venture capital has been directed to dissimilar industries and divergent sorts of firms than in the US, though lately, this has been altering. Milosevic (2018) asserted that in an effort to duplicate the U.S attainment, a lot of European countries had set various creativities to boost up their particular VC markets. However, after two decades of attempts, still, the U.S is admired for its accomplishment. One of the main contributing factors for weaker efficiency of European VC industry is low human capital, flagging both firm choices (Wright, Lockett, Clarysse, & Binks, 2006) and value adding of behavior (Sapienza, Manigart, & Vermeir, 1996).

Grilli et al. (2018) executed study in the European setting that denotes a good case because of the tremendous differences in the extent of VC industry improvement regardless of active contribution of both national governments and specialists in the Europe.

2.4 Determinants of Venture Capital Investments

Although by today it is significantly admitted that VC industry, not only is advantageous but also plays an indispensable role in fostering a lot of countries' economy and in the last two decades level of VC around the world has grown up remarkably (Bonini & Alkan, 2011), although there are still considerable differences across nations in the relative volume of venture capital investment, which can be a result of various factors affecting VC funding, both directly and indirectly. These differences can be described in venture capital activities when we refer to the

determinants impacting these sorts of businesses (Félix, Pires, & Gulamhussen, 2012). Furthermore, these researchers deliberated that as shown by the Global Entrepreneurship Monitor (GEM), there is a vast dissimilarity between the entrepreneurial circumstances of the USA and Europe and all these variances clarify studying which determinants affect the European venture capital activity in more details while little empirical researches have been done about replying to the proposed question.

2.4.1 Macroeconomic Determinants

Startup of new businesses is noticeably formed by fluctuations in macroeconomic factors (Audretsch & Acs, 1994). Particularly, enlargement in macroeconomic acts as a promoter for startup activities and in times of macroeconomic development, we can see an increase in the new firm startup in almost every industry. On the other hand, these activities come to be lethargic during depressions.

Jeng and Wells (2000) are one of the first researchers who started to work on the factors which affect venture capital activities across the markets. They examined these determinants for about 21 countries (mostly European) in 1986 through 1995 and by employing panel data analysis and started to propose the effect of GDP, initial public offerings (IPO), growth in market capitalization, accounting principles, government plans, labor market strictness and private pension funds on VC investments. The obtained results showed that the most critical determinant of venture capital investing are IPOs. Levels of the pension fund have a substantial impact over time but not from country to country. Unexpectedly, market capitalization and GDP were not significant. Although Gompers and Lerner (1999), have studied the same contributing factors in another period, and they have found a positive and statistically significant coefficient

for GDP and stock market capitalization. They also involved interest rate in their study, which was positively related to venture capital intensity.

Schertler (2003), in her working paper, detected factors driving VC activity across Western European countries by using dynamic panel estimations, which contains data for 14 countries from 1988 to 2000. The studied elements were GDP, the fluidity of stock markets, labor market inelasticity, and endowment in human capital. The results exposed that these elements do not distress expansion stage funds, whereas they positively impact early stage. Hence, the outcomes propose that liquid stocks play a vital role in venture capital development.

Another study conducted by Romain and La Potterie (2004), explored the determinants of venture capital in 16 OECD countries between 1990 and 2000. The number of exclusive rights and the stock of knowledge as pointers of technological opportunity displayed a positive and significant impact on the relative levels of VC and labor market inflexibilities decreased the influence of GDP growth rate. Their results indicated that interest rates, either short-term or long-term, have a positive effect on VC amount. This study also showed that interest rates are relatively more connected to the demand for VC, which is from entrepreneurs, and not that much related to the demand side. In addition, Jagwani (2008) used the interest rate variable during different periods and found that it is in synchrony with the theoretical bases regarding the impact on the VC offers.

Cherif and Gazdar (2011) studied the determinants of VC investments across European countries over 1997-2006 via panel data method of estimation. In addition to the factors introduced before, for the first time, they tested the effect of the institutional

environment. They found that growth in GDP, R&D expenditures, stock market capitalization, and rate of unemployment are the greatest macroeconomic determining factors of VC funding across the Europe. While the first three ones were positively related to VC, the unemployment rate was negatively connected with these sorts of investments.

Chaabouni (2011) proposed that literature at all times expressed a positive correlation between an offer for venture capital and economic growth, which can be an outcome of growth in GDP. By referring to the economic theory, he also stated that low-interest rates would have a negative effect on the offers for venture capital since inventing small and medium enterprises have low-cost resources which don't attract venture capital.

In another study conducted by Félix et al. (2012), the analysis showed a positive and statistically significant relationship between GDP growth and interest rate with venture capital funding. They declared that nevertheless, the interest rate has an impact on the cost of capital and is therefore anticipated to affect the choice to run a new business. Unemployment rate and market capitalization turned out to be negative and statistically significant factors that affect VC. However, they have discussed that the effect of unemployment rate on VC activities can be ambiguous since for an unemployed person the opportunity cost of generating a new company is less when there is a high rate of unemployment which increases motivation to be an entrepreneur. In total, they expressed that this factor affects the demand side of VC funding in a positive way while this relationship is negative for the supply of VC.

Groh and Wallmeroth (2016) expanded Jeng and Wells (2000) frame by using accumulated venture capital funding from 2000 to 2013, across 118 countries, which 78 of them are considered as emerging. They illustrated that legal rights, merger and acquisition activity, innovation and security of investor, protection of IP, bribery, unemployment and corporate taxes have an impact on VC activity and they claim that determinants of venture capital may differ along with the progressive phase of a country in developed and developing nation, for example, exports are significant factors but only in developed economies.

2.4.2 Political Risk (Internal Conflict)

In this study, internal conflict is used as a proxy to examine the effect of political risk on the venture capital intensity. Unexpectedly, there are not so many studies addressing the impact of this factor on VC funding, since for political risk a set of standardized and reliable measures are not easy to find and also tracking down of a consistent set of political stability might be so complicated. Political risk arises when in a country government's procedures can be quickly altered in doing business, regulations on price and product and taxation (Bonini & Alkan, 2011).

As indicated by Porta et al. (1998), political risk can be taken into account as one of the critical determinants influencing the level of development in the economy and investment in a country. Also, Henisz and Delios (2001) expressed that companies are likely to avoid funding in high uncertainty, and political organizations are vital contributing factors in eluding this insecurity in a particular place to absorb investments.

Bonini and Alkan (2011) in their paper introduced and examined a further determinant as political and legal drivers of variances in venture capital funds, and by using the

International Country Risk Guide, they select mostly internal conflict, socioeconomic environments, and corruption as proxies for political risk, which is highly interrelated with VC investments. The outcomes displayed durable and positive impacts of a satisfactory innovative and sociopolitical atmosphere on the foundation and expansion of VC activity.

Moreover, findings from Jens (2017) provided some empirical indications that countries within the United States are influenced by political risk, rather than uncertainty in the economic state, and also it was shown that funding activities associated to speculation are suspended in periods of higher political insecurity.

2.4.3 Financial Development (Domestic Credits Provided by Banks)

In the literature, there are so many discussions on the role of banks and the credits they provide, on financial development and the volume of venture capital activity in different countries. The amount of credits banks provide is also a good indicator of financial development, which can affect both economic growth and VC markets at the same time.

In one hand, Tyebjee and Vickery (1988) expressed that banks are a noteworthy source of venture capital funding in the Europe, while in the U.S banks are not the major well-head for these sort of funds. Bottazzi et al. (2002) pointed out that European venture capital is dominated by funding from financial institutions (mainly banks), which remain the largest source of funding. Stultz (2000) argued that banks are more effective in providing external resources to new, innovative activities that require staged financing because banks can credibly commit to making additional funding available as the project develops.

Hellmann et al. (2008) expressed that banks' relationships with the venture capital industry can be mutually profitable in the credit market. This highlights the vital characteristics of banks' investments in the VC market, although, laws or vaster risk objection might affect banks' activities. As expressed by Nwokoye et al. (2015), in Nigeria credits by banks to the private sector is a substantial driver of investments but just for a short run.

On the other hand, some observers argued that banks typically fail to provide value-adding support, and Bottazzi et al. (2008) provided some supporting evidence from European venture capital deals. Since banks are less skillful investors and provide insufficient monetary incentives for their venture managers (Hellmann, Lindsey, & Puri, 2008). Moreover, Hsu, Tian, and Xu (2014) used domestic credit delivered by the banking sector as a proxy for the credit market development as banks are dominant in credit markets. They also used stock market capitalization as a proxy for the equity market. By using panel data mostly on Western European countries, they found that development in equity market encourages invention in businesses that require external funding and development in credit market discourages novelty in these activities. Compared with equity markets, credit markets are less likely to promote innovation in high tech industries for two reasons. First, banks are excessively concerned with avoiding risky activities and failures. Therefore, their control could lead firms to under-invest in innovative projects with high uncertainty (Stiglitz, 1985).

Black and Gilson (1998) proposed that Germany and Japan are similar in the fragility of their VC industries and this reinforces the observed support for the assertion that bank oriented VC markets do not have stable venture capital business. On the other hand, the U.S and U.K which have market-based systems illustrate that stock market

systems are more expected to motivate and support new technologies (Beck & Levine, 2002). Beck and Levine (2002) also found limited signs that financial development supports the start-up in R&D concentrated industries.

As conveyed in literature, financial development and its legitimate determinants support industries which are externally dependent and help the start-up of new institutions to grow quicker, and banks as an essential channel for development in the financial status of a country have a significant role in this procedure.

Chapter 3

DATA AND METHODOLOGY

For the empirical analysis, a panel data on nine Western European countries including Germany, France, Ireland, Netherlands, Switzerland, United Kingdom, Belgium, Austria, and the Czech Republic is collected throughout 2007-2017. These countries have been chosen based on the availability of the data in the tested period and the fact that little empirical studies have been conducted on this sample. The data are gathered from different sources, including the World Bank, OECD annual database, and the political risk services (PRS) database.

Furthermore, there are six forthcoming factors collected as the independent variables and one dependent variable: Annual GDP values for each country are in constant 2010 US$, stock market capitalization, and domestic credit by banks provided to the private sector which is used as the proxy for financial development are collected from the World Bank database. Annual lending interest rates, unemployment rates and also the dependent variable that is total venture capital investments are collected from annual statistics by OECD database. Internal conflict employed as an indicator for political risk, was obtained from Political Risk Services database which is given in index that varies from 0 to 12 where higher values indicate superior quality of political environment.

Moreover, given the nature of the data collected a panel data regression is conducted to check both time and sectional relationships. All of the variables are in percentage of GDP. By expressing the variables in terms of GDP, the effect of inflation is eliminated.

3.1 Variables Description

3.1.1 Dependent Variable (Venture Capital Investment)

This variable characterizes the quantity of total venture capital funds into a particular country for a specific year as a percentage of GDP.

3.1.2 GDP growth

The first determining factor of VC funding is the annual rate of growth in the gross domestic product (GDP), which is used as a percentage of GDP and states how quick the economy is improving. According to Félix et al. (2012), if the economy is expanding, there are naturally more attractive opportunities for entrepreneurs, leading to the emergence of more new companies.

3.1.3 Interest rate

It represents the yearly real interest rate, that is the lending interest rate as a percentage of GDP to adjust inflation. Findings by Gompers and Lerner (1999) showed that the interest rate affects the VC demand positively. However, Romain and La Potterie (2004) noticed that interest rates either short or long, impact the demand of VC more than its supply part.

3.1.4 Unemployment rate

The unemployment rate can explain entire unemployment in the proportion of the whole labor force or the percentage of populations of a country who are active economically. Based on the study conducted by Félix et al. (2012), we assume that influence of unemployment rate on VC investments is equivocal. However, as Groh

and Wallmeroth (2016) and Cherif and Gazdar (2011) found a negative impact on VC by this factor.

3.1.5 Stock market capitalization

It can be defined as the percentage of changes which occur in stock market capitalization. It is equivalent to the estimation of recorded local organization stocks in every nation state's significant stock trades as the GDP percentage. Gompers and Lerner (1999) and also Cherif and Gazdar (2011) found a positive relationship between stock market capitalization and VC investments.

3.1.6 Internal conflict

Another variable used is an index of internal conflict which can be used as a proxy for political risk of a country. The internal conflict constitutes of accumulation of the ratings of three subdivisions: threats of rebellion or civil war, political severity, and civil chaos. This measure varies from 0 to 12, where higher rates symbolize more exceptional quality, which in this sample it implies an inferior level of conflicts (Bonini & Alkan, 2011).

3.1.7 Domestic credits provided by banks

The last variable, banks credits to the private sector which is defined by Schröder (2009) as the equal worth of loans provided by banks in the percentage of GDP, and exemplifies it as the financial system and mentions that this system plays a substantial and positive role in creating and absorbing early-stage VC. There are so many deliberations on the impact of this variable, but with regards to the literature, we also anticipate the positive effect of domestic credits by banks on venture capital investments.

3.2 Methodology

3.2.1 Unit Root Test for Panel Data

First of all, the unit root test or testing for stationary was conducted, which is very important in analyzing panel data since the whole outcomes for the regression may be misinterpreted if we do not do a prior check for the data.

There is a broad literature on examining the unit root test for time series data, although recently some methods have been proposed for panel data as well. In all of the previous studies, the unit root is a null hypothesis to be examined, and there is the fact that standard hypothesis testing is conducted to make sure the null hypothesis is affirmed unless there is enough evidence to reject it and accept that all the variables are stationary (Hadri, 2000). Since the publication of the study conducted by Levin and Lin (1993), the usage of unit root tests for panel data has become widespread among observational researchers who work with a panel data set (Maddala & Wu, 1999). They designed an adjusted t-test for different panel data models to test the unit root, which gained a considerable reputation in applications and has regularly been utilized in macroeconomics and also international finance (Choi, 2001).

Later, a study by Levin, Lin, and Chu (2002) revised the earlier work conducted by Levin and Lin (1993). They placed a method employing a cross-section time series to examine the null and alternative hypothesis against each other. As both the time-series and cross-section dimension of the panel data become large, the statistic of the unit root test holds a standard limiting distribution. The Levin, Lin, and Chu (2002) test treat panel data as being comprised of homogenous or analogous cross-section, hence

conducting the test on a merged data series. The unit root test for panel data is estimated based on the following equation:

$$y_t = p_i y_{i,t-1} + z_{it}\gamma + u_{it} \quad (3.2.1.1)$$

In this sense, the LLC test is proposed as $H0: p = 1$ against the alternative hypothesis that is $H1: |p| < 1$.

Another unit root tests operated in this thesis are Augmented Dickey-Fuller (ADF) and Phillips-Perron (PP) which are common in testing for stationary for the panel data. There are two types of the Dickey-Fuller test known as simple and the Augmented Dickey-Fuller or (ADF) test. To remove the autocorrelation, the ADF test includes lagged terms for the tested dependent variable. (Asteriou & Hall, 2015). ADF test includes the estimation of one of the three followings:

$$\Delta X_t = \beta X_{t-1} + \sum_{j=1}^{p} \delta_j \Delta X_{t-j} + \varepsilon_t \quad (3.2.1.2)$$

$$\Delta X_t = \alpha_0 + \beta X_{t-1} + \sum_{j=1}^{p} \delta_j \Delta X_{t-j} + \varepsilon_t \quad (3.2.1.3)$$

$$\Delta X_t = \alpha_0 + \alpha_1 t + \beta X_{t-1} + \sum_{j=1}^{p} \delta_j \Delta X_{t-j} + \varepsilon_t \quad (3.2.1.4)$$

Where for all three equations j stands for the number of lags and β is the coefficient of interest.

A simple random walk is proposed in the equation (3.2.1.2) with no intercept and no trend under the null hypothesis (H_0) . However, this form is not favored since it is not likely to occur in practice (Asteriou & Hall, 2015). The next equation (3.2.1.3), illustrates a random walk with drifts model that is with an intercept but no trend under the null hypothesis. Equation (3.2.1.4) is conducted for the model with both intercept and linear trend, which its definitive coefficients show the power of this model (Campbell & Perron, 1991). The notable distinction amongst these regressions are the

deterministic parts α_0 and $\alpha_1 t$, which α_0 stands for a drift term and a linear time drift is shown by $\alpha_1 t$. Variable attributes show which of the equations should be used. To ensure that there is no correlation in the error terms, lagged terms are included in the comparison.

The null hypothesis of $(H_0: \beta = 0)$ indicates that there is a unit root in X_t and this hypothesis can be rejected if β is considerably negative ($\beta < 0$). Rejecting the null hypothesis specifies that there is no unit root and data are stationarity. If the H_0 cannot be rejected, the test is carried on the variations of the order X_{t-1}, and differencing is maintained until the null hypothesis can be rejected (Dickey & Fuller, 1979).

Phillips-Perron test estimates the autonomous and equal division of error terms. In the existence of low autocorrelation and also heteroskedastic residual, PP tests act stronger than the Augmented Dickey-Fuller. Another difference is that PP tests do not apply lagged terms to constrain autocorrelation, unlike the ADF. The following model is used in PP test:

$$\Delta y_t = \alpha_0 + \gamma X_{t-1} + \varepsilon_i \qquad (3.2.1.5)$$

Where the null hypothesis of $H_0: \gamma = 0$ is contrary to the alternative hypothesis that is $H_0: \gamma < 0$, and if the test value is higher compared to critical value, rejection of the (H_0) is failed which means there is a unit root in the series.

3.2.2 Fixed Effect Regression

For the panel data regression, partial least squares (PLS) model under fixed effect (FE) regression is used as it has been confirmed through a standard likelihood ratio test that rejected the null hypothesis which is cross section effects are not linked with the

descriptive variables. The likelihood ratio test is frequently done to check whether fixed effect estimation is the appropriate model to use.

The standard FE model presumes that all of the data in the panel have equal variance (homoscedastic errors) also there is not any correlation during the time period, whether across or within the panel data (Bonini & Alkan, The political and legal determinants of venture capital investments around the world, 2011). Also our panel data regression is based on the following created model:

$$\log(VC) = \beta_0 + \beta_1 \log(GDP) + \beta_2 \log(INTEREST) + \beta_3 \log(STOCK) + \beta_4 \log(UNEMP) + \beta_5 \log(DC) + \beta_6 \log(CONFLICT) + \varepsilon it \quad (3.2.1.6)$$

Where log (VC), log (GDP), log (INTEREST), log (STOCK), log (UNEMP), log (DC) and log (CONFLICT) are denoting total venture capital investment, annual gross domestic product constant 2010 US$, annual rate of real interest rate, stock market capitalization in a percentage of GDP, unemployment rate in percentage of total labor, domestic credits by banks and total internal conflict respectively, and t denotes the time series dimension (years).

The fixed effect regression is often used to decrease selection prejudice in the estimation of causal forces in the data by excluding large parts of variation assumed to include confounding factors (Mummolo & Peterson, 2018). When items in panel data are assumed to vary analytically from each other in an undetected way which influences the favorable outcome, fixed effects are applied as they remove all the variation between units, and produce an estimation of a variable's impact within items over time (Wooldridge, 2010).

The explanation behind the fixed effect estimate is clear and practical, which describes why it is frequently used in many orders. To withdraw the dilemma of heterogeneity, all higher-level variations, and any within effects are checked out using the higher-level items themselves (Allison, 2009). Since fixed-effect models only consider within impacts, they cannot undergo heterogeneity bias. By using FE, researchers not only make a methodological decision but a genuine one, by restricting the analysis to a distinct dimension of data, for instance, overtime or within-country variations (Bell & Jones, 2015).

3.2.3 Granger Causality Test

After obtaining the appropriate outcome from the regression Granger causality test was conducted to check the direction of the relationship between variables. Granger Causality test is developed on F-test that measures whether variations in one variable lead to a change in the other variable. The variable "X" is a Granger cause for variable "Y" if the previous value of X assist in forecasting the contemporary value of Y. This test might be described using a simple Vector Autoregressive model:

$$y_t = \beta_1 y_{t-1} + \beta_2 y_{t-2} + \cdots + \beta_k y_{t-k} + \alpha_1 x_{t-1} + \alpha_2 x_{t-2} + \cdots + \alpha_q x_{t-q} + u_t \quad (3.2.1.7)$$

$$X_t = \lambda_1 y_{t-1} + \lambda_2 y_{t-2} + \cdots + \lambda_k y_{t-k} + \delta_1 x_{t-1} + \delta_2 x_{t-2} + \cdots + \delta_q x_{t-q} + u_t \quad (3.2.1.8)$$

Consequently, the below hypotheses are established in the Granger causality test by assessing VAR model:

The null hypothesis of $H_0: \alpha_1 = \alpha_2 = \cdots = \alpha_p = 0$, indicates that X does not Granger cause Y and alternative hypothesis of
$H_1: at\ least\ one\ of\ the\ \alpha\ coefficients \neq 0$ which states X does Granger cause Y.

Chapter 4

EMPIRICAL RESULTS

In this chapter the findings and main empirical results obtained through the analysis are presented. As the first test, table 4.1 displays the results attained from testing unit roots for stationarity.

Table 4.1: Unit Root Test

Variables	LLC	PP	ADF
LNVC			
τ_T	-3.29*	34.60*	27.87*
τ_μ	-3.93*	39.78*	38.20*
τ	-6.39*	8.64	27.02*
LNGDP			
τ_T	-10.62*	38.19*	46.87*
τ_μ	4.13	0.10	0.53
τ	4.39	0.39	0.60
LNSTOCK			
τ_T	-14.73*	120.26*	82.83*
τ_μ	-8.76*	54.41*	52.44*
τ	2.71	13.17	4.86
LNUNEMPLOY			
τ_T	-18.51*	26.41*	31.32*
τ_μ	-1.48*	9.12	16.87
τ	-2.07*	25.37*	24.15*
INTEREST			
τ_T	-3.59*	33.78*	25.48*
τ_μ	-1.56*	7.09	4.60
τ	-7.07*	77.17*	61.71*
LNDC			
τ_T	-4.44*	45.11*	25.32*
τ_μ	-4.23*	41.50*	31.60*
τ	-0.27	31.73*	27.44*
LNCONFLICT			
τ_T	-9.45*	0.35	12.98*
τ_μ	-27.29*	8.31*	23.56*
τ	2.17	0.18	0.19

Note: τ_T represents the most general model with a drift and trend; τ_μ is the model with a drift and without trend; τ is the most restricted model without a drift and trend. Optimum lag lengths are selected based on Schwartz Criterion. * denotes rejection of the null hypothesis at the 10 percent level.

Table 4.1 illustrates the results of the unit root test. As displayed in the table, three different tests such as LLC, PP, and ADF have been conducted by applying individual intercept and trend, single individual intercept and no trend and intercept as well. For the unit root test, the null hypothesis indicates that there is a unit root in the series, and the alternative hypothesis states that variables are stationary at their level forms. Based on table 4.1, it can be observed that overall results are significant, which means there is enough evidence to reject the null hypothesis. In other words, all the variables are stationary at their level forms, or all the variables are integrated of order zero.

Table 4.2: Descriptive Statistics

	LNVC	LNSTOCK	LNGDP	LNDC	LNCONFLICT	INTEREST	LNUNEMP
Mean	-3.6983	3.9719	27.4526	4.4814	2.3576	2.6796	1.8957
Median	-3.5404	3.9881	27.2130	4.5491	2.3513	2.5887	1.9333
Maximum	-2.5383	4.8862	28.9878	5.2698	2.4849	9.5775	2.7375
Minimum	-6.9077	2.8752	26.0364	3.6600	1.8718	0.0900	1.0615
Std. Dev.	0.8085	0.5509	1.05785	0.3949	0.1171	1.7063	0.3374
Skewness	-2.0332	-0.1613	0.14615	-0.0874	-1.9840	0.7281	0.2871
Kurtosis	7.3531	1.8799	1.43038	2.3196	8.3313	4.3606	2.9909

Table 4.2 shows the summary of descriptive statistics for the six independent variables and also the dependent variable. The highest value of mean relates to GDP growth with the number of 27.4526 and the lowest one is for VC with the value of -3.6983. Again the maximum value is for GDP and the minimum is -6.9077 which shows VC.

Table 4.3: Correlation Analysis

	LNVC	LNSTOCK	LNGDP	LNDC	LNCONFLICT	INTEREST	LNUNEMP
LNVC	1.0000						
LNSTOCK	0.4890	1.0000					
LNGDP	0.4176	0.5597	1.0000				
LNDC	0.5507	0.4436	0.4610	1.0000			
LNCONFLICT	-0.0940	-0.2476	-0.4562	-0.3989	1.0000		
INTEREST	0.1779	-0.1394	-0.2241	0.2255	-0.1165	1.0000	
LNUNEMP	0.2941	0.1806	-0.0458	0.0818	0.0737	0.2961	1.0000

Table 4.3 contains the results for the matrix of correlations which shows to which extend potential determinants of VC investment are correlated to each other, and the explanations of the variables are equal to those in Table 1. In case of correlation with the dependent variable, domestic credit with a value of 0.55, stock market capitalization (0.48) and GDP (0.41) have the highest numbers which are moderately correlated to venture capital. Interest rate (0.17) and unemployment rate (0.29) show a weak correlation. Moreover, internal conflict (-0.09) is correlated with VC investments in a negative and weak way. Because the maximum correlation found between independent variables in absolute values is 0.55 (between stock market capitalization and GDP), and the rest are less than 0.50, outcomes shown in table 4.3 do not specify any severe multicollinearity.

Table 4.4: Residual Cross Section Dependence

Test	Statistic	Prob.
Breusch-Pagan LM	32.78641	0.2437
Pesaran scaled LM	0.639611	0.5224
Bias-corrected scaled LM	0.195167	0.8453

Cross sectional dependence is considered a serious problem in the panel data analysis. Hence before regression a residual cross section dependence test was conducted by applying three different tests shown in the table 4.4, which represents the results. Since they are not significant, the null hypothesis of there is no cross sectional dependence in the data cannot be rejected which confirms to continue the rest of analysis.

Table 4.5: Redundant Fixed Effect

Effects Test	Statistic	Prob.
Cross-section F	9.126625	0.0000
Cross-section Chi-square	54.160425	0.0000

Table 4.5 shows redundant fixed effect test to test cross-section fixed effects. Since all the results are significant, the null hypothesis of the fixed effect is not suitable can be rejected which means that FE is appropriate for the collected data. That is why the panel least squares is applied under fixed effect regression.

Table 4.6: Cross Section Fixed Effect

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	-18.74091	2.800408	-6.692208	0.0000
LOG (GDP)	0.212507*	0.046233	4.596405	0.0000
LOG (DC)	0.778932*	0.199996	3.894739	0.0002
LOG (UNEMP)	0.369582***	0.200574	1.842624	0.0694
LOG (STOCK)	0.251437*	0.078723	3.193939	0.0021
LOG(CONFLICT)	1.568468*	0.456007	3.439571	0.0010
INTEREST	0.104141**	0.049704	2.095218	0.0396

Table 4.6: Cross Section Fixed Effect Test (continued).

R-squared	0.485334	Mean dependent var	-3.712572
Adjusted R-squared	0.443033	S.D. dependent var	0.778455
S.E. of regression	0.580963	Akaike info criterion	1.835172
Sum squared resid	24.63878	Schwarz criterion	2.043599
Log likelihood	-66.40689	Hannan-Quinn criter.	1.918737
F-statistic	11.47328	Durbin-Watson stat	0.945368
Prob (F-statistic)	0.000000		

Table 4.6 displays result from fixed-effect regression conducted on our panel data sample where * indicates significance of variables at 1 percent level, ** in 5 percent and *** in 10 percent level. According to the findings all of the variables are significant and the value of adjusted R-squared indicates that independent variables can explain 44 percent of the changes in the dependent variable (VC funding).

GDP growth shows a positive and statistically significant coefficient (0.21), which reveals that growth in GDP helps to expand venture capital investment. This result is in line with the opinions of Romain and La Potterie (2004), Félix et al. (2012), Cherif and Gazdar (2011) and Chaabouni (2011) who discussed that growths in the real GDP results in more commitments to VC funds. Since expansion in the economy will create more opportunities for entrepreneurs and increases the number of start-ups and consequently leads to more VC activity GDP growth is considered as one of the most important elements affecting venture capital funding. On the other hand, our result is contrary to Jeng and Wells (2000), who found that GDP growth does not show a significant effect as a determinant of VC investment.

Domestic credits provided by banks reveals a strong positive and significant relationship (0.77), which demonstrates that banks play a vital role in providing VC

investment and the higher credits they provide results in greater intensity of VC funds. Also the findings are in conformity with the previous studies such as Stultz (2000) and Hellmann et al. (2008) who were also supporting the role of this variable in expanding financial development and venture capital subsequently. They have also mentioned that banks as an essential channel for this development in a country can be conductive to VC investments.

Surprisingly for the unemployment rate our result shows a positive and statistically insignificant coefficient (0.36) on VC investment which is also consistent with the finding by Audretsch and Acs (1994) who obtained a positive and significant impact for the rate of unemployment on venture capital investment and they stated it can be conductive to the start-up of new-firms. Furthermore, discussions by Félix et al. (2012) expressed that unemployment rate might have a positive effect since for an unemployed person who wants to start an innovative firm the opportunity cost of capital for creating a new business is lower comparing to employed individuals. Although it is opposing to Cherif and Gazdar (2011), Groh and Wallmeroth (2016) results who have found a positive and significant relationship between this variable and VC intensity. A negative and significant coefficient for unemployment rate was expected in this thesis as well.

In the case of growth in stock market capitalization the result from regression shows a positive and also significant relationship with value of (0.25) and our finding is in line with Gompers and Lerner (1999) and also Félix et al. (2012) results which indicated that upsurges in this factor resembles an increase in VC funding since the any growth in stock market capitalization results to increase in funding available for investors and

entrepreneurs. It also worth mentioning that market capitalization growth can illustrate a good state of the economy in a country.

Internal conflict as an indicator for the political risk of a country shows a positive and statistically significant impact on venture capital investments with the coefficient of 1.56. The reason behind a positive relationship for this variable, is that internal conflict is used as an index which varies from 0 to 12, and higher values indicate the excellent quality or in another word, less volume of political risk. In this thesis sample, almost all of the countries have high values (close to 12), that means they have a minor amount of internal conflict and also political risk. To this end, the positive coefficient reveals that low political risk shown in the sample is constructive for VC funding. This is worthy of mentioning that this result is consistent with studies by Bonini and Alkan (2011) as well as Jens (2017) who have discussed that lower political risk results in higher VC intensity.

At the end, according to the obtained result, the importance of real interest rate as a determining factor of VC market in Western Europe is confirmed since a positive and significant impact for this variable was found. It should be noted that Jagwani (2008), Romain and La Potterie (2004) and Chaabouni (2011) also obtained a positive effect of interest rates on VC intensity. Moreover, as expressed by Félix et al. (2012), interest rate has an obvious impact on the cost of capital and therefore it is anticipated to affect the choice of becoming an investor and the higher interest is favorable for them to put the capital in the projects. Moreover, as stated by Chaabouni (2011), in line with the economic theory low interest rates must have a negative effect on offers for venture capital.

Table 4.7: Granger Causality Test

Null Hypothesis:	F-Statistics	Prob.
LNSTOCK does not Granger Cause LNVC LNVC does not Granger Cause LNSTOCK	2.61467 1.75374	0.0598 0.1663
LNGDP does not Granger Cause LNVC LNVC does not Granger Cause LNGDP	3.24229 1.48379	0.0285 0.2286
LNDC does not Granger Cause LNVC LNVC does not Granger Cause LNDC	2.12104 0.33515	0.1076 0.8000
LNCONFLICT does not Granger Cause LNVC LNVC does not Granger Cause LNCONFLICT	0.14329 1.57748	0.9336 0.2048
INTEREST does not Granger Cause LNVC LNVC does not Granger Cause INTEREST	3.58559 1.59119	0.0191 0.2015
LNGDP does not Granger Cause LNSTOCK LNSTOCK does not Granger Cause LNGDP	3.01985 0.35762	0.0371 0.7838
LNDC does not Granger Cause LNSTOCK LNSTOCK does not Granger Cause LNDC	1.58622 1.15667	0.2027 0.3343
LNCONFLICT does not Granger Cause LNSTOCK LNSTOCK does not Granger Cause LNCONFLICT	1.00624 0.86581	0.3967 0.4642
INTEREST does not Granger Cause LNSTOCK LNSTOCK does not Granger Cause INTEREST	6.42590 0.46244	0.0008 0.7096
LNDC does not Granger Cause LNGDP LNGDP does not Granger Cause LNDC	4.33981 3.95533	0.0080 0.0124
LNCONFLICT does not Granger Cause LNGDP LNGDP does not Granger Cause LNCONFLICT	0.18070 2.29105	0.9091 0.0879
INTEREST does not Granger Cause LNGDP LNGDP does not Granger Cause INTEREST	6.67039 1.98067	0.0006 0.1271
LNCONFLICT does not Granger Cause LNDC LNDC does not Granger Cause LNCONFLICT	0.55351 1.24919	0.6479 0.3005
INTEREST does not Granger Cause LNDC LNDC does not Granger Cause INTEREST	9.56254 3.63720	3.E-05 0.0180
INTEREST does not Granger Cause LNCONFLICT LNCONFLICT does not Granger Cause INTEREST	1.48949 0.15166	0.2271 0.9282

Mentioned previously, after obtaining the appropriate result from the regression analysis a Granger Causality test was conducted to check the direction of the relationship between the variables. Table 4.7 demonstrates the findings for the

causality test. In the Granger causality test, if the P-value is significant, the null hypothesis can be rejected.

Therefore, according to the results of the analysis the null hypothesis of LNSTOCK does not Granger Cause LNVC can be rejected. In another word, Granger causality runs one way from LNSTOCK to LNVC but not in the other way. Respectively, LNGDP Granger Cause LNVC, INTEREST Granger Cause LNVC, LNGDP Granger Cause LNSTOCK, INTEREST Granger Cause LNSTOCK, and INTEREST Granger Cause LNGDP in one way. Finally, Granger causality run two ways from INTEREST to LNDC and LNDC to LNGDP and from the other way.

Chapter 5

CONCLUSION

5.1 Conclusion

This thesis aimed to examine the determinants of venture capital financing. On the ground of this, a panel data estimation technique on the collected data from nine Western European countries from 2007 through 2017 was conducted using fixed-effect regression for the analysis. The empirical model contains various determinants which have been already studied in previous researches (GDP growth, rate of unemployment, interest rate, stock market capitalization, as well as political risk and financial development).

Results from previous pieces of literature and this thesis reveals that higher GDP growth, interest rate, market capitalization leads to more significant VC activity since, during stages of macroeconomic development, there is an increase in the startup of new companies in almost every industry. On the reverse, startup activity turns out to be slow during a recession, and this is also in line with findings by Jeng and Wells (2000), Romain and La Potterie (2004), Jagwani (2008), Chaabouni (2011), Cherif and Gazdar (2011) and Félix et al. (2012) which approves the anticipated theoretical effect.

Domestic credits provided by banks to the private sector as a proxy for financial development generates a positive and promising impact on venture capital activities, that is in agreement with results by previous researchers such as Stultz (2000), Bottazzi

et al. (2002) and Hellman et al. (2008), Nwokoye et al. (2015), Caporale et al. (2015) who also indicated that the overall level of financial development and its legal determinants help externally dependent industries grow faster and help the start-up of new establishments in these industries. Higher quality (index) or in another word, a lower amount of internal conflict which we used as an indicator for political risk reveals a positive effect on VC investment that means less political risk will result in strength in venture capital funding activities, our obtained results are in line with Porta et al. (1998), Bonini and Alkan (2011) and Jens (2017) as well.

Unexpectedly unemployment rate shows a positive and significant impact on venture capital intensity which is consistent with Audretsch and Acs (1994) results and Félix et al. (2012) who have discussed that higher rate of unemployment results in less cost of capital for individuals to begin a new business in the market and also can motivate them to run innovative firms which results in creating investment opportunities as well.

5.2 Policy Implications

For venture capital investments to have a contribution in persistent economic development, policymakers should make sure that they employ rational and comprehensive strategies, that will make the industry able to keep up in providing a constant financing progression for startups, company evolution, and buyout funds.

For the Europe to endure competition, officials have to maintain regulations which encourage speculations that will carry efficiency growth and novelty to encourage and absorb employment. Furthermore, policymakers should make the setting and raising of VC funds easier to motivate a high-growth, innovative economy (Cherif & Gazdar, 2011).

Based on the results obtained through the empirical analysis in this thesis and also with regard to the literature conducted on the same subject, it can be concluded that by maintaining a high level of economic and political stability, expanding GDP through different channels such as encouraging export and tourism industry, increasing interest rates that motivates investment angels to provide fund for more businesses and also strengthening the stock markets to boost the capitalization, policymakers can improve the level of VC financing in the Western part of Europe. Moreover, in Western European countries where banks play a substantial role in providing early-stage funds, it might be practical to encourage banks to support risky projects as well as later-stage funding.

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