



How do Economic Crises impact Venture Capital activity in European countries? – An Empirical Analysis

Mariana Felizardo

Dissertation written under the supervision of Prof. Alberta Di Giuli

Dissertation submitted in partial fulfilment of requirements for the MSc in
Management, at the Universidade Católica Portuguesa, 30th May, 2016.

Abstract

This thesis analyzes the impact of an Economic Crisis on Venture Capital Activity. For the analysis, a panel data was created with information on 20 European countries for the period between 2006 and 2012. Crisis was not found to significantly impact VC Activity (Investment or Fund Raising Levels). However, when accounting for the different Stages of Investment considered – Seed, Start-up and Later Stage – results were different. While Investments in Seed and Start-up Stages proved not to be significantly impacted by the Crisis variable, Later Stage was found to be. These results follow in line with the previous research done on the subject. Furthermore, the results yielded for the same test but using Fund Raising Levels proved to be insignificant for all stages assumed. Possible causes for the main results are theorized in this thesis.

Keywords: venture capital; crisis; investment stages; fundraising; seed investments; start-up investments; later stage investments, early stage funds; later stage funds

Abstract

Esta tese tem como objectivo analisar o impacto de uma crise económica na actividade ao nível do capital de risco. Para a análise foi criado uma panel data com informação relativa a 20 países europeus para o período entre 2006 e 2012. Os resultados obtidos indicam que a variável Crise não impacta significativamente o investimento ou a angariação de fundos. No entanto, quando considerando as diferentes etapas de investimento consideradas – Seed, Start-up e Later Stage – os resultados foram distintos. Enquanto os Investimentos em Seed e Start-up não se mostraram significativamente impactados pela variável crise, Investimentos em Later Stage mostraram-se significativos. Os resultados vão de encontro às conclusões obtidas por Block & Sandner (2009). Por seu lado, ao testar a mesma relação, mas substituindo a variável Investimento por Fundos angariados, nenhuma conclusão significativa foi obtida. Possíveis causas para tal resultado são debatidas nesta tese.

Palavras-Chave: capital de risco; crise; etapas de investimento; angariação de fundos; investimentos em seed; investimentos em start-up; investimentos em later stage, early stage; later stage

Abstract

Cette thèse étudie l'impact d'une crise économique dans l'activité de capital-risque. Pour cette analyse, nous avons eu recours à un ensemble de données de panel se concentrant sur 20 pays européens pendant la période de 2006 à 2012. La crise n'a pas eu d'impact significatif sur l'activité de capital-risque (Investissement ou niveau de Collecte de Fonds). Cependant, quand nous prenons en compte les différents Stages d'Investissement - capitaux d'amorçage, start-up et financement à des étapes avancées du projet - les résultats divergent. Alors que les stages de capitaux d'amorçage et de start-up n'ont pas été significativement impactés par la variable Crise, il semble que l'investissement à des étapes avancées l'a bien été. Ces résultats confirment les conclusions d'autres études sur le même sujet. De plus, les résultats obtenus pour le même test mais en utilisant des niveaux de Collecte de Fonds se sont révélés insignifiants pour tous les stages. Les causes pouvant expliquer ces résultats sont théorisées dans cette thèse.

Mot-clé: capital-risque; crise; stage d'investissement; fonds; capitaux d'amorçage; start-up; collecte de fonds

Acknowledgements

This thesis would not have been possible without the help and guidance of my supervisor, Prof. Alberta Di Giuli.

I would also like to acknowledge the support provided by my best friends, colleagues and friends from ESCP and Católica, in particular my Double Degree friends. A special thank you note to my friend Inês Andrez that, even though not in Paris with me, was always available and willing to help.

Finally, I would like to thank my family. Without my parents' efforts and support my studies, in particular, my Masters and this Thesis would have never been possible. For that, I will be eternally grateful. And lastly to my little brother that inspires me to work hard and supports me in everything.

Table of Contents

Abstract	II
Acknowledgements	V
Table of Contents	VI
Table of Figures	VIII
List of Tables.....	IX
List of Abbreviations.....	X
1. Introduction	1
2. Theoretical Foundations	2
2.1. Venture Capital.....	2
2.2. VC Structure.....	4
2.3. Fund Type.....	6
2.4. Financing Rounds	7
2.5. Funding Decision.....	9
2.6. Economic Crisis.....	10
3. Literature Review	11
3.1. VC Determinants	11
3.2. Impact of Economic Crisis in the VC Activity.....	14
3.3. Positioning of this Thesis	14
4. Hypothesis	16
5. Empirical Analysis & Interpretation of Results	18
5.1. Data Description and Sources.....	18
5.2. Descriptive Statistics	21
5.3. Empirical Methods and Results.....	29
6. Discussion of Results.....	42
6.1. Control Variables Results.....	42

6.2. Early and Later Stage Funds not Impacted by the Crisis – Possible reasons	43
6.3. Crisis impact on Later Stage Venture Investment	43
7. Conclusion	44
8. References	X
Affidavit	XVI

Table of Figures

Figure 1: Venture Capital Industry. Source: (Zider, 1998) 4

List of Tables

Table 1: Literature Review Results Comparisson.....	15
Table 2: Descriptive Statistics – Variable Definition.....	21
Table 3: Descriptive Statistics – Investment and Fund Raising Levels on a Country-Level 2006-2012.....	23
Table 4: Descriptive Statistics – Investment on Seed, Start-up and Later Stage Ventures and Funds Raised based on Fund Types on Country-Level.....	24
Table 5: Descriptive Statistics – Different Stages of Investments on a Country-Level.....	26
Table 6: Descriptive Statistics – Different Fund Types on Country-Level.....	27
Table 7: Descriptive Statistics – Variables’ summary statistics	28
Table 8: Panel A – Crisis and Total Investment in VC.....	30
Table 9: Panel B – Crisis and Total Fund Raising amounts.....	31
Table 10: Panel C – Crisis and Investment Seed	34
Table 11: Panel D – Crisis and Investment Start-Up.	35
Table 12: Panel E – Crisis and Investment Later Stage	36
Table 13: Panel F – Crisis and Early Stage Funds.	38
Table 14: Panel G – Crisis and Later Stage Funds.....	39

List of Abbreviations

ERISA	Employee Retirement Income Security Act
EVCA	European Venture Capital Association
GDP	Gross Domestic Product
GP	General Partners
IMF	International Monetary Fund
IPO	Initial Public Offering
LBO	Leverage Buyout
LP	Limited Partners
MBO	Management-Buy-Out
MBI	Management-Buy-In
OECD	Organization for Economic Cooperation and Development
VC	Venture Capital
R&D	Research and Development
UNESCO	United Nations Educational, Scientific, and Cultural Organization
US	United States of America

1. Introduction

Since its beginning, Venture Capital has been an activity that positively impacts countries' economies. By playing a role in the entrepreneurial process, it helps Startups reach their full potential. Nowadays, many VC funded companies are present in the 500 Fortune list. VC support also plays a valuable role in the creation of new industries and disruptive concepts. Examples illustrating successful cases involve Apple, Intel, Federal Express, Microsoft, Compaq Computer, among many others (Sahlman, 1990). As a consequence, it is easy to deduct the positive impact that these companies have on the economies they work in (Bygrave & Timmons, 1992). It is also of importance to state that the vast majority of companies that enjoy VC financing could not get financing somewhere else. Fast growing companies have a need for cash more than any others in their first years. In result of their high investment and rapid growth, they tend to maintain negative cash flows making it harder for Banks to accept financing such enterprises (as Banks are not willing to wait years to receive their first payment). It is in these situations that Venture Capitalists arise. By providing financing and knowledge support, they enable these highly promising companies with the needed tools to be successful (Bygrave & Timmons, 1992)

However, although the benefits to the economy are recognized, it is valid to assume that, not only does VC Activity impact the economy, but also the other way around. It is therefore expected that the effects of an Economic Crisis will impact/challenge the VC market - both on the supply and demand side. On the supply side, the usual VC funds' investors like Pension Funds, Insurance Companies and Banks (Block & Sandner, 2009; Gompers & Lerner, 1999) are negatively impacted by the Economic Crisis and therefore, they won't be as willing to invest. In addition to this, the impact crisis has on the exit options makes investing in VC firms even less attractive for Investors. Finally, market constraints can complicate entrepreneurs' life as consumers are not as willing to spend money during recession periods. As a consequence, new ventures will get lower valuations compared with what could happen in a normal situation (Block & Sandner, 2009).

It is fundamental though to further evaluate the effect an economic crisis has on VC Activity. Therefore, the purpose of this thesis is to discuss such implications for the European countries' VC market example.

2. Theoretical Foundations

2.1. Venture Capital

Venture Capital had its origins in the 1920s with wealthy families and individuals taking the role of investors in the US (Bygrave & Timmons, 1992; Gompers, 1994). However, when focusing on the European market, in the 1980s there was still an insignificant number of deals accounted for. It was only in the 2000s that European Venture Capital Activity had its breakthrough with a growth of over 50% in 2005 (Wrighta, Gilliganb, & Amess, 2008). Nowadays, the US is still ahead in the amounts invested but Europe and Asia already account for half of the investment (Rin, Hellmann, & Puri, 2011). To add to this, the fact that it is harder and harder to earn high returns in the US is making US investors to turn into Europe and Asia for new opportunities and therefore, increasing cross-border investments (Wrighta, Gilliganb, & Amess, 2008).

Venture Capital is a sub-part of Private Equity related to the equity investment in high growth new ventures (Wrighta, Gilliganb, & Amess, 2008; EVCA, Central and Eastern Europe Statistics 2014, 2015). Venture Capitalists invest funds from institutional investors and/or wealthy individuals in promising business concepts, usually in high tech or high growth sectors in the economy (Rin, Hellmann, & Puri, 2011). Besides this, Venture Capitalists, not only provide financial support, but also their expertise (to help companies grow) (Sapienza, 1992). In this definition of Venture Capital it is excluded the investments made by non-professionals (Business Angels) as well as other forms of financial intermediation like Buyouts (Rin, Hellmann, & Puri, 2011). Venture Capital investments are characterized by high levels of uncertainty and information asymmetry between both parts of the deal (Gompers & Lerner, The Venture Capital Revolution, 2001).

Furthermore, for a healthy VC market it is important to take into consideration the demand side (entrepreneurs) and the supply side (investors, funds, etc.) (Kelly, 2012). Lastly, it is important to underline that, it is common for different investors and venture capitalists to focus its investments in companies at different development stages. These investments are expected to be affected differently by VC's determinants (Jeng & Wells, 2000).

Additionally, Venture Capital has multiple definitions. As Jeng & Wells (2000) wrote in their paper, outside of the US, the concepts of Venture Capital and Private Equity can be considered the same and thus, it is of interest to highlight this distinction and to adopt the "US

definition” that distinguishes the two terms. Moreover, the definition can have other variations as, for example, the concept of a narrow and broad definition of Venture Capital in which the narrow version comprises investments in companies’ early stage of development and the broader version includes also the expansion stage (Schertler, 2003).

2.1.1. Venture Capital in Europe

Venture Capital activity had its start in Europe in the 1970s in UK and Ireland and developed to continental Europe in further years. However, it was only more recently that the VC market boomed. While the VC European market has been growing as a whole, differences still arise among different countries (Schertler, 2003). In turn, based on EVCA’s 2014 European Private Equity Activity Report on Venture Capital Activity, Venture Capital accounts for 9% of funds raised which represented a decline compared to past years (with the exception being Early-Stage funds which increased significantly). In 2014, Fundraising in Europe benefited from a major contribution from Government Agencies (35%). In terms of Investment, in 2014, it accounted for €3.6bn with Start-Up Stage Investments dominating the market (52% of investments). However, when compared to total Investments in new business formation, Venture Capital plays a small part (which can be justified by their business model - targeting only specific new ventures) (Sahlman, 1990). Moreover, Investments in 2014 followed the previous years’ trend with life sciences, communications and computer and consumer electronics representing more than 70% of Capital Invested. Finally, in what regards to divestment options, trade sales (45, 3%), write-offs (11, 2%) and sales to a private equity firm (11, 2%) are the most common exit routes (EVCA, 2014 European Venture Capital Activity, 2015).

2.1.2. Europe vs US

VC has been globally growing for the past thirty years (Rin, Hellmann, & Puri, 2011). However, despite of this growth, Venture Capital Activity in Europe (as in Asia), is still lacking behind the US. Based on the work of Gregoriou, Kooli, & Roman (2007), the main factor appointed for such discrepancy is the underdevelopment of a Liquid Stock Market which, in turn, leads to fewer exit routes to Investors (IPOs not common) (Bottazzi & Rin, 2002; Jeng & Wells, 2000). Other factors dividing the US and European markets are institutional differences as well as tax regulations. Schwienbacher (2005) found two facts to be highlighted - VCs are not as profitable in Europe and Investors spend more time

monitoring their portfolio in the US. Having said this, practices between the two have been converging (Megginson, 2001).

2.2. VC Structure

2.2.1. How does the Venture Capital Industry Work?

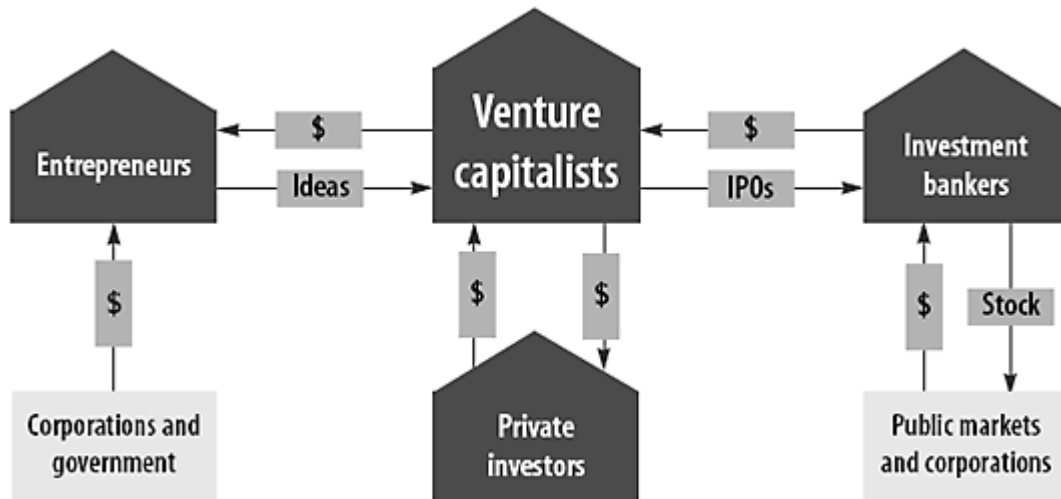


Figure 1: Venture Capital Industry. Source: (Zider, 1998)

As briefly explained and illustrated in the scheme above, the VC industry is composed of four main players: the Venture Capitalists (who invest in Entrepreneurs and earn money by creating value for all the players), the Entrepreneurs (who have ideas in need for funding), Private Investors (wealthy individuals that are looking for high returns) and the Investment Bankers that make a business out of selling companies (Zider, 1998). Their importance and responsibility in the process will be discussed later on. However, it is important to highlight in this scheme that, in order for Venture Capital Activity to be successful, it is fundamental that each of the individuals/entities represented in the scheme are “working” properly. Otherwise, a change in the environment will certainly impact this industry.

On another note, the most common type of Venture Capital firm is a limited partnership. In this structure, the organization is constituted by few investors (Venture Capitalists) denominated General Partners (GPs) and Limited Partners (LPs) (Sahlman, 1990; Rin, Hellmann, & Puri, 2011). Nowadays, the majority of Venture Capital companies are composed by several partners, its associates and administrator support personnel (Sahlman, 1990). Furthermore, VCs tend to focus its investment in order to better support and yield the

most knowledge they can. Therefore, firms can choose to focus on an industry (biotech, computer, etc.), in a particular investment stage or in a geographic location (Sahlman, 1990).

2.2.2. General Partners (GPs)

The General Partners serve as intermediators between the Limited Partners and the new ventures looking for financing. Therefore, their responsibilities are to organize the fund, raise money, select the ventures to invest in, monitor them, advise them, define an exit strategy for each company and further distribute the returns (Bygrave & Timmons, 1992; Gompers & Lerner, 2004). Besides this, GPs have a legal liability regarding the fund management and have to accept responsibility for actions concerning the fund. On average, they only account for 1% of the total capital raised by the funds and they are rewarded both via management fees and performance-based funds (Bygrave & Timmons, 1992; Sahlman, 1990).

2.2.3. Supply Side: Limited Partners (LPs)

Limited Partners are mainly wealthy individuals or institutions that supply with capital to the VC firm. They contribute with 99% of the fund's capital and their functions are reserved only to the supply of capital and collection of further earnings obtained (Bygrave & Timmons, 1992). LPs are not expected or even allowed to participate in the management of the fund (Sahlman, 1990).

2.2.4. Relationship between GPs and LPs

Partnerships between GPs and LPs usually take the form of Limited Partnerships. These types of partnership, as the name indicates, have a limited time frame. On average, contracts between the two parts can last from 5 to 10 years (Gorman & Sahlman, 1989) with the option to further extent in case of content by the two parts. These contracts highly contributed to the vitality of the Venture Capital Industry as they manage to get LPs engaged for a 10-year period which is enough time for Investments to yield results. Before this, capital suppliers would invest on a deal basis which created a funding problem for further investments. With these partnerships, the success of a VC firm will be determined by the ability GPs will have to convince LPs to provide funds (supply) and to provide them to promising ventures looking for equity capital (demand for VC financing depends on both quality and quantity of the companies seeking for financing) (Kelly, 2012).

2.2.5. Demand Side: Necessity vs Opportunity-Driven Entrepreneurship

While the majority of literature reviewed focuses on the importance of Opportunity-Driven Entrepreneurship on the demand for financing, it is important to highlight some exceptions. Williams (2008) stressed that there is a clear underlining of how necessity and opportunity factors are interconnected. Furthermore, what starts as necessity-driven can move into an opportunity driven venture in no time (fact that should not be forgotten by investors).

2.3. Fund Type

As already mentioned, for VC's success, know-how plays an important role. Therefore, they are usually organized and focused on a particular industry, a stage of development, etc. in order to maximize their knowledge and probabilities of success. In line with this, there are different kinds of funds formed: Early Stage Fund, Later Stage Venture Fund, Balanced Fund, Growth Fund, Buyout Fund, Generalist Fund and Mezzanine Fund. Based on EVCA's definitions:

- Early Stage Fund: Funds that specifically target companies at an early stage of development.
- Later Stage Venture Fund: When a company is at a later stage of development but still needs capital for development.
- Balanced Funds: Funds investing in both early and later stage ventures without specific focus.

The three funds mentioned above are Venture Capital Funds. In what regards to Private Equity Funds:

- Growth Fund: The main focus of such funds is to invest in more mature companies that need investment for restructuring or expansion of their activities.
- Buyout Fund: Their objective is to acquire other companies.
- Generalist Fund: They are not specialized in a particular area or stage of the venture's development and therefore, have a broad range of investments.
- Mezzanine Fund: Facilitate the buyout of a company. Usually also obtaining the right to part of the equity.

2.4. Financing Rounds

According to the European Venture Capital Association (EVCA) only some of the investment stages are associated with Venture Capital - Seed, Start-up and Later Stage. Further stages are Growth, Rescue/Turnaround, Replacement Capital and Buyouts and are already associated with Private Equity activity.

2.4.1. Seed Stage

In this stage there is an idea which needs to be tested. Therefore, a small amount of capital is needed as investment is made for prototyping and testing the viability and the commercial potential of the idea. In this phase there is still no production, no defined management team neither a business plan developed as the future venture is still not a formal entity (most commonly only represented by its founder and one or more technicians). At this point, Venture Capitalists focus on verifying the feasibility of the concept (both in terms of technology and economic feasibility). Research suggests that the majority of risks identified in this phase are internal - the feasibility of the concept (Schertler, 2003; Sahlman, 1990; Jeng & Wells, 2000; Tyzoon & Bruno, 1984; Ruhnka & Young, 1987; EVCA, Central and Eastern Europe Statistics 2014, 2015).

2.4.2. Start-Up Stage

After passing through the idea phase (Seed Stage), companies, usually with less than 1-year existence, are financed for product development and the launch of an initial marketing campaign. In this stage, the feasibility of the concept has already been checked, there is a formal business plan, some market analysis and, in some cases, the product has been finalized for beta testing. In rare situations, companies have some initial production and orders. However, in the normal case, companies at this stage are not generating revenues. Main tasks associated with this phase are proceeding with the beta testing and finalizing the product, initiate sales and check manufacturing feasibility. In similarity with the Seed Stage, the majority of risks associated with this phase are linked to internal factors. The main risk though is that the expected demand for the product does not exist or that the market size is not large enough for the business concept to be viable (Schertler, 2003; Sahlman, 1990; Jeng & Wells, 2000; Ruhnka & Young, 1987; EVCA, Central and Eastern Europe Statistics 2014, 2015).

Seed and Start-Up Stages together can be denominated Early Stage Investments. These, as companies are still at a very early stage yield a much greater risk than investments in the expansion phase (Jeng & Wells, 2000; Schertler, 2003).

2.4.3. Later Venture Stage

After testing the idea/concept, the viability of the product, the market confirmation, and the management team is in place, financing is made to enable the company to expand. Examples of uses for the cash demanded are inventory, equipment and marketing. This stage is way more heterogeneous than the previous ones as different companies in different sectors will develop differently and have different needs. Despite the differences among companies at this stage, they are already present in the market and their main goals are to improve manufacturing and increase marketing. Other points of attention for VCs during this period are production capacity, unit costs, sales force, distribution, etc. Furthermore, in this stage there is an increase in the external risk as the new ventures become more liable to competition and market risk. However, the main risk in the Later Venture Stage is the inability of managers to cope with the development and challenges the company faces. The companies at this point may or may not be profitable (if profitable, only marginally) (Schertler, 2003; Sahlman, 1990; Jeng & Wells, 2000; Ruhnka & Young, 1987; EVCA, Central and Eastern Europe Statistics 2014, 2015).

Some VCs only invest at this stage as the risk/return is more favorable for them and they believe that only here there is a real need for their expertise (also because, the amounts demanded in previous stages were not significant or worth spending time on).

2.4.4. Growth Stage

Growth Stage (also denominated by “third round or stage”, “expansion phase”, and “bridge” or “prepublic”) companies are already financed by Private Equity investments. This phase is the first time companies resort to private equity financing and, most often but not obligatorily, investments are made in the form of minority investment. As they are already profitable and stable, the need for cash is to expand, restructure, or even acquire other companies. At this stage, some companies are already preparing for a buyout, merger or IPO (EVCA, Central and Eastern Europe Statistics 2014, 2015).

2.4.5. Rescue/Turnaround Stage

Another Stage where Private Equity Investments can focus on is in existing businesses that are facing difficulties. In these cases, investments are made with the goal of reestablishing the wealth of the business (EVCA, Central and Eastern Europe Statistics 2014, 2015; Eurostat).

2.4.6. Replacement capital/secondary purchase

By Replacement Capital or Secondary purchase, it is defined the purchase of a minority stake of existing shares by other Shareholders or a different Private Equity Fund (EVCA, Central and Eastern Europe Statistics 2014, 2015; Eurostat).

2.4.7. Buyout Stage

Financing provided to acquire a company. It can be further divided into a Management Buyout, which means that the management of the company acquires the assets they manage or a Management Buy-in in which managers from outside the business buy its assets. Other buyout transactions included are LBOs, Public-to-Private, etc. (EVCA, Central and Eastern Europe Statistics 2014, 2015; Eurostat).

Note: For all phases described here, different risks are associated and they can be divided into internal and external. Internal risks can be controlled by either the management team or the venture capital firm. External risks are harder to deal with as they cannot be controlled directly and are related to market limitation or market competitors (Ruhnka & Young, 1987).

2.5. Funding Decision

The Venture Capital funding decision is a complex process in which VCs identify the potential of a business idea and evaluate the preparedness and qualities of entrepreneurs (passion, persuasion, etc.). No decision follows the exact same route as different markets, concepts and stages demand different responses (Chen, Yao, & Kotha, 2009).

Moreover, not all investors have the same criteria in selecting their investment. Several papers have explored the motives behind investors' decisions. Besides investors' background, there were four main factors identified – human capital of the entrepreneurs (Tysoon & Bruno, 1984; Clarysse, Knockaert, & Lockett, 2005), the market environment (Hisrich & Jankowicz, 1990; Clarysse, Knockaert, & Lockett, 2005), exit options and the characteristics of the

product (Macmillan, Zemann, & Subbanarasimha, 1987; Clarysse, Knockaert, & Lockett, 2005).

Furthermore, it was found that, in Europe, there are three groups of VCs – the ones investing in national projects, the ones who focus only on the deal and those who have the quality of the management team as a primary criterion (Clarysse, Knockaert, & Lockett, 2005; Muzyka, Birley, & Leleux, 1996).

The timing of the Funding tends to be convergent amongst Venture Capitalists. Around 80% of Investments take place during the venture’s “adolescence” phase which is characterized by its high development. In this phase, there is still no noticeable difference between the companies that will further succeed and the ones who will not. This fact highlights the theory that Venture Capitalists invest in promising industries rather than in people and its ideas (Zider, 1998)

2.6. Economic Crisis

Economic Crisis is considered to be a downfall of a country’s economy due to a Financial Crisis (2016). A Financial Crisis can have multiple types (Currency Crisis, Sudden Stops and Debt and Banking crises) and origins. They also tend to impact different countries, no matter their economic and social situation, and transfer borders (Claessens & Kose, 2013). As a consequence of this, negative impacts on the economy and the financial system of the countries affected are real.

2.6.1. From the US to Europe

The Global Financial Crisis had its origins in the summer of 2007 with a crisis burst from the Real Estate market in the US. The fast credit growth, liquidity, strong leveraging, increasing asset prices and the development of a Real Estate bubble contributed for financial institutions to become vulnerable. As a consequence, the subprime crisis showed all the liabilities of the Financial System and culminated in the default of Lehman Brothers (Comission, 2009; Terazi & Şenel; The Origins of the Financial Crisis, 2013). The Crisis rapidly transposed borders reaching a global scale due to the close ties between Financial Institutions around the world (Europe not an exception). In turn, all European countries were affected by the Financial Crisis, regardless of their original Economic situation. Moreover, in September 2007, right after the collapse of Lehman Brothers, some European Banks such as the Northern Rock in the UK announced the need for financial support by the bank of England (Wilson & Goddard,

2009). This was just the beginning as this case was followed by many others that either had to receive financial aid or experienced heavy losses - the case of UBS in Switzerland (Wilson & Goddard, 2009). The crisis continued to spread throughout 2008 and, in Europe, the Global Financial Crisis turned into a Eurozone crisis with countries with high debt levels being especially impacted. By September 2008, Ireland announced the need for support from the IMF followed by Greece that triggered the need for the bail of Portugal (2010) by the European commission. Countries such as Spain and Italy followed up due to the crisis on the Financial System as well as the negative impacts of the Real Estate Bubble (especially in Spain) (Wilson & Goddard, 2009; Merler & Pisani-Ferry, 2012).

2.6.2. Consequences of the Crisis

The harsh impact on the Financial Institutions led to a restraint from credit. As a consequence, funding became much harder. On the other side, the Crisis also affected consumers' confidence levels which translated in a decrease in consumption. Furthermore, on a general level, several indicators can be mentioned as having been directly affected by the crisis – the decrease of GDP growth and Consumption levels, the increase in Unemployment Rates, etc. (Comission, 2009)

3. Literature Review

Numerous literature cover the many determinants that ultimately impact the Venture Capital Market. These results yield important information for all the parties involved in the Venture Capital market – being them policy makers, GPs, LPs, entrepreneurs, etc.

3.1. VC Determinants

In 1999 Gompers & Lerner published a paper on the determinants of VC Activity in the United States. More specifically, they aimed at checking whether macroeconomic, regulatory, or performance factors affected Venture Capital Activity. Main conclusions from the analysis highlighted the importance of demand for Fundraising – increases in GDP and in R&D expenses have a positive impact. Capital Gains Tax Rates increase were also found to have an impact on the demand for Venture Capital. Besides this, Fundraising was proved to be positively affected by the ease of Pension Funds' Regulations. In the paper it is underlined the importance both performance and the reputation of VC firms for Fundraising purposes. In this sense, and as can be deduced, firms that hold higher equity stakes and have gone public, have

easier access to funds. The paper also points for the example of the ERISA¹ clarification in helping the Fundraising process especially for Early Stage Ventures Investments. Furthermore, it is pointed out that the US model can be difficult to transfer to other locations (even though the US serves as a benchmark) and that “regional concentration” should be prioritized over measures for the entire country.

Following the same line of analysis, Jeng & Wells (2000) intended to conclude on the determinants of VC Activity. To do so, they selected Initial Public Offerings (IPOs), Gross Domestic Product (GDP), Market Capitalization Growth, Labor Market Rigidities, Accounting Standards, Private Pension Funds, and Government Programs as the factors for analysis. Early Stage and Later Stage investing were examined separately. Results gave IPOs as the main driver for VC Investment followed by Private Pension Funds (over time) and Government Policies while GDP and Market Capitalization Growth were found not significant. Early Stage Investing was determined as negatively impacted by Labor Market Rigidities and IPOs were not significant whereas the total opposite results occur for Later Stages.

In 2003, Schertler studied the impact the VC Drivers - Liquidity of Stock Markets, Human Capital Endowment and Labor Market Rigidities – have on Venture Capital Activity both using a “narrow” definition of VC (Early Stage Investments) and a “broad” definition. Furthermore, Schertler separated the impact of the determinants for both the supply and demand side (in line with previous researches). Significant results were only associated with the narrow definition of VC. Results stated that Venture Capital Investments are positively dependent on the Liquidity of Stock Markets (which goes against the results of Jeng & Wells (2000) due to a different variable choice), Human Capital Endowment and on Labour Market Ridigity.

Also in 2003, Romain and La Potterie published a paper identifying and analyzing the determinants of the VC Activity. They took into consideration both the demand and supply side of VC Activity, chose the different variables to use and, based on that, developed a panel dataset of 16 European Countries for the period between 1990 and 1998. The most significant results yielded a positive impact of Interest Rates and R&D expenditures on Investment levels while Corporate Tax Rates were found to have a negative impact. Furthermore, the other variables indicated to impact VC Investments were GDP growth and the Level of

¹ ERISA stands for Employee Retirement Income Security Act.

Entrepreneurship Activity (positive relation). Findings also concluded on the negative impact of Labor Market Rigidities on VC Investments (Romain & La Potterie, 2003).

Besides that, Kelly (2012), in his paper analyzed the impact various determinants had on VC Activity. Going further on the analysis, he checked the different impacts the same determinants had on VC in general, for Early Stage and Buyout Investments. In addition to this, he also looked at the impact from the supply and demand side. He separated VC Drivers into two classes – Structural and Cyclical Factors (with focus on Structural Factors as Cyclical Factors affected all countries in the same manner). From this analysis, he concluded that investors in the Early Venture Stage and Buyout are, indeed, very different. While on the combined level only Market Capitalization and Unemployment are significant (at 1%), for Buyout Investments, Employment Protection, Tax Incentives and R&D were significant determinants. When looking at the results for Early Stage Investments, Market Capitalization was no longer indicated as a determinant - at this stage, IPOs are not a common exit route. Furthermore, Unemployment was proven significant whereas Employment Protection not (as Labor Market Rigidity is not a good incentive for opportunity-driven entrepreneurship²).

In line with the other papers' analysis Félix, Pires, & Gulamhussen (2013), investigated how M&A, Information Asymmetry, the Level of Entrepreneurial Activity and Unemployed Rates impacted VC Activity. The results also underlined a positive relationship between M&A market size and Information Asymmetry (the variable used was Market-to-Book) while Unemployment was found to have a negative influence. These results both highlighted the importance the exit market has on investment decisions and the degree of asymmetry in information. Furthermore, via the results, it provided some suggestions over the reasons why Europe is still lacking behind the US in terms of VC activity (especially for the high-tech sector and Early Stage financing).

Based on all the literature covered, it can be listed all the determinants used for the different analysis. The determinants covered were – GDP Growth, Interest Rate, Unemployment rate, Market Capitalization Growth, Total Entrepreneurial Activity Index, IPO and M&A market size, Market-to-Book ratio, R&D, Labor Market Rigidities, Accounting Standards, Private Pension Funds, Government Programs, Tax Systems, Laws, Human Capital and the Relationship between GPs and LPs. Furthermore, Table 1 summarizes the main conclusions on the links between the Indicators and VC Activity concerning the research conclusions.

² By opportunity-driven entrepreneurship, he defined, innovative entrepreneurship that differs from necessity-driven entrepreneurship (that is frequently just replicative entrepreneurship).

3.2. Impact of Economic Crisis in the VC Activity

In what regards to literature directly related to the impact of the Economic Crisis in the VC Activity, Block & Sandner (2009) studied the impact of Financial Crisis in US Internet Start-ups. Results obtained in this paper associate the Financial Crisis to troubles in VC Activity, especially in what concerns to Later Stage Ventures that need financing to continue their business. Furthermore, the average 20% decrease in Funds Raised per funding rounds for Later Stage Ventures only reinforces the challenges these ventures face. Besides this, as during a financial crisis the IPO market is weak, companies face problems as there are no good exit routes (having most likely to postpone further expansion). On the other hand, the impact of the crisis in Early Stage Venture seems to be not as dramatic as for Later Stage as companies, informed by the situation, can choose to hold their initial funding once the market is more favorable. However, this unfavorable environment ends up having an impact in the demand for funding as entrepreneurs may refrain from starting their own business.

3.3. Positioning of this Thesis

From the literature reviewed above we can yield some conclusions and some differentiations to keep in mind. Several analysis tried to separate the impacts indicators have in different VC Investment Stages either via a narrower version of VC (Schertler, 2003) or by distinguishing Early from Later Stage Investments (Jeng & Wells, 2000). In the case of Jeng & Wells (2000) analysis, differences between Early and Later Stage Investments were found for some variables. Furthermore, the analyses covered converged in the indicators chosen. It can, therefore, be drawn a table with all the main impacts of the indicators used and its relationship with VC activity (Table 1). Moreover, and from all variables used, it can be accessed the ones that can be impacted by the economic climate of a country. For the purpose of this thesis, those variables will be the ones focused on as they will be added as control variables in the model. Therefore, and from the variables represented on Table 1, the ones that will be used for analysis are – GDP, GDP growth, Interest Rate, R&D Expenditures, Unemployment Rate and Stock Market Capitalization. It will be interesting to check the impact and significance of the different variables in what regards the different stages of investment.

Indicators	(Gompers & Lerner)	(Jeng & Wells)	(Schertler)	(Kelly)	(Romain & La Potterie)	(Félix, Pires, & Gulamhussen)
GDP		(0)				
GDP Growth	(+)				(+)	(+)
Interest Rate					(+)	(+)
R&D Expenditures	(+)		(+)		(+)	(+)
Unemployment						(-)
Private Pension Funds	(+)	(+)				
		Through Time only				
IPO		(+)				(+)
		Later Stage				
Stock Market Capitalization		(0)	(+)	(+)		
Labor Market Rigidities		(-)	(+)	(-)	(-)	
		Early Stage				
Corporate Tax Rates				(-)	(-)	
Entrepreneurial Activity					(+)	(-)

Table 1: Literature Review Results Comparisson

On the other side, Block & Sandner, 2009 made the only analysis found regarding the relationship between the Financial Crisis and Venture Capital. Moreover, their analysis only focused on US companies in the Internet Business. Results suggest that the crisis negatively impacts funding in the Later Stage Investing. The authors suggest that these relations might be caused by the fact that Early-Stage companies may choose to postpone its funding until a better economic environment is attained while Later-Stage Ventures need the capital to keep

growing or even surviving (Block & Sandner, 2009). For the purpose of this thesis, it will be accessed whether the same results are gathered when considering the different Investment levels among European Countries.

4. Hypothesis

Based on the literature review, it was possible to better understand the various results over all the determinants that have been tested in association to the Venture Capital Activity. Moreover, it has also given some hints on the impacts an economic crisis can have on VC Activity and that those impacts can vary depending on the stage of development of the new venture. Impacts and determinants were evaluated separately for the demand and supply side (Block & Sandner, 2009). However, the results obtained were of a different market (US) and focused on a specific industry (Internet Start-Ups). In line with this, with this thesis it is intended to study the impacts of an Economic Crisis on the Venture Capital activity in European Countries.

As already mentioned, Venture Capital plays a fundamental role in fostering the development of new business ventures and, with that, can improve society and the economy in general. However, in order for the Venture Capital Industry to function well and therefore, provide support for the new ventures, it is crucial that all players in the environment are in good health. As a consequence, any factor that may affect this balance, may affect the VC Activity. There is no discussion on the visible negative impacts a crisis has on the countries affected. As a consequence is reasonable to think that the Venture Capital Industry will be affected by a Crisis environment. Based on this, a first hypothesis can be formulated.

H1: The Economic Crisis negatively Impacts the VC Activity in Europe.

In Hypothesis 1, the goal is to test the idea that the crisis has indeed a negative effect on VC Activity. Based on the reasoning exposed above, it is to expect that this relation would hold.

For the first hypothesis, the model was tested with two dependent variables – Total Investments in VC and Total of Funds Raised. The goal is to determine to what extend there can be differences between the two variables' results. Is the crisis supposed to affect more severely Investment levels? Or are the levels of Funds Raised the most impacted?

In order to test the hypothesis, a dummy variable was created to distinguish Crisis years from non-Crisis years. In the case the Crisis dummy proves to be related to the Venture Capital Activity, the hypothesis is accepted.

Furthermore, several of the determinants collected from the literature review findings on Venture Capital Activity were chosen as control variables. The reason for this was to check if the determinants that were already proven to affect Venture Capital activity and that are expected to be affected by an Economic Crisis will help better explain the model. The control variables considered were Stock Market Capitalization, Research and Development Expenditure, GDP per Capita, GDP growth, Unemployment Rate and Interest Rate.

One research (Félix, Pires, & Gulamhussen, 2013) argues that market capitalization reflects the expectations of investors concerning the economy. Therefore, it is expected that the impact of a crisis will affect investors' confidence and, in turn, this indicator. In turn, a decrease in market capitalization will decrease the funding levels for new ventures. Related to this variable, it is also important to highlight that other factors can influence its relation with VC Activity on the opposite direction and that can alter the analysis (Jeng & Wells, 2000; Félix, Pires, & Gulamhussen, 2013).

In what regards to Research and Development expenditures, the analysis is expected to be much more straightforward. All research findings concluded that R&D expenditure has a positive effect in VC activity.

Just like R&D expenditure, the Interest Rate impact on the model is expected to be positive. For the Unemployment Rate, however, the relationship is expected to be the opposite. Moreover, both GDP and GDP growth are known to be linked to the crisis.

Interactions were also introduced in the regressions to examine if the impact of the Crisis in the control variables was significant for understanding the model being tested.

From this first assumption, other questions arise – Is the impact of the Crisis equally significant for different types of Investments and Funds? In order to answer this, a second hypothesis was formulated.

H2: The impact of an Economic Crisis is not the same for Early Stage and Later Stage Financing.

Some of the research covered tested, not only the impact of determinants on VC Activity but also how that impact may have changed depending on the Stage of Investment. In order to test this hypothesis, it was used the different stage definition by EVCA. Investment Stages were separated into Seed, Start-up and Later Stage Investments while Funds were only separated into two categories, Early and Later Stage Funding. Based on the results of Block & Sandner (2009), the Financial Crisis was proven to have a significant negative impact on VC Financing, but only for Later Stage Ventures' financing. The authors argue that these findings may be associated with the fact that companies at an Early Stage may wait for a better environment to get funded while Later Stage ventures don't have that option.

In a nutshell, results on the second hypothesis are expected to be different for the different dependent variables to be applied. It will be interesting to see if the regression results will go in line with the findings of Block & Sandner (2009) or if the different external conditions provide different results.

For the testing of this hypothesis, the control variables determined were also added. The same type of relation is expected as in Hypothesis 1. However, it needs to be verified whether the variables chosen grant the same contribution for the model here as they did in the first hypothesis. It would not be surprising to see that the control variables don't hold the same importance for the different stages considered.

Just like in the first hypothesis, interactions will be introduced here.

5. Empirical Analysis & Interpretation of Results

In order to test the two hypothesis formulated previously, a panel database was developed. In this section it will be discussed the data and methods used to obtain the results.

5.1. Data Description and Sources

As briefly mentioned, to test the hypothesis formulated, a panel database was created based on a country-level data. There were 20 countries chosen based on the data gathered by EVCA Yearbook 2015 together with some restrictions provided by other variables chosen for the analysis. Therefore, the 20 countries taken into consideration for the purpose of this analysis were: Austria, Belgium, Czech Republic, Denmark, Finland, France, Germany, Greece,

Hungary, Ireland, Italy, Luxembourg, The Netherlands, Norway, Poland, Portugal, Spain, Sweden, Switzerland and United Kingdom. Furthermore, the data gathered concerns the time period from 2006 until 2012. Several variables were considered: Investments in VC, Funds Raised, Crisis, Market Capitalization, Research and Development Expenditure, GDP growth, GDP per Capita, Unemployment and Interest Rate. It will be further discussed in greater detail each variable and its possible implications for the model being tested.

Investment levels is the dependant variable of the model. All information and data on this variable was collected from the EVCA 2015 Yearbook. By Investment level, it is considered the amount invested by Venture Capitalists in new ventures (EVCA, Yearbook 2015 Europe Country Tables, 2015). The majority of research papers covered on the literature review used Investment Level as representing the (or part of) Venture Capital Activity. For the purpose of this analysis, the total investment variable will only comprise the investments at the Seed, Start-up and Later Stage. The variables Seed, Start-up and Later Stage Venture Investment will only be introduced for the second hypothesis and are related to the amounts invested by funds on ventures at different development stages.

Funds Raised is used as a dependant variable with the objective to provide a better analysis and a comparison term with Investment results. By Funds Raised it is considered the amount raised by Venture Capital funds. As explained in the first part of this thesis, the fund raising activity plays a crucial role in the success of a Venture Capital fund. For the second hypothesis, total funds raised will be divided into two categories – Early and Later Stage Funds. These two variables stand for the amounts raised by funds that are specialized in investing in a particular stage of venture development.

Furthermore, one independent variable was employed – a dummy variable for Crisis. This variable takes the value of 1 for Crisis' years and 0 for non-Crisis years.

In addition to the variables considered, it was employed the following control variables:

The variable used for Stock Market Capitalization is Market Capitalization (% of GDP) and is defined as the share price of listed domestic companies times the number of shares outstanding. The data in the dataset was collect at year end values and Investment Funds and Trusts were not considered for the data (WorldBank, Data: Market capitalization of listed domestic companies (% of GDP)).

Research and Development expenditure (as % of GDP) is defined by the UNESCO as the systematic expenditure in research and experimental development in order to increase knowledge base. Within these expenses, there were all costs associated with R&D for the business enterprise sector. Source: United Nations Educational, Scientific, and Cultural Organization (UNESCO) Institute for Statistics. (WorldBank, Data: Research and development expenditure (% of GDP))

The GDP growth (annual %) is the percentage of annual growth of GDP at market prices and on local currency. According to the WorldBank's definition, GDP is the sum of gross value added by all resident producers in the economy plus any product taxes and minus any subsidies not included in the value of the products (WorldBank, Data: GDP growth (annual %)). Source: World Bank national accounts data, and OECD National Accounts data files.

GDP per Capita stands up for the gross domestic product divided by the country's population (WorldBank, Data: GDP per capita (current LCU)). The only difference between these variables when comparing to GDP is the fact that here, there is a consideration for the country's population. Source: World Bank national accounts data, and OECD National Accounts data files.

The Unemployment variable considered for the analysis takes into consideration the percentage of the labor force that, while seeking for employment, still has none. The variable is given as a percentage of total labor force and is an estimate by the International Labor Organization (ILO) (WorldBank, Data: Unemployment, total (% of total labor force)). Source: International Labor Organization, Key Indicators of the Labor Market database.

WorldBank defines Interest rate spread to be the Interest Rate demanded by banks on loans related to private sector customers deducted by the Interest Rate paid by commercial or similar Banks for demand, time, or savings deposits. (WorldBank, Data: Interest rate spread (lending rate minus deposit rate, %)). Source: International Monetary Fund, International Financial Statistics and data files.

Time Variante Variables	Definition
InvVC	Total of Investments in Venture Capital (composed of Seed, Start-up and Later Stage Investments) - In 1,000€.
InvSeed	Venture Capital Investments in the Seed Stage - In 1,000€.
InvStart.up	Venture Capital Investments in the Start-up Stage - In 1,000€.
Inv.LaterStage	Venture Capital Investments in the Later Venture Stage - In 1,000€.
Funds	Annual Amounts Raised by Venture Capital Funds (Early and Later Stage Funds) - In 1,000€.
FundsEarlyStage	Annual Amounts Raised by Venture Capital funds focused on investing in Early Stage Ventures - In 1,000€.
FundsLaterStage	Annual Amounts Raised by Venture Capital funds focused on investing in later stage companies - In 1,000€.
Crisis	Dummy Variable concerning the years pre-crisis (0) and crisis (1)
stockmktcap	Market capitalization of listed domestic companies (% of GDP)
R.D	Research and development expenditure as % of GDP
GDPgrowth	GDP growth (annual %)
GDPpercapita	GDP per capita
Unemployment	Unemployment, total (% of total labor force) (modeled ILO estimate)
IntRate	Interest rate spread (lending rate minus deposit rate, %)

Table 2: Descriptive Statistics – Variable Definition

5.2. Descriptive Statistics

This section has the objective to improve the knowledge over the data used in order to, later on, better understand the results provided by the testing of the models.

In line with this, in Tables 3 and 4, it can be seen Investment and Fund Raising Levels over the time period accounted for on a country-level (Table 3) and the share of investments and funds allocated to each stage considered (Table 4). Tables 5 and 6 show the main statistics of the dependent variables used for the analysis.

From the analysis of Tables 3 and 4, three countries need to be highlighted – UK, France and Germany. Together, they represent the majority of total Investments in VC and Funds Raised. In what regards to the total Investment levels, UK's Investment amounts for 36% of the total European Investment in VC, followed by France (16%) and Germany (13%). Moreover, when differentiating between the different stages of Investment, Seed Stage Investments are of residual value when compared with the others. They account for 3% against the 41% of Start-up Investments and 56% of Later Stage Investments. Therefore, the two later stages have a much higher weight on the amounts Invested by Venture Capitalists.

Fund Raising levels follow the same trend - the UK, France and Germany together account for 60% of total funds raised. Looking at the different types of funds, Balanced Funds represent 50% of the total. However, as they don't have a focus on a specific phase, they will not be accounted for in the analysis (Balanced Funds invest in both Early and Later Stage Ventures). Therefore, the analysis was based on the Early Stage and Later Stage amounts raised by funds. These accounts for the other 50% of the total funds rose. Out of it, Early Stage Funds hold a 34% share and thus, the majority of funds rose. This fact might be justified by the fact that Early Stage Funds account for both the Seed and Start-up Investment Stages.

From the initial comparison between the two dependent variables used, one interesting fact should be highlighted. While Investments in Later Stage Ventures represent the majority of Investment, for Fund Raising, the Early Stage Funds dominate. This is most likely due to the existence of Balanced funds in which it is not determinable the distribution of investments among different stages of the venture's development.

Country Name	Investments in VC (in 1,000€)							Funds Raised by VC (in 1,000€)						
	2006	2007	2008	2009	2010	2011	2012	2006	2007	2008	2009	2010	2011	2012
Austria	89,176	38005.17	31850	35604.4	29131.99	24826.5	24639.7	72929	32750	5500	60050	26600	58000	17040
Belgium	530162	189307.03	185501.78	183990.2	91696.89	114403.06	128228.44	206574	125150	68000	73050	42000	98000	15000
Czech Republic	1065	2025.98	4333	1445.91	11578.18	8203	724	1679	0	0	0	10450	7600	0
Denmark	179648	214157.49	178326.2	118176.68	141689.88	165242.87	177365.14	444727	550520	43290	0	205180	173000	90790
Finland	157,008	131346.62	114682.83	86885.48	98634.99	77432.98	80296.98	333717	264090	186730	56980	64370	129220	98800
France	1907909	956935.48	1138004.87	929227.63	847371.66	725475.15	674700.37	2179564	1012290	1011200	502420	916490	1168920	1310920
Germany	939,800	864013.02	1004522.99	704454.12	751153.43	770492.69	590698.7	1038150	1243040	1349060	413790	563960	1377000	376370
Greece	15035	583	4500	13178	5000	9291	0	0	0	34000	0	25000	0	0
Hungary	35754	6112.25	10676.87	528.85	17900.29	30494.5	66839.97	26832	33000	100000	0	133690	0	0
Ireland	95,061	66123.34	46111.07	45229.13	28286.08	41327.06	75068.72	13574	191300	80810	125270	93340	11450	0
Italy	994,402	116665.13	60776.34	64920.11	63029	50310.04	67187.35	1500434	140400	78120	89120	0	5000	0
Luxembourg	NA	38575	71093	48745.44	43892.32	109893.2	50952.6	NA	105000	180000	0	0	50500	15130
Netherlands	487,375	307377.65	242350.14	174817.72	165845.12	185525.11	168265.53	507206	781600	190600	193200	106750	135820	189110
Norway	239,775	285713.63	183307.85	133816.49	162049.64	122222.73	130260.85	571343	281200	413410	14330	174480	237870	232010
Poland	17,654	19846	57509.42	2101.73	8063.35	25448.95	8318.94	133407	11120	8860	13360	7660	3560	18840
Portugal	72,016	137129.92	92141.34	42203.42	65357.89	12846.17	17371.12	62962	101720	80	247100	56500	41910	8000
Spain	499,826	365481.11	496214.49	135872.22	105123.56	125269.78	89832.97	984516	394950	319070	177660	117190	197610	149500
Sweden	695,779	421538.2	348215.22	218388.67	246160.59	235006.7	216612	169621	599650	133370	454300	43550	27040	127430
Switzerland	401647	438814.38	496843.49	331090.905	227346.09	262486.51	128651.84	231523	655200	1005000	638620	21670	666030	209210
United Kingdom	9,434,366	1641123.55	1769518.27	875410.1	801919.03	839821.5	678464.19	8724041	1737560	971990	575150	556210	695650	981740
Total	16,793,458	6,240,874	6,536,479	4,146,087	3,911,230	3,936,020	3,374,480	17,202,799	8,260,540	6,179,090	3,654,400	3,165,090	5,084,180	3,839,890

Table 3: Descriptive Statistics – Investment and Fund Raising Levels on a Country-Level 2006-2012

Country	Investment in Seed	Investment in Start-Up	Investment in Later Stage	Investment Total	Funds Early Stage	Funds Later Stage	Funds Balanced	Funds Total
Austria	46047.3	64332.31	162854.15	273233.76	109778	29452	133639	272869
Belgium	35396.68	543458.97	844433.75	1423289.4	329367	0	298407	627774
Czech Republic	103	16687.18	12584.89	29375.07	18050	0	1679	19729
Denmark	44758.16	616862.26	512985.84	1174606.26	974396	5710	527401	1507507
Finland	58112.36	350936.38	337239.14	746287.88	546105	151884	435918	1133907
France	139106.05	2688537.91	4351980.4	7179624.36	2679477	952663	4120086	7752226
Germany	365003.57	2509338.01	2750793.37	5625134.95	2634080	762920	2964370	6361370
Greece	11578	11452	24557	47587	0	0	59000	59000
Hungary	5592.34	88115.68	74598.71	168306.73	96620	100000	96902	293522
Ireland	7921.64	234825.12	154459.64	397206.4	378382	1476	135886	515744
Italy	24229.59	256768.19	1136292.19	1417289.97	324711	37952	1450411	1813074
Luxembourg	1495.41	239065.18	122590.97	363151.56	350630	0	0	350630
Netherlands	55726.07	757874.7	917955.5	1731556.27	463464	357667	1283155	2104286
Norway	80599.05	620032.88	556514.26	1257146.19	484935	456811	982897	1924643
Poland	11432.67	24568.95	102940.77	138942.39	53280	53580	89947	196807
Portugal	5535.97	197426	236103.89	439065.86	56797	15231	446244	518272
Spain	80371.01	591675.76	1145573.36	1817620.13	507087	688963	1144446	2340496
Sweden	62560.64	1016890.77	1302248.97	2381700.38	822504	289765	442692	1554961
Switzerland	72432.6	985122.285	1229325.33	2286880.215	1210910	1082510	1153833	3447253
United Kingdom	149772.84	6765309.48	9125540.32	16040622.64	3918392	2759837	7564112	14242341
Total	1257774.95	18579280.02	25101572.45	44938627.42	15958965	7746421	23331025	47036411

Table 4: Descriptive Statistics – Investment on Seed, Start-up and Later Stage Ventures and Funds Raised based on Fund Types on Country-Level. Values in 1,000€.

It is also observable on Tables 3 and 4, the “good performance” of both Switzerland and Spain in relation to the amounts raised and investment levels (the two countries follow the top three countries talked about). On the other side, Czech Republic, Greece and Poland have its contribution for the European total be barely zero (both on the Investment and Fund side).

On another note, it is be observable in Table 3 the decline in Investment levels from 2008 to 2009. The same observation is applicable to the amounts raised by funds. This fact is of importance to the analysis conducted in this thesis as it may be indicative of the impact of the Economic Crisis that is being tested. Furthermore, Investment levels suffer from a sharp decrease in 2007 followed by a recuperation period just before Investments levels crashed again from 2009 onwards (2012). In turn, Funds Raised followed a decreasing trend since 2006 until 2012 with 2007 and 2009 spotting steep decreases in amounts raised.

Finally, in Table 3, and further on Tables 5 and 6, it can be done a comparison of the Total Investment and Funds Raised amounts on a country-level. The first acknowledgement is the fact that total Fund Raising levels are higher than Investments made. When looking at the country data information, only three countries have Investment Levels surpassing Total Funds – Belgium, Czech Republic and United Kingdom. On the other side, many countries such as Greece, Ireland and Hungary had Fund Levels over Investment Levels. Lastly, the rest of the countries accounted for did not show a major gap between the two variables.

The results provided by Table 5 (Investment in VC) go in line with what was already discussed. In what regards the main statistics on Fund Raising levels (Table 6) for European countries, two points are visible out of looking at the two tables provided. Firstly, Greece has no funds raised by either Early or Later Stage Funds. This indicates that, in Greece, there are no specialized funds and thus all amounts raised are associated with Balanced Funds. In addition to this, Belgium, Czech Republic and Luxembourg have no amounts raised linked to Later Stage Ventures.

Country Name	Investments in Seed (in 1,000€)			Investments in Start-up (in 1,000€)			Investment Later Stage (in 1,000€)			Investments in VC (in 1,000€)						
	Average	St.Dev	Max.	Average	St.Dev	Max.	Average	St.Dev	Max.	Average	St.Dev	Max.				
Austria	6578.286	1607.707	4325	8,647	9190.33	4,351	4,578	15811.01	23264.879	25503.302	5681.8	80273	39033.394	22677.997	24639.7	89176
Belgium	5056.857	3551.022	126	9,622	77636.996	24,934	39,049	111734.3	120633.39	165753.06	21161.94	490987	203327.06	149286.01	91696.89	530162
Czech Republic	14.71429	38.93034	0	103	2383.8829	4,314	0	11578.18	1797.8414	1777.3062	0	4333	4196.4386	4177.3461	724	11578.18
Denmark	6394	4550.881	0	13,001	88123.18	34,069	32041	130869.35	73283.691	36826.927	35838.71	147607	167800.89	30666.04	118176.68	214157.49
Finland	8301.714	4731.64	3272	17,022	50133.769	8,987	36,140	61210.25	48177.02	33465.498	16136	111747	106612.55	29476.998	77432.98	157008
France	19872.14	15292.89	0	47,987	384076.84	72,127	330,115	536031	621711.49	351782.91	338193.88	1371878	1025660.6	418345.38	674700.57	1907909
Germany	52143.57	22687.71	31150	97,296	358476.86	62,567	233,100	415618.91	392970.48	165955.59	219750.07	675550	803590.71	142345.72	590698.7	1004523
Greece	1654	2348.974	0	5,000	1636	1,973	0	4150	3508.1429	4974.881	0	12000	6798.1429	5889.5424	0	15035
Hungary	799	1406.734	0	3,850	12587.954	20,315	362.4	56674.64	10656.959	9991.4176	166.45	31534	24043.819	22734.568	528.85	66839.97
Ireland	1131.714	847.5519	0	2,325	33546.446	12,349	23183.09	58716	22065.663	23629.168	1999.16	69421	56743.771	23040.351	28286.08	95061
Italy	3461.429	2675.499	210	8,669	36681.17	11,635	18077.43	50168	162327.46	355031.74	10411	963825	202470	349860.37	50310.04	994402
Luxembourg	249.1667	248.7138	0	615	39844.197	18,154	25481.53	76000.1	20431.828	13383.737	6298.84	36681.52	60325.26	26599.771	38575	109893.2
Netherlands	7960.714	5555.686	1025	15,298	108267.81	33,151	49346	150278.03	131136.5	132964.24	56229.74	422731	247365.18	117771.65	165845.12	487375
Norway	11514	11987.32	1813	29,647	88576.126	38,367	24,642	154064	79502.037	59386.258	37228.42	205433	179592.31	61948.27	122222.73	285713.63
Poland	1633.429	1327.721	0	3,874	3509.85	3,771	518	11368.06	14705.824	14119.148	483.72	42267.85	19848.913	18444.937	2101.73	57509.42
Portugal	790.8571	1466.697	0	4,074	28203.714	18,590	9,530	53176.49	33729.127	38702.122	2835.92	108575.8	62723.694	43704.834	12846.17	137129.92
Spain	11481.43	10283	876	32,258	84525.109	67,657	46332.36	233784	163653.34	141570.53	28369.18	403271.41	259660.02	187502.32	89832.97	499826
Sweden	8937.286	4839.388	2213	14,823	145270.11	46,965	84,155	227125.61	186035.57	149653.15	98532.93	518226	340242.91	174708.13	216612	695779
Switzerland	10347.57	6678.393	581	20,118	140731.76	55,735	56,774	196259.7	175617.9	110528.05	55758.63	329245	326697.17	129339.62	128651.84	496843.49
United Kingdom	21396.14	23612.02	4730	68,855	966472.78	1,420,629	288,699	4,171,538	1,303,649	1742284.5	298164.47	5193973	2291517.5	3179345	678464.19	9434366
Total	179718	125758.5	50321	403084	2659874.9	1960639.4	1302123.9	6726155.6	3588857.8	3577483.5	1233260.9	11221579.6	6428450.4	5137864.8	3112346.2	17290287

Table 5: Descriptive Statistics – Different Stages of Investments on a Country-Level

Country Name	Funds Early Stage (in 1,000€)			Funds Later Stage (in 1,000€)			Funds Total (in 1,000€)		
	Average	St.Dev	Min. Max.	Average	St.Dev	Min. Max.	Average	St.Dev	Min. Max.
Austria	15682.571	17796.74857	0 51800	4,207	3,830	0 9,000	38981.29	25008.6	5500 72929
Belgium	47052.429	41096.88076	0 125150	0	0	0 0	89682	62701.2	15000 206574
Czech Republic	2578.5714	4479.94207	0 10450	0	0	0 0	2818.429	4362.28	0 10450
Denmark	139199.43	155547.7071	0 436450	815.714	1863.97	0 5000	215358.1	207503	0 550520
Finland	78015	40626.82683	34940 155350	21697.7	55846	0 148330	161986.7	105000	56980 333717
France	382782.43	180275.886	167600 699460	136095	66809.4	37480 216710	1157401	516073	502420 2179564
Germany	376297.14	306849.9832	81620 993500	108989	160895	0 456800	908767.1	445144	376370 1377000
Greece	0	0	0 0	0	0	0 0	8428.571	14627.1	0 34000
Hungary	13802.857	25175.62427	0 63620	14285.7	37796.4	0 100000	41931.71	53811.5	0 133690
Ireland	54054.571	57158.27324	0 131300	210.857	557.876	0 1476	73677.71	70530.6	0 191300
Italy	46387.286	50187.25919	0 130400	5421.71	10610.9	0 27952	259010.6	550073	0 1500434
Luxembourg	58438.333	71713.22623	0 180000	0	0	0 0	58438.33	71713.2	0 180000
Netherlands	66209.143	73354.03678	11584 221600	51095.3	39729.7	0 91877	300612.3	249947	106750 781600
Norway	69276.429	96318.90238	3570 257670	65258.7	68342	0 170910	274949	177151	14330 571343
Poland	7611.4286	7430.36883	0 18840	7654.29	16038.4	0 43460	28115.29	46674.5	3560 133407
Portugal	8113.8571	9712.419754	0 25500	2175.86	5721.58	0 15151	74038.86	83676	80 247100
Spain	72441	36166.29716	21800 125600	98423.3	126652	0 332000	334356.6	303095	117190 984516
Sweden	117500.57	112755.5909	17570 308910	41395	37951.8	885 92640	222137.3	218319	27040 599650
Switzerland	172987.14	202802.1466	0 514030	154644	256768	0 633100	492464.7	345659	21670 1005000
United Kingdom	559770.29	590392.1856	63510 1669272	394262	837977	5000 2284787	2034620	2977217	556210 8724041
Total	2288200.5	2079840.305	402194 6118902	1106632	1727389	43365 4629193	6777775	6528286	1803100 19816835

Table 6: Descriptive Statistics – Different Fund Types on Country-Level.

The following table indicates a summary of the variables to be used in the hypothesis testing. Furthermore, it can be seen the higher average amount of Investments in VC for both Start-Up and Later Stage Investments when in comparison to Seed Investments. Besides this, and in line with what was previously mentioned, average amounts of Funds Raised are higher for Early Stage Funds than for Later Stage with the opposite happening for Investment Levels. Looking at the Table below it is also observable the differences between total Investment and Funds. Furthermore, It can be seen the descriptive statistics for the control variables used.

	Obs.	Mean	Std. Dev.	Min.	Max.
InvVC	139	323299	855785.5	0	9434366
InvSeed	139	9049	14498.2	0	97296
Inv.Start.up	139	133664	369753.2	0	4171538
InvLaterStage	139	180587	369753.2	0	5193973
Crisis	140	0.5714	0.4966486	0	1
Stockmktcap	140	70.00	52.02256	14.61	265.11
R.D	135	1.8449	0.8232097	0.5532	3.7488
GDPgrowth	140	0.9397	3.303276	-9.1325	8.3956
GDPpercapita	140	240174	579276.5	15800	2885771
Unemployment	140	7.708	3.964266	2.500	25.200
IntRate	140	4.321	2.552559	0	22.500
Funds	139	340906	823182.5	0	8724041
FundsEarlyStage	139	114813	217717.5	0	1669272
FundsLaterStage	139	55730	210814.5	0	2284787
FundsBalanced	139	167849	459872.8	0	4769982

Table 7: Descriptive Statistics – Variables’ summary statistics

5.3. Empirical Methods and Results

In order to test the hypothesis formulated, an unbalanced panel data and a dummy variable with regards to the Economic Crisis were created. In line with this, the dummy takes the value of 1 starting in 2009 until 2012 with all previous years considered the non-Crisis years. The decision on the year 2009 comes after the above analysis of the variables with special regard to the change in Investment/Funds Raised Levels throughout the years together with the information collected from the Literature Review. It is to stress that not all countries suffered from the impacts of the crisis at the same time and therefore, the choice of 2009 comes as an approximation of the general impact of crisis in Europe. Also to reinforce that, while for investments, it was used three stages of investment, Seed, Start-up and Later Stage, for Funds only two categories were included – Early and Later Stage Funds.

First Hypothesis

For the First Hypothesis, a regression was made in order to analyze the impact of the variable Crisis in the Venture Capital Activity. Therefore, two base regressions were developed – with the dependent variable being Investments in VC and the other one being Fund Raising levels.

$$\text{InvVC}_{it} = \beta_0 + \beta_1 \text{Crisis} + \epsilon_{it}$$

$$\text{Funds}_{it} = \beta_0 + \beta_1 \text{Crisis} + \epsilon_{it}$$

The dependent variable was scaled to GDP in order to account for each country's size. Furthermore, control variables were introduced to check if results suffered any change. In addition to this, in later regressions, interactions between the variable Crisis and each of the control variables were introduced, one at the time, as it was believed that the Crisis had an impact on all control variables chosen and therefore, that could have an impact on the dependent variable.

$$\text{InvVC}_{it} \text{ or } \text{Funds}_{it} = \beta_0 + \beta_1 \text{Crisis} + \beta_2 \text{Stockmktcap} + \beta_3 \text{R.D} + \beta_4 \text{GDPgrowth} + \beta_5 \text{GDPperCapita} + \beta_6 \text{Unemployment} + \beta_7 \text{IntRate} + \epsilon_{it} \text{ (Reg. 7)}$$

$$\begin{aligned} \text{InvVC}_{it} \text{ or } \text{Funds}_{it} = & \beta_0 + \beta_1 \text{Crisis} + \beta_2 \text{Stockmktcap} + \beta_3 \text{R.D} + \beta_4 \text{GDPgrowth} + \\ & \beta_5 \text{GDPperCapita} + \beta_6 \text{Unemployment} + \beta_7 \text{IntRate} + \beta_8 \text{Stockmktcap} * \text{Crisis} + \beta_9 \text{R.D} * \text{Crisis} + \\ & \beta_{10} \text{GDPgrowth} * \text{Crisis} + \beta_{11} \text{GDPperCapita} * \text{Crisis} + \beta_{12} \text{Unemployment} * \text{Crisis} + \\ & \beta_{13} \text{IntRate} * \text{Crisis} + \epsilon_{it} \text{ (Reg. 13)} \end{aligned}$$

Panel A – Crisis and Total Investment in

	Reg 1	Reg 2	Reg 3	Reg 4	Reg 5	Reg 6	Reg 7	Reg 8	Reg 9	Reg 10	Reg 11	Reg 12	Reg 13
Crisis	-0.0004 (0.113)	-0.0002 (0.337)	-0.0002 (0.504)	-0.0003 (0.373)	-0.0003 (0.356)	-0.0003 (0.315)	-0.00004 (0.239)	-0.0003 (0.579)	-0.0003 (0.701)	-0.001 (0.466)	-0.001 (0.399)	0.001 (0.483)	0.002 (0.361)
Stockmktcap	0.00001** (0.016)	0.00001** (0.016)	0.00001** (0.005)	0.00001** (0.004)	0.00001** (0.007)	0.00001** (0.007)	0.00001** (0.019)	0.00001** (0.045)	0.00001* (0.058)	0.00001* (0.033)	0.00001* (0.039)	0.00001* (0.015)	0.00001* (0.024)
R.D			-0.00002 (0.892)	-0.00002 (0.894)	-0.00004 (0.819)	-0.00001 (0.948)	-0.00004 (0.799)	-0.00005 (0.780)	-0.00005 (0.847)	-0.00001 (0.680)	-0.00001 (0.656)	-0.00005 (0.851)	-0.00004 (0.864)
GDPgrowth			-0.00003 (0.495)	-0.00003 (0.495)	-0.00003 (0.418)	-0.00003 (0.555)	-0.00003 (0.450)	-0.00003 (0.455)	-0.00003 (0.457)	-0.00001 (0.125)	-0.00001 (0.121)	-0.00002* (0.078)	-0.00002* (0.086)
GDPperCapita			-0.00002 (0.340)	-0.00002 (0.322)	-0.00002 (0.340)	-0.00002 (0.340)	-0.00002 (0.442)	-0.00003 (0.448)	-0.00003 (0.450)	-0.00004 (0.411)	-0.00004 (0.380)	-0.00005 (0.379)	-0.00004 (0.285)
Unemployment			0.00002 (0.626)	0.00002 (0.626)	0.00002 (0.626)	0.00002 (0.626)	0.00003 (0.424)	0.00003 (0.418)	0.00003 (0.420)	0.00004 (0.345)	0.00004 (0.356)	0.0002** (0.046)	0.0002** (0.062)
IntRate			-0.0001 (0.471)	-0.0001 (0.471)	-0.0001 (0.471)	-0.0001 (0.471)	-0.0001 (0.471)	-0.0001 (0.471)	-0.0001 (0.472)	-0.00005 (0.539)	-0.00004 (0.574)	-0.00001 (0.881)	0.0002 (0.584)
Crisis:stockmktcap								-0.00000 (0.816)					
Crisis:R.D									0.00000 (0.998)				
Crisis:GDPgrowth										0.00001 (0.179)			
Crisis:GDPperCapita											0.000 (0.638)		
Crisis:Unemployment												-0.0002* (0.076)	
Crisis:IntRate													-0.0002 (0.539)
Constant	0.001*** (0.00002)	0.0003 (0.230)	0.0002 (0.626)	0.0002 (0.544)	0.0003 (0.377)	0.0002 (0.757)	-0.0004 (0.514)	0.0004 (0.551)	0.0004 (0.560)	0.001 (0.388)	0.001 (0.352)	-0.001 (0.543)	-0.001 (0.394)
Obs	140	140	135	135	135	135	135	135	135	135	135	135	135
Adjusted R ²	0.018	0.058	0.077	0.080	0.086	0.087	0.089	0.089	0.088	0.100	0.100	0.120	0.122

Table 8: Panel A – Crisis and Total Investment in VC

Note: Std. error clustered at country-level; p-values on the table: * p<0.10; **p<0.05; ***p<0.01

Panel B – Crisis and Total Fund Raising amounts

	Reg 1	Reg 2	Reg 3	Reg 4	Reg 5	Reg 6	Reg 7	Reg 8	Reg 9	Reg 10	Reg 11	Reg 12	Reg 13
Crisis	-0.0005* (0.077)	-0.0003 (0.271)	-0.0003 (0.384)	-0.0003 (0.319)	-0.0003 (0.306)	-0.0004 (0.241)	-0.001 (0.149)	0.0004 (0.478)	0.0001 (0.894)	-0.0002 (0.782)	-0.0003 (0.768)	0.001 (0.514)	0.0002 (0.914)
Stockmktcap	0.00001*** (0.009)	0.00001*** (0.009)	0.00001*** (0.004)	0.00001*** (0.003)	0.00001*** (0.006)	0.00001*** (0.005)	0.00001*** (0.018)	0.00001*** (0.002)	0.00002*** (0.002)	0.00002*** (0.001)	0.00002*** (0.001)	0.00002*** (0.0005)	0.00002*** (0.0013)
R.D			-0.00001 (0.964)	-0.00001 (0.964)	-0.00002 (0.899)	0.00002 (0.898)	-0.00003 (0.879)	-0.0001 (0.690)	-0.0002 (0.528)	-0.0002 (0.381)	-0.0002 (0.380)	-0.0002 (0.484)	-0.0002 (0.479)
GDPgrowth			-0.00002 (0.617)	-0.00002 (0.617)	-0.00002 (0.605)	-0.00002 (0.730)	-0.00003 (0.545)	-0.00003 (0.574)	-0.00003 (0.561)	-0.0002 (0.109)	-0.0002 (0.110)	-0.0002* (0.084)	-0.0002* (0.082)
GDPperCapita					-0.00002 (0.394)	-0.00002 (0.426)	-0.00002 (0.386)	-0.00002 (0.625)	-0.00002 (0.613)	-0.00002 (0.561)	-0.00002 (0.657)	-0.00002 (0.659)	-0.00002 (0.894)
Unemployment							0.00003 (0.962)	0.00001 (0.165)	0.00001 (0.171)	0.00001 (0.127)	0.00001 (0.130)	0.00002* (0.077)	0.00002* (0.072)
IntRate							-0.0001 (0.296)	-0.0001 (0.146)	-0.0001 (0.204)	-0.0001 (0.248)	-0.0001 (0.257)	-0.0001 (0.401)	-0.0002 (0.555)
Crisis:stockmktcap							-0.00001*** (0.0039)						
Crisis:R.D									0.0002 (0.622)				
Crisis:GDPgrowth										0.0002 (0.128)			
Crisis:GDPperCapita											0.000 (0.916)		
Crisis:Unemployment												-0.00001 (0.236)	
Crisis:IntRate													0.0001 (0.711)
Constant	0.001*** (0.00002)	-0.0003 (0.288)	0.0001 (0.719)	0.0002 (0.654)	0.0003 (0.491)	-0.0003 (0.962)	0.0004 (0.594)	0.0001 (0.885)	0.0002 (0.809)	0.0004 (0.569)	0.0004 (0.564)	-0.0005 (0.662)	0.0001 (0.964)
Obs	140	140	135	135	135	135	135	135	135	135	135	135	135
R²	0.022	0.069	0.087	0.088	0.093	0.096	0.103	0.130	0.130	0.144	0.143	0.151	0.150

Table 9: Panel B – Crisis and Total Fund Raising amounts

Note: Std. error clustered at country-level; p-values on the table: * p<0.10; **p<0.05; ***p<0.01

In the equations, Stockmktcap stands for Stock Market Capitalization, R.D for Research and Development Expenditures and IntRate for Interest Rate. More information on the variables was given in the “Data Description and Sources” part.

Looking at Tables 8 and 9, one difference stands out – Crisis appears to impact Fund Raising Levels (at 10% significance level) while it has no significant impact on Investments in VC. However, when adding the control variables in Table 9, the variable Crisis becomes non-significant. This leads to the conclusion that the variable Crisis also does not impact Funds Raised significantly. This variation may result from the fact that the Crisis variable “absorbed” the effects of other control variables used and therefore, when adding them (in particular when adding the significant variable Market Capitalization) the independent variable stopped being significant . Also to note that all coefficients obtained from the analysis showed a residual relationship (coefficients near to zero).

In what regards the control variables, only Market Capitalization impacts significantly Investments and Funds. Moreover, it has a positive correlation with the dependent variable as it was predicted. All other variables chosen provided unexpected results: they showed not to be significant and not to have the type of relationship expected (based on the prior research results) - R&D, GDP growth, GDP per Capita, Unemployment and Interest Rates with negative relations.

On the other hand, interactions can be concluded not to have an important impact on the testing of this first hypothesis and therefore, it will not be the focus here.

To summarize, the first hypothesis is rejected - Crisis does not appear to have a significant impact in either Investments or Fund Raising. It is now of interest to understand whether, when assuming different stages of investment or different types of funds these results change.

Second Hypothesis

The main goal of the second hypothesis was to check whether there was any significant change in the results of the first hypothesis when dividing the depend variable into specific groups - Are the impacts of Crisis in VC Investments and Funds different when considering the different Stages of Investment and the different Fund types? The base regression forms were,

$$\text{InvSeed}_{it} = \beta_0 + \beta_1 \text{Crisis} + \epsilon_{it}$$

$$\text{InvStart.up}_{it} = \beta_0 + \beta_1 \text{Crisis} + \epsilon_{it}$$

$$\text{InvLaterStage}_{it} = \beta_0 + \beta_1 \text{Crisis} + \epsilon_{it}$$

For the second hypothesis the analysis on the results concerning the Investment side and the Fund Raising side was divided. Later on, a comparison between the two results will be made.

Panel C – Crisis and Seed Investment

	Reg 1	Reg 2	Reg 3	Reg 4	Reg 5	Reg 6	Reg 7	Reg 8	Reg 9	Reg 10	Reg 11	Reg 12	Reg 13
Crisis	-0.00000 (0.334)	-0.00000 (0.445)	-0.00000 (0.369)	-0.00001 (0.238)	-0.00001 (0.219)	-0.00001 (0.202)	-0.00001 (0.189)	-0.00001 (0.455)	-0.00001 (0.706)	-0.00001 (0.467)	-0.00001 (0.435)	0.00000 (0.975)	0.00002 (0.585)
Stockmktcap	0.00000 (0.493)	0.00000 (0.493)	0.00000 (0.636)	0.00000 (0.533)	0.00000 (0.694)	0.00000 (0.674)	0.00000 (0.775)	0.00000 (0.776)	0.00000 (0.836)	0.00000 (0.630)	0.00000 (0.656)	0.00000 (0.532)	0.00000 (0.365)
R.D			0.00000 (0.186)	0.00000 (0.186)	0.00000 (0.233)	0.00000 (0.214)	0.00000 (0.270)	0.00000 (0.280)	0.00000 (0.380)	0.00000 (0.518)	0.00000 (0.535)	0.00000 (0.468)	0.00000 (0.458)
GDPgrowth			-0.00000 (0.380)	-0.00000 (0.380)	-0.00000 (0.363)	-0.00000 (0.415)	-0.00000 (0.382)	-0.00000 (0.385)	-0.00000 (0.392)	-0.00000 (0.109)	-0.00000 (0.107)	0.00000* (0.091)	-0.00000 (0.101)
GDPperCapita				-0.000 (0.178)	-0.000 (0.178)	-0.000 (0.189)	-0.000 (0.230)	-0.000 (0.233)	-0.000 (0.238)	-0.000 (0.212)	-0.000 (0.314)	-0.000 (0.316)	-0.000 (0.230)
Unemployment				0.00000 (0.712)	0.00000 (0.712)	0.00000 (0.712)	0.00000 (0.619)	0.00000 (0.617)	0.00000 (0.615)	0.00000 (0.520)	0.00000 (0.529)	0.00000 (0.318)	0.00000 (0.383)
IntRate							-0.000 (0.728)	-0.00000 (0.720)	-0.00000 (0.693)	-0.00000 (0.773)	-0.00000 (0.798)	-0.00000 (0.944)	0.00000 (0.534)
Crisis:stockmktcap													
Crisis:R.D									-0.00000 (0.850)				
Crisis:GDPgrowth										0.00000 (0.174)			
Crisis:GDPperCapita											0.000 (0.768)		
Crisis:Unemployment												-0.0000 (0.427)	
Crisis:IntRate													-0.00000 (0.504)
Constant	0.00002** * (0.0004)	0.00001** * (0.021)	0.00001 (0.406)	0.00001 (0.326)	0.00001 (0.177)	-0.00001 (0.464)	-0.00001 (0.423)	0.00001 (0.444)	0.00001 (0.478)	0.00001 (0.322)	0.00001 (0.306)	0.00000 (0.876)	0.00002 (0.653)
Obs	140	140	135	135	135	135	135	135	135	135	135	135	135
Adjusted R ²	0.007	0.010	0.025	0.030	0.043	0.044	0.044	0.044	0.044	0.056	0.057	0.060	0.063

Table 10: Panel C – Crisis and Seed Investment

Note: Std. error clustered at country-level; p-values on the table: * p<0.10; **p<0.05; ***p<0.01

Panel D – Crisis and Start-Up Investment

	Reg 1	Reg 2	Reg 3	Reg 4	Reg 5	Reg 6	Reg 7	Reg 8	Reg 9	Reg 10	Reg 11	Reg 12	Reg 13
Crisis	-0.0001 (0.515)	-0.00002 (0.817)	-0.0001 (0.528)	-0.00004 (0.722)	0.00003 (0.747)	0.00003 (0.762)	0.00001 (0.898)	-0.00001 (0.966)	-0.00001 (0.962)	-0.0001 (0.683)	-0.0001 (0.643)	0.0003 (0.466)	0.001 (0.337)
Stockmktcap	0.00000*** (0.0005)	0.00000*** (0.0005)	0.00000** (0.00003)	0.00000** (0.00003)	0.00000** (0.0001)	0.00000** (0.0001)	0.00000** (0.0003)	0.00000*** (0.0005)	0.00000** (0.008)	0.00000** (0.004)	0.00000** (0.005)	0.00001** (0.002)	0.00001** (0.005)
R.D	-	-	0.000004 (0.515)	-0.00004 (0.517)	-0.00004 (0.462)	-0.00004 (0.496)	-0.00005 (0.431)	-0.00005 (0.447)	-0.00005 (0.590)	-0.0001 (0.449)	-0.0001 (0.441)	-0.0001 (0.578)	-0.0001 (0.590)
GDPgrowth				-0.00001 (0.602)	-0.00001 (0.588)	-0.00001 (0.604)	-0.00001 (0.530)	-0.00001 (0.529)	-0.00001 (0.530)	-0.0005 (0.137)	-0.0005 (0.136)	-0.0001* (0.098)	-0.0001 (0.108)
GDPperCapita				-0.00001 (0.344)	-0.00001 (0.344)	-0.00001 (0.349)	-0.00001 (0.423)	-0.00001 (0.423)	-0.00001 (0.424)	-0.00001 (0.386)	-0.00001 (0.469)	-0.00001 (0.470)	-0.00001 (0.334)
Unemployment				0.00000 (0.960)	0.00000 (0.960)	0.00000 (0.960)	0.00000 (0.754)	0.00000 (0.764)	0.00000 (0.765)	0.00001 (0.660)	0.00001 (0.668)	0.00005 (0.140)	0.00004 (0.178)
IntRate				-0.00001 (0.617)	-0.00001 (0.617)	-0.00001 (0.649)	-0.00001 (0.617)	-0.00001 (0.649)	-0.00001 (0.667)	-0.00001 (0.745)	-0.00001 (0.766)	0.00000 (0.972)	0.00001 (0.526)
Crisis:stockmktcap													
Crisis:R.D									0.00000 (0.981)				
Crisis:GDPgrowth										0.0001 (0.174)			
Crisis:GDPperCapita											0.000 (0.811)		
Crisis:Unemployment												-0.0001 (0.147)	
Crisis:IntRate													-0.001 (0.515)
Constant	0.0003*** (0.0001)	0.00002 (0.859)	-0.00003 (0.843)	-0.00001 (0.924)	0.00003 (0.840)	-0.00002 (0.911)	0.0001 (0.713)	0.0001 (0.697)	0.0002 (0.501)	0.0002 (0.501)	0.0002 (0.482)	-0.0002 (0.591)	-0.001 (0.401)
Obs	140	140	135	135	135	135	135	135	135	135	135	135	135
Adjusted R ²	0.003	0.087	0.129	0.130	0.135	0.134	0.134	0.133	0.143	0.143	0.142	0.154	0.156

Table 11: Panel D – Crisis and Start-Up Investment

Note: Std. error clustered at country-level; p-values on the table: * p<0.10; **p<0.05; ***p<0.01

Panel E – Crisis and Later Stage Investment

	Reg 1	Reg 2	Reg 3	Reg 4	Reg 5	Reg 6	Reg 7	Reg 8	Reg 9	Reg 10	Reg 11	Reg 12	Reg 13
Crisis	-0.0003** (0.038)	-0.0003 (0.109)	-0.0002 (0.173)	-0.0003 (0.123)	-0.0003 (0.116)	-0.0003* (0.092)	-0.0004* (0.064)	-0.0003 (0.415)	-0.0003 (0.575)	-0.0004 (0.379)	-0.0001 (0.306)	0.0005 (0.503)	0.001 (0.393)
Stockmktcap	0.00000* (0.086)	0.00000* (0.052)	0.00000* (0.052)	0.00000* (0.041)	0.00000* (0.063)	0.00000* (0.057)	0.00000 (0.122)	0.00000 (0.135)	0.00000 (0.159)	0.00000 (0.101)	0.00000 (0.118)	0.00001* (0.046)	0.00001* (0.059)
R.D	0.00001 (0.908)	0.00001 (0.907)	0.00001 (0.908)	0.00001 (0.907)	0.00000 (0.981)	0.00003 (0.806)	0.00000 (0.987)	-0.00000 (0.972)	-0.00000 (0.982)	-0.00004 (0.817)	-0.00004 (0.784)	0.00000 (0.999)	0.00000 (0.988)
GDPgrowth				-0.00002 (0.460)	-0.00002 (0.448)	-0.00002 (0.549)	-0.00002 (0.428)	-0.00002 (0.436)	-0.00002 (0.439)	-0.00001 (0.138)	-0.0001 (0.131)	-0.0001* (0.082)	-0.0001* (0.090)
GDPperCapita					-0.000 (0.338)	-0.000 (0.364)	-0.000 (0.484)	-0.000 (0.494)	-0.000 (0.496)	-0.000 (0.467)	-0.000 (0.358)	-0.000 (0.356)	-0.000 (0.282)
Unemployment					0.00002 (0.475)	0.00002 (0.296)	0.00003 (0.410)	0.00003 (0.371)	0.00003 (0.390)	0.00003 (0.233)	0.00003 (0.244)	0.0001** (0.026)	0.0001** (0.036)
IntRate					-0.00004 (0.410)	-0.00004 (0.371)	-0.00004 (0.447)	-0.00004 (0.635)	-0.00004 (0.999)	-0.00004 (0.204)	-0.00004 (0.487)	-0.00001 (0.801)	0.0001 (0.638)
Crisis:stockmktcap													
Crisis:R.D													
Crisis:GDPgrowth													
Crisis:GDPperCapita													
Crisis:Unemployment													
Crisis:IntRate													
Constant	0.001*** (0.00002)	0.0003* (0.091)	0.0002 (0.399)	0.0002 (0.334)	0.0003 (0.225)	0.0001 (0.693)	0.0003 (0.434)	0.0003 (0.494)	0.0003 (0.505)	0.0004 (0.353)	0.0005 (0.309)	-0.0004 (0.523)	-0.001 (0.406)
Obs	140	140	135	135	135	135	135	135	135	135	135	135	135
Adjusted R ²	0.030	0.051	0.059	0.062	0.068	0.071	0.075	0.076	0.075	0.085	0.087	0.111	0.112

Table 12: Panel E – Crisis and Later Stage Investment

Note: Std. error clustered at country-level; p-values on the table: * p<0.10; **p<0.05; ***p<0.01

Starting the analysis on the Impacts of the Crisis on Seed and Start-up Investments, the results are, as expected, very similar among these two stages. The impact of Crisis is non-significant as it occurred when using the Total Investment variable. For Seed Stage Investment, other than not being significant, the coefficient is zero which indicates that the impact of the Crisis on Seed Investments is null. Moreover, none of the control variables added to the model (from Model 2 to 7) proved to be significant and their impact on VC Investments is null. Besides this, Start-up results did not fall too far from the Seed Stage case. Even though coefficients are close to zero, when adding control variables, results provided show a null significant impact from the Market Capitalization variable. In what concerns the other variables added, no significance is shown and impacts are equal to those presented in the first hypothesis.

On the other side, results shown provide different outcomes when considering Later Stage Investment. When focusing only in Model 1 (accounting for no control variables), it can be seen that crisis has a significant negative impact (at a 5% level). However, and in similarity with what happened in the first hypothesis, when adding control variables, the Crisis stops being a significant variable for regression Models 2, 3, 4 and 5. However, when adding both Unemployment and Interest Rate (Models 6 and 7) the Crisis variable gets significant again at a 10% level. In line with the explanation given in Hypothesis 1, the same might have happened here. Therefore, the variable crisis became insignificant. However, by adding more control variables that were omitted previously, the variable turned significant. Therefore, it can be stated that the Crisis negatively impacted Investment in Later Stage Ventures (at a 10% significance level). According to all results drawn from the Investment regressions, interactions do not provide a worth mentioning impact on the dependent variable.

Moving to the analysis on the impacts of Economic Crisis on the amounts raised by VC Funds, the objective of the regressions conducted was the same as before. Therefore, the base regressions took the form of,

$$\text{FundsEarlyStage}_{it} = \beta_0 + \beta_1 \text{Crisis} + \epsilon_{it}$$

$$\text{FundsLaterStage}_{it} = \beta_0 + \beta_1 \text{Crisis} + \epsilon_{it}$$

Panel F – Crisis and Early Stage Funds

	Reg 1	Reg 2	Reg 3	Reg 4	Reg 5	Reg 6	Reg 7	Reg 8	Reg 9	Reg 10	Reg 11	Reg 12	Reg 13
Crisis	-0.0002 (0.127)	-0.0001 (0.622)	-0.0000 (0.990)	-0.0001 (0.637)	-0.0001 (0.625)	-0.0001 (0.600)	-0.0001 (0.317)	0.0005** (0.015)	0.0002 (0.441)	0.0001 (0.858)	0.0001 (0.764)	0.0002 (0.679)	-0.002** (0.016)
Stockmktcap	0.0000*** (0.00003)	0.0000***	0.0001**	0.0001**	0.0001**	0.0001**	0.0001**	0.0001***	0.0001**	0.0001**	0.0001**	0.0001**	0.0001**
R.D	0.00000 (0.432)	0.00000 (0.432)	0.00000 (0.432)	0.00000 (0.432)	0.00000 (0.408)	0.00000 (0.475)	0.00002 (0.267)	-0.0001 (0.103)	0.0002** (0.041)	0.0002** (0.017)	0.0002** (0.019)	0.0002** (0.023)	0.0002** (0.014)
GDPgrowth	0.00000 (0.432)	0.00000 (0.432)	0.00000 (0.432)	0.00000 (0.432)	0.00000 (0.408)	0.00000 (0.475)	0.00002 (0.267)	-0.0001 (0.103)	0.0002** (0.041)	0.0002** (0.017)	0.0002** (0.019)	0.0002** (0.023)	0.0002** (0.014)
GDPperCapita	0.00000 (0.432)	0.00000 (0.432)	0.00000 (0.432)	0.00000 (0.432)	0.00000 (0.408)	0.00000 (0.475)	0.00002 (0.267)	-0.0001 (0.103)	0.0002** (0.041)	0.0002** (0.017)	0.0002** (0.019)	0.0002** (0.023)	0.0002** (0.014)
Unemployment	0.00000 (0.432)	0.00000 (0.432)	0.00000 (0.432)	0.00000 (0.432)	0.00000 (0.408)	0.00000 (0.475)	0.00002 (0.267)	-0.0001 (0.103)	0.0002** (0.041)	0.0002** (0.017)	0.0002** (0.019)	0.0002** (0.023)	0.0002** (0.014)
IntRate	0.00000 (0.432)	0.00000 (0.432)	0.00000 (0.432)	0.00000 (0.432)	0.00000 (0.408)	0.00000 (0.475)	0.00002 (0.267)	-0.0001 (0.103)	0.0002** (0.041)	0.0002** (0.017)	0.0002** (0.019)	0.0002** (0.023)	0.0002** (0.014)
Crisis:stockmktcap													
Crisis:R.D													
Crisis:GDPgrowth													
Crisis:GDPperCapita													
Crisis:Unemployment													
Crisis:IntRate													
Constant	0.0004*** (0.0001)	-0.00004 (0.745)	-0.0001 (0.553)	-0.0001 (0.709)	-0.00003 (0.843)	-0.0001 (0.766)	0.0002 (0.537)	-0.00003 (0.923)	0.00004 (0.869)	0.0002 (0.313)	0.0002 (0.583)	0.0001 (0.855)	0.001 (0.005)
Obs	140	140	135	135	135	135	135	135	135	135	135	135	135
R ²	0.017	0.136	0.187	0.193	0.193	0.192	0.205	0.286	0.292	0.313	0.311	0.309	0.36

Table 13: Panel F – Crisis and Early Stage Funds.

Note: Std. error clustered at country-level; p-values on the table: * p<0.10; **p<0.05; ***p<0.01

Panel G – Crisis and Later Stage Funds

	Reg 1	Reg 2	Reg 3	Reg 4	Reg 5	Reg 6	Reg 7	Reg 8	Reg 9	Reg 10	Reg 11	Reg 12	Reg 13
Crisis	-0.0001 (0.143)	-0.00004 (0.387)	-0.0001 (0.218)	-0.0001 (0.201)	-0.0001 (0.194)	-0.0001 (0.163)	-0.0001 (0.201)	0.00002 (0.782)	-0.00001 (0.953)	-0.00005 (0.701)	-0.0001 (0.606)	-0.0001 (0.522)	0.001* (0.013)
Stockmktcap	0.00000** (0.020)	0.00000**	0.00000*	0.00000*	0.00000*	0.00000**	0.00000*	0.00000**	0.00000*	0.00000*	0.00000*	0.00000*	0.00000*
R.D			0.0001 (0.789)	0.0001 (0.789)	0.0001 (0.838)	0.0001 (0.701)	0.0001 (0.686)	0.0001 (0.810)	-0.00000 (0.932)	-0.00001 (0.774)	-0.00001 (0.749)	-0.00000 (0.905)	-0.00000 (0.959)
GDPgrowth			-0.00000 (0.789)	-0.00000 (0.693)	-0.00000 (0.683)	-0.00000 (0.782)	-0.00000 (0.818)	-0.00000 (0.843)	-0.00000 (0.833)	-0.00002 (0.246)	-0.00002 (0.238)	-0.00002 (0.181)	-0.00002 (0.231)
GDPperCapita			0.0001 (0.789)	0.0001 (0.521)	0.0001 (0.549)	0.0001 (0.541)	0.0001 (0.541)	0.0001 (0.568)	0.00000 (0.560)	0.00000 (0.520)	0.00000 (0.449)	0.00000 (0.450)	0.00000 (0.028)
Unemployment			0.0001 (0.789)	0.00000 (0.541)	0.00000 (0.541)	0.00000 (0.541)	0.00000 (0.661)	0.00000 (0.597)	0.00000 (0.604)	0.00000 (0.519)	0.00000 (0.532)	0.00002 (0.131)	0.00002 (0.276)
IntRate			0.0001 (0.789)	0.00000 (0.541)	0.00000 (0.541)	0.00000 (0.541)	0.00000 (0.661)	0.00000 (0.597)	-0.00000 (0.961)	0.00000 (0.964)	0.00000 (0.927)	0.00001 (0.688)	0.0001** (0.008)
Crisis:stockmktcap								-0.00000 (0.168)					
Crisis:R.D								0.00002 (0.729)					
Crisis:GDPgrowth										0.00002 (0.219)			
Crisis:GDPperCapita											0.000 (0.648)		
Crisis:Unemployment												-0.0002 (0.168)	
Crisis:IntRate													0.0001** *
Constant	0.0001*** (0.0004)	0.00003 (0.469)	0.00002 (0.706)	0.00003 (0.657)	0.00004 (0.536)	-0.0000 (0.974)	-0.0000 (0.963)	-0.00003 (0.762)	-0.00002 (0.882)	0.00001 (0.963)	0.00001 (0.897)	-0.0001 (0.373)	-0.0001 (0.001*** (0.008))
Obs	140	140	135	135	135	135	135	135	135	135	135	135	135
R ²	0.015	0.053	0.065	0.066	0.068	0.070	0.070	0.082	0.083	0.092	0.093	0.105	0.149

Table 14: Panel G – Crisis and Later Stage Funds

Note: Std. error clustered at country-level; p-values on the table: * p<0.10; **p<0.05; ***p<0.01

The understanding of Tables 13 and 14 varies considerably with the ones already showed and explained. To start with, either Early or Later Stage Funds seem not to be significantly affected by the Crisis (even when adding all the control variables to the equation). Besides this, the Market Capitalization variable continues to be the only variable that confirms the kind of impact expected from the control variables present in the regression.

Moreover, for this analysis, the addition of the interaction presents a challenge to understand what the true impacts are on the Fund Raising level. Therefore, it is important to better understand the interaction model. To start with, according to Brambor, Clark & Golder, 2005, the coefficients given by the regression are no longer to be interpreted the way they were as their meanings differ. If focusing on the last interaction conducted in Tables 13 there is (simplified),

$$\text{FundsEarlyStage}_{it} = \beta_0 + \beta_1 \text{Crisis} + \beta_2 \text{IntRate} + \beta_3 \text{IntRate} * \text{Crisis} + \epsilon_{it}$$

If the equation is reorganized,

$$\text{FundsEarlyStage}_{it} = \beta_0 + \beta_2 \text{IntRate} + (\beta_1 + \beta_3 \text{IntRate}) * \text{Crisis}$$

From this equation, Early Stage Funds can be presented as a function of crisis by substituting the betas for the coefficients given in the regression results and, for the Interest Rate, it can be assumed the mean (avg. = 4.321) as the value to use. Therefore,

$$\text{FundsEarlyStage}_{it} = 0.002 + (-0.0004) * (4.321) + (-0.002 + (0.0004) * 4.321) * \text{Crisis}$$

$$\text{FundsEarlyStage}_{it} = 0.0002716 - 0.0002761 * \text{Crisis}$$

Looking at this final equation, it is noticeable that, even though the interaction may be significant, the impact of crisis will be null on Early Stage Funds – in Crisis years (Crisis = 1), the impact on Early Stage Fund Raising is zero. This is also the case for the interaction concerning the Market Capitalization variable on the same table. This situation occurs for Table 14 as well - the only interaction found to be significant is concerning the variable Interest Rate and the impact is null.

With the example of one of the interactions given above it is comprehensible why the coefficients of the independent variable cannot be interpreted the same way and therefore, why the changes in sign should not be worth worrying about (Brambor, Clark, & Golder, 2005).

To conclude with, the testing of the second hypothesis yielded different results for the Investment and Funds side. While the Crisis proved to be not significant for the Investment at an Early Stage phase of the ventures – Seed and Start-up Stages – it is significant when accounting for Later Stage Investments. These results go in line with the findings of Block & Sandner (2009). On the other side, amounts raised by VC Funds (no matter which type) are not impacted by the crisis. However, the regression results confirmed that the impact of the Crisis is not the same for Early and Later Stage Investments and therefore, the second hypothesis is accepted.

On another note, the only control variable that yielded the results expected was Market Capitalization. All the others proved to be not significant and to have an impact opposed of what would be expected. Moreover, the coefficient results for this hypothesis continue to be of a small amount (almost zero).

Finally, the main objective of adding the interactions to the model was to check if, considering the impact of the crisis on the control variables, the dependent variable was impacted and therefore, contributed to the significance of the model. After getting the results and analyzing the contribution interactions had to validate the hypothesis, It can be concluded that its introduction did not yielded the expected results and therefore, its addition to the model was unnecessary for the purpose of this analysis.

In the next part, it will be discussed probable reasons for the odd signs that resulted from the regressions with the control variables. Furthermore, there will also be a discussion on the results of the second hypothesis with a special focus on the non-significant outcomes yielded by Early and Later Stage Fund Raising variables and the proved impact of the Crisis in Later Stage Investments.

6. Discussion of Results

6.1. Control Variables Results

The results concerning the control variables, even though unexpected, can have possible justifications. According to the work of Kennedy (2002), the origin of the issues may have different sources. Out of all origins indicated in his paper, some are found to be possible justifications over the results achieved.

In what concerns the unexpected signs showed in the regressions, the first cause may be related to the usage of not the most appropriate “version” of the variables collected (“Bad Economic Theory problem). For example, instead of accounting for long term interest rates, other Interest Rate definitions or variables could have been chosen (i.e. short term interest rate). Moreover, there could have been an error of Omitted Variables, Causality Problems or the variables can be related to the equation’s error.

On the other hand, the results may be justified by other factors rather than just statistical limitations or data collection errors. The Unemployment Rate was expected to have a negative impact on the dependent variable. However, there is also a possible justification for the opposite result - the rise in Unemployment Rates causes people without a job to look for an alternative to earn money and thus, the number of necessity-driven entrepreneurship increases. According to the research of Williams (2008), both necessity-driven and opportunity-driven entrepreneurship are fundamental for the development of the economy and contribute for the Venture Capital industry. Additionally, the majority of necessity-driven entrepreneurship turns into an opportunity-driven type. As a consequence, it is not hard to imagine that, in fact, an increase in unemployment can have a positive impact on the Investment or Fund Raising levels.

Moreover, the non-significant outcomes yielded by the control variables added may be associated with different explanations. Firstly, the control variables used may have not been the most indicated. Besides that, the different stages have different characteristics (as described before) which, in turn, leads them to be influenced by different variables. Even though this does not explain all the outcomes, it helps justify the reason behind why some variables did not yield a significant result.

6.2. Early and Later Stage Funds not Impacted by the Crisis – Possible reasons

To start with, for the regressions developed, only the data on the amounts raised by Early and Later Stage were taken into consideration. Moreover, and as mentioned in the descriptive statistics section, these two types of funds only account for 50% of the total amounts raised by funds. As a consequence, the lack of a significant result may have resulted from the lack of data concerning these two types of funds. Furthermore, as a model with Balanced Funds information was not included, it is uncertain whether there is any impact on the amounts raised by them. However, based on the results of the first hypothesis, the probability is that they would also have proven to be insignificant.

To summarize, the real reason for this insignificant result was not found as there was no research found on this subject matter. As a consequence, it could not be compared with previous papers and thus, the justification present above just theorizes based on the analysis done.

6.3. Crisis impact on Later Stage Venture Investment

As already mentioned, the results regarding Later Stage investments go in line with the findings of Block & Sandner (2009). As theorized in their paper, this result may be due to the fact that, while Early Stage Ventures (Seed and Start-up) choose to wait for a better environment to get the funding needed, Later Stage Ventures cannot afford to do so. The reason behind it is that they need the capital to keep its operations and to further expand. As a consequence, the crisis impact is not seen in the Early Stage as it is in the Later Stage (Block & Sandner, 2009).

Another train of thought can also be developed based on the findings of Williams (2008) in his paper regarding necessity and opportunity-driven entrepreneurship. It was seen that unemployment has a positive impact on investment levels. This fact can be explained by the increase in necessity-driven entrepreneurship. As a consequence, the increase can lead to more investment in Seed and Start-up Stages and thus, soften the impact of crisis (making it not significant for Early Stage venture investments).

7. Conclusion

The main objective of this thesis was to assess what type of impact an Economic Crisis has on Venture Capital Activity. It is a known fact that Venture Capital plays an important and positive role in the Economic Environment. However, the reverse relationship is still not clear. With that in mind, this thesis was developed in order to try bringing more enlightenment to the relationship. Furthermore, two hypotheses were defined – “The Economic Crisis negatively impacts VC Activity in Europe” and “The impact of an Economic Crisis is not the same for Early and Later Stage Venture Financing”. The results yielded by the two hypotheses went in line with the findings of Block & Sandner (2009).

In regards to the first hypothesis, regression results proved not to be significant for Total Investments in VC or for Total Funds Raised. As a consequence, the hypothesis was rejected - the predicted negative relationship between the variable Crisis and Investments or Funds Raised was not confirmed.

On the other hand, the results gathered led to the confirmation of the second hypothesis formulated. Results found that, while the impact of Crisis is insignificant for the Early Stages of Investment, Seed and Start-up Investments, there is a significant negative impact for Investments in a Later Stage.

The control variables added proved to be, in general, insignificant. The exception was Market Capitalization which confirmed the relation expected before. In addition to this, all other control variables experienced unexpected impacts on the dependent variable. This fact can have several sources as it was discussed. On the other side, the interaction models introduced proved to be of little value for the final results and analysis.

This analysis was limited by some factors. To start with, the data selected on the 20 countries chosen showed that Investments and Funds Raising amounts of the European total came mainly from countries such as UK, France and Germany which can have created a “bias” on the results. It should also be accounted for the very different economic environments within Europe. Even though all countries in the sample got impacted by the Crisis, the magnitude of the impact was very different when comparing countries (i.e. the impact of the Crisis in Germany and Switzerland against the impact in Greece and Portugal).

To conclude with, more research should be done in order to confirm the results provided. Further research is also needed to share light on the differences among results with Investments and Fund Raising amounts as well as to develop a more in depth analysis on the impacts of the Crisis in the different investment stages. These results could provide useful information on the effects of a crisis and further develop indications on how to soften the impact on Venture Capital Activity. Additionally, from the significant results of Crisis on Later Stage Investments, it can be expected that, Private Equity Investments will follow the same trend. Therefore, it would be of interest to investigate if the negative significant impact of Crisis would remain unchanged for the Private Equity Stages of Investment.

8. References

- Baum, J. A., & Silverman, B. S. (2003). Picking Winners or Building Them? Selection Criteria in New Venture Financing and Performance. *Academy of Management Best Conference Paper*.
- Berger, A., & Udell, G. F. (1998). The economics of small business Finance: The roles of private equity and debt markets in the Financial Growth Cycle. *Journal of Banking & Finance*, 613-673.
- Block, J., & Sandner, P. (2009). What is the Effect of the Current Financial Crisis on Venture Capital Financing? Empirical Evidence from US Internet Start-ups. *MPRA Paper No. 14727*. Available at: <http://mpra.ub.uni-muenchen.de/14727/>.
- Bottazzi, L., & Rin, M. (2002). Venture Capital in Europe and the Financing of Innovative Companies. *Forthcoming, Economic Policy*, v.34, 229-69.
- Brambor, T., Clark, W. R., & Golder, M. (2005). Understanding Interaction Models: Improving Empirical Analyses. *Oxford University Press*.
- Burrill, D. F. (n.d.). Modeling and Interpreting Interactions in Multiple Regression. *The Ontario Institute for Studies in Education*.
- Bygrave, W., & Timmons, J. (1992). *Venture Capital at the Crossroads*. United States of America: Harvard Business School Press.
- Cao, J. X., & Hsu, P.-H. (2011). *The Informational Role of Patents in Venture Capital Financing*. Retrieved April 7, 2016, from Social Science Research Network: http://papers.ssrn.com/sol3/papers.cfm?abstract_id=1678809
- Chemmanur, T. J., Krishnan, K., & Nandy, D. K. (2011). How Does Venture Capital Financing Improve Efficiency in Private Firms? A Look Beneath the Surface. *The Review of Financial Studies / v 24 n 12*, 4038-4090.

- Chen, X.-P., Yao, X., & Kotha, S. (2009). Entrepreneur Passion and Preparedness in Business Plan Presentations: A Persuasion Analysis of Venture Capitalists' Funding Decisions. *Academy of Management Journal*, 52, 199–214.
- Claessens, S., & Kose, M. A. (2013). Financial Crisis: Explanations, Types and Implications. *International Monetary Fund (IMF)*.
- Clarysse, B., Knockaert, M., & Lockett, A. (2005). How do Early Stage High Technology Investors Select Their Investments? *Working Paper, Universiteit Gent*.
- Comission, E. (2009). Economic Crisis in Europe: Causes, Consequences and Responses. *Economic and Financial Affairs*.
- Damodaran, A. (2009, June 12). *Valuing Young, Start-up and Growth Companies: Estimation Issues and Valuation Challenges*. Retrieved May 7, 2016, from Social Science Research Network: http://papers.ssrn.com/sol3/papers.cfm?abstract_id=1418687
- Economic Crisis*. (n.d.). Retrieved May 1st, 2016, from BusinessDictionary: <http://www.businessdictionary.com/definition/economic-crisis.html>
- Engel, D., & Keilbach, M. (2007). Firm-level implications of early stage venture capital investment — An empirical investigation. *Journal of Empirical Finance* 14, 150-167.
- EuroStat. (2016). *Database*. Retrieved May 1, 2016, from EuroStat: <http://ec.europa.eu/eurostat/data/database>
- Eurostat. (n.d.). *Venture Capital Investments*. Retrieved April 30, 2016, from Eurostat: http://ec.europa.eu/eurostat/cache/metadata/EN/tin00141_esms.htm
- EVCA. (2015). *2014 European Venture Capital Activity*.
- EVCA. (2015). *Central and Eastern Europe Statistics 2014*. Brussels, Belgium: EVCA Central and Eastern Europe Task Force.
- EVCA. (2015). *Yearbook 2015 Europe Country Tables*.
- Félix, E., Pires, C., & Gulamhussen, M. (2013). The Determinants of Venture Capital in Europe—Evidence Across Countries. *Journal of Financial Services Research*, 259–279.

- Ge, D., Mahoney, J. M., & Mahoney, J. T. (2005). New Venture Valuation by Venture Capitalists: An Integrative Approach. *Business UIUC - Working Paper*.
- Gompers, P. (1994). The Rise and Fall of Venture Capital. *Business and Economic History*, Volume 23, no. 2.
- Gompers, P., & Lerner, J. (1999). An Analysis of Compensation in the U.S. Venture Capital Partnership. *Journal of Financial Economics*, 51, 3-44.
- Gompers, P., & Lerner, J. (1999). What Drives Venture Capital Fundraising? *NBER Working Paper 6906*.
- Gompers, P., & Lerner, J. (2001). The Venture Capital Revolution. *The Journal of Economic Perspectives*, 145-168.
- Gompers, P., & Lerner, J. (2004). *The Venture Capital Cycle*. Cambridge, Massachusetts: The MIT Press.
- Gorman, M., & Sahlman, W. (1989). What Do Venture Capitalists Do? *Journal of Business Ventures*, Vol. 4, 231-248.
- Gregoriou, G., Kooli, M., & Roman, K. (2007). *Venture Capital in Europe*. Oxford, UK: Elsevier Finance.
- Groh, A., Liechtenstein, H., Lieser, K., & Biesinger, M. (2015). *The Venture Capital and Private Equity Country Attractiveness Index*. Spain: IESE.
- Hisrich, R., & Jankowicz, A. (1990). Intuition in Venture Capital Decisions: An Exploratory Study Using a New Technique. *Journal of Business Venturing*, 49-62 .
- Jeng, L., & Wells, P. (2000). The determinants of venture capital funding:.. *Journal of Corporate Finance*, 241–289.
- Kaplan, S., & Strömberg, P. (2001). Venture Capitalists as Principals: Contracting, Screening, and Monitoring. *NBER Working Paper No. 8202*.
- Kelly, R. (2012, October). Drivers of private equity investment activity: are buyout and venture. *Venture Capital*, 14, 309-330.

- Kempken, M. G. (2014). *Memoire de Recherche: Does Venture Capital trigger Innovation? - An empirical Analysis*. Paris.
- Kennedy, P. (2002). Oh No! I got the wrong sign! What should I do? *Department of Economics - Simon Fraiser University*.
- Macmillan, I., Zemann, L., & Subbanarasimha, P. (1987). Criteria Distinguishing Successful from Unsuccessful Ventures in the Venture Screening Process. *Journal of Business Venturing*, 123-137 .
- Mayera, C., Schoorsb, K., & Yafehc, Y. (2005). Sources of funds and investment activities of venture capital funds: evidence from Germany, Israel, Japan and the United Kingdom. *Journal of Corporate Finance 11*, 586-608.
- Megginson, W. (2001). Towards a Gloabl Model of Venture Capital? *The University of Oklahoma*.
- Merler, S., & Pisani-Ferry, J. (2012). Sudden stops in the Euro area. *Econstor*.
- Muzyka, D., Birley, S., & Leleux, B. (1996). Trade-Offs in the Investments Decisions of European Venture Capitalists. *Journal of Business Venturing*, 273-287 .
- Preacher, K. J. (2010). *A Primer on Interaction Effects in Multiple Linear Regression*. Retrieved May 6, 2016, from Quantpsy:
<http://www.quantpsy.org/interact/interactions.htm>
- Questions: Why does an insignificant regressor become significant if I add some significant dummy variables?* (n.d.). Retrieved May 6, 2016, from StackExchange:
<http://stats.stackexchange.com/questions/160026/why-does-an-insignificant-regressor-become-significant-if-i-add-some-significant>
- Reinhart, C., Kaminsky, G., & Lizondo, S. (2008). Leading Indicators of Currency Crises. *MPRA Paper No. 6981*.
- Rin, M., Hellmann, T., & Puri, M. (2011). A Survey of Venture Capital Research. *NBER Working Paper 17523*.
- Romain, A., & La Potterie, B. V. (2003). The Determinants of Venture Capital: A Panel Data Analysis of 16 OECD Countries . *Institute of Innovation Research Working Paper*.

- Romain, A., & la Potterie, B. v. (2004). The Economic Impact of Venture Capital. *Université Libre de Bruxelles – Solvay Business School – Centre Emile Bernheim Working Paper*.
- Ruhnka, J., & Young, J. (1987). A Venture Capital Model of the Development Process for New Ventures. *Journal of Business Venturing* 2, 167-184.
- Sahlman, W. (1990). The structure and governance of venture capital organizations. *Journal of Financial Economics*, 473-521.
- Sapienza, H. (1992). When do Venture Capitalist Add Value? *Journal of Business Venturing* , 9-27.
- Schertler, A. (2003, June). Driving Forces of Venture Capital Investments in Europe: A Dynamic Panel Data Analysis. *Kiel Working Paper No. 1172*.
- Terazi, E., & Şenel, S. (n.d.). The Effects of the Global Financial Crisis on the Central and Eastern European Union Countries. *International Journal of Business and Social Science*, 186 - 192.
- The Origins of the Financial Crisis*. (2013, September 7th). Retrieved May 1st, 2016, from Economist: <http://www.economist.com/news/schoolsbrief/21584534-effects-financial-crisis-are-still-being-felt-five-years-article>
- Tyzoon, T., & Bruno, A. (1984). A Model of Venture Capitalist Investment Activity. *Institute for Operations Research and the Management Sciences*, 1051-1066.
- Williams, C. (2008). Beyond necessity-driven versus opportunity-driven entrepreneurship A study of informal entrepreneurs in England, Russia and Ukraine. *International Journal of Entrepreneurship and Innovation*, Vol 9, No 3, 157–165.
- Wilson, J., & Goddard, J. (2009). The Financial Crisis in Europe: Evolution, Policy Responses and Lessons for the Future. *Journal of Financial Regulation and Compliance*.
- Wooldridge, J. M. (2002). *Introductory Econometrics: A modern Approach*. South-Western.

- WorldBank. (2016). *World DataBank: World Development Indicators*. Retrieved May 1, 2016, from WorldBank:
<http://databank.worldbank.org/data/reports.aspx?source=world-development-indicators>
- WorldBank. (n.d.). *Data: GDP growth (annual %)*. Retrieved May 2nd, 2016, from WorldBank:
<http://data.worldbank.org/indicator/NY.GDP.MKTP.KD.ZG/countries/VN?display=graph>
- WorldBank. (n.d.). *Data: GDP per capita (current LCU)*. Retrieved May 2nd, 2016, from WorldBank: <http://data.worldbank.org/indicator/NY.GDP.PCAP.CN>
- WorldBank. (n.d.). *Data: Interest rate spread (lending rate minus deposit rate, %)*. Retrieved May 2, 2016, from WorldBank: <http://data.worldbank.org/indicator/FR.INR.LNDP>
- WorldBank. (n.d.). *Data: Market capitalization of listed domestic companies (% of GDP)*. Retrieved May 2nd, 2016, from WorldBank:
<http://data.worldbank.org/indicator/CM.MKT.LCAP.GD.ZS>
- WorldBank. (n.d.). *Data: Research and development expenditure (% of GDP)*. Retrieved May 2nd, 2016, from WorldBank:
<http://data.worldbank.org/indicator/GB.XPD.RSDV.GD.ZS>
- WorldBank. (n.d.). *Data: Unemployment, total (% of total labor force)*. Retrieved May 2, 2016, from WorldBank: <http://data.worldbank.org/indicator/SL.UEM.TOTL.ZS>
- WorldBank. (n.d.). *Global Financial Development*. Retrieved May 2, 2016, from WorldBank:
<http://databank.worldbank.org/data/reports.aspx?source=global-financial-development>
- Wrighta, M., Gilliganb, J., & Amess, K. (2008). The economic impact of private equity: what we know and what we would like. *Venture Capital*, 1-21.
- Zider, B. (1998). How Venture Capital Works. *Harvard Business Review*, 135-139.

Affidavit

ESCP Europe

I, the undersigned, do hereby state that I have not plagiarised the paper enclosed and that I am the only author of all sentences within this text. Any sentence included which was written by another author was placed within quotation marks, with explicit indication of its source. I am aware that by contravening the stated ESCP Europe rules on plagiarism, I break the recognised academic principles and I expose myself to sanctions upon which the disciplinary committee will decide.

I also confirm this work has not previously been submitted during studies prior to ESCP Europe. If this work has been written during studies conducted in parallel to my time at ESCP Europe, I must state it.

I accept full responsibility for the content of this paper.

.....

Mariana Felizardo

Paris, 12th May, 2016