

CHARLES UNIVERSITY
FACULTY OF SOCIAL SCIENCES

Institute of Economic Studies



**Fundraising and Investment in Private
Equity in Europe**

Bachelor's thesis

Author: Ha Phuong Hoang

Study program: Economics and Finance

Supervisor: prof. Ing. Michal Mejstřík CSc.

Year of defense: 2020

Declaration of Authorship

The author hereby declares that she compiled this thesis independently, using only the listed resources and literature, and the thesis has not been used to obtain any other academic title.

The author grants to Charles University permission to reproduce and to distribute copies of this thesis in whole or in part and agrees with the thesis being used for study and scientific purposes.

Prague, July 31, 2020

Ha Phuong Hoang

Abstract

The attractiveness of private equity has been steadily increasing over the past years. This thesis aims to investigate the determinants of commitments to new funds raised and subsequent investment into companies on a data set covering 20 European countries spanning over the period 2007-2018. Using Extreme Bounds Analysis, the number of explanatory variables of diverse nature – macroeconomic, labour, financial, political, legal and social – is reduced as a large number of regressions are run to determine the robustness of each variable. Furthermore, a panel data analysis is conducted with fixed effects and random effects models. Three models are built for each fundraising activity and investment split according to stage focus. The analysis identifies differences in the determinants of fundraised and invested capital, tertiary education attainment and domestic credit to private companies as major drivers of fundraising, whereas market capitalisation and unemployment rate are confirmed as the key stimuli for investments in private equity.

JEL Classification C33, C51, E22, F21, G24, G30

Keywords fundraising, investment, private equity, venture capital, buyout, Europe

Title Fundraising and Investment in Private Equity in Europe

Abstrakt

V posledních letech pozorujeme rostoucí trend příležitostí a atraktivitu private equity. Hlavním cílem této práce je prozkoumat determinanty fundraisingu a následné investice do společností na souboru dat z 20 evropských zemí za období 2007-2018. Vzhledem k šíři problematiky a množství potenciálních proměnných byla pomocí metody tzv. Extreme Bounds Analysis množina makroekonomických, finančních, politických, právních a sociálních prediktorů zúžena na robustní proměnné. S použitím panelových dat a s tím spojených metod fixních efektů a náhodných efektů byly vybrány tři různé nejlépe performující konfigurace modelů – tři modely v rámci fundraisingu byly vytvořeny dle zaměření fondů a tři modely investic podle téhož kritéria. Dosažené terciární vzdělání a poskytnutí úvěru soukromým společnostem byly určeny jako hlavní hnací síly fundraisingu, zatímco tržní kapitalizace a míra nezaměstnanosti se ukázaly jako klíčové podněty pro investice do private equity.

Klasifikace JEL C33, C51, E22, F21, G24, G30

Klíčová slova fundraising, investice, private equity, venture capital, buyout, Evropa

Název práce Fundraising a investice v private equity v Evropě

Acknowledgments

I would like to express my gratitude to prof. Ing. Michal Mejstřík CSc. for providing me with valuable feedback and useful comments. Special thanks also belong to my family and friends for their continuous support.

Typeset in FSV L^AT_EX template with great thanks to prof. Zuzana Havránková and prof. Tomáš Havránek of Institute of Economic Studies, Faculty of Social Sciences, Charles University.

Bibliographic Record

Hoang, Ha Phuong: *Fundraising and Investment in Private Equity in Europe*. Bachelor's thesis. Charles University, Faculty of Social Sciences, Institute of Economic Studies, Prague. 2020, pages 73. Advisor: prof. Ing. Michal Mejstřík CSc.

Contents

List of Tables	viii
List of Figures	ix
Acronyms	x
Thesis Proposal	xii
1 Introduction	1
2 Private Equity	3
2.1 Key Principles and Basic Concept	3
2.1.1 Type of Private Equity Deals	7
2.1.2 Life Cycle	8
2.2 Private Equity Activity in Europe	10
2.2.1 Fundraising Activity	11
2.2.2 Investment Activity	12
3 Literature Review	14
4 Data	20
4.1 Private Equity Data	21
4.1.1 Data on Fundraising	21
4.1.2 Data on Investment	22
4.1.3 Data on Divestment	22
4.2 Independent Variables	25
4.2.1 Economic Activity	25
4.2.2 Financial Environment	25
4.2.3 Labour Market Environment	26
4.2.4 Political, Legal and Social Environment	27

5	Methodology and Models	30
5.1	Motivation	30
5.2	Extreme Bounds Analysis	31
5.3	Panel Data Analysis	31
5.3.1	Pooled Regression	32
5.3.2	Fixed Effects	32
5.3.3	Random Effects	33
5.3.4	Testing	33
6	Results	35
6.1	EBA Evaluation	35
6.2	Panel Data Analysis	39
6.2.1	Fundraising	40
6.2.2	Investment	44
6.2.3	Discussion regarding R^2	47
7	Conclusion	49
	Bibliography	54
	Appendix A: Additional Tables	I
	Appendix B: Additional Figures	III

List of Tables

4.1	Descriptive statistics for chosen private equity data	23
4.2	Dependent variables	29
5.1	List of the testing techniques	33
6.1	EBA results for fundraising	37
6.2	EBA results for investment	38
6.3	Fundraising Estimation results	41
6.4	Investment estimation results	45
A.1	Fundraising: Testing for an appropriate estimator	I
A.2	Investment: Testing for an appropriate estimator	I
A.3	Fundraising: Testing for serial correlation (SC) and heteroskedasticity (HC)	II
A.4	Investment: Testing for serial correlation (SC) and heteroskedasticity (HC)	II

List of Figures

4.1	Fundraising by stages	22
4.2	Investment by stages	24
4.3	Divestment by exit route	24
B.1	Divestment and investment by sectors	III
B.2	Histograms for fundraising	IV
B.3	Histograms for investment	V

Acronyms

BO	Buy-out
BP	Breusch-Pagan
BLUE	Best Linear Unbiased Estimator
CAGR	Compound Annual Growth Rate
EBA	Extreme Bounds Analysis
EDC	European Data Cooperative
EVCA	European Private Equity and Venture Capital Association
GDP	Gross Domestic Product
IE	Invest Europe
IMF	International Monetary Fund
OECD	Organization for Economic Cooperation and Development
EU	European Union
CEE	Central and Eastern Europe
WE	Western Europe
OLS	Ordinary Least Squares
POLS	Pooled Ordinary Least Squares
FE	Fixed Effects
RE	Random Effects
PE	Private Equity
VC	Venture Capital
LBO	Leveraged Buy-out
IPO	Initial Public Offering
LP	Limited Partner
GP	General Partner

CLM	Classical Linear model
IRR	Internal Rate of Return
DPI	Distributed to Paid-in Capital
RVPI	Residual Value to Paid-in Capital
TVPI	Total Value to Paid-in Capital
HR	Human resources
LPA	Limited Partnership Agreement
PPM	Private Placement Memorandum
VIF	Variation Inflation Factor
WB	The World Bank
WGI	World Governance Indicators
HF	The Heritage Foundation
UK	United Kingdom

Bachelor's Thesis Proposal

Author	Ha Phuong Hoang
Supervisor	prof. Ing. Michal Mejstřík CSc.
Proposed topic	Fundraising and Investment in Private Equity in Europe

Research question and motivation

Private equity (hereinafter "PE") is an asset class often described as a mean of providing capital to support businesses to achieve high growth and returns using money raised from third parties – external passive investors – limited partners. The PE industry has grown over time and has allowed businesses to flourish. More importantly, it has contributed positively on overall economic growth. Particularly, deal-making in Europe has been performing well as most countries have recovered from global financial crisis, although the performance cannot be compared to the pre-crisis level. Fundraising is an important activity of any private equity firm as it refers to seeking and gathering financial means by engaging businesses and high net worth individuals to commit their capital. We want shed light on number of factors underpinning the growth confidence of fundraising and investments in Europe as the region benefits from relative political stability, low costs, a skilled labour force. Previous research papers have considered various macroeconomic variables to identify major determinants lying behind fundraising and investments such as IPOs, market capitalization, GDP growth. This paper aims not only to assess previously mentioned economic factors but also the effect of quality of life indicators obtained from The European Statistical System.

Contribution

This paper will contribute to overall research and evaluation of fundraising and investment activities within private equity industry in Europe. This research will enable us to make a bigger picture clearer as one can grasp a concept of factors determining such activities in Europe.

Methodology

The thesis will be split into two parts. Firstly, the relevant literature will be discussed to introduce the concept of private equity. Furthermore, we will try to maximize the amount of information presented using appropriate methods of descriptive statistics to display the data. The objective of the thesis will be studied using a panel data analysis over an observation period from 2007 to 2018. The database has been kindly provided by Invest Europe, an association representing European private equity, venture capital and their investors. Moving on to the second part, we will conduct the empirical research to figure out what driving forces are in level of fundraising and investments in Europe with help of the variables obtained from The European Statistical System. Conclusion will be drawn based on the results as we want to test hypothesis that has been made.

Outline

1. Introduction
2. Private Equity
3. Literature Overview
4. Data
5. Methodology and models
6. Results
7. Conclusion

Core bibliography

1. Gompers, P. A., & Lerner, J. (1999). What drives venture capital fundraising? (No. w6906). National bureau of economic research.
2. Bernoth, K., Colavecchio, R., & Sass, M. (2010). Drivers of private equity investment in CEE and Western European countries.
3. Schertler, A. (2007): Knowledge capital and venture capital investments: new evidence from European panel data. *German Economic Review* 8(1): 64-88.
4. Fraser-Sampson, G. (2011). Private equity as an asset class. John Wiley & Sons.

5. Bernoth, K., & Colavecchio, R. (2014). The macroeconomic determinants of private equity investment: a European comparison. *Applied Economics*, 46(11), 1170-1183.
6. Kelly, R. (2012). Drivers of private equity investment activity: are buyout and venture investors really so different?. *Venture Capital*, 14(4), 309-330.
7. Groh, A. P., Liechtenstein, H., & Lieser, K. (2008). The attractiveness of Central Eastern European countries for venture capital and private equity investors.
8. Metrick, A., & Yasuda, A. (2010). The economics of private equity funds. *The Review of Financial Studies*, 23(6), 2303-2341.
9. Lerner, J. (1997). *Venture capital and private equity: A course overview*. Available at SSRN 79148.
10. Jeffrey, M. (2007). Wooldridge. *Introductory Econometrics – A Modern Approach*.

Author

Supervisor

Chapter 1

Introduction

Private equity firms establish funds in order to raise capital that is subsequently invested in the companies (of all stages) with the aim to help them develop, grow and increase profitability. Additionally, this alternative source of financing helps businesses to overcome the need for financing throughout the business cycle of a company as especially young companies may struggle with obtaining a loan in a traditional way from bank-like institutions.

Contribution of private equity to the economy is undisputed, as creation and development of innovative enterprises are promoted. This impacts not only economic growth, but also jobs and technological opportunities for further innovation. This is why the private equity industry has been under close scrutiny in recent years.

A question is raised while inspecting this asset class: what are the key factors for raising new funds and investment activity? Unfortunately, there is an uncertainty stemming from the opaqueness of the industry, such as uneven disclosure of PE data and the quality of data available for research.

Given the pronounced positive impact of private equity on economic development, rich academic literature on the topic exists, however, with inconclusive results. The purpose of the thesis is to provide a general understanding of the topic and evaluate the key determinants to support investors' decisions, that are closely tied to entrepreneurial decision making as well as policy-making initiatives.

Most of the previous studies have attempted to discover the main forces that lie behind fundraising activities within the US market (Gompers and Lerner, 1999; Jeng and Wells, 2000), followed by studies of Balboa and Martí (2003); Martí and Balboa (2001) which focused on fundraising within the European

countries. Moreover, analyses of Bernoth and Colavecchio (2014); Félix et al. (2013); Kelly (2012); Precup (2015, 2017) dealt with private equity investments and investigated the relationship among PE investments and various determinants.

The scope of our study covers 20 European countries during the period 2007-2018. Fixed effects and random effects models are employed to identify the key drivers that explain the private equity activity in Europe on the aggregate level, then we examine specifically venture capital, buy-out fundraising and investment activity each separately.

Our research reveals that tertiary education attainment and domestic credit provided to private companies explain the fundraising activity, whereas investments are influenced by market capitalisation and unemployment rate.

The thesis is structured as follows. Chapter 2 gives an overview of private equity and the general understanding of the process behind it. Chapter 3 reviews literature related to this problematique. Chapter 4 describes the available data in private equity as well as its possible determinants. In Chapter 5, the methodology applied for assessing the drivers of private equity activity will be explained and the basic characteristics of required statistical tests will be provided. Chapter 6 reports the empirical findings and discusses some possible shortcomings of the implemented models. Finally, Chapter 7 summarizes the main findings, discusses the contribution and gives suggestions for further research.

Chapter 2

Private Equity

2.1 Key Principles and Basic Concept

Private equity is an asset class providing equity capital to companies that are not publicly listed and traded on stock market resulting in minority, majority, or full ownership in the investee company. These companies come from large scale of industries, various geographical regions and different stage of development. There are two definitions of private equity – one differentiates venture capital from private equity (European concept), the other defines venture capital as a subset of private equity (American concept). Nevertheless, the point is to invest into a company in order to create a more valuable asset over a pre-agreed investment horizon, and finally, to sell the business to another buyer.

The latter, American concept, also used in Sedláková (2008) and Invest Europe (previously known as the European Venture Capital Association) definition is followed, described and used in this work. Private equity includes the following investment stages: venture capital, growth capital, replacement capital, rescue/turn-around and buyouts. Venture capital is a subset of private equity and refers to equity investments made for launch (seed), early development (start-up), or expansion (later stage venture) of business. For the purpose of this thesis, only a brief description of such funds is provided as it is not essential for our analysis – with a primary focus on buyout and venture capital as the main categories. Private equity emphasizes riskier transactions with mid-to long-term investment horizons as the enterprises find themselves in a narrow access to the traditional way of financing (bank loans).

Institutional investors (pension funds, insurance companies) and high net worth individuals (angel investors) invest into companies through private equity

fund structures. Limited Partners (investors) form the private equity fund as a limited partnership and commit the capital to General Partners (private equity firm), who manage the portfolio of companies. The investment criteria are laid out in the limited partnership agreement.

Business Model

A business model of a private equity firm is formed by the following phases: raising funds from external sources (fundraising), investment into the companies, and selling (exiting) the companies a couple of years later (divestment). This thesis is focused on the analysis of the first two stages which will be discussed later in the following chapter.

General partners (“GP”) raise funds from Limited partners (“LP”), as mentioned above, screen investment opportunities, identify, and select target companies and are involved in the companies on the operating level. General partners play the active role in the whole process, whereas limited partners are passive and do not participate in the management of the portfolio companies or the private equity firm itself. The limited partnership refers to the closed-end type of fund with a limited lifespan of 10 or 12 years (Gottschalg, 2007). An extension can be granted if asked. Although the main source of capital comes from LP, GP obtain disproportionate share of profit once investments are realized. On one side, this goes in line with GP’s full exposure and unlimited liability for investments. On the other, LP’s are liable up to the amount they have committed. Investors’ controlling rights over private equity fund are considerably restricted in favour of LP (private equity firm) to enable effective and professional operation of GP and achievement of their investment goals.

General partners’ remuneration can be divided into two parts. Firstly, they earn management fee annually. This is approximately 2% of committed capital (Fraser-Sampson, 2011), and primarily covers the costs of running the fund. An exit of an investment is followed by returning proceeds to investors (distribution). If the pre-agreed rate of return (hurdle rate) is reached or exceeded, the second part called carried interest (carry) is allocated to general partners. Carried interest serves as an incentive to ensure the profitability of companies. Hurdle rate is defined as the lowest possible return that LP accept to pay GP as a compensation in the form of carry.

Performance of private equity funds seems to be difficult to measure and compare due to their illiquidity and long-term nature. One of the indicators is

internal rate of return (“IRR”). IRR represents a compound return of a series of cash flows over the investment period. Time matters while calculating IRR, as it is based on the concept of time value of money – the shorter the period, the higher IRR. It is important to differentiate between the gross IRR and the net IRR, as the gross IRR refers to performance of a fund without adjusting for any fees. The net IRR reflects the performance from the LP’s perspective as paid fees are accounted for.

Other tools for evaluating fund’s performance are money multiples (Fraser-Sampson, 2011). Note that these multiples do not reflect time value of money, which makes them easy to calculate and widely use in practice. The main disadvantage remains, until the last divestment, only interim performance can be tracked, hence fluctuation over the life of a fund occurs. The money multiples are:

- Distributed¹ to Paid-in² Capital (“DPI”) also called the realization multiple represents the ratio of money distributed by the fund to total amount of money paid to date.
- Residual Value³ to Paid-in-Capital (“RVPI”) represents the ratio of the current value of all investments within a fund to total amount of money paid to date.
- Total Value⁴ to Paid-in Capital (“TVPI”) refers to the ratio of the sum of total money invested and distributed to total amount of money paid to date.

Value Creation and Investment Strategy

General partners are highly specialised individuals with strong competencies within the industry. Prior to any acquisition, the investment team vets an opportunity and creates a strategy for the target company to maximize its value. PE firms have a discipline guiding them in every step of their decision ranging from proceeding with an investment to walking away from an opportunity if a red flag (possible deal breaker) is uncovered. There is a large set of key skills that these individuals need to possess. An extra attention is given to the following building blocks:

¹The amount of money paid back to investors.

²The amount of money drawn down.

³The value of investments plus fund’s assets minus fund’s liabilities.

⁴Mathematically expressed as: Total Value = Distributions + Residual Value.

- Generating a great deal flow, in terms of finding attractive opportunities within the industry via strong network of contacts. A lot of proprietary deals come from extensive research and direct contact with sellers. Nowadays, most of the deals come from intermediaries – investment banks, M&A boutiques and advisor firms.
- Due diligence must be conducted to gain an insight into the target company in terms of analysis of financial health, operations, management, personnel, customer base, suppliers, competitors, segment and market. Both internal and external assessment is thus crucial as attention needs to be given to issues possibly determining the success of the deal. Valuation models are built upon these findings and reflect the reality and full potential, driven by revenue growth, cost reduction opportunities.
- Financial engineering represents an important component in a deal structure because efficient use of capital includes leverage. The term refers to “optimisation of capital structure and minimization of after-tax cost of capital of the portfolio company as a consequence of the utilisation of financial knowledge and experience” (see Gottschalg, 2007, p. 3).
- Strengthening the management team as the management is the key value creator. In the pre-acquisition phase, the top management individuals are screened. A human resources (“HR”) plan is created to cover the key positions and by whom specifically. These individuals can arise either from the inside of the company – the existing managers. In such case, their future role and responsibilities are pre-agreed. In other case, the managers can be found externally, suitable candidates are to be found and lined up ideally prior to the transaction (so the smooth transition can be delivered). Regular evaluation, mentoring and training are also a part of the private equity fund’s representatives activities.
- Operating partners can help appraise the business through deep functional and sector experience. Operational improvements such as effective operations, management on board, effective financial management and standard corporate management could be implemented.
- Growth acceleration using adaptive strategy changes, taking advantage of market trends and new business models; business model changes, e.g., from sale to lease; sales and marketing strategy upgrades, particularly

regarding exports; product / service portfolio restructuring, including pricing; wide-ranging changes to operations including procurement, productivity and IT. Adjustments to the investment approach and new focus of the capital expenditures budget; market development or consolidation and focus on promising, more profitable segments.

2.1.1 Type of Private Equity Deals

Private equity refers to investment in private companies that match the investment criteria laid out in LPA. These investments include inherent risk and thus no return or profit is guaranteed.

The key considerations to be assessed: type of sector in which the company operates, geographical region, stage of development, and deal structure (type of investment required, the amount of money). The following division follows the IE terminology according to enterprises' stage of development.

Venture Capital

These types of transactions with strong market potential bear higher risk. Nevertheless, higher returns could be achieved with massive capital inflows to the fund in case of success.

Seed: Providing finance to support an idea, conduct research, lay out a plan prior stepping to the next phase. This stage is associated with high risk and abysmal failure.

Start-up: Providing finance to develop a product, introduce it to the market and cover initial marketing expenses. Businesses are at the start of their operations and VC professionals assist them to form a business plan. This phase is also subject to a significant risk.

Later stage venture: Providing finance to companies to help them reach a break-even point when profits have not been generated yet. Product development has been finished and large-scale manufacturing needs to commence.

Mature companies

Growth capital: Providing finance for expansion of an established company, to increase the production capacity, working capital, enter new market as well as support both horizontal and vertical growth.

Rescue / Turnaround: Providing finance to financially troubled companies.

Replacement capital: Acquiring of existing shares from another private equity firm, investors or shareholders.

Buy-out: Providing a mix of equity and debt to acquire a majority stake and have a control position in a company. The underlying idea of such investment strategy is to minimize the initial equity requirement to amplify returns. Generally, the existing management (management buy-out) or a group of experienced executives outside of company (management buy-in) obtain a significant equity stake (buy the business) with an assistance of private equity firm. However, the most common type is leveraged buy-out (LBO), which often targets companies with a strong cash flow as the company can service the loan itself.

2.1.2 Life Cycle

The natural rhythm of a fund's operations comprise of fundraising period, investment period (acquisition of shares in various enterprises), development and subsequent divestment through the sale of these shares with profit. The life cycle of a fund from inception to final liquidation and dissolution typically lasts for 10 to 12 years (Gottschalg, 2007).

Fundraising

The whole cycle starts with this initial period as a relationship between GP and LP is established. This process happens before forming of the fund as the first task for the group of individuals, GP, is to raise capital. Investors, LP, of diverse background include institutional investors, being pension plans, sovereign investment funds, endowments, foundations, banks, insurance companies, funds of funds, family offices, to wealthy individuals (business angels). Prior reaching out to investors, fund managers need to articulate their intentions in the form of presentation to investors or private placement memorandum ("PPM"). In these offering documents, clear strategy, terms, policies, procedures and controls are outlined. Nevertheless, a limited partnership agreement is also drafted covering the fund structure in terms of legal and tax perspective specified within covenants.

If a team of general partners has no previous experience of managing a fund, they face a great barrier to entry the PE market. GP struggle to persuade LP to

commit capital as investors rely on their past performance (track record). This group of individuals often tends to hire a placement agent to help them connect with investors and present them their competitive advantage with new insights. In case of successful fundraising and if LP decided to commit their capital to the fund, these agents tend to be generously compensated by a negotiated fee based on the amount raised.

Once the fundraising activity starts, it can take from months to couple of years to hit the target size which is stated in the PPM or presentation. Fundraising is divided into closings. Once a certain amount of capital is obtained, “first closing” – initial investor commitments – are made, the fund commences its operations and first investments opportunities are officially evaluated. Nevertheless, after the first closing, marketing continues, seeking for other investors until sufficient investor interest is obtained and preset cap is reached. Final closing occurs anywhere from six to eighteen months after the first closing (Fraser-Sampson, 2011).

During this time, all expenses in connection to this activity and fund formation are incurred by GP. Once the fund is closed, capital is promised, expenses up to a certain cap will be reimbursed to them.

Investment

The investment period, often called commitment period, is the core and the most active phase as investment strategy shall be followed and realized. Fund managers identify suitable opportunities, recommend the realization of any particular investment and provide comprehensive advisory services regarding terms and conditions of any acquisition. Funds make a couple of investments within an investment period (generally five years). Among many rules (covenants), one investment cannot exceed a certain percentage of committed capital as exposure to diversified range of portfolio companies is desired. Furthermore, acquisition financing or other debt to be accepted on acquisition of a portfolio company will not exceed an amount specified in the LPA.

Throughout this period, it is crucial to maintain a steady pipeline of attractive opportunities to ensure a great deal flow.

The frequency of capital calls, drawdown notices – demands for a part of committed capital – is the highest. Drawn down capital then refers to the total amount of capital which has been requested from GP (LP’s point of view), or the total amount of money that have been drawn down from LP (GP’s point

of view). Nevertheless, the term refers to the subsequent payment pursuant to such a request.

Divestment

After holding period, the fund exits investments and proceeds are distributed to investors, unless a term extension is granted. This may be desirable because exiting may take a considerable amount of time, because of an economic slowdown, or because of series of unexpected events may occur. Then liquidation of the rest of holdings in portfolio companies and dissolution of the fund follow.

2.2 Private Equity Activity in Europe

It was not until late 1990s when private equity became an attractive source of financing. Loans were privately placed, therefore, firms faced difficulties to raise capital from banks or the primary financial markets. This issue was solved by investment professionals (general partners) by taking the long-term equity position in the portfolio companies via limited partnership structure.

Globally, past years have been increasingly successful in terms of good levels of economic growth (Roberts and Naydenova, 2019). Consequently, limited partners have enthusiastically flooded the market with fresh capital, general partners have secured record distributions for their LP. These favourable conditions drive fierce competition and private equity industry has seen a wave of surge. Since the European sovereign debt crisis in 2013, investment represented 21.5% of EU's GDP in 2018 – reaching the long-term average (EIB, 2019).

Times of prosperity have brought overall strength, great resilience and increasingly positive attitude of investors towards this asset class. Low interest rates, steady GDP growth with relaxed credit conditions created favourable conditions for leveraged buyouts, which subsequently reinforced supply of funds for investment.

Uncertainty is growing in macroeconomic climate and downturn is expected. This fuels a threat of recession and this cycle may be running its course. Brexit, falling export demand and weakening manufacturing output are contributing to the worsening economic climate, especially the investment outlook (EIB, 2019).

However, comparisons across the European countries reveal large differences in private activity, despite region's economies being integrated by the European

Union (“EU”) membership and the single currency market. Furthermore, non-members also benefit from the access to the Union’s large single market.

On national levels, private equity activity is measured as a portion of their economies –a percentage of GDP.

2.2.1 Fundraising Activity

According to Invest Europe statistics, the amount raised by private equity institutions across Europe reached record high €112.3 billion in 2006. As the world entered a financial crisis in 2008 – the amount dramatically declined to €21.1 billion in 2009. Although, pre-crisis level of fundraising have not been reached, the total amount of funds raised was €97.1 billion in 2018 and the number is then highest of the past decade. Share of venture capital fundraising amounted to €11.4 billion in 2018 representing an increase of 11% year-on-year. Compared to 2006 VC fundraising, the number was still lower by €6.1 billion.

As statistics show, funds from the United Kingdom⁵ and Ireland accounted for the largest share of total funds raised – €49.4 billion corresponding to 50.8% of total amount raised. The UK funds alone have accounted for half of funds raised since 2012. The UK and Ireland have historically been a key private equity market and this remains the case.

With regard to the origin of institutional investors, those based in Europe accounted for 48%, the remaining share of investors outside Europe were led by LP from North America (22.9%) and Asia and Australia (13.6%). Pension funds contributed 27.6% of total commitments and have represented the most significant group for a couple of past years, followed by fund of funds (10.6%) and insurance companies (9.5%).

48.1% of commitments were provided by government agencies in Ireland, whereas the UK funds received the majority of commitments (36%) by pension funds. Statistics on other European countries, such as Sweden, Switzerland and Luxembourg show pension funds’ interest to participate in the fundraising activity by 33.7%, 21.9% and 32.3% respectively. The single-digit percentage share of banks contributing to the private equity industry could be observed. Considering that, funds of funds play an important role for PE as it represents a special investment vehicle that invests in other funds, allowing to diversify their

⁵Database shows data up till 2018. Effective date of Brexit (withdrawal of the UK from EU) was January 31, 2020.

portfolio and lower risk exposure. Having said that, funds of funds represent the second largest conduit for investment in private equity.

From the fund stage focus perspective, buy-out fundraising decreased from €72.6 billion in 2017 to €66.5 billion in 2018. However, buy-out funds still represent the largest share, approximately two thirds for seven consecutive years. Pension funds provided a total of €22.9 billion in buy-out funds (34.5% of total buy-out funds raised).

Since 2008, venture funds have raised consistently more capital. Compared with 2017, an increase of 11% was recorded. Majority of sources come from government agencies as they represent a largest provider to VC funds, from the geographic perspective, France and Benelux⁶ committed 30.7% of total VC funds.

2.2.2 Investment Activity

According to IE market statistics⁷, total investment into private equity grew sharply by 7% year-on-year to €79.9 billion at CAGR⁸ of 13% since financial crisis 2008. Record levels invested reached the peak in decade with 8,242 companies backed by PE houses, out of which 57.6% were companies in their early stage - venture capital companies. However, the amount of capital poured into them accounted for 10.4% of the total investments.

Sector-wise, business products and services, and ICT (communications, computer and electronics) received the largest portion of total investment, 22.2% (€17.7 billion) and 21.2% (€16.94 billion) respectively. The runner-up was investment into consumer goods and services with 19.1% share of €15.3 billion. The largest number (approximately a third of total number) of ICT focused companies obtained investment for five consecutive years.

Geographically, companies based in France, Germany and the United Kingdom received the most investments together €44 billion (55.1% share). Correspondingly, the highest number of portfolio companies are in these countries. Investments by UK based funds accounted for 35% of total PE investments. The UK, Sweden and Luxembourg were the only member states of EU where the level of funds managed exceeded domestic investment in 2018.

⁶Benelux countries are represented by Belgium, Netherlands and Luxembourg.

⁷Market statistics show data for European investee companies regardless of the residence of private equity firm.

⁸Compound Annual Growth Rate (CAGR) is a term providing a constant rate of return over a specific period.

Predictably, the greatest part was accounted for buy-out investment that increased by 10% from 2017 to €58.3 billion (73% of total investments) with 1,285 companies. Larger transactions of more than €150 million in equity grew strongly attaining €31.4 billion, an increase of 14% over the €27.6 billion investment in 2017. Larger transactions represented a 53% share of the buy-out market in 2018. The increase in the amount of buy-out investment was mainly driven by a significant increase in the number and the average size of the mega buy-outs (equity ticket of at least €300 million), in terms of number of companies they increased by 25 companies in 2017, the number slightly decreased to 35 in 2018, although, the amount poured into them increased to €20.1 billion (compared to 2016 mega buy-out investment of €5.6 billion). Mid market buy-outs (transactions from €15 million to €150 million in equity) increased by 8%, representing a 39% market share. Average size of small buy-outs (equity value less than €15 million) was €5.7 million. Total number of 671 companies out of 1,083 buy-out transactions indicate that PE houses can create value even with relatively small amount of cash. Business products and services, and consumer goods and services have been the strongest sectors in buy-out market and data confirm that this continuously remains the same, given the fact that private equity houses contributed to the business product and services sector with €15 billion, representing 25.6% share of buy-out market, followed by 19.9% share of consumer goods and services.

Venture capital investment has been steadily growing, reaching €8.2 billion, an increase of 13.3% compared to 2017. The number of VC backed enterprises reached 4,437 representing 56.7% share of total companies, led by €4.9 billion investment into 2,275 start-up companies. Although the amount invested into seed companies declined by 7%, the number of companies increased from 1,108 to 1,350. The similar trend in later stage investments is observed. On one hand, the amount slightly decreased by 3%, on the other hand, the number of backed companies increased by 8%. Sector-wise, ICT sector claims the top position over past years with 47.1% of total VC investments. The next largest sector is biotech and healthcare which accounts for 27.6% of VC market.

The Czech Republic, Denmark, France, Luxembourg and Netherlands were countries where the level of VC funds managed exceeded domestic investment in 2018 whereas funds based in Germany, France and UK account for 55.4% of all VC investments.

Chapter 3

Literature Review

Literature regarding the topic of determinants of private equity fundraising and investment is in general very rich. Numerous analyses have been carried out to study the topic. This section lays out the theoretical underpinnings of our empirical framework supported by previous research.

Gompers and Lerner (1999) examined the determinants of venture capital fundraising within the US market using multivariate regressions (reduced-form specification estimation), fixed-effects regression models. According to their findings, shifts in demand for venture capital have a positive effect on commitments to VC funds. Furthermore, firm performance and reputation have a positive impact on new funds raised. Increased VC activity was shown to be driven by higher GDP growth, R&D expenditures, and decrease in capital gains tax. However, the authors failed to validate a relationship between the exit through IPOs and the VC fundraising activity.

The work of Jeng and Wells (2000) studied the impacts of IPO, GDP growth, market capitalization, labor market rigidities, accounting standards, private pension funds and government programs on raising new VC funds using a sample of 21 countries. The authors found evidence that GDP growth and market capitalization were not significant drivers of venture capital. While initial public offerings were shown to play a significant role in VC activity, private pension funds were validated as significant over time but not across countries. The authors focused on a country fixed effects approach, thus fixed effects ordinary least squares regressions were employed.

Martí and Balboa (2001) went further in the analysis using panel data of the European countries in the 1990s. They conducted research on variables directly related to the private equity industry rather than focusing on the economic

climate. The authors focused on the ability of the fund managers with a proven track record in investment to raise new funds. It was found that the amount of money invested had a statistically significant positive effect on fundraising. A time trend was included in the regression and it confirmed a statistically positive effect. Surprisingly, the empirical analysis showed a negative significant impact of divestment on raising new funds. GDP growth was not statistically significant contrary to findings of Gompers and Lerner (1999). However, this result corresponds with Jeng and Wells (2000).

Although, the lack of information about past returns could disincentivize investors to commit their capital into new funds, it was shown that increased number of successfully closed deals leads to higher probability in future participation in new funds.

Balboa and Martí (2003) extended the research based on the previous work as economic climate was not included in their empirical framework. They proposed five models, where each of them accounted for annual volume of capital raised by all funds as the explained variable. First three models introduced variables closely related to the private equity industry – total amounts of invested and divested – each one with a one-year lag and a time trend. The latter two models considered macroeconomic determinants, GDP growth, long-term interest rate, stock market return, growth of market capitalization, and for the first time, explanatory variables also included aggregated domestic savings as a percentage of GDP, aggregated gross private capital flows as a percentage of GDP. However, they were only able to confirm a positive statistical effect of GDP growth and gross domestic savings. Furthermore, as the main objective was to test whether investment and divestment explain the fundraising activity, results confirmed their hypothesis for the used sample, delivering positive statistical significant coefficients of both variables.

The factors determining VC activity in the panel of 16 OECD countries in the period 1999-2000 were studied by van Pottelsberghe de la Potterie and Romain (2004). They found evidence that a higher VC activity was underpinned by both long-term and short-term interest rates and argued increased attractiveness of this source of financing due to increased interest rates. At the same time a positive impact of technological opportunities (measured by number of patents, stock of knowledge and R&D growth) was confirmed. In contradiction to Jeng and Wells (2000), GDP growth was found as a significant driver of VC activity, supporting results of Gompers and Lerner (1999)

Cherif and Gazdar (2011) continued the line to answer the question what

drives the VC activity. A panel data analysis covering 21 European countries spanning from 1997 to 2006 was employed. Authors estimated reduced form equations where the level of VC investment was chosen as dependent variable and was regressed against macroeconomic determinants (GDP growth, interest rate, unemployment rate, stock market capitalization), R&D expenditures as an indicator of technological opportunities and innovation, variables closely related to VC industry (exit strategies through IPO, trade sale and write off), and institutional factors. Consistent with Gompers and Lerner (1999) and van Pottelsberghe de la Potterie and Romain (2004), an increased GDP growth leads to a greater VC activity. Authors corroborate Gompers and Lerner (1999) and van Pottelsberghe de la Potterie and Romain (2004) evidence that market capitalisation positively affects VC investments. Contrary to Balboa and Martí (2003) findings, variables directly related to VC process were not validated as statistically significant drivers of VC investments. Results also suggested positive and statistically significant impact of R&D expenditures on VC investments and funds raised – in line with Gompers and Lerner (1999).

Identification of factors influencing venture capital and buy-out investors was attempted by Kelly (2012). The author investigated both structural and cyclical determinants using panel data estimation of 17 European countries over the six-year period 2003-2008. To address the problem of endogeneity, Generalized Method of Moments estimator was used. Interestingly, results suggested no effect of employment protection and R&D expenditure on total PE activity. The latter being contrary to the results of Gompers and Lerner (1999), van Pottelsberghe de la Potterie and Romain (2004) and later Félix et al. (2013).

Looking at buy-outs separately, employment protection, market capitalisation, exit via IPO and R&D were identified as significant drivers by Kelly. On the contrary, neither market capitalisation nor exit via IPO played any role in VC activity. This reflects the fact that VC investments are highly risky and exit route via IPO is hardly ever an option. Results also demonstrated that countries with less employment protection seemed to attract PE investors more.

Félix et al. (2013) analysed determinants of VC market on the panel data set covering 23 countries in the period 1998-2003 using fixed effect and random effect models. In addition to the already studied variables, possible relevance of Total Entrepreneurial Activity Index (“TEA”), size of the M&A market and market-to-book ratio was studied. Evidence confirmed that market-to-book

ratio and the total deal value of M&A transactions had a positive impact on VC activity, whereas TEA and unemployment rate had a negative effect. Results also confirmed a positive and statistically significant effect of R&D on VC activity. This result is consistent with findings of Gompers and Lerner (1999) and van Pottelsberghe de la Potterie and Romain (2004). Moreover, a negative relationship between VC activity and market capitalisation was confirmed. Investing in VC becomes less attractive relative to investing in the stock market as capital market returns increase. Finally, their evidence suggested a sensitivity of early stage and high-tech investments to macroeconomic factors rather than to entrepreneurial environment.

Bernoth and Colavecchio (2014) focused on 14 Western European (“WE”) and Central Eastern European (“CEE”) countries during 2001-2008. Authors investigated the relationship between PE activity and a large set of variables using robust estimation techniques. In the first step, extreme bounds analysis (“EBA”) was employed to determine the robust set of variables. This narrowed down the number of explanatory variables which were consequently used in the panel data analysis with fixed effects. The panel data was pooled into two groups, WE and CEE, similarly to Balboa and Martí (2003). For both regions, a positive effect of debt financing and equity market capitalization was shown. Moreover, an increased PE flow is driven by a lower corporate tax rate (primarily in the CEE countries), supporting Gompers and Lerner (1999). Next, no evidence was found that a short-term interest rate affects PE investment. Furthermore, economic growth aspects had no effect on a PE activity in the CEE countries. However, real GDP growth attracted investment in Western European companies, as did inflation and market capitalisation.

Precup (2015) tried to answer the similar question as previous authors, however, new set of variables was introduced. Aggregated data covering 27 European countries during 2000-2012 were examined using a panel data model with fixed and random effects. Precup ran a specification test (Hausman test) to compare the consistency of used models. The results suggested that market capitalisation and unemployment rate were validated as statistically significant, and consequently were considered by Precup as main drivers of PE activity. However, Félix et al. (2013) had determined market capitalisation as negative, such finding is in contradiction with Precup. According to this research, market capitalisation has a positive impact, thus, increases the investors’ positive expectations about the economy. With respect to unemployment rate, results of Precup corroborate Félix et al. (2013) as a negative coefficient was obtained.

Furthermore, R&D expenditures were found as statistically insignificant with varying coefficient and therefore did not confirm previous work analyses. Precup argued that van Pottelsberghe de la Potterie and Romain (2004) used two variables for R&D expenditure, thus, capturing innovation was better captured. Consequently, regression in van Pottelsberghe de la Potterie and Romain validated R&D expenditures as statistically significant, whereas Precup's models included variable that measured innovation poorly. Precup was the first to examine a relationship between productivity and PE activity. Estimations showed positive and statistically significant effect, which confirmed the author's hypothesis of a positive change in productivity leads to an increase in PE activity.

An analysis led by Henchiri (2016) investigated the effect of macroeconomic and institutional climate on leveraged buy-out fundraising on a panel data set covering 19 European countries from 2001 to 2010. Panel data analysis with fixed and random effects was employed. Henchiri regressed investment in LBO against GDP growth, market capitalisation, interest rate, unemployment, divestment by trade sale, divestment by flotation, divestment by write-off, R&D expenditures, property rights, and corruption. Following the evidence by Cherif and Gazdar (2011), the quality of institutional environment is relevant for private equity investments. Furthermore, Henchiri validated the significance of divestment by IPO as the most significant exit route, supporting the evidence of Gompers and Lerner (1999), van Pottelsberghe de la Potterie and Romain (2004) and Kelly (2012).

Precup (2017) then examined different variables (GDP growth, market capitalisation, R&D expenditures, productivity, corruption index) influencing VC and LBO in Eastern European countries over the period 2000-2013. A panel data analysis using fixed effects and random effects was employed. The Hausman test was run and the consistency of the models was validated, Precup then proceeded with fixed effects models. Results confirmed the positive effect of economic growth on VC activity, supporting Gompers and Lerner (1999), van Pottelsberghe de la Potterie and Romain (2004), Bernoth and Colavecchio (2014). Precup validated the evidence of a positive effect of long-term interest rates on VC investments, thus, confirming the previous study carried out by van Pottelsberghe de la Potterie and Romain (2004). While market capitalisation was found to be negative and insignificant for VC, the variable was validated as statistically significant for LBO. Precup believed that development in stock market led to lower attractiveness for VC investments. Neither GDP growth,

long-term interest rates, unemployment rate or market capitalisation showed a statistically significant effect on LBO. In line with Gompers and Lerner (1999) and van Pottelsberghe de la Potterie and Romain (2004), Precup showed that R&D expenditures positively and significantly affect VC investments, whereas R&D negatively affects LBO. Finally, Precup argued that corruption had a positive contribution to the development of VC and LBO.

Chapter 4

Data

Due to the limited data availability in the private equity industry, it tends to be extremely difficult to gather data. Although, the author requested data from various sources, a paid membership was required to access the data from the (private) databases such as PREQUIN, CEPRES and Pitchbook. Many of the institutions did not respond to the request but, in the end, Invest Europe (previously known as the European Venture Capital Association) provided the data. While Invest Europe represents European association of private equity investors, the European Data Cooperative (EDC) is the source of the data as it serves as the data entry point for the private equity and venture capital associations across the European continent. A particular challenge of analysis in this industry that is called private equity is the general discreteness. One should be aware of the skewness of the data provided because only the private equity firms that voluntarily chose to disclose their data are included in the database. Not only a great part of the data might be missing, but also the accuracy and reliability are uncertain, hence it may be subject to severe biases related to this issue.

Furthermore, data for the independent variables were retrieved from various sources – Eurostat, the International Monetary Fund (IMF), the World Bank (WB), the OECD National Accounts (OECD), and The Heritage Foundation (HF).

In the end, a balanced¹ panel was collected. Our data set consists of annual data spanning from 2007 to 2018 from the following countries, the members of European Union: Austria, Belgium, Czech Republic, Denmark, Finland, France, Germany, Greece, Hungary, Ireland, Italy, Luxembourg, Nether-

¹Values for market capitalisation were missing for some countries.

lands Poland, Portugal, Spain, Sweden, and other non EU countries: Norway, Switzerland, United Kingdom.

4.1 Private Equity Data

The original Invest Europe data set provided reports on annual aggregated data for each European country. Each variable related to PE process was adjusted (normalized) by the year's GDP of the respective country. By doing so, a problem of heteroskedasticity was addressed as each country follows its path of economic growth. Consequently, a large variability in such observations occurs. Furthermore, only nominal values are reported, therefore, an increase over time could be driven by increased price levels. As GDP accounts for inflation (different inflation rates lead to bias of the estimated parameters), adjustment to real terms is required (Balboa and Martí, 2003). Also as a measurement of private equity market in each country in absolute terms is hardly comparable, normalization must be able to overcome this issue.

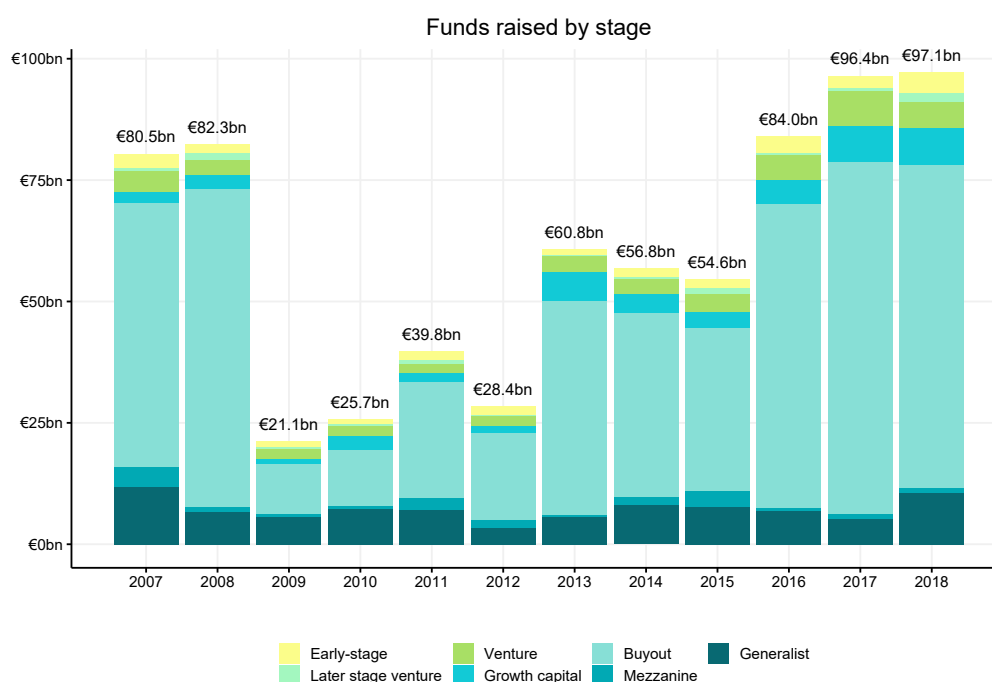
The large database is broken down into two data sets as the aim of this study is to investigate the determinants which drive the investors to commit their capital to new funds and shed light on the determinants of investments among different stages of investee companies.

4.1.1 Data on Fundraising

Incremental amounts raised during each year are reported, further broken down according to a fund stage focus (early-stage, later stage venture, growth capital, buyout, mezzanine, generalist), investor type, and geographic sources of funds. This offers multiple dimensions for our empirical analysis.

Fundraising - the amounts raised normalized by GDP in percentage, obtained from IE.

Figure 4.1: Fundraising by stages



Source: Author's elaboration, based on data provided by Invest Europe

4.1.2 Data on Investment

There are two ways in which Invest Europe reports its data on investment. First, industry statistics are provided, concerned on figures according to the location of private equity firm. Second, market statistics show figures for investments in companies located in Europe, regardless of PE firms' residence. Only market statistics are followed in this thesis, as we are concerned about investments into European companies.

Investment - the amounts invested in companies with residence in Europe normalized by GDP in percentage.

4.1.3 Data on Divestment

Data on divestment are collected and reported in a similar fashion. Firstly, industry statistics are provided, concerned on figures according to the location of private equity firm. Secondly, market statistics show figures for divestments in companies with location in Europe, regardless of PE firm's residence. Only market statistics are followed in this thesis, as we are concerned about divestments in European companies. There are multiple ways of exit routes, ac-

according to Jeng and Wells (2000), Balboa and Martí (2003), van Pottelsberghe de la Potterie and Romain (2004), but in this thesis, we follow specifically the exit through public initial public offering, write off and sale to trade buyers. Divestment broken down according to exit routes are found in Figure 4.3. Investments and divestments broken down according to the sectors of investee companies across years could be found in Figure B.1 (Appendix B).

Divestment by Public Offering - amounts divested normalized by GDP in percentage.

Divestment by Write Off - amounts divested normalized by GDP in percentage.

Divestment by Sale to Trade Buyers amounts divested normalized by GDP in percentage.

Table 4.1: Descriptive statistics for chosen private equity data

	Fundraising / GDP	Investment / GDP	Div Tr Sale to Buyes / GDP lag	Div by PO/ GDP lag	Div by Write Off / GDP lag
n	240	240	220	220	220
mean	0.3628	0.3704	0.0733	0.0322	0.0144
median	0.1443	0.2742	0.0443	0.0071	0.0048
min	0.0000	0.0049	0.0000	0.0000	0.0000
max	7.7173	3.1260	1.1022	0.3728	0.1705
sd	0.7197	0.3626	0.1152	0.0582	0.0248
Q0.25	0.0575	0.1798	0.0146	0.0003	0.0010
Q0.75	0.3356	0.4576	0.0886	0.0388	0.0170

Source: Author's elaboration, based on data provided by Invest Europe

Figure 4.2: Investment by stages

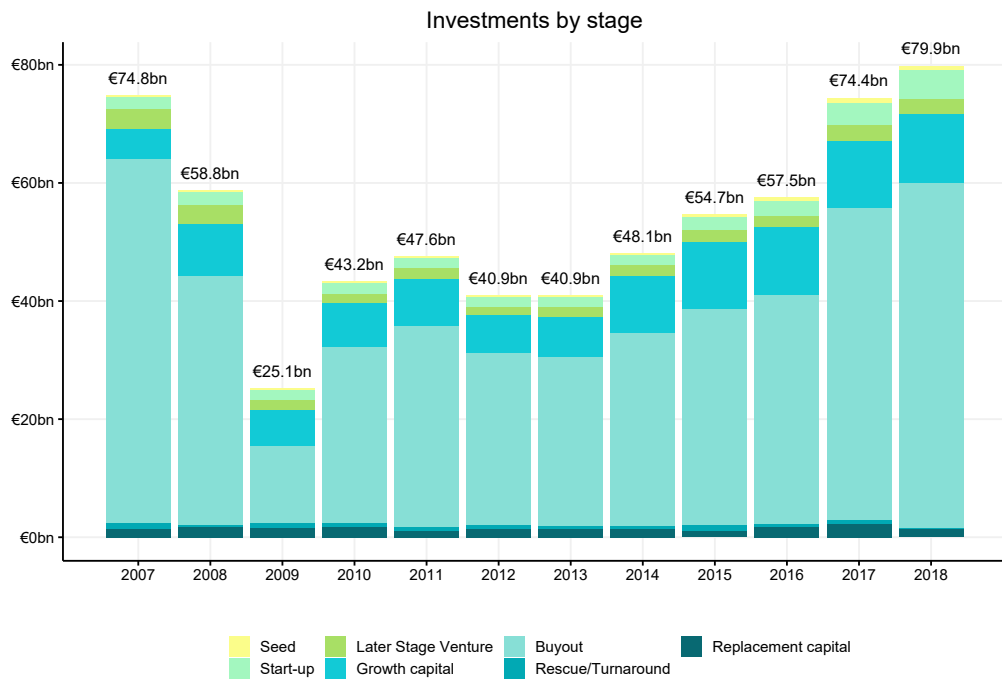
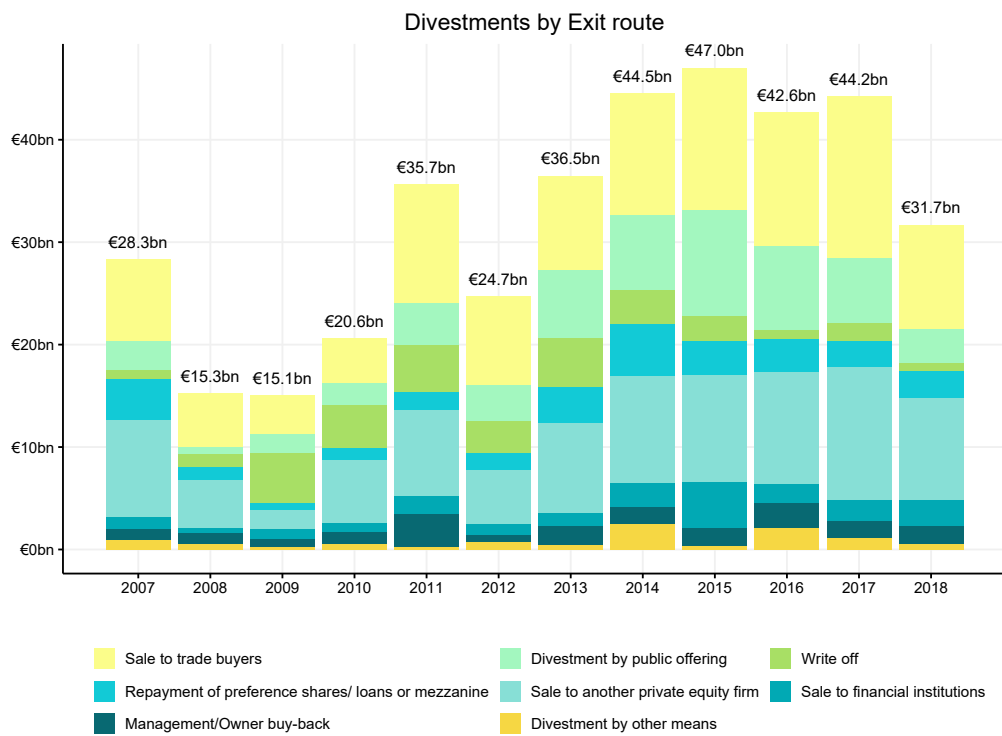


Figure 4.3: Divestment by exit route



Source: Author's elaboration, based on data provided by Invest Europe

4.2 Independent Variables

In the following section, independent variables used in this thesis will be presented. They can be divided into variables concerning economic activity (Subsection 4.2.1), financial environment (Subsection 4.2.2), labour market (Subsection 4.2.3) and political, legal and social environment (Subsection 4.2.4).

4.2.1 Economic Activity

GDP growth - annual growth rate of gross domestic product in percentage obtained from the OECD. A significant and positive effect is expected as it indicates economic growth based on findings of Gompers and Lerner (1999); van Pottelsberghe de la Potterie and Romain (2004); Cherif and Gazdar (2011); Félix et al. (2013).

Unemployment rate - number of unemployed people as a percentage of total labour force obtained from the OECD. Based on findings of Cherif and Gazdar (2011); Félix et al. (2013), a negative relationship is expected between PE activity and unemployment rate.

Inflation - annual change of harmonized consumer price index obtained from the IMF. One could expect a negative relationship between inflation and PE activity, supported by findings of Bernoth and Colavecchio (2014).

4.2.2 Financial Environment

Market capitalisation - market capitalisation of listed companies in percentage of GDP obtained from the OECD. Based on finding of Félix et al. (2013), this variable serves as a proxy for the liquidity of stock market and a positive relationship on PE activity could be expected for both fundraising and investment. However, authors Jeng and Wells (2000), and Balboa and Martí (2003) found evidence for insignificance of this variable.

Long-term interest rate - refers to the interest rate of government bonds with a ten-year maturity in percentage obtained from the OECD. Based on findings of van Pottelsberghe de la Potterie and Romain (2004); Félix et al. (2013); Precup (2017), a positive influence on the PE activity is expected.

Short-term interest rate - based on three-months money rates in percentage obtained from the OECD. Literature represented by Gompers and Lerner (1999); van Pottelsberghe de la Potterie and Romain (2004) predicts a higher interest rate leads to higher amounts of capital raised. PE investments also seem to be more attractive than traditional source of financing from financial institutions.

Domestic credit to private sector / GDP - financial resources provided to private sector as a percentage of GDP obtained from the World Bank. The author hypothesizes that a greater share of domestic credit leads to a higher PE activity.

Tax on corporate profits - the tax levied on enterprises' net profits as a percentage of GDP obtained from the OECD. The author hypothesizes that a negative relationship – a higher amount collected decreases PE activity level.

4.2.3 Labour Market Environment

Labour productivity and utilisation - annual growth rate reflecting two components – labour productivity as growth in GDP per hour worked, and changes in hours worked per capita – obtained from the OECD. The author hypothesizes that a positive change in productivity leads to a positive change in PE activity level.

Employment protection - an indicator of the strictness of regulation on employee discharge and the use of temporal contracts obtained from the OECD. The author hypothesizes that a positive relationship with respect to PE activity.

Labour cost - refers to the average costs of labour per unit of output produced measured as a percentage change from the previous period obtained from the OECD.

Education Attainment - tertiary education level attainment in percentage of the total population obtained from Eurostat. The author hypothesizes a higher share of population with tertiary education determines positively evolution of private equity in Europe.

4.2.4 Political, Legal and Social Environment

Research & development expenditures - a proxy for innovation and technological opportunity which represents the total expenditures on research and development activities as a percentage of GDP obtained from the OECD. Based on findings of Gompers and Lerner (1999); van Pottelsberghe de la Potterie and Romain (2004); Cherif and Gazdar (2011); Precup (2017), the author hypothesizes a positive and statistically significant effect on the PE activity.

Control of corruption - an indicator measuring the degree of countries' ability to prevent corruption or fight against corruption subsequently indicating the attractiveness of a respective country as a place of business, obtained from the World Bank – Worldwide Governance Indicators (WGI).

Rule of law - a likelihood indicator of crime and violence, which also measures the degree of legal obedience obtained from the WB – WGI.

Voice and accountability - an indicator of freedom of expression, association and free media obtained from the WB – WGI.

Political stability and absence of violence - a likelihood indicator of political instability in case of violence obtained from the WB – WGI.

Government effectiveness - an indicator of public services' quality and governments' credibility obtained from the WB – WGI.

Regulatory quality - an indicator of the ability to implement policies and regulations that permit and promote private sector's development obtained from the WB – WGI

Index of economic freedom - an annual indicator capturing the degree of economic freedom annually in countries as an indicator of institutional quality, (taking into account multiple factors rated on a scale from 0 to 100, weighted equally) created by and obtained from the Heritage foundation. Based on Cherif and Gazdar (2011), the author hypothesizes a positive effect on funds raised.

- Property rights, Business freedom, Trade freedom, Investment freedom, Financial freedom.

In Table 4.2, one can find a summary of the descriptive statistics for our explanatory variables. The rows that have been highlighted (green colour) indicate the variables that are used as “core” variables (Chapter 5 further describes the meaning of core variables.)

Table 4.2: Dependent variables

	n	mean	median	min	max	sd	Q0.25	Q0.75
GDP growth	240	1.3887	1.7315	-9.1320	25.1210	3.1315	0.4058	2.7120
Unemployment rate	240	8.2805	7.2667	2.2667	27.4917	4.8051	5.0458	9.2938
Inflation	240	1.6076	1.5269	-4.4781	7.9587	1.5162	0.5085	2.4655
Market capitalization	173	66.2521	50.4528	10.3254	326.3590	54.8718	29.3820	81.8578
Long-term interest rate	240	3.1955	2.9446	-0.3620	22.4975	2.6149	1.4531	4.3027
Short-term interest rate	240	1.4092	0.7284	-0.7838	8.9044	1.9470	0.0010	1.8157
Domestic Credit	240	105.3292	97.5750	32.8085	201.2587	40.7830	80.5434	130.6715
Tax on corporate profits	240	2.9595	2.6435	1.0920	11.9850	1.5558	2.1560	3.2115
Labour Productivity	240	0.8579	0.7284	-5.8145	19.8677	2.2362	-0.1656	1.6434
Employment protection	240	1.7276	1.5620	0.3750	3.7500	0.8663	1.1250	2.2500
Labour Costs	240	1.5321	1.3331	-15.2579	9.4175	2.7093	0.2162	2.8673
Education Attainment	240	26.9679	28.30	11.60	40.50	7.2817	21.40	32.5250
R&D expenditures	240	1.9604	1.6744	0.5619	3.7340	0.8171	1.2933	2.7435
Control of Corruption	240	1.4008	1.6005	-0.1892	2.4465	0.7689	0.6399	2.0916
Government Effectiveness	240	1.3837	1.5448	0.1976	2.3540	0.5388	0.9921	1.8204
Political Stability No Violence	240	0.8272	0.9223	-0.4738	1.5123	0.4327	0.5455	1.1325
Regulatory Quality	240	1.3704	1.5025	0.1484	2.0474	0.4227	1.0145	1.7410
Rule of Law	240	1.4249	1.6605	0.0839	2.1003	0.5451	1.0230	1.8739
Voice and Accountability	240	1.2824	1.3366	0.3183	1.7380	0.2892	1.0443	1.5388
GenGovNetLendBorr	240	-2.0115	-2.2080	-32.0660	18.6330	4.8739	-4.1840	0.2160
Property Rights	240	78.8863	86.20	40.00	95.00	14.1910	70.00	90.00
Business Freedom	240	82.0271	81.75	53.70	99.90	9.8489	75.8750	90.4250
Trade Freedom	240	86.6875	87.00	80.80	90.00	1.9624	86.50	87.80
Investment Freedom	240	79.1042	80.00	50.00	95.00	11.1911	70.00	90.00
Financial Freedom	240	71.7500	70.00	40.00	90.00	10.9516	60.00	80.00

Chapter 5

Methodology and Models

5.1 Motivation

So far many determinants have been identified and statistically validated as significant. However, the conclusion turned out to be ambiguous as many findings contradict each other. Only a few of the existing studies control for the variables used by others, other than the usual macroeconomic variables and variables directly related to the PE process.

Introduction of extreme bounds analysis (“EBA”), a sensitivity test that investigates the degree of robustness of the dependent variable on large variety of possible determinants, solves the problem of model selection under uncertainty. The underlying idea is to run a whole range of possible specification models and analyse to what extent are the estimated parameters sensitive to the inclusion of an additional regressor. The approach proposed by Sala-i Martin (1997) who built on previous studies of Levine and Renelt (1992) and Leamer (1985) assigns a certain level of confidence to each of the explanatory variables. Subsequently, the entire distribution of estimated coefficient is investigated. In line with Levine and Renelt (1992), Sala-i Martin (1997) proposed a model specification with a group of core variables included in every regression, then variables of interest (whose robustness are of interest), and an additional set of variables with robustness not being of major interest.

In the following section, econometric techniques and the underlying theory will be reviewed. Regarding the empirical analysis, EBA will be employed to narrow down the number of possible determinants with a certain degree of robustness. In the next step, based on the results of testing, either fixed-effects or random effects panel estimation method will be applied.

5.2 Extreme Bounds Analysis

A brief description of the proposed method will be presented as the fundamentals need to be acknowledged to understand the whole procedure.

Let us consider N number of variables potentially determining the PE activity. To conduct an EBA, we estimate model with country-fixed effects (controlling for all unobserved time-invariant heterogeneity between the countries) in the following form:

$$y_{it} = \alpha_i + \beta_X X_{it} + \beta_Z Z_{it} + \beta_R R_{it} + u_{it} \quad (5.1)$$

where y_{it} represents the dependent variable (in our case, fundraising as a share of GDP and investments as a share of GDP); α_i denotes country-fixed effects, X_{it} is a vector of explanatory variables that always appear in the regressions, Z_{it} is a vector of explanatory variables that are tested for robustness, R_{it} is a vector of random variables drawn from the pool of N variables available and u_{it} refers to error term. The indices i and t denote countries and years, respectively.

Every regression yields a certain value of coefficient estimate, β_Z with a corresponding standard deviation and a cumulative distribution function (CDF). $CDF(0)$ is based on the fraction of the CDF lying on each side of zero. Following Sala-i Martin (1997)'s criterion, a variable is considered robust if the CDF is greater than 0.90 or lower than 0.10.

In our case, we choose three variables as the core variables (GDP growth, unemployment rate, short-term interest rate) which are widely used in the existing literature (Henchiri, 2016). Then for each variable of interest, a total of $\binom{N}{N-k-3}$ regressions will be estimated. As we set $k = 2$ ¹, total of $\binom{N}{5}$ ² regressions will be run.

Finally, only these robust variables identified by EBA are further used in our panel data analysis as explanatory variables.

5.3 Panel Data Analysis

For our analysis, a framework in Wooldridge (2013) and Greene (2003) is presented and followed. Panel data monitor the same cross-sectional units over a certain period of time while accounting for an individual heterogeneity. Our

¹Levine and Renelt (1992) suggested that imposing three restrictions give the results more credibility. However, the results were consistent even for $k = 2, 3, 4$.

² $\binom{N}{N-5} = \binom{N}{5}$

panel data set has both cross-sectional and time series dimension. Let i denote the cross-sectional unit (country) and t the time period (year). We can then write the model in the following fashion (as in Wooldridge):

$$y_{it} = \beta_0 + \beta_1 x_{it1} + \beta_2 x_{it2} + \dots + \beta_k x_{itk} + a_i + u_{it} \quad (5.2)$$

or

$$y_{it} = \beta_0 + \sum_{j=1}^k \beta_j x_{itj} + v_{it} \quad (5.3)$$

where $i = 1, \dots, n$ represents i -th cross-sectional unit (country), $t = 1, \dots, T$ stands for a time period and $j = 1, \dots, k$ is j -th explanatory variable. a_i is usually referred to an unobserved effect, fixed effect, or unobserved heterogeneity, that is specific for each cross-sectional unit (country) and which does not change over time (time invariant). While u_{it} stands for idiosyncratic error that changes over time (time varying), $v_{it} = a_i + u_{it}$ is called the composite error.

It is important to distinguish between balanced and unbalanced panels. Balanced panel consists of $n = NT$ observations on cross-sectional units $i = 1, \dots, N$ at all times $t = 1, \dots, T$. Unbalanced panel consists of less than NT observations. That is some observations for at least one cross-sectional unit in any time period are missing – $n = \sum_{i=1}^N T_i$.

We follow three methods for panel data analysis: Pooled Ordinary Least Squares (“POLS”), Fixed Effects (“FE”), and Random Effects (“RE”).

5.3.1 Pooled Regression

There are no assumptions on individual differences and if the unobserved effect a_i is uncorrelated with x_{it} then POLS leads to efficient and consistent estimates. However, if should this assumption be broken, heterogeneity bias from omitting a time constant variable arises.

5.3.2 Fixed Effects

The fixed effects model assumes the unobserved individual effects to be correlated with the explanatory variables. This approach takes the fixed effect as a group-specific constant term regressions and examines the differences in the intercepts.

5.3.3 Random Effects

Equation 5.2 becomes a random effects model if the unobserved effect is assumed to be uncorrelated with each explanatory variable:

$$Cov(x_{itj}, a_i) = 0, t = 1, \dots, T; j = 1, \dots, k.$$

This approach allows for the same intercepts and differences in the error variances across cross-sectional units.

5.3.4 Testing

Not only the assumptions of the Classical Linear Model need to be verified, but also further tests for panel data need to be performed. These are summarized in the Table 5.1 below.

Table 5.1: List of the testing techniques

Test	Null hypothesis
Breusch-Pagan	homoskedasticity
Poolability	no individual effects
Breusch-Godfrey	no serial correlation
F test	OLS preferred over FE
BP LM test	OLS preferred over RE
Hausman	RE consistent and efficient

- Using the Breusch-Pagan test under the null hypothesis of no heteroskedasticity, we test for the presence of homoskedasticity. Without homoskedasticity, standard errors and test statistics would not be valid.
- The poolability test is an extension of the Chow test³ (Chow, 1960). If the null hypothesis that the slopes of all explanatory variables are equal is rejected, the panel data set is not poolable.
- Serial correlation which affects the statistical inference is tested by Breusch-Godfrey test under the null hypothesis of no serial correlation in time varying errors.
- The LM test by Breusch and Pagan (1980) compares OLS and random effects models. The test examines, whether the cross-sectional or the time period specific variance components equal zero. If the null hypothesis is rejected, RE are preferred to pooled OLS.

³A test for the equality of the regression coefficients across different groups.

-
- F-tests's null hypothesis is that all fixed (time invariant) effects equal zero. If the null hypothesis is rejected, FE are preferred to pooled OLS.
 - Hausman specification test (Hausman, 1978) compares FE and RE under the null hypothesis that unobserved heterogeneity (individual effects) is uncorrelated with any explanatory variable in the model. If the null hypothesis is rejected, FE are preferred.
 - In case of presence of heteroskedasticity and serial correlation, robust standard errors need to be estimated to achieve the best linear unbiased estimators ("BLUE") using the technique proposed by Arellano (1987); Millo (2014).
 - Multicollinearity is addressed using the variance inflation factor ("VIF"), as it captures a high correlation among the supposed independent variables. This implies unreliable and unstable estimates given the sensitivity to minor changes in specification.

Chapter 6

Results

This chapter is organized followingly: Section 6.1 presents evaluation of the extreme bounds analysis, then Section 6.2 presents the panel data analysis that was carried out. Consequently, Subsection 6.2.1 presents the models with results for fundraising activity, whereas Subsection 6.2.2 is focused on the models and results for investment activity.

6.1 EBA Evaluation

Following Sala-i Martin (1997)'s proposed method, a variable is considered to be robust if 90% of the slopes' distribution is positive or negative (lies on each side of zero). Despite the fact, that the coefficients in each regression have an asymptotic normal distribution, Sala-i Martin proposed two versions of EBA –one with normal model with an assumption of normal distribution across the estimated models, and a generic model, in which the coefficient estimates do not follow any particular distribution across different specifications.

In both of our extreme bounds analysis, GDP growth (*GDPgr*), short-term interest rate (*IRS*) and unenemployment rate (*UnR*) were treated as “core” variables which are characterised by general acceptance in extant literature (e.g. HENCHIRI, 2016) both for theoretical plausibility and supportive empirical evidence found in analyses. Also the problem of multicollinearity among regressors was addressed, therefore, a maximum variance inflation factor was specified to seven ($vif = 7$) when the equations were set up. The total of 5,250 (2,625 for each dependent variable) regressions were run and evaluated. Table 6.1 and Table 6.2 report the distribution of coefficient estimates from the Sala-i Martin's extreme bounds analysis. Having visually inspected the histograms

(see Figure B.2 and Figure B.3), the author focused on results from the generic models as histograms did not indicate a normally distributed approximation of the coefficients.

As shown in Table 6.1, variables *Div_WO_norm_lag*, *MCAP*, *EducAttain*, *DomCredit*, and *BusinessFreedom* passed the 90% threshold and found to be robustly related to PE fundraising. Coefficients for divestment by write off, market capitalisation and business freedom indicated a negative sign, whereas education attainment and domestic credit indicated a positive relationship with fundraising. Intuitively, market capitalisation is associated with capital market returns, hence, PE industry is less attractive. Moreover, from the supply side of view, this leads to less supply of funds from investors who prefer investing in the stock market in such case. Moreover, divestment by write off is a sign of failure and writing down investments means a loss of invested capital, hence, this is not a convincing case for investors, who will be hesitant to commit their capital to PE firms.

Moving on to investment shown in Table 6.2, *Div_TrBuyers_norm_lag*, *MCAP*, *ControlofCorruption*, and *RnD* were identified as robust variables passing the 90% threshold. Intuitively, the distribution of coefficient estimates for *RnD* and *MCAP* lie on the right side of zero indicating a positive relationship with investments. Although, the expected sign is opposite (from fundraising case), from theoretical point of view, this could be expected as liquidity of the stock market is a sign of exit opportunities for the PE firms. Furthermore, technological opportunities and promising entrepreneurial ideas (*RnD*) attract PE investors as high returns could be expected.

If the threshold was slightly loosened to 85%, Education Attainment (*EducAttain*), Inflation, Government Effectiveness, Rule of Law, Voice and Accountability, and Investment Freedom (*InvFreedom*) would have passed the lowered threshold. Consequently, these would also have been included in our regressions. On the other hand, this lowered threshold would not add any new variables for fundraising.

Compared to the EBA of Bernoth and Colavecchio (2014) who compared Western European (“WE”) countries to Central and Eastern European (“CEE”) countries, Bernoth and Colavecchio identified in total of nine robust determinants robustly related to investments for WE: market capitalisation, inflation, political stability, regulatory quality, union density, unemployment rate and annual growth rate of unit labour cost. Whereas for CEE they were: commercial bank lending / GDP, inflation. This set of variables surpassed the 90%

threshold and overlaps with our robust variables only in market capitalisation.

Table 6.1: EBA results for fundraising

	G: CDF(beta ≤ 0)	G: CDF(beta > 0)
Div_TrBuyers_norm_lag	69.56%	30.44%
Div_PO_norm_lag	16.43%	83.57%
Div_WO_norm_lag	97.61%	2.39%
MCAP	99.22%	0.78%
EducAttain	0.77%	99.23%
DomCredit	6.63%	93.37%
Inflation	39.04%	60.96%
ControlofCorruption	44.29%	55.71%
GovernmentEffectiveness	37.20%	62.80%
PoliticalStabilityNoViolence	76.03%	23.97%
RegulatoryQuality	37.77%	62.23%
RuleofLaw	69.65%	30.35%
VoiceandAccountability	84.93%	15.07%
IRL	76.64%	23.36%
LabourProd	68.65%	31.35%
RnD	82.12%	17.88%
EmplProt	44.07%	55.93%
CorpTax	15.09%	84.91%
UnitLabCosts	26.94%	73.06%
GenGovNetLendBorr	14.37%	85.63%
PropertyRights	80.19%	19.81%
BusinessFreedom	99.14%	0.86%
TradeFreedom	77.39%	22.61%
InvFreedom	47.53%	52.47%
FinFreedom	33.23%	66.77%

Note: Coloured variables indicate robustness, source: Author's elaboration

Table 6.2: EBA results for investment

	G: CDF(beta ≤ 0)	G: CDF(beta > 0)
Div_TrBuyers_norm_lag	93.30%	6.70%
Div_PO_norm_lag	77.56%	22.44%
Div_WO_norm_lag	57.13%	42.87%
MCAP	0.00%	100.00%
EducAttain	87.10%	12.90%
DomCredit	71.58%	28.42%
Inflation	89.61%	10.39%
ControlofCorruption	98.49%	1.51%
GovernmentEffectiveness	88.03%	11.97%
PoliticalStabilityNoViolence	70.52%	29.48%
RegulatoryQuality	76.71%	23.29%
RuleofLaw	87.21%	12.79%
VoiceandAccountability	88.01%	11.99%
IRL	35.40%	64.60%
LabourProd	62.63%	37.37%
RnD	0.31%	99.69%
EmplProt	81.04%	18.96%
CorpTax	38.60%	61.40%
UnitLabCosts	67.36%	32.64%
GenGovNetLendBorr	22.71%	77.29%
PropertyRights	17.89%	82.11%
BusinessFreedom	52.59%	47.41%
TradeFreedom	49.91%	50.09%
InvFreedom	11.53%	88.47%
FinFreedom	72.14%	27.86%

Note: Coloured variables indicate robustness, source: Author's elaboration

6.2 Panel Data Analysis

Considering the nature of the data, panel data analysis was then employed. The EBA approach helped us to investigate whether the variables proposed in the extant literature were indeed robust determinants of private equity fundraising and investment. Three models were proposed for each dependent variable. The quality of model specification was tested using the testing techniques described in Table 5.1. The performed tests (Table A.1, Table A.2) were evaluated at significance level of at least 5%. Breusch and Pagan LM tests for presence of individual-specific random effects against the null hypothesis of independent and identically distributed errors (pooled OLS) rejected the null hypothesis and preferred RE. According to Hausman test results, either fixed effects or random effects models were subsequently carried out.

Before proceeding to interpretation of our results, a valid statistical inference needs to be confirmed as it requires controlling for both serial correlation and heteroskedasticity using Breusch-Godfrey and Breusch Pagan tests respectively. Results of the performed tests can be found in Table A.3 and Table A.4. One can observe that normalisation of variables solved the problem of heteroskedasticity only partially. Given these, robust standard errors were calculated instead following Millo (2014).

Furthermore, multicollinearity was tested using variance inflation factor; cross-sectional dependence was rejected at 5% significance level in all of the models. RE model restricts all coefficients to be the same in different cross sections and time periods, while FE model assumes constant regression parameters except for the intercept varying across cross sections (i). Therefore, these constraints were tested using poolability test.

The final estimation results for fundraising and investment are presented in Table 6.3 and Table 6.4 respectively. Abbreviation “Tot” stands for Total, as in total amount of funds raised across all stages (in percentage of GDP). “VC” and “BO” then refer to Venture Capital and Buy-out respectively.

6.2.1 Fundraising

MODEL 1: Firstly, the set of three macroeconomic variables were used as explanatory variables for the first estimated model.

$$Fundr_Mkt_norm_{it} = \beta_0 + \beta_1 GDPgr_{it} + \beta_2 IRS_{it} + \beta_3 UnR_{it} + a_i + u_{it} \quad (6.1)$$

MODEL 2: Secondly, *MCAP* and *Div_WO_norm_lag* were added.

$$Fundr_Mkt_norm_{it} = \beta_0 + \beta_1 GDPgr_{it} + \beta_2 IRS_{it} + \beta_3 UnR_{it} + \beta_4 Div_WO_norm_lag_{it} + \beta_5 MCAP_{it} + a_i + u_{it} \quad (6.2)$$

MODEL 3: Lastly, *EducAttain*, *DomCredit* and *BusinessFreedom* were added to study the influence on fundraising.

$$Fundr_Mkt_norm_{it} = \beta_0 + \beta_1 GDPgr_{it} + \beta_2 IRS_{it} + \beta_3 UnR_{it} + \beta_4 Div_WO_norm_lag_{it} + \beta_5 EducAttain_{it} + \beta_6 DomCredit_{it} + \beta_7 BusinessFreedom_{it} + a_i + u_{it} \quad (6.3)$$

Table 6.3: Fundraising Estimation results

	<i>Dependent variable:</i>									
	Fundr_Mkt_norm									
	(1) Tot (<i>RE</i> ^r)	(1) VC (<i>RE</i> ^r)	(1) BO (<i>RE</i> ^r)	(2) Tot (<i>FE</i> ^r)	(2) VC (<i>RE</i>)	(2) BO (<i>FE</i>)	(3) Tot (<i>RE</i> ^r)	(3) VC (<i>RE</i> ^r)	(3) BO (<i>RE</i> ^r)	
GDPgr	0.020* (0.012)	0.001 (0.001)	0.018* (0.010)	0.006 (0.008)	0.00004 (0.002)	0.007 (0.016)	0.009 (0.015)	-0.0004 (0.001)	0.009 (0.013)	
IRS	-0.0005 (0.021)	0.003 (0.003)	-0.004 (0.019)	-0.068 (0.054)	0.001 (0.003)	-0.060* (0.032)	0.056** (0.024)	0.003 (0.004)	0.053** (0.023)	
UnR	-0.012* (0.007)	-0.002** (0.001)	-0.009 (0.006)	0.010 (0.013)	-0.002 (0.001)	0.013 (0.018)	-0.010 (0.008)	-0.003** (0.001)	-0.006 (0.007)	
Div_WO_norm_lag				-2.476 (2.185)	0.126 (0.257)	-2.579 (2.242)	-2.559** (1.160)	0.115 (0.119)	-2.785** (1.215)	
MCAP				-0.013 (0.008)	0.0002 (0.0002)	-0.011*** (0.003)				
EducAttain							0.051** (0.022)	0.002** (0.001)	0.047** (0.020)	
DomCredit							0.005** (0.002)	0.0003* (0.0002)	0.005** (0.002)	
BusinessFreedom							-0.026 (0.017)	-0.002* (0.001)	-0.021 (0.015)	
Constant	0.437** (0.181)	0.060*** (0.017)	0.309* (0.159)		0.051** (0.023)		0.557 (0.745)	0.129 (0.084)	0.249 (0.643)	
Observations	240	240	240	156	156	156	220	220	220	
R ²	0.017	0.033	0.015	0.129	0.030	0.131	0.128	0.059	0.130	
Adjusted R ²	0.004	0.021	0.002	-0.007	-0.002	-0.005	0.099	0.028	0.101	

*p<0.1; **p<0.05; ***p<0.01

r denotes robust estimation

(robust) standard errors in parentheses

Funds raised normalised by GDP in total –all types together –were regressed against chosen variables. Then the most pronounced types of funds by its stage focus were investigated (venture capital and buy-out).

As heteroskedasticity and serial correlation were detected, random effects regression method with robust standard errors was applied to Equation 6.1 and Equation 6.3 for all types of funds. Results of the performed tests, which were evaluated at 5% significance level, can be found in Table A.3. Blue-coloured values indicate a rejection of the null hypothesis of homoskedasticity presence and absence of serial correlation using Breusch-Pagan and Breusch-Godfrey test, respectively.

Economic growth showed a positive sign as expected and turned out to be statistically significant only for *Tot* and *BO* in the first model. However, *GDPgrowth* was not validated as statistically significant for venture fundraising, neither for the other two proposed models across all stage focuses. This finding is in line with Jeng and Wells (2000) who did not validate significance of the coefficient either. Although, the sign turned out to be negative for VC funds in the third model, the effect remained economically insignificant.

Short-term interest rate (*IRS*) showed a negative sign on the total level, however, economically and statistically insignificant for the first two models. Overall, the effect is ambiguous due to inconsistency of the variable across models. In the third proposed model, a positive and statistically significant effect on funds raised is confirmed, supporting the evidence of Gompers and Lerner (1999) van Pottelsberghe de la Potterie and Romain (2004).

Unemployment rate (*UnR*) confirmed its negative impact on fundraising, while being statistically significant at 5% level only for VC (model 1 and 2), this is in line with theory as it indicates the existence of unskilled labour force and lower entrepreneurial activity that disincentivizes investors' entry. Hence, the evidence supports finding in the analysis lead by Cherif and Gazdar (2011).

Although, divestment by write-off lagged by one period (*Div_WO_norm_lag*) is statistically insignificant in model 2, the negative coefficient of the variable is economically significant. Thus, our analysis confirms the findings of Martí and Balboa (2001). The negative effect of write-offs mainly affects buy-out funds raised (evaluated at significance level of 5%). As already stated, this type of exit indicates a poor performance of the PE fund (firm) which implies less trust in the future.

Market capitalisation (*MCAP*) was used as a proxy for liquidity of the stock market, on total level of funds raised, the results showed a negative and statisti-

cally insignificant impact. For BO fundraising, *MCAP* was found statistically significant at 1% level. This is in contradiction with the arguments of Jeng and Wells (2000) and Balboa and Martí (2003) as these authors argued *MCAP* had no statistically significant evidence on new funds raised. The negative effect seems to be in line with theory, as vibrant stock market becomes more attractive rather than committing capital to the new funds with high risk.

Tertiary education level attainment (*EducAttain*) was validated as positive and statistically significant, confirming our hypothesis of the importance of an academic degree in terms of skill set and knowledge for fundraising process.

Domestic credit to private sector in a percentage of GDP (*DomCredit*) was positive and statistically significant on 5% and 10% level for buy-out and venture capital fundraising, respectively, thus also confirmed our hypothesis. Obtaining a loan is crucial for buy-out type of deals as higher leverage means lower commitment of capital (own resources), thus, this ratio boosts the equity returns in case of success. Furthermore, banks are considered generally more risk averse than PE investors. Consequently, this implies that committing capital to private sector is less risky.

Business freedom, a proxy for efficiency of governmental regulation of business, is the the last variable motivated by EBA. Surprisingly, the effect turned out to be negative and statistically insignificant. One possible explanation for the negative impact might be that an unfavourable business environment attracts investors more than an environment with higher regulatory quality with pleasant business conditions (less competition in the market).

6.2.2 Investment

MODEL 1: Firstly, the regression included only macroeconomic variables.

$$Inv_Mkt_norm_{it} = \alpha_0 + \alpha_1 GDPgr_{it} + \alpha_2 IRS_{it} + \alpha_3 UnR_{it} + a_i + u_{it} \quad (6.4)$$

MODEL 2: Then variables divestment via trade sale normalized by GDP lagged one period and market capitalisation were added.

$$Inv_Mkt_norm_{it} = \alpha_0 + \alpha_1 GDPgr_{it} + \alpha_2 IRS_{it} + \alpha_3 UnR_{it} + \\ + \alpha_4 Div_TrBuyers_norm_lag_{it} + \alpha_5 MCAP_{it} + a_i + u_{it} \quad (6.5)$$

MODEL 3: Lastly, the third proposed model included variables from political, legal and social environment.

$$Inv_Mkt_norm_{it} = \alpha_0 + \alpha_1 GDPgr_{it} + \alpha_2 IRS_{it} + \alpha_3 UnR_{it} \\ + \alpha_4 Div_TrBuyers_norm_lag_{it} + \\ + \alpha_5 Control\ of\ Corruption_{it} + \\ + \alpha_6 RnD_{it} + a_i + u_{it} \quad (6.6)$$

Table 6.4: Investment estimation results

	<i>Dependent variable:</i>								
	(1) Tot (<i>RE^r</i>)	(1) VC (<i>RE^r</i>)	(1) BO (<i>RE^r</i>)	(2) Tot (<i>FE^r</i>)	Inv_Mkt_norm (2) VC (<i>RE^r</i>)	(2) BO (<i>FE^r</i>)	(3) Tot (<i>FE^r</i>)	(3) VC (<i>FE^r</i>)	(3) BO (<i>FE^r</i>)
GDPgr	0.005 (0.009)	0.0004 (0.0004)	0.007 (0.008)	0.003 (0.004)	0.0002 (0.001)	0.004 (0.004)	0.002 (0.006)	0.00001 (0.0004)	0.003 (0.006)
IRS	0.027** (0.012)	0.001* (0.001)	0.024** (0.010)	0.039 (0.028)	-0.0002 (0.001)	0.034* (0.019)	0.036 (0.029)	0.002 (0.001)	0.027 (0.021)
UnR	-0.006* (0.004)	-0.001*** (0.0003)	-0.005 (0.003)	-0.005 (0.006)	-0.001*** (0.0003)	-0.004 (0.005)	-0.008** (0.004)	-0.001** (0.001)	-0.006* (0.004)
Div_TrBuyers_norm_lag				-0.256*** (0.027)	-0.012 (0.012)	-0.185*** (0.026)	-0.259 (0.168)	-0.003 (0.012)	-0.181 (0.160)
MCAP				0.006** (0.002)	0.00004 (0.0001)	0.005** (0.002)			
ControlofCorruption							-0.452 (0.291)	-0.043*** (0.009)	-0.348 (0.247)
RnD							0.277 (0.256)	0.004 (0.009)	0.206 (0.204)
Constant	0.380*** (0.087)	0.038*** (0.006)	0.263*** (0.073)		0.036*** (0.006)				
Observations	240	240	240	156	156	156	220	220	220
R ²	0.043	0.073	0.050	0.147	0.098	0.180	0.089	0.164	0.072
Adjusted R ²	0.031	0.061	0.038	0.013	0.068	0.051	-0.028	0.056	-0.048

Note:

*p<0.1; **p<0.05; ***p<0.01

^r denotes robust estimation

(robust) standard errors in parentheses

The amounts invested for each country were normalised by GDP of the respective country. Each model was regressed with a different number of explanatory variables at the aggregate level, then specifically for venture capital and buy-out.

Tests proposed in Table 5.1 were evaluated at least at 5% significance level (blue-coloured values in Table A.4). Then fixed effects and random effects regression analyses with robust standard errors were employed. The results are summarized in Table A.2.

The influence of economic activity was not validated as economically and statistically significant for investments in PE across all types of funds and models indicating that a favourable macroeconomic environment does not play a major role. This finding confirms evidence of Jeng and Wells (2000) and Félix et al. (2013).

Short-term interest rate has a positive effect on investments in private equity, although economically and statistically insignificant. Throughout extant literature, the effect seems to be rather ambiguous. On one hand, the positive impact indicates attractiveness of PE investments compared to bank financing with higher costs (due to increased interest rates). On the other, higher level of interest rates makes riskier PE investments less interesting. This implies a rather decreasing effect as investors seek for less-risky assets with risk-free returns.

A strong negative and statistically significant relationship between unemployment rate and evolution of PE investments was validated in our analysis. This finding confirmed the arguments of Félix et al. (2013) who argued that unemployment is positively correlated with labour market rigidities, that is higher level of unemployment is associated with more rigid labour markets. Consequently, the negative effect outweighs the potential entrepreneurial activity of self-employed people.

Furthermore, divestment by sale to trade buyers was found to be another EBA robust determinant of investment in comparison to exit through write-off for fundraising. Across all stage focuses in model 2 (Equation 6.5) and model 3 (Equation 6.6), a negative coefficient was found being statistically significant at 1% level. Although trade sale is generally seen as an exit with many benefits (one of them is that strategic players are willing to pay premium), this comes with some flaws –a negative impact on company's value in case of not proceeding further and burdening the company with excessive administration work that comes with the process.

MCAP was found positive and statistically significant in model 2 for investment. The finding confirmed our hypothesis and supports theory as an active stock market attracts PE investments due to the possibility of exit options with probability of higher returns, This is in line with Félix et al. (2013), Bernoth and Colavecchio (2014). However, the evidence is opposite from findings on fundraising. Nonetheless this seems rational as PE firms strategically see better exit opportunities offered by a dynamic stock market.

A negative and statistically significant (at 1% level) impact of control of corruption for VC investments (in the third model) implies that unfavourable environment for setting up new businesses is more attractive than in the markets with efficient regulation of bureaucracy. Corruption may be seen as a compensation for inefficient administration, and this would explain the evidence by negative coefficient in our findings. Likewise, Precup (2017) concluded that corruption has a positive and significant impact on both venture capital and buy-out investments.

Technological opportunities and innovation proxied by research and development expenses were not validated as robust and relevant for fundraising activities, however, the results show a positive and economically significant impact on investments across all stage focuses. This supports the evidence of Gompers and Lerner (1999), van Pottelsberghe de la Potterie and Romain (2004), Cherif and Gazdar (2011) and Precup (2017). However, Precup argued that *RnD* had a strong negative impact on buy-outs as these mature firms rather focus on debt repayments and do not invest into research and development.

6.2.3 Discussion regarding R^2

Theory indicates that R^2 naturally increases with added variables (see Wooldridge, 2013). In terms of R^2 , the value increases with added variables in our models, justifying that the variation of dependent variables is better explained by included regressors.

However, a small value of R^2 does not necessarily imply that the models are incorrectly estimated. A large error variance is often offset by a large sample size (Wooldridge). A large number of cross-sectional units (countries) over a substantially long period (years) is included in the regressions.

Moreover, the author also reports adjusted R^2 along with R^2 for its attractive feature in form of a compensation for adding more independent variables¹

The value of adjusted R^2 seems to be rather small. However, the author found out, after thorough inspection of other work analyses, that some models did not homogenize the data. Absolute values of funds raised were used in case of Henchiri (2016). It may be a problem of spurious regression. The concept of this issue was first described by Newbold and Granger (1974). According to Newbold and Granger, spurious regressions tend to have a high value of R^2 .

¹Increasing value of R^2 indicates either better fit of the models, or it simply captures the addition of explanatory variables.

Chapter 7

Conclusion

The aim of the thesis was to answer the question which factors attract the investors' attention to provide a capital infusion, and subsequently, to provide evidence on the key drivers of investments into the companies. The industry has been growing over the past years and the merits as well as the potential of this alternative investment class are unequivocal. Hence, the determinants were subjects to scrutiny.

The majority of the previous research tends to examine a narrow set of determinants to investigate their influence on the amount raised and invested in private equity across the European countries. In order to reveal possible determinants, a large set of variables was proposed by utilizing the rich literature on the topic. Extreme bounds analysis (EBA) helped to identify the explanatory variables that are most robustly associated with fundraising and investment (as the explained variables). However, concerns might arise due to the choice of variables that may appear to be somewhat limited in final regressions. The reason for applying EBA first is, that effect of one explanatory variable on the amounts raised or invested within the narrow set may encompass the effects of other variables that did not pass the threshold and were excluded. Moreover, limiting the set of variables partially addresses the troublesome multicollinearity.

Using a panel data analysis, empirical models with fixed and random effects were built on a data set covering 20 European countries over the period 2007-2018 provided by Invest Europe. Using appropriate testing techniques, the most suitable models were selected while checking for any violations in the assumptions (e. g. the presence of homoskedasticity, absence of serial correlation) using robust standard errors.

The first three set of estimated models examined fundraising activity. Each model was specified with a different number of predictors for all types of funds, then specifically for venture capital and buy-out. The remaining three presented models focused on investment.

A set of explanatory variables was included for fundraising was different from that of investment. Divestment by write-off (normalised and lagged by one period) was preferred as an exit route robustly associated with newly raised funds. Evidence showed a negative relationship between write-off and fundraising with both statistically and economically significant coefficient. This is in line with theory, as write-off is considered to be an unsuccessful way of exit. On the contrary, EBA identified divestment by trade sale (normalised and lagged by one period) as robustly associated with investment. Our findings confirm the indicated negative relationship, while being statistically significant at 1% level for buy-outs and on the total level in the second proposed model without variables related to political and social environment. Although unemployment rate was validated as a negative and statistically significant determinant of investment, no such evidence was found for fundraising. Notwithstanding the fact, that results confirmed the same direction of impact with lower effect size on fundraising.

Our study documents a strong and positive relationship of tertiary education attainment with regard to fundraising. Persuading investors to commit their capital without having any track record (experience) is not an easy task, however, graduating from an academic institution seems to matter as an indicator for superior performance. This could be explained by their competitive advantage in sense of possessing a better equipped skill set (that universities often recognize in the admission phase) and consequent development in academic training.

Our findings confirmed positive impact of *DomCredit* across all types of funds (model 3). A larger share of bank credit obtained by privately held companies serves as an indicator of lower risk since bank institutions tend to be more cautious and risk averse. Moreover, the possibility of external financing leverages the returns primarily in leveraged buy-out deals, thus these favourable conditions attract investors' attention in private equity market.

As expected by literature (Gompers and Lerner, 1999; Félix et al., 2013), a positive and significant result of market capitalization on investment activity was confirmed.

For further research, as recent data as possible could be obtained to examine to what extent has the Covid-19 crisis impacted (and will impact). This is of interest due to the fact that this crisis was not of financial origin like the other crises. The coronavirus (Covid-19) pandemic has caused a global social and economic disruption, thus having a widespread and possibly deteriorating effect (not only) on private equity activity.

Bibliography

- Arellano, M. (1987). Computing robust standard errors for within-groups estimators. *Oxford Bulletin of Economics and Statistics*, 49(4):431–34.
- Balboa, M. and Martí, J. (2003). An integrative approach to the determinants of private equity fundraising. In *EFMA 2004 Basel Meetings Paper*.
- Bernoth, K. and Colavecchio, R. (2014). The macroeconomic determinants of private equity investment: a european comparison. *Applied Economics*, 46(11):1170–1183.
- Breusch, T. S. and Pagan, A. R. (1980). The lagrange multiplier test and its applications to model specification in econometrics. *The review of economic studies*, 47(1):239–253.
- Cherif, M. and Gazdar, K. (2011). What drives venture capital investments in europe? new results from a panel data analysis. *Journal of Applied Business and Economics*, 12(3):122–139.
- Chow, G. C. (1960). Tests of equality between sets of coefficients in two linear regressions. *Econometrica: Journal of the Econometric Society*, pages 591–605.
- EIB (2019). EIB Investment Report 2019/2020: accelerating Europe’s transformation. *European Investment Bank*, page 440.
- Félix, E. G. S., Pires, C. P., and Gulamhussen, M. A. (2013). The determinants of venture capital in europe –evidence across countries. *Journal of Financial Services Research*, 44(3):259–279.
- Fraser-Sampson, G. (2011). *Private equity as an asset class*. John Wiley & Sons.

- Gompers, P. A. and Lerner, J. (1999). What Drives Venture Capital Fundraising? Working Paper 6906, National Bureau of Economic Research.
- Gottschalg, O. (2007). Private equity and leveraged buyouts. *Study for the European Parliament*, 25.
- Greene, W. H. (2003). *Econometric analysis*. Pearson Education India.
- Hausman, J. A. (1978). Specification tests in econometrics. *Econometrica: Journal of the econometric society*, pages 1251–1271.
- Henchiri, B. (2016). The impact of the macroeconomic and institutional environment on lbo fundraising. *Global Journal of Management And Business Research*.
- Jeng, L. A. and Wells, P. C. (2000). The determinants of venture capital funding: Evidence across countries. *Journal of Corporate Finance*, 6(3):241–289.
- Kelly, R. (2012). Drivers of private equity investment activity: are buyout and venture investors really so different? *Venture Capital*, 14(4):309–330.
- Leamer, E. E. (1985). Sensitivity analyses would help. *The American Economic Review*, 75(3):308–313.
- Levine, R. and Renelt, D. (1992). A sensitivity analysis of cross-country growth regressions. *The American economic review*, pages 942–963.
- Martí, J. and Balboa, M. (2001). Determinants of private equity fundraising in western europe. *University Complutense of Madrid e University of Alicante*.
- Millo, G. (2014). Robust standard error estimators for panel models: a unifying approach.
- Newbold, P. and Granger, C. (1974). Spurious regressions in econometrics. *Journal of Econometrics*, 2(2):111–120.
- Precup, M. (2015). The future of private equity in europe - the determinants across countries. *Romanian Journal of European Affairs*, 15(4):72–92.
- Precup, M. (2017). Venture capital and leveraged buyout: What is the difference in eastern europe –a cross-country panel data analysis. *Romanian J. Eur. Aff.*, 17:30.

- Roberts, S. and Naydenova, E. (2019). Private equity trend report 2019. Technical report, PricewaterhouseCoopers.
- Sala-i Martin, X. (1997). I Just Ran Two Million Regressions. *American Economic Review*, 87(2):178–183.
- Sedláková, B. (2008). Development of private equity funds in the czech republic. *Diplomova prace, IES FSV UK, Prague.*
- van Pottelsberghe de la Potterie, B. and Romain, A. (2004). The Determinants of Venture Capital: Additional Evidence. Technical report, Frankfurt a. M.: Deutsche Bundesbank.
- Wooldridge, J. M. (2013). *Introductory Econometrics: A Modern Approach*. South Western, Cengage Learning.

Appendix A:

Additional Tables

Table A.1: Fundraising: Testing for an appropriate estimator

		OLS vs FE	OLS vs RE	RE vs FE
Model 1	Total	1.59E-17	1.47E-40	0.8395
	Total Venture	7.24E-10	4.54E-18	0.8253
	Buyout	2.25E-16	6.32E-37	0.8313
Model 2	Total	9.77E-10	7.64E-08	1.59E-26
	Total Venture	8.34E-04	0.0057	0.0676
	Buyout	2.41E-09	7.46E-07	3.77E-28
Model 3	Total	2.26E-12	1.47E-21	0.5101
	Total Venture	3.67E-05	6.09E-06	0.7046
	Buyout	2.37E-12	2.45E-21	0.4968

Source: Author's elaboration

Note: Coloured values indicate the rejected null hypothesis at the 5% significance level.

Table A.2: Investment: Testing for an appropriate estimator

		OLS vs FE	OLS vs RE	RE vs FE
Model 1	Total	4.61E-25	1.27E-60	0.2419
	Total Venture	1.66E-32	1.05E-86	0.6465
	Buyout	5.41E-20	7.48E-45	0.2866
Model 2	Total	4.09E-12	6.10E-18	1.55E-08
	Total Venture	1.22E-11	5.31E-20	0.7252
	Buyout	1.92E-10	2.58E-13	4.59E-12
Model 3	Total	2.38E-14	2.42E-10	0.0102
	Total Venture	1.71E-19	4.82E-16	6.91E-12
	Buyout	3.34E-11	1.05E-07	1.97E-43

Source: Author's elaboration

Note: Coloured values indicate the rejected the null hypothesis at the 5% significance level.

Table A.3: Fundraising: Testing for serial correlation (SC) and heteroskedasticity (HC)

		OLS SC	RE SC	FE SC	OLS HC	RE HC	FE HC
Model 1	Total	1.1E-10	1.2E-05	3.9E-07	0.3613	0.3613	0.3613
	Total Venture	3.7E-05	0.0101	0.0006	0.2049	0.2049	0.2049
	Buyout	1.8E-09	0.0001	2.2E-06	0.3554	0.3554	0.3554
Model 2	Total	0.0000	0.0029	0.0331	0.7849	0.7849	0.7849
	Total Venture	0.5465	0.4219	0.2334	0.2155	0.2155	0.2155
	Buyout	0.0005	0.0513	0.4543	0.7945	0.7945	0.7945
Model 3	Total	2.4E-07	2.1E-05	1.8E-06	0.0302	0.0302	0.0302
	Total Venture	0.0021	0.0011	9.1E-06	0.0340	0.0340	0.0340
	Buyout	1.2E-06	9.2E-05	9.2E-06	0.0301	0.0301	0.0301

Source: Author's elaboration

Note: Coloured values indicate the rejected null hypothesis at the 5% significance level.

Table A.4: Investment: Testing for serial correlation (SC) and heteroskedasticity (HC)

		OLS SC	RE SC	FE SC	OLS HC	RE HC	FE HC
Model 1	Total	7.19144E-23	6.83E-13	1.2E-11	0.2022	0.2022	0.2022
	Total Venture	1.79809E-17	3.89E-06	7.46E-07	0.0109	0.0109	0.0109
	Buyout	6.01958E-19	3.67E-11	1.13E-10	0.1882	0.1882	0.1882
Model 2	Total	1.0495E-10	1.33E-09	7.8E-05	0.0009	0.0009	0.0009
	Total Venture	3.81783E-08	0.0127	0.0242	0.2290	0.2290	0.2290
	Buyout	3.37544E-10	7.05E-10	2.8E-05	0.0001	0.0001	0.0001
Model 3	Total	1.45427E-12	5.01E-12	4.96E-08	0.0141	0.0141	0.0141
	Total Venture	3.35091E-11	2.44E-05	3.81E-05	0.0529	0.0529	0.0529
	Buyout	3.23357E-11	6.5E-11	3.69E-08	0.0054	0.0054	0.0054

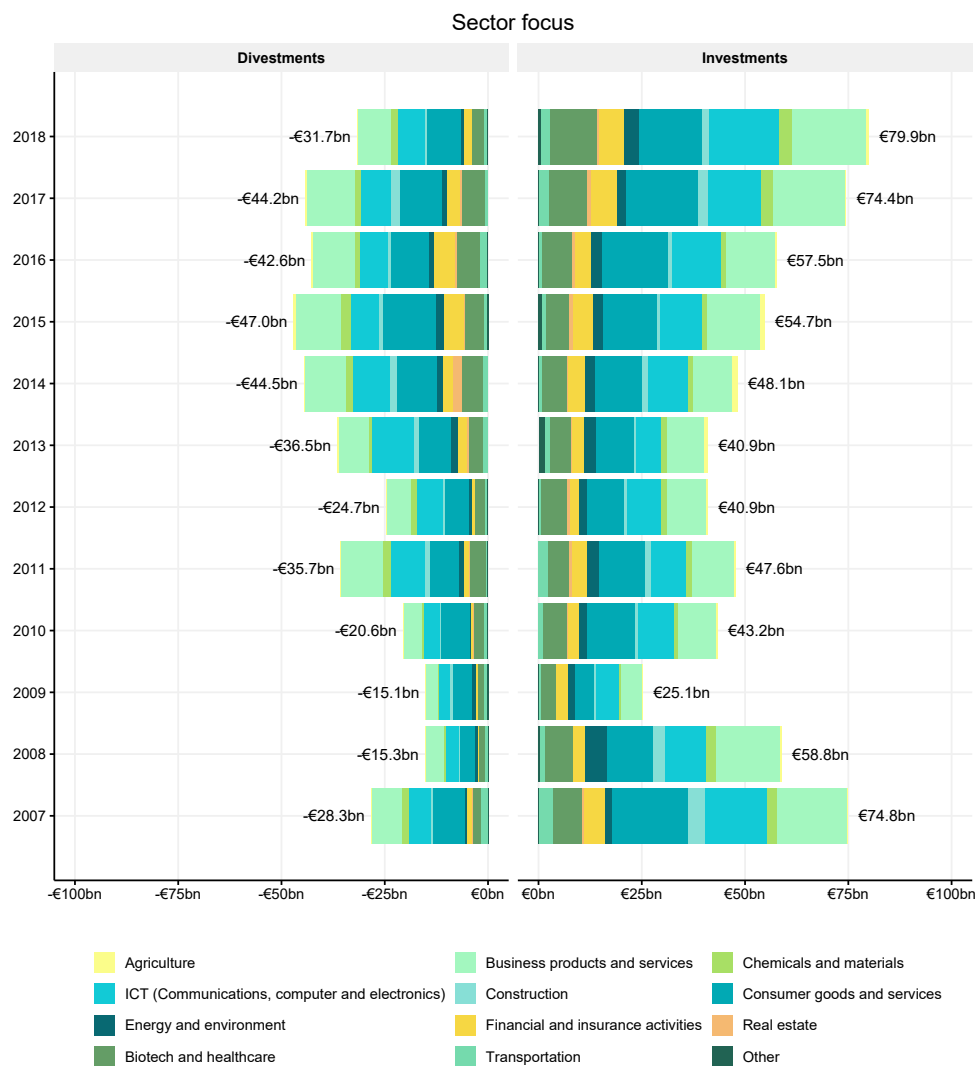
Source: Author's elaboration

Note: Coloured values indicate the rejected null hypothesis at the 5% significance level.

Appendix B:

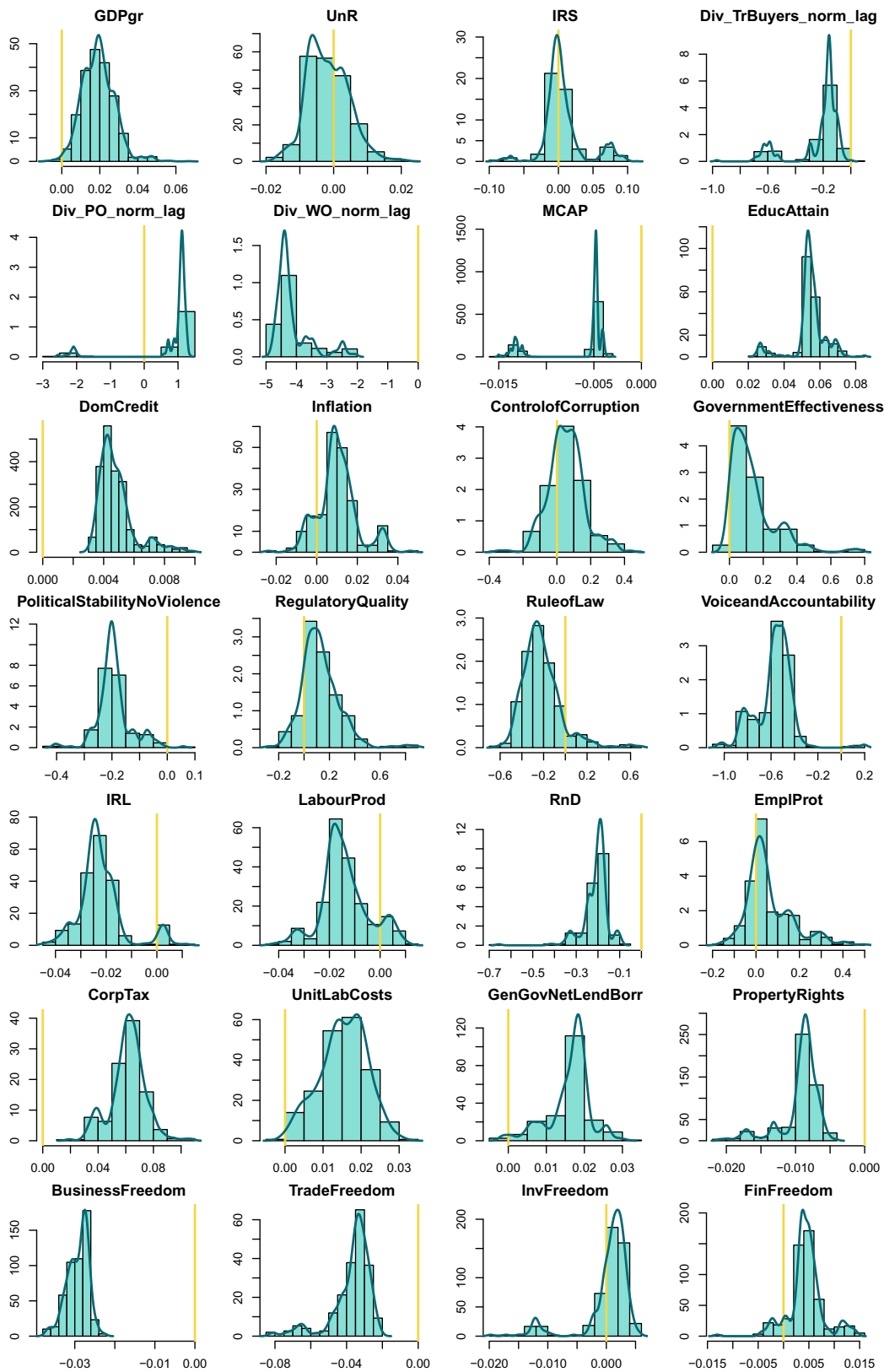
Additional Figures

Figure B.1: Divestment and investment by sectors



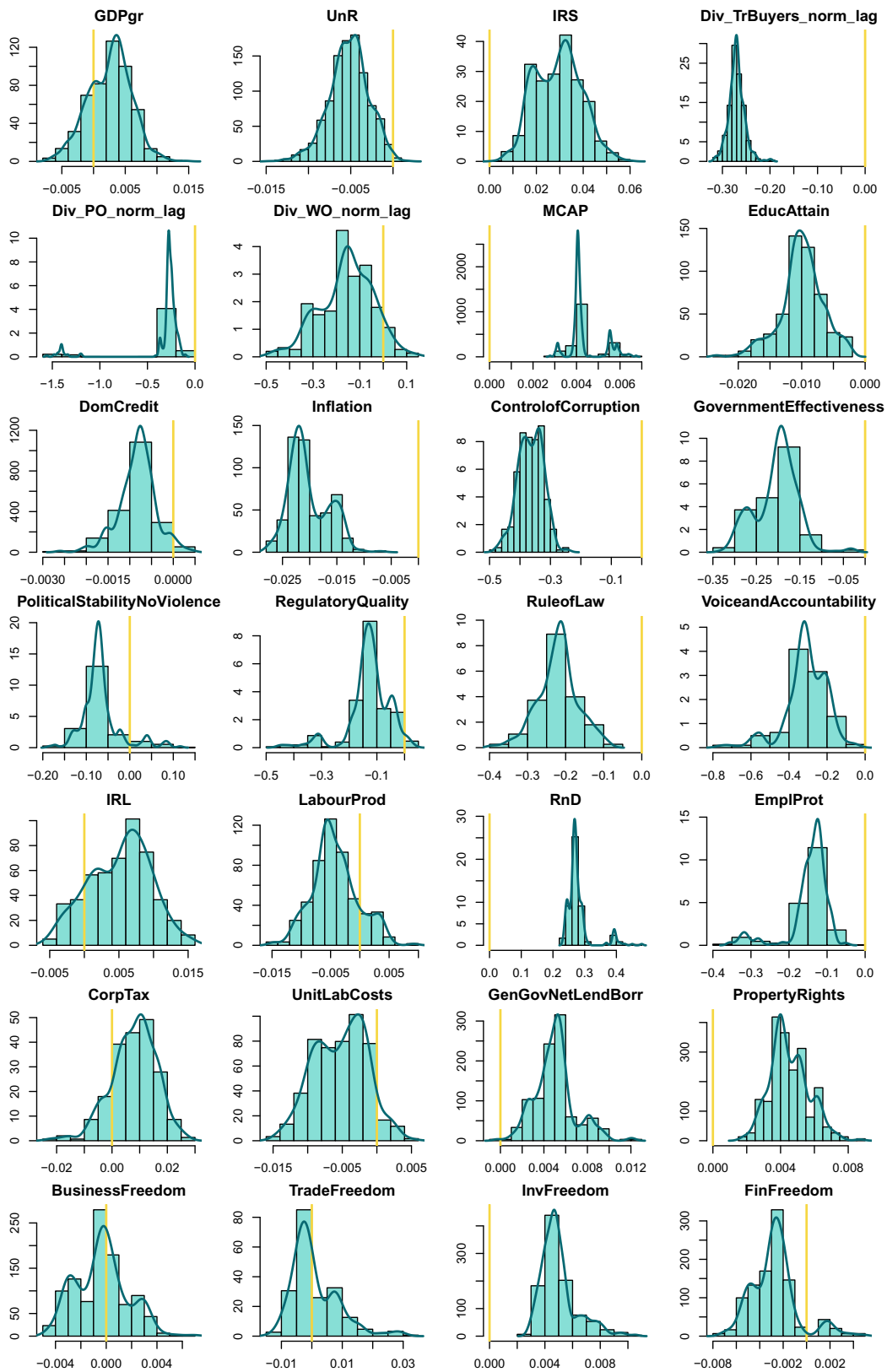
Source: Author's elaboration, based on the data provided by Invest Europe

Figure B.2: Histograms for fundraising



Source: Author's elaboration

Figure B.3: Histograms for investment



Source: Author's elaboration