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The Role of Innovation and Foreign Capital in Venture Capital Backed Investments – Empirical Evidence from Finland

Empirical Evidence from Finland

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ABSTRACT:

Venture capital (VC) has a significant impact for economic growth by acting as financial intermediate and provide funding to early-stage and innovative entrepreneurial firms. It is characteristics for the VC investments that they are including relatively high risks, and usually one or two of the portfolio companies are the ones making homerun for the whole fund. Due to small size of the target companies, it requires phenomenal growth up to billion dollar valuation for making the VC fund able to return the funds to its investors. That unique characteristic is the reason why VCs are mainly screening scalable and high-tech businesses, having ability to penetrate or even create new market segments. Academic literature has debated intensively about venture capital (VC) funds' capability to generate significantly high returns. In historical period VC have been able to overperform the market constantly basis. Yet most of the literature have focused the VC value creation activities and their impact of the target firm operative performance.

The purpose of this thesis is to examine value creation of venture capital investments in Finnish VC-backed transactions. Specifically, value creation is measured based on post-investment firm performance from two point of views, (1) what is the role of innovation intensity and (2) foreign capital involvement in relation to improvement of financial performance of target companies over the investment period.

This thesis utilizes the latest evidence from Finnish VC investments, and the data sample comprises 117 VC-backed Finnish firms, that have performed exits between the years 2005 and 2020. The evidence of value creation is hand collected from target companies' financial statements post-investment. The empirical analysis consists of logistic regressions.

The results show that an increase in innovation intensity has an increasing impact on the firm value measured in sales growth and enterprise value. However, the results indicate that VCs tend to invest in already innovative firms rather than accelerating the innovation intensity. In addition, relating to foreign VC involvement in the deal, results show that foreign VC involvement has been a significant impact on the increase in targets' financial performance. However, in comparison to prior academic literature, we could not find that target's development stages have an impact for the slope of financial performance improvement.

KEYWORDS: (Venture capital, private equity, early-stage investments, value creation, operative performance).

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1 Introduction

The global venture capital (VC) market has been growing significantly during the last decades, and the trend seems to continue, as the market recorded new all-time highs in terms of annual raised capital and deal count. The global fundraising exceeds 200 billion US dollar milestone in 2021. In addition, the industry has also been relative immune to global COVID19-pandemic compared to stock market, which suffered a steep albeit temporary decrease in capital inflows. VC in Europe ja Nordics have followed the global trend, leading in record braking year in 2021 as well. (KPMG, 2022)

Venture capital industry have been notorious about growing firm values extremely rapidly, and especially their capability to find and grow portfolio companies, which values exceeds a billion US dollar valuation referred as unicorns. The academics and commercial world have been trying to figure out the recipe, what is behind significantly higher returns that the VC market have been able to deliver. Therefore, especially academics have debated what are the value creation activities that venture capitalists (VCs) bring in to table, and what is their effect on the firm performance. Before diving into value creation methodology, we are going to define how the industry has evolved and what is its contribution to economy.

Modern venture capital has born in 1946 in US, when Professor Georges Doriot from Harvard established the first VC firm referred as American Research and Development Company (ARDC) together with Karl Compton, Merrill Griswold and Ralph Flanders. ARDC was established in order to raise funds from college endowments and wealthy individuals and in invest them to US start-up focused technology-based manufacturing. However, the maturation of the market has not been straight forward process. Prior the 1980s, VC investors were mostly publicly funded companies referred as Small Business Investment Companies (SBICSs). SBICs acted as a trendsetter by helping the industry to gain critical mass of investments, which were directed to start-ups. However, SBICs suffered about bureaucratical limitations and lack of professional hands-on experience, as well as they had difficulties with defective capital structure and incentives. According to

Lerner (1999), SBICs track record was mixed, leading steep fall in investor confidence, thus committed funds. However, in late 1980s pension funds were allowed to invest in VC, which had remarkable contribution in fund count increase and evolvement of professionalization in the industry. All the way to 2000th century, VC has gained crucial and permanent role as financial intermediation for innovative entrepreneurial start-ups operating in for instance information technology (IT), biotechnology and e-commerce industries. There is a long list of fortune 500 companies that have received VC funding in their early stages such as Apple, Amazon, Cisco, Intel, Microsoft, FedEx and Starbucks. (Bottazzi & Da Rin, 2002).

VCs funding have a significant role for economic growth and contribution to national level competitiveness through financing of innovative entrepreneurial firms. It is widely accepted among economists, business leaders and policymakers that venture capital industry is one of the main contributor of US leadership in commercialization and technological innovation. (Bottazzi & Da Rin, 2002.) However, European VC industry has been relatively underperformer in terms of reproducing such growth due to legislation obstacles. For instance, national level regulators have controlled insurance companies and pension funds' involvement in risk capital market before European Commission introduced directives to prohibit such national level actions between 2002 and 2003. (Popov, Roosenboom, Ichino & Schivardi, 2012.)

Typically, Continental European bank-based system compared to market-driven system in US and UK have seen less capable of financing innovation and pursuing commercial breakthroughs (Carlin & Mayer, 2002; Herrera & Minetti, 2007). It has direct contribution why policymakers tend to perceive VC having better fit for financing innovations rather than banks. Another reason for a such phenomenon is that VC is associated with high risks, as investing in maturing technologies relate to high uncertainty of success. Therefore, VCs have higher incentives to maximize their portfolio companies' value, as they provide equity investment, thus they are sharing the proceeds and covering losses with

the targets. On contrary, banks are acting as lenders, which leads to carrying a share only in the losses. (Kaplan & Strömberg, 2001.)

1.1 Purpose of the thesis

The impact of venture capital involvement to create firm value in their target companies have been extensively studied among academics. Majority of literature focus on comparing VC-backed firms to non-VC backed firms in terms of economic performance. Moreover, the value creation ability and activities contribution to firm performance have been hot topic among academics.

This thesis contributes to academic literature by measuring the VC post-investment value creation by utilizing unique data set based on actual investment periods. In comparison to previous studies, the most common approach has been sampling post-investment activities based on the average holding period suggested by consensus of academics. In addition, the value creation among academics has been based on evaluating the effects on sales growth, but we are utilizing enterprise value growth as a proxy for firm value creation in addition to sales growth.

There are several research questions that this thesis is aiming to have answer to. In general, the purpose of venture capital investor is to maximize their portfolio companies operative and financial performance. In order to maximize the value add, they typically take active role in target companies by sharing their knowledge, resources, networks and for instance sitting in the board of directors. Typically venture capital investors are experienced prior at least senior level industry professional or they might have prior experience from entrepreneurship. Therefore they have leverage to help and advice young entrepreneurial firms that are usually relative early-stage start-ups. Characteristics for a such start-ups are that they are trying to pursue innovation in order to achieve commercialized successful products. Therefore, the first research question is whether the increase in innovation intensity leads increase in firm performance post venture capital

investment. Secondly we are aiming to have answer whether venture capitalists are increasing the innovation intensity rather than investing already innovative companies. These questions are a base for the first hypothesis:

H_0: Increase in innovation intensity decrease financial performance of the target company
H_1: Increase in innovation intensity increase financial performance of the target company

Lastly, foreign VC investments has become more common during the last few decades. Traditionally VC investing has been regional and focused on domestic markets. Extant academic literature suggests that foreign VCs are able to contribute for their targets' internationalization, thus increase the sales growth especially in the long term (see e.g. Lockett, Wright, Burrows & Patton, 2008; Devigne, Vancker, Manigart & Paeleman, 2013). However, prior studies have mixed evidence of the foreign VCs involvement impact on the company performance. Therefore our second hypothesis is motivated to examine what is such impact in our sample:

H_0: Involvement of foreign VCs decrease financial performance of the target company
H_1: Involvement of foreign VCs increase financial performance of the target company

1.2 Structure of the thesis

This thesis is divided into five main chapters excluding introduction and conclusion. The first chapter focuses on defining and introducing the venture capital industry. In other words, the main characteristics, terminology and processes related to the industry. Therefore, following questions are going to be answered to; what is venture capital financing, what are VC funds and their main stakeholders and how they operate, as well as short description of Finnish VC market is covered.

The determinants of VC value creation are presented in the second main chapter. The chapter focuses on identifying comprehensively what are the VCs' post investment value

adding activities and sources addressed in extant academic literature. This chapter is divided into four different parts according to Luukkonen, Deschryvere and Bertoni's (2013) classification of typical VC value creation activities.

The third main chapter focuses on the evidence of VC returns and value creation capabilities addressed in extant academic literature. This part of the study has been divided into three sections. The first section presents the major evidence of how VC-backed firms are performing in comparison to stock market and non-VC-backed firms in terms of returns and operative performance. The second part focuses on corporate governance and innovative impact on the company performance. While the last part focuses on comparing different fund types and their value creation capabilities.

Data and methodology used in the empirical analysis of this thesis is presented in the fourth chapter. This chapter is divided into three different sections, starting from defining the data collection process and procedures. Then variables that are used in empirical models are going to be defined. Lastly descriptive statistics for the data sample is presented.

In the fifth and last main chapter, the results of empirical analysis in respect to research questions are going to be presented. The chapter is divided in to three parts, where the first part focuses on identifying factors affecting the VC-backed companies' financial performance in general. In turn second part focuses on innovation intensity impact on the VC-backed firm value creation, while second part foreign VC involvement impact. After this, major findings are going to be concluded in the conclusion.

2 Private equity and venture capital

This chapter defines the concepts of private equity and venture capital in general, as well as key terminology and characteristics relating to VC industry.

2.1 Definition and characteristics of venture capital

In a broad definition, private equity (PE) refers to medium to long-term financing for growing privately held companies in exchange for equity stake. PE is typically categorized as alternative investments, meaning they are complementary for publicly listed bonds and stocks used by traditional investors. (EVCA, 2007) Metric and Yasuda (2011a, p. 3) sums up PE industry's five main characteristics as follows:

1. Private equity is rising funds from investors and invest them directly in portfolio companies
2. Private equity invests only in privately held companies, hence portfolio companies are not publicly listed and cannot be traded after investment.
3. Private equity plays active role in portfolio companies, such as helping and monitoring them.
4. Private equity is maximizing its returns in companies through sale or initial public offering (IPO).
5. Private equity invests to fund internal growth of companies.

In academic literature, PE can be divided into four main subclasses, which are (1) venture capital (2) mezzanine, (3) buyout and (4) distress, which of VC and BO are the most important subclasses. (Metric & Yasuda, 2011a) Traditionally, the major difference between venture capital (VC) and buyout (BO) relates to investment stage and acquired ownership (EVCA, 2007). VC refers investments in early-stage companies, and VC investors usually takes minority ownership in a target company (Invest Europe, 2016). VCs are seeking extremely rapid growth in target companies, therefore they are focusing on investing in smaller but scalable business models which owns realistic potential to grow enough to

be large company within approximately five years. (Metric & Yasuda 2011a, p. 6) According to Kortum and Lerner (2000), VCs have typically eyes on the high-technology companies or other highly growing sectors, such as information technology, clean energy and life science. Highly growing companies operating in either of those industries have potential to penetrate or even provoke large markets (Metric & Yasuda, 2011, p. 6). Therefore, VC backed businesses can be heavily unprofitable during the investment period.

BOs refers more mature stage investments into usually profitable companies, which owns more stable growth potential. BO investors aims to take over the control of a company, in other words, it acquires majority equity stake of a portfolio company and partners with the management team. (Invest Europe, 2016) In turn Mezzanine typically overlaps characteristics from both VC and BO. Such investments comprise from two parts, growth equity (later-stage VC) and buyout relating to subordinate debt layer (equity ownership). Lastly, distressed investing refers to investing in mature and distressed target companies, hence in some occasion referred as specialized part of buyouts. (Metric & Yasuda 2011b)

Depending on the geographics, academic literature might use PE related terms in conflicting contexts. Especially in Europe, VC typically covers all investment stages, and it is used as a synonym for PE. However, in USA, VC covers only early-stage investments. (EVCA, 2007) In order to avoid confusion, this thesis is focusing on VC investments from early-stage and minority investments point of view.

2.2 Venture capital fund characteristics

As covered in section 2.1, VC investing covers the less mature part financing stages. Most VC firms are specialized in a specific type of funds based on for instance stage, geographic or industry. Regarding the stage of portfolio companies, funds are usually specialized as early- or late-stage or mixing the two strategies, referred as multistage. Metric and Yasuda (2011a, p. 15-16) divides stages of growth funding for VCs into four different categories as follows:

1. Seed/Start-up stage
2. Early stage
3. Expansion/Mid stage
4. Later stage

First and smallest stage in terms of invested capital (seed/start-up stage) provides funding for entrepreneur(s) to prove a concept. In other words, product or services are in pre-marketing phase, meaning activities such as business plan development, product development and market research are reasons to raise capital for. In turn second stage (early stage) provides funding for companies that are in piloting phase or just have launched product to markets. Therefore, VC's networking capabilities acts in a crucial role. Typically, such companies have been running business for no longer than three years. This stage is also usually the first one when institutional VC funds are involved. (Metric & Yasuda, 2011a, p. 15)

In third stage (expansion stage), growth starts to accelerate. Therefore, it requires investments into working capital, as production is ramping up and inventories as well as accounts receivables are growing. Typically, business may not show profitable, and capital is raised to scale up the business further, as well as activities such as marketing and development of product or services are burning funds. In terms of VC's involvement, their role turns from supportive to strategic. In forth and last stage (later stage), company have reached more steady state in terms of growth. Therefore, likelihood of showing profit increases and cash flow turns somewhat positive. This stage might be ideal to consider at least partial exit for instance through initial public offering (IPO). (Metric & Yasuda, 2011a, p. 15-16) Listing might be the channel to secure steady growth if VC does not see a potential to accelerate the growth pace further.

In terms of raising capital, individual financing event is referred as a round, and typically rounds are labelled in alphabetical order, so that Series A is the first, then series B and up to series D. Typically each financing round takes place when prearranged milestone

have reached. Regarding the four growth stages, amount of rounds per stage varies across the investments, so that there are not VC industry fixed terms. Due to the cost of financing rounds, and rounds are relative expensive and time consuming to execute, therefore both parties, VC fund and portfolio company prefers not to raise capital very often. (Metric & Yasuda, 2011a, p. 16)

2.3 Venture capital fund structure and stakeholders

It is crucial to understand the business model of VCs as the funds are not operating as traditional mutual funds. The fund structure typically appears to be similar for all PE sub-types presented in section 2.1.

Venture capital firms are investing in portfolio companies through vehicles called funds. VC funds are constructed around the two key roles, general partner (GP) and limited partners (LPs). GP is the one representing the VC firm, meaning that they are raising the capital, making the investment decisions, providing value-adding services and finally executing exit, as well as distributing the exit proceeds to LPs. As a compensation of their input GP is charging management fee from a fund and potentially receives performance-based proceeds referred as carried interests. LPs are usually institutional investors such as pension funds, financial institutions and corporates or individual wealthy persons, meaning that LPs are the ones investing majority of capital in the fund. Capital invested by LPs over the lifetime of a fund is referred as committed capital. Typically, LPs are caring up to 99 percentages of committed capital, as the rest is provided by GP. (Da Rin, Hellman & Puri, 2011; Metrick & Yasuda, 2011b) Figure 1 identifies relationships of all fund stakeholders.

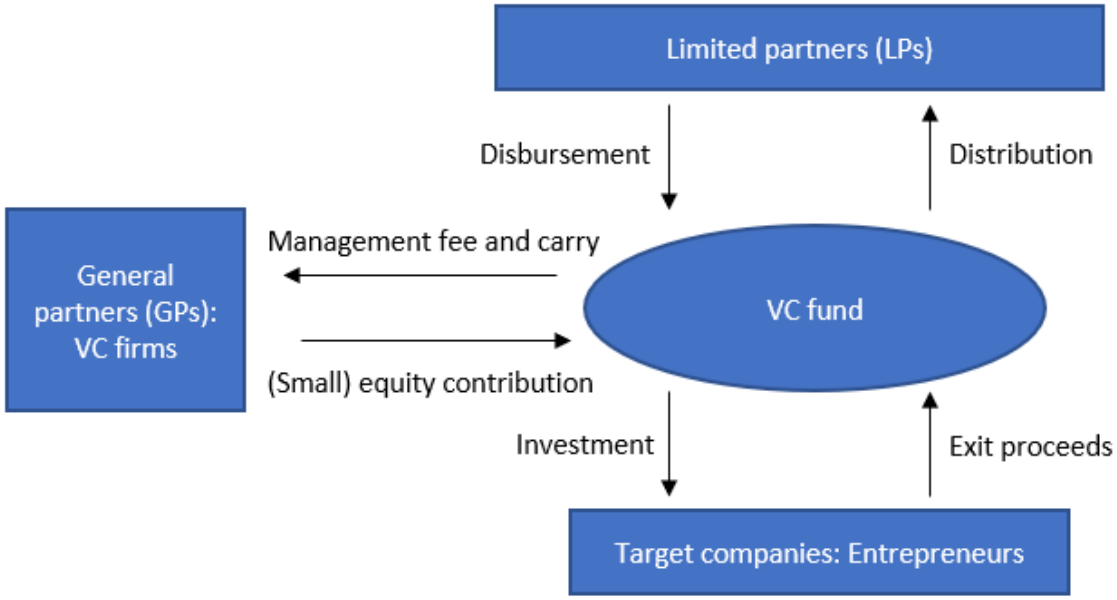

Figure 1. Venture capital fund structure (Da Rin, Hellman & Puri 2011).

VC funds are investing in long-term horizon, meaning LPs have to wait for many years before receiving return on invested capital. However, GP is receiving annual management fee covering the fixed costs of running a fund over its lifetime such as salaries and office cost. Typically, the management fee is around two percentages of committed capital per annum. (Metrick & Yasuda, 2011a, p. 30)

Traditionally, the main differences between all PE fund types compared to mutual and hedge funds relate to characteristics presented in table 1. PE is traditionally referred as investing in illiquid and private companies. PE funds are required to return the capital raised to investors in limited time period typically up to 10 years, and therefore their focus is on clear path to exit in their target companies. In comparison, hedge and mutual funds do not have limitations if fund lifetime. In addition, PE funds are not open-ended. Due to illiquidity and long-term investment horizon, PE funds are not permitting reinvestments or those are restricted to modest fraction of the total fund size. In terms of fees, PE funds are collecting higher fees younger the fund, and typically fees are declining when fund matures, due to fund managers are expecting new fee streams from follow-

on funds. In comparison, hedge and mutual funds have fixed fee, as the total fees would rise in hand with asset value growth. (Metric & Yasuda, 2011b)

Table 1. PE fund differences to hedge and mutual funds (Metrick & Yasuda, 2011b).

	PE funds	**Hedge funds**	**Mutual funds**
Open-end	No	Yes	Varies
Finite life	Yes	No	No
Liquidity	Illiquidity for up to 10 years	Varies, e.g. 1 year lockup and 3 months wait period for withdrawals	Minimal lockup and redemption restrictions
Reinvestments	No	Yes	Yes
Annual fees	Effective % often varies over lifetime	Fixed % of asset under management	Fixed % of asset under management
Performance fees	(usually) 20% of realized profit, payable only after investment exits and return of capital to investors	(usually) 20% of annual implied profit, payable as long as market value exceeds costs ("high watermarks")	Usually none

2.4 VC fund types

Typically VC funds can be divided into three different categories based on the VC firm ownership, which are (1) independent VC, (2) government VC and (3) corporate VC.

The most typical VC firm type is referred as independent VC (IVC). It consists of small group of individuals, which are employing around ten professionals. Typically, IVCs employees highly educated people holding at least senior level career status, and the organization are typically top-heavy, meaning that the organization structures are substantially low. The top level is referred as partner, or in some occasions managing partner or

senior partners. The lower ranks include professionals such as principals, senior associates, associates and analysts. It is also common that at least the partners have prior start-up or entrepreneurial experience. (Metric & Yasuda, 2011, p. 25-26)

GVCs are government backed firms that are subjective to pursue specific objectives. Typically GVCs objectives relates to for instance filling a funding caps in early-stage investments, supporting development of a young industry or regional development in terms of job creation. Especially in Europe, the establishment of GVC funds have become increasingly common during the 2000th century. (Luukkonen et al., 2013)

Third type is referred as corporate VC (CVC). CVCs are typically corporate backed funds, which have been established in order to acquire external research and development (R&D) activities, as well as expand their portfolio with new technologies. In addition, such investments are way to expose the management to entrepreneurial way of thinking. CVCs have significant role on funding riskier and younger firms holding pioneering technology, and such companies would not have ability grow without CVCs. (Chemmanur, Loutskina & Tian, 2014)

Another typical form of VC investing is syndicate investments, hereafter referred as syndications. Syndicate means investment made by two or more VCs into a target company. Typically co-investing parties are either multiple IVCs or IVCs and GVCs. The advantages of syndications relate to extensive expertise, diversification and risk management. Co-investing enables sharing of heterogenous skills, networks, industry knowledge and information. For instance some VC firms are expert in screening while others have better networks. From diversification point of view, syndicates enable investing in variety of companies in terms of development stage and firm size. Moreover, co-investing enables investing in higher risk firms, as there are several parties providing the resources and covering risks. (Tian, 2012) Typically the power of syndication lies on sharing risks and portfolio diversification rather than having access to intangible resources or deal flow, which are practices that are more crucial to younger VC firms. (Lerner, 1994)

2.5 VC funding sources

Regarding the capital sources, VC funds can be divided into three categories, which are (1) independent, (2) captive and (3) semi-captive. Independent funds (IVC) are raising the capital from third parties (LPs), and the fund is managed by the GP. Typically the ownerships have divided somewhat equally, so that no one of the shareholders have majority of shares. In turn for captive funds, a single shareholder contributes most of the capital, and they can be subsidiaries or departments of a larger entities. Therefore the primary capital source for the fund is the parent company. For instance, most of the CVC, financial institutions and insurance companies falls under this category. Lastly in semi-captive funds, majority of the capital is contributed by one shareholder, although a significant share is raised from third parties. Typically some of the financial institutions, insurance companies and minority of CVC falls under this category. In terms of GVC, the capital source might be mainly or totally from the public sector, and therefore such funds are either captive or semi-captive. (EVCA, 2007)

2.6 VC investment process

In academic literature, VC investment process can be divided into five different phases, which are presented in figure 2.

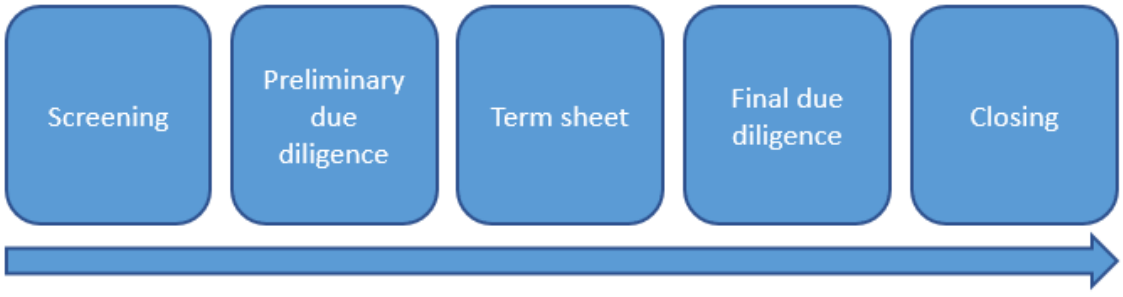

Figure 2. VC investment process (Metric & Yasuda, 2011, p. 136).

The process starts with screening, where hundreds of possible target companies are screened. Vast minority of targets will be qualified for greater attention (Metric & Yasuda, 2011, p. 9) According to Dotzler (2001) it is crucial that venture capitalist have access to a stream of business opportunities referred as deal flow. Therefore networks and visibility within the industry, and perhaps prior entrepreneurial experience are the key capabilities having access to deal flow. For instance VCs might have networked with co-workers or other professionals from prior employments, or otherwise have contacts within a specific industry to utilize. In terms of visibility, venture capitalist might have gained recognition as a spokesperson or through activism within they industry, such as through publishments and speeches. Such capabilities are likely to increase the probability to be approached by early-stage investors or entrepreneurs. According to Metric and Yasuda (2011a, p. 137) more reputable VCs have better access to deal flow and less they have to work getting into it. In terms of screening, venture capitalists are evaluating whether there is demand for target company's products under development and business plan in general. In other words, following questions are aimed to have answer for; the size of the market, sales growth potential, what is the potential rate to penetrate the market for new products and are the products competitive to competitors that already exist in the market. Furthermore, the focus is on more detail product level potential, such as sales and distribution channels, as well as sales prices and margins. From the strategy point of view, it is crucial to evaluate whether target company is implementing viable strategy in order to create a company with significant value. Moreover, it is crucial to analyse the parameters and key performance indicators used by the target to prepare sales and earnings forecasts. Lastly venture capitalist are evaluating the capabilities of the management team. Typically VCs are evaluating whether the management have a track record of success, do they have both relevant functional and industry experience, capability for people leading and organize resources, as well as individual level qualities such as motivation, ethics and reliability. (Dotzler, 2001)

The next phase for targets that passes the screening is preliminary due diligence. As the purpose of screening phase is to identify opportunities that matches the market and

management test, the preliminary due diligence is about management interviews and identifying factors that could cause issues. The amount of steps in this stages varies across the VCs, and also varies which steps belongs to the preliminary and final due diligence. (Metric & Yuasuda, 2011a, p. 140) Therefore the due diligence process as a whole is determined later in this section.

Targets that pass the preliminary due diligence phase are approached by the preliminary offer referred as a term sheet from venture capitalist. The term sheet comprises for instance proposed valuation and control rights for the venture capitalist, as well as security structure. Term sheet is perceived as a basis for negotiations. (Metric & Yasuda, 2011a, p. 146)

If the term sheet is accepted by the target, the process proceeds to next phase, final due diligence. (Dotzler, 2001) The due diligence in general is an extensive process where every aspect of the company is analyzed. (Metric & Yasuda, 2011, p. 140) De Cleyn and Braet (2007) have divided the process into four steps: (1) the non-confidential part (2) the first confidential part (3) the second confidential part (4) the finalization. The first part comprises analysis of non-confidential information of business that are publicly available provided by the target company. The second part comprise analysis of target's actual status and historical facts. Typically this step includes signing of the non-disclosure agreement (NDA), which is legally binding contract about treatment of confidential business specific information such as trade secrets. The third part of the process it the most important. It comprises complete data transfer of required scope items in transaction referred as White book from the target. Typically White book comprise items presented in figure 3. (De Cleyn et al., 2007)

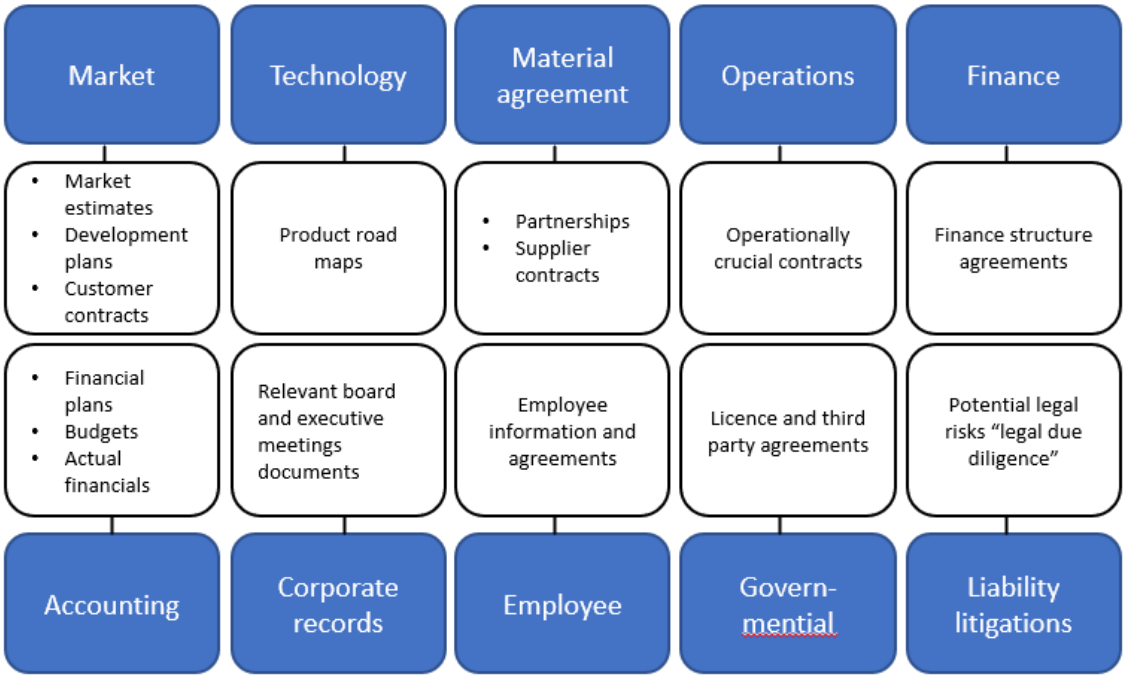

Figure 3. White book content (De Cleyn et al., 2007).

If previous steps have led into a positive outcome, the fourth stage is about establishing the final contract and agreeing the closing date. At this stage neither VC or the target are not able to withdraw from the deal without sanctions.

The due diligence process is extremely time intensive, and time spent to the process varies in the academic literature. Gompers, Gornall and Kaplan (2020) have found that average due diligence lasts 81 hours for early-stage VC firms, while Cumming and Zambelli (2017) have found that such process might require up to six months. In turn Gompers et al. (2020) have found that on average five out of hundred screened target companies proceeds to the due diligence phase, and due diligence requires on average 50% of the VCs time on weekly basis.

2.7 Venture capital in Finland

Finnish start-up companies have raised in total 743 million Euros worth of VC investments in 2021, which of 190 million came from domestic investors and 553 million from

foreign. In turn Finnish VC funds have raised 268 million Euros of new capital during the year, which is the third highest amount historically. The count of deals in Finnish target companies have been in upward trend mainly driven by foreign investments, being 743 sealed deals in total in 2021 as figure 4 shows. (FVCA, 2021)

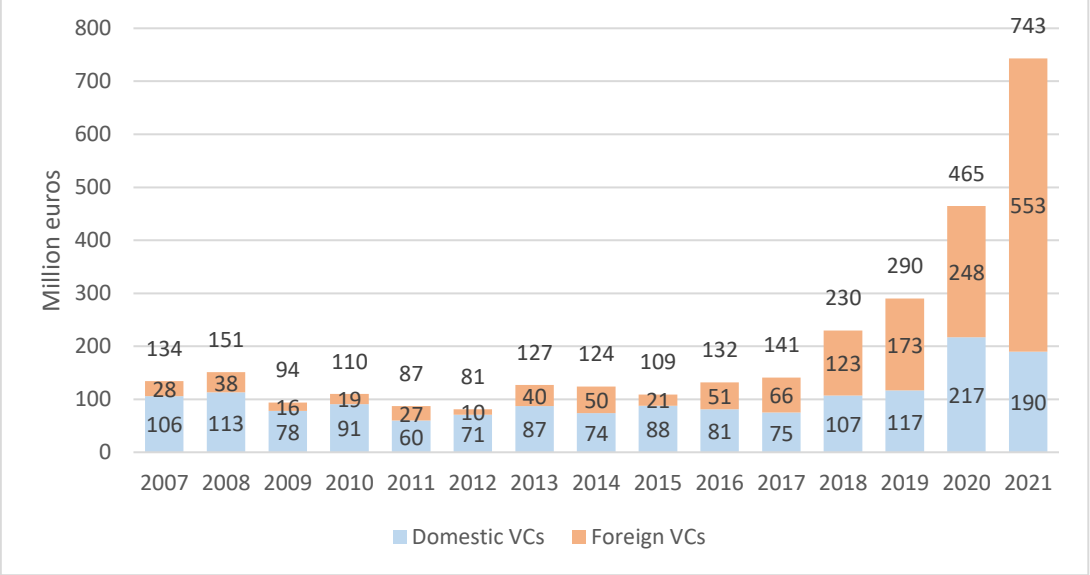

Figure 4. The amount of VC deals in Finnish target companies between years 2007 and 2021 (FVCA, 2021).

In terms of size, the median size for the Finnish VC fund has been 43 million euros and average 54 million in 2021. Furthermore, the average size of Finnish VC investments has been in upward trend as well. The average deal size in 2021 has been 0.5 million euros for seed stage, 1.2 million for start-up or expansion stage and 3.4 million for later stage VC. In turn the average investment period has been raging between 4.6 and 7.5 years between 2007 and 2021, being 5.6 years in 2021. (FVCA, 2021)

The sources of funding in 2021 is presented in figure 5. The three major sources have been public sector (GVC), pension funds and family offices. (FVCA, 2021)

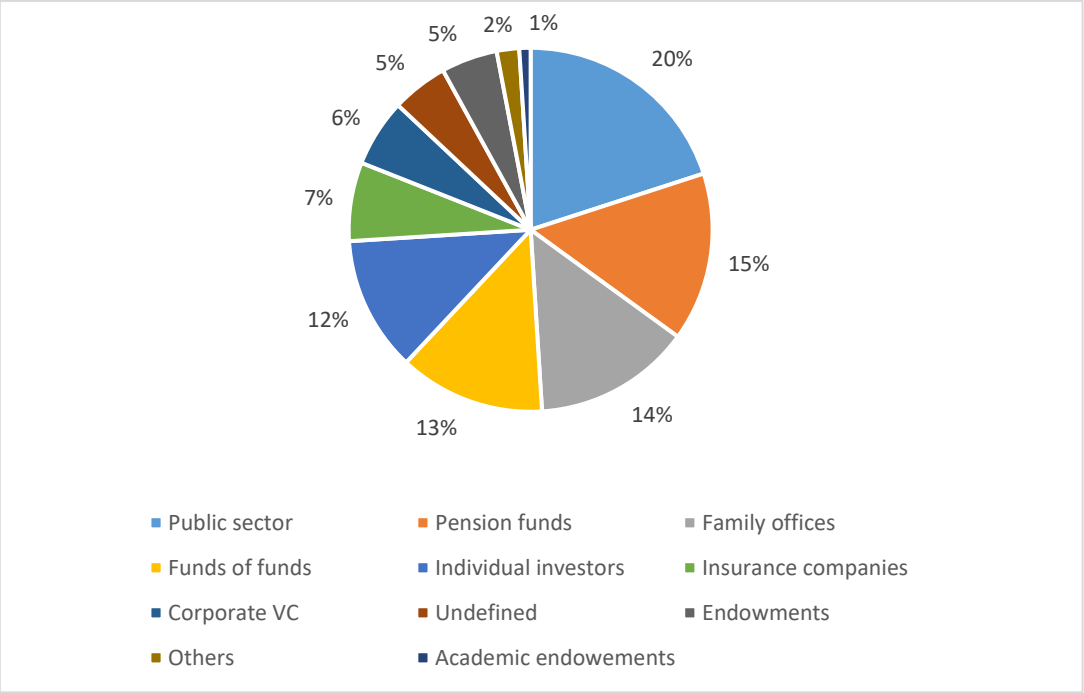

Figure 5. Sources of VC funding in Finland 2021 (FVCA, 2021).

3 Determinants of value creation in VC

According to Keuschingg (2004) “One of the key propositions of the empirical literature is that VC adds value to young firms, making them growing faster and larger, and making them less vulnerable to business failure.” In academic literature, the post-investment value adding activities have been classified in couple of different ways. Da Rin et al. (2011) have divided such activities into value-adding services and control activities. Division between the two is that value adding activities are likely to benefit both, the company and founder(s), while control activities are likely to benefit the company, but it occurs at the cost of founder(s). Da Rin et al. (2011) and Metric and Yasuda (2011b) have divided the post-investment activities into two categories; (1) monitoring and governance activities and (2) exiting activities. In turn Luukkonen et al. (2013) have identified eight different categories for value creation; technology position, market position, professionalization, financial function, quality and internationalization and exit orientation.

Furthermore, it is widely supported that VCs are actively participating in value creation in their target companies, but the amount of time and level of activism is also debated in academic literature. According to Metric and Yasuda (2011b), funds less than five years old requires more of the VCs’ time and efforts. While Sapienza et al. (1994) argues that VCs are spending more time on early-stage rather than later-stage target companies. On contrary over five years old funds are in the growth and harvesting stage, meaning VC’s working hours is mainly spent on monitoring, value-adding activities, providing follow-on funding and lastly prepare targets for the exit. (Metric & Yasuda, 2011b) Bottazzi et al. (2008) have found that more business experienced VCs tend to be more actively involved value creation, and such VCs tend to pursue interaction more frequently with their targets. Moreover, some studies suggests that European VCs tend to be less active compared to US equivalents in terms of monitoring their targets. (Sapienza et al. 1996; Bottazzi et al. 2008)

According to Proksch, Stranz, Röhr, Ernst, Pinkwart and Schefczyk (2017), the spectrum of VC value-adding activities is both complex and substantially diverse, leading they are

highly dependent on the target companies' context. Therefore, the most common value creation activities addressed in academic literature are determined in the following sections based on Luukkonen's et. al (2013) classification.

3.1 Strategy and technology position

In terms of strategy and technology position, VCs are providing help in activities such as creation of business plan, strategic focus, as well as research and development (R&D) function and technology development (Luukkonen et al., 2013). According to Higashide and Birey (2002), VCs have differing opinions about target management's strategy and innovation activities, and such conflicts might lead to corrective actions.

Akerlof (1970) have developed an information asymmetry theory referred as lemons problem. According to theory, financing of innovative companies tend to lead information asymmetry, meaning investors are dealing with uncertainty whether they are investing in good or bad innovations. According to Kaplan and Stromberg (2001) monitoring and staged financing gives and comparative advantage with dealing such asymmetry, and therefore VCs plays in a crucial role transforming scientific knowledge into commercial success.

Typically innovation activity is associated with higher R&D expenses and intensity of filling patent applications. According to Kortum and Lerner (2000), VCs have significant role on fostering the innovation in terms of patent filling activity. On the other hand, Hellman and Puri (2000) have found that higher innovation intensity increases probability that the firm is getting VC funding. In terms of R&D activity, governments have experienced to be the major source of R&D funding. According to Lerner (1999) majority of their US based sample have received government related R&D grants and receiving such grants have increased the probability of receiving VC funding. Moreover, there is a positive relationship of receiving government funding and innovation, if domestic VC are involved in the deal (Samila & Sorenson, 2010).

3.2 Market position and internationalization

In terms of market position, VCs are providing help in activities such as sales and marketing positioning, as well as they are accelerating the growth pressure for their targets (Luukkonen et al. 2013). According to Hellman and Puri (2000) VCs are able to reduce the time to brining products to the market compared to competitors. In addition, it is widely supported that VC-backed companies are growing, hence scaling faster compared to non-VC-backed equivalents. (Engel & Keilbach, 2007; Puri & Zarutskie, 2012) Furthermore Engel et al. (2007) and Davila, Foster and Gupta (2003) have found that VC-backed firms have higher employment compared to non-VC-backed. In turn regarding of growth pressure, according to Lutz and George (2012), VCs tend accelerate the growth of their targets by encouraging to utilize their resources and networks.

VC-backed firms are typically considering internationalizing in early development stages, due to that they are aiming high growth and they are operating in knowledge intensive industries. Typically new ventures require resources relating to creating competitive advantage in foreign markets. (Lutz & George, 2012) According to Frenhaber, McDougall-Covin and Oviatt (2007), VCs can provide resources such as knowledge about specific foreign markets, experience and usually VC's reputation have seen lowering the boundaries for internationalization. Luzt and George (2012) have identified financial and non-financial resources that VC-backed firms favor in their survey. Non-financial resources relate to help in building internationalization strategy and use of networks. Networks enables to establish strategic alliances and relationships to foreign customers and suppliers (Frenhaber & McDougall-Covin, 2009). Furthermore, networks to other VCs are favorable in order to having access to head hunting activities and hiring international employees, and for financial resources, contacts to the other VCs favors having access to further funding rounds. (Luzt & George, 2012)

3.3 Professionalization and quality

In terms of professionalization and quality, VCs are providing help in activities such as improvement of corporate governance, recruiting and finding board members. In addition, VCs can increase the targets' credibility for customers, investors and suppliers by utilizing their network. (Luukkonen et al., 2013)

In early studies of Gorman and Sahlman (1898) and Sahlman (1990), they have found that VCs are pursuing to get involved in the board of directors in order to implement different governance structures. According to Hellman and Puri (2002), VC involvement in US almost doubles the probability that founder is replaced by professional CEO, while Wasserman (2003) have found especially CEOs of high-tech companies tend to be replaced after additional VC financing rounds. In contrast, Bottazzi et al. (2008) findings support the CEO change paradigm in Europe, but with smaller degree. In addition, VC involvement is associated with more independent boards (Baker & Gompers, 2003; Hocher, 2003).

3.4 Financial function and exit orientation

According to Luukkonen et al. (2013) financial function and exit orientation activities relates to attracting new investors, raising follow-on financing, Prepare IPO and finding buyers as well as exit routes. As mentioned earlier in this study, VC investing model is based on stage financing largely from a risk-management point of view. Gompers (1995) have found that the high innovation intensity and R&D activity is associated with more frequent investment rounds, in order to secure the funds to proceed the growth.

In terms of exits, VCs are helping their targets to prepare for exit events, which is typically executed via IPO or acquisition (trade sale). On contrary for the successful exits, VCs tend to help in restructuring activities and shutting down the company. (Metric & Yasuda, 2011b) According to Inderst et al. (2007), VCs improve their target companies' bargaining power in exit events. There is also evidence that VCs tend to affect the timing of exits,

due to facing liquidity pressure towards the end of their funds' life. Therefore exit events occurred closer the end of fund life have yielded significantly lower returns, referred as "fire sales". (Puri & Zarutskie, 2010)

Moreover, there is evidence that VCs tend to create value through capital structure management. According to Alperovych and Hubner (2013) VC-backed firms are faster to responses changes in capital structure compared to non-VC-backed equivalents. Changes in capital structure, such as low tangibility of assets used as collateral, might limit the choices of possible future financing source (De Bettignies, 2008). Hence VCs involvement indicates the quality and future prospects for the target company from the external fund providers point of view (Bayens & Manigart, 2003; Lopez-Garcia & Sogorb-Mira, 2009), as well as coerce discipline in terms of nature and use of the funds raised from third parties (Kaplan & Strömberg, 2003).

4 Prior evidence of value creation

This chapter focus on the evidence of VC value creation in performance from three different perspectives. First we are introducing the prior evidence of capability delivering returns and operative performance. Secondly, we are focusing on more specified in value creation characteristics, which relate to corporate governance and innovation as well as different fund types and their capabilities to deliver firm value.

4.1 Returns and operative performance

The impact of VC investments crating value have started to attract academics since 1990s (Guo & Jang, 2013). Academics have discussed the quality of reported VC returns, and there seems to be certain issues. In general, the sources of return data are VCs and LPs, which are voluntarily providing the date for various databases. Therefore reporting readiness is likely to be positive correlated with investment performance, referred as reporting bias. VCs are typically providing the data about gross returns, referred as returns gained by VC fund investing in target companies. In other hand, LPs are providing data about net returns, referred as returns gained by LPs that have accounted through investing in VC funds. (Da Rin et al., 2011)

In terms of net returns, several studies have examined the realized return of VC funds measured on internal rate of return (IRR) and public market equivalent (PME)[1]. It is widely agreed that average VC investments overperforms the public equivalents, however the distributions are highly skewed. In other words, the top tier VC funds have significantly overperformed the public market, while the median rarely overperforms the market. (Da Rin et al., 2011.) Kaplan and Schoar (2005) have fund in their US based sample that VC funds between 1980 and 2011 have yielded on average IRR of 17% (median 13%) and PME of 1.21 (median 0.92) during the period. Standard deviation for IRR and

[1] PME is a ratio of the return value to the VC investment over the return value of the public market investment. It is a measure to compare VC investment to the public market executed with an investment of same amount. Typically S&P500 or Nasdaq is used as a proxy for public market. (Da Rin et al 2011.)

PME has been 0.31 and 0.74, indicating high fluctuation in the returns (Kaplan & Schoar, 2005). Ewens, Jones and Rhodes-Kropf (2013) have used the same period and methodology, and they find an average IRR of 19.3% with standard deviation of 0.59. On contrary, Robinson and Sensoy (2016) have also used similar methodology than Kaplan and Schoar (2005), but they find lower returns in their US based data sample including findings up to 2010. The average IRR have been 9% (median 2%) and PME 1.03 (median 0.82), while standard deviations have been 0.47 and 0.95 respectively (Robinson et al., 2004).

Gross returns are significantly less studied topic among the academics. According to Da Rin et al. (2011) there is certain issues on evaluating the gross returns. Target company valuations are typically only observed when the funding round occurs. In addition, targets' have higher intensives to execute additional funding rounds and raise capital when the valuation is higher, thus observed returns are likely be upward biased. (Da Rin et al., 2011) Therefore, most of the studies have employed various econometric approaches to evaluate gross returns. Gompers and Lerner (1997) have found average yearly alphas of 8% for VC-backed firms, based on the US sample between 1972 and 1997. In turn Cochrane (2005) have develop maximum likelihood approach in order to correct the survivorship bias. Approach assumes that betas lies under log-normally distributed returns. The results indicates that US VC-backed firms have accounted average yearly alphas of 32%. In addition, betas appear to be close to 2, indicating high systematic risk of individual investment (Cochrane, 2005). Kortweg and Sorensen (2010) have found in their US based study that average alphas are around 30% and beta over 2. In overall, gross returns seem to be significantly higher compared to net results in academic literature. Possible explanation for such relationship is two folded. First, high alphas might be a result of limited data. Second, LPs are paying too high management fees to VCs, especially in underperforming investments. (Da Rin et al., 2011)

The most studied topics relate to VC value creation refers to value creation activities effect on the operative performance. In academic literature the sales growth is the most preferred estimate of evaluating firm performance (e.g. Wiklund & Shepheard, 2003;

Chandler, McKelvie & Davidsson, 2009; Chemmanuer et al., 2011; Puri & Zarutskie, 2012; Croce, Marti & Murtinu, 2013). There is clear evidence that VCs are not only picking the most efficient firms in their portfolio, but they also contribute to increase the efficiency post investment. The efficiency improvement is typically derived to be result of contribution to sales growth, however some academics have made contradictory findings on VC-backed companies' ability to grow sales. According Chemmanuer et al. (2011) and Puri and Zarutskie (2012), VC-backed firms that have received VC funding are younger, faster-growing and larger compared to non-VC-backed equivalents, in their US based sample. As a conclusion for a such finding, Puri and Zarutskie (2011) claim that VCs tend to screen scalable businesses rather than focusing on profitability. Croce et al. (2012) have made similar findings related to sales growth in their European based sample. In turn according to Inderts and Mueller (2009) findings, VC business models leads better results if target operates in emerging markets, which enables strong growth and large scale. Therefore, VCs strategic focus tend to be in such markets, as the circumstances enables to achieve remarkable high growth in relative short period of time (Inders and Mueller, 2009). Another significant driver relates to target firm size, as Sapienza et al. (1994) suggest that the value added is higher for companies at early-stages due to high uncertainty. (Luukkonen et al., 2013). However, Guo and Jiang (2013) could not find significant growth in their Chinese sample. Moreover, Guo and Jiang (2013) have found that on average, VC-backed Chinese firms are achieving significantly higher return on sales (ROS), return on equity (ROE) and labor productivity compared to non-VC-backed equivalents.

Moreover in relation to performance, most of the studies suggest that VC-backed firms are overperforming the non-VC backed firms. The typical approach has been comparing the pricing of IPOs. The general finding is that VC-backed IPOs are less underpriced compared to non-VC-backed equivalents (Meggins & Weiss, 1991; Gompers & Lerner, 1997; Lee & Wahal, 2004). However, Bradley and Jordan (2002) controlled the industry effect and quality of underwriting and suggests that such difference in underpricing does not exist.

4.2 Corporate governance and innovation

Most of the studies related to VC corporate governance actions are related to board characteristics impact on firm performance. Academic literature suggest that the board has a vital role of creating firm value and performance increase. Increase in head count of board members have seen positive impact on the target's performance, due to increase of competences and wider access to recourses (Pfeffer and Salanick, 1978; Zahara, Neubam and Huse, 2000). However, the increase in board member might increase the probability of conflicting risks within the board (Forbes and Milken, 1999), and for instance free-riding (Golden and Zajac, 2001). Typically VCs contribution to corporate governance are associated with improved professionalism, for instance their hiring practices are more diligent (Hellman et al., 2002). In turn increase in professionalism is typically associated with increase in social capital, and Landry, Amara and Lamari (2002) suggest that increased level of social capital has increasing impact for innovation of a target company. As a conclusion we could presume that VC involvement increases both professionalism and social capital which are crucial drivers for operative and financial growth.

When observing recruiting activities and accelerating hiring intensity, Engel et al. (2007) and Davila, Foster and Gupta (2003) have found that VC-backed firms have higher employment compared to non-VC-backed. Moreover, there is also evidence that VC-backed firms outperform non-VC-backed in terms of total factor productivity (TFP) (Chemmanur et al., 2011).

Another hot topic among corporate governance studies relates to gender diversity in board of directors and its' impact on company performance. The relationship has been discussed especially in context of non-VC backed companies, and findings are mixed. Some studies suggests that gender diversity has negative impact on company performance (see e.g. Joecks, Kersin & Vetter, 2013; Carter, Simkins & Simpson, 2003). While some have found no link (see e.g. Rose, 2007; Miller & Del Carmen Triana, 2009) and others negative link (see e.g. Adams & Ferreira, 2009; Ahren & Dittmar, 2012). In contrast

related to innovation intensity and gender diversity, Griffin, Li and Tiang (2021) have found that gender diversity in board of directors is associated with higher innovation intensity in terms of patent activity. However for VC-backed companies, the gender diversity impact remains open, and hence it might have explanatory power in terms of financial performance.

In terms of innovation, there is consensus among academics that VCs are associated with substantial increase in innovativeness of their target companies (Kortum & Lerner, 2000; Hirawuaka & Ueda, 2011; Popov & Rosenboom, 2009; Bertoni, Croce, D'Adda, 2010). According to Kortum and Lerner (2000), industries funded by VCs tend be more innovative in terms of filled patent applications, and Popov and Roosenboom's (2012) findings suggest that VCs tend to be involved in the industries with high R&D intensity. On the other hand, Spiegel and Tookes (2008) have found that VCs are significantly contributing the innovation intensity in their investments, leading higher productivity compared to non-VC-backed equivalents. However, the findings related to VCs ability to foster innovations differ geographically in academic literature. According to Engel and Keilbach (2007) and Caselli, Stefano and Perrini (2009) VCs in Europe are investing in already innovative firms rather than fostering innovation in the target companies.

4.3 Fund types

Academic literature has been focusing on the different fund types and their ability to create firm value. Most typically the debate relates to whether IVCs, GVCs, foreign VCs or syndications of at least two of those contribution to company performance differs.

4.3.1 IVC versus GVC

Academics have debated and evaluated the post-investment value crating activities of VC firms, and especially whether there is a difference between IVC and GVC backed VCs operative performance and value creation ability in Europe. The most common finding

is that GVC backed companies are underperformed other types of VCs (Knocakert, Lockett, Clarysse & White, 2006; Shilder, 2006; Schäfer & Schilder,2006; Brander, Du & Hellman, 2010). According to Brander et al. (2010), GVCs are associated with weaker operative performance target companies. However, if the syndicate consist of GVC and IVC investors, the underperformance does not longer exist (Brander et al., 2010). In addition, GVC-backed funds are associated with lower rate of engagement in value-adding activities with their portfolio companies leading significantly lower performance compared to IVC-backed (Knockaert et al., 2006; Schilder, 2006). The lower engagement is related to limitations and capabilities of GVC fund managers. According to Schäfre and Schilder (2006), GVC managers have more firms under management and less contacts.

In contrast, Luukkonen et al. (2013) have studied whether IVC versus GVC value add differs based on questionary poll data to young European high-tech target companies' executives. They claim that there is not any statistically significant difference between the value creation ability of the two, even though value adding activities differs between the investment types. However, IVCs have provided significant higher value in activities such as business idea development, professionalization and exit orientation.

For innovation intensity, academics have mixed findings related to whether IVC outperforms GVC by increasing innovativeness. Brander, Egan and Hellman (2008) argue that GVC-backed companies generates fewer innovations. In contrary, Brander et al. (2010) findings suggest the opposite. In turn Bertoni and Tykova (2012) have found that IVC and syndicates are associated as the most innovation increasing type of VC, but if syndicate is formed by IVC and GVC, it is outperforming the types of investments in terms of innovation production.

4.3.2 Foreign VCs

During the last few decades, cross border investment flows have seen remarkable growth, as VC investors have started to search growth and investment opportunities internationally rather than regionally. The regional approach has been the traditional way

of investing in the early days at the industry. (Alhorr, Moore & Payne, 2008; Meuleman & Wright, 2011.) Among the academics, the presence of foreign VCs has seen both contributing and constraining force for the growth of target companies. In terms of contribution, foreign VCs are providing the resources for internationalization, and therefore stronger growth (Frenhaber & McDougall-Covin, 2009; Lutz & George, 2010). In contrast, Foreign VCs might encourage target companies to internationalize towards investor's domestic market, which is not always the optimal expansion plan in terms of the target market. In addition, Foreign VCs are seen less patient compared to domestic VCs, as for they tend to discontinue the value creation activities for collapsing target companies earlier. (Mäkelä & Maula 2005) In contrast, there is significant evidence that investments made by Foreign VCs decreases the probability for successful exit. However, involvement of foreign capital has seen increasing the probability of forming syndicates with foreign and domestic VCs. (Chemmanur et al., 2011; Cumming & Dai, 2010; Moeser, 2010)

In terms of setting foreign VC performance into context, there is debate among the academics whether foreign VC have been able to overperform domestic equivalents. There seems to be significant variation depending on whether the performance is examined either short- or long-term period. Lockett et al. (2008) have found that early-stage domestic VC-backed firms have been able to deliver higher growth in comparison to foreign backed equivalents. As the target matures, the contribution on of foreign VCs becomes more crucial, as they provide resources for internationalization such as networks, international knowledge and reputation. (Lockett et al., 2008) In turn Devigne et al. (2013) findings in their European technology companies-based sample between 1994 and 2004 are similar. In short term, domestic backed VCs have able to nurture higher growth compared foreign backed VCs, while in medium term period, foreign VCs have overperformed domestic equivalents. However, the syndicate investments backed by both domestic and foreign VCs have been able to provide highest growth. (Devigne et al., 2013). In turn when comparing the performance to GVCs, Tykvova and Waltz (2007) have found that foreign VCs have significantly overperformed GVC investors.

4.3.3 Syndicates

According to prior sections, syndicates seems to have remarkable explanatory power for VC-backed companies overperformance and operative gains in general. Brander, Armit and Antweiler (2002) agrees with the performance based on Canadian and Tian (2011) with US based data respectively. Moreover, according to Tian (2011), syndicate investments comprise higher probability to perform successful exit, as well as they are achieving higher valuations and lower probability to be underpriced in IPOs. In turn, Brander et al. (2002) suggests that syndicates overperformance can be explained through value-adding activities. Hence for example influencing through managerial decisions have statistically higher impact on the company level performance rather than picking the winning horse.

Academics have also debated whether the homophily of syndicates have impact on performance. Du (2011) have studied impact of homogeneity on syndicate investments performance in short- and long-term horizons. They find that heterogeneous syndicates appear to have higher probability to perform unsuccessful exits, while on the longer-term, heterogenous syndicate investments appear to have higher survival rates. (Du, 2011.) However, Hochberg, Lindsey and Westerfield (2011) have found relative little evidence of homophily in syndicate deals. According to their findings, formation of syndication is rather driven by sharing resource, as some VCs provides capital and others have access to deals. On contrary Bubna, Das and Prabhala (2011) have studied syndication formation determinants. They have found that syndicates are aiming to build VC communities, where formation is based on choosing preferred partners. In terms of homophily in syndicates, heterogeneity seems to appear in some characteristics such as influence and size, while homogeneity appears in other dimensions such as focusing on similar growth stages. In overall, such communities have higher probability to perform successful exit.

5 Data and methodology

This chapter focuses on the data and methodology used in empirical part of the thesis. First section is introducing the data collection procedures and the variables used in empirical analysis, as well as descriptive statistics presents insights from the data sample. Later parts cover the empirical models used in respect to examine research questions.

5.1 Data

5.1.1 Data collection

The data sample for the empirical analysis comprises of venture capital deals that have been exited between the years 2005 and 2020 in Finland. Therefore, the sample is restricted to Finnish companies, and it contains both Finnish and foreign VC firms as investors. Moreover, other PE investment types such as buyouts have not been covered. Finnish Venture Capital Association (FVCA) have provided such data set including target company names, investment and exit dates, as well as information of VC firms involved in the deals. FVCA sample have been self-reported by its member firms, and it comprise exits between years 2014 and 2020, in total of 56 firm observations. Sample have been self-extended with 89 exits collected from public media sources and databases such as VC firms' websites, Crunchbase and Dealroom. Therefore, the total number of exits collected is 145.

Furthermore, the dataset is collected from financial statements between actual entry and exit years, which differs from the typical approach in previous studies. Academics have found that the typical investment period is on average three to four years for private equity investments, which have been in use for replicating the holding period in most of the studies (see e.g. Lerner, Sorensen & Strömberg, 2011; Amess, Stiebale & Writght, 2016). Therefore, our approach should provide more accurate results of the exit performance. The financial statements have been collected from Orbis database provided by Bureau van Dijk (BvD) and National Bureau and Registration of Finland's (NBPR)

VIRRE database. Every Finnish private companies are obligated to deliver their financial statements to the NBPR yearly basis, and therefore the access granted to their archive have been critical for collecting the data. The raw sample included in total 147 firm observation, but due to lack of sufficient financial information or some of the exits provided in FVCA sample covers investments to foreign firms, those have been excluded. Therefore the final sample covers 117 firm observations. The distribution for final sample based on target companies exit years is presented in figure 6.

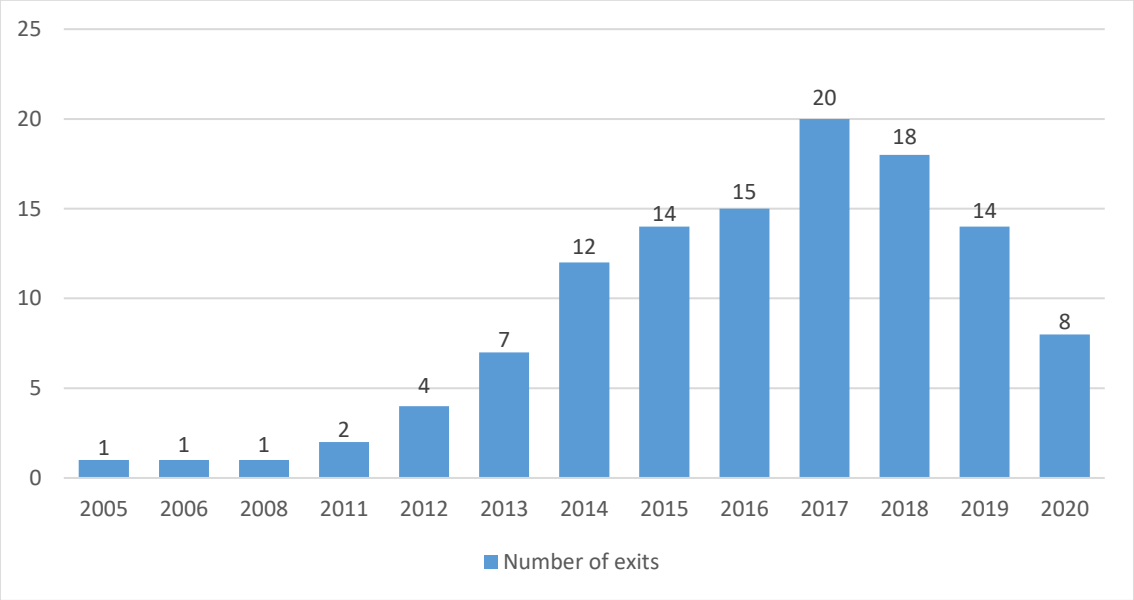

Figure 6. Distribution of target companies exit years

Firm attributes such as NACE industry codes have been provided by BvD and collected one by one based on the target company's business id. The industry split for the target companies based on the NACE Rev. 2 main section is presented in the figure 7. Although the original data from FVCA do not include business ids, such data have been retrieved from Virre or other public sources, such as Finder.fi, ytunnus.fi and Asiakastieto. BvD database have also enabled to collect addition firm level data, such as patent citations as per target company.

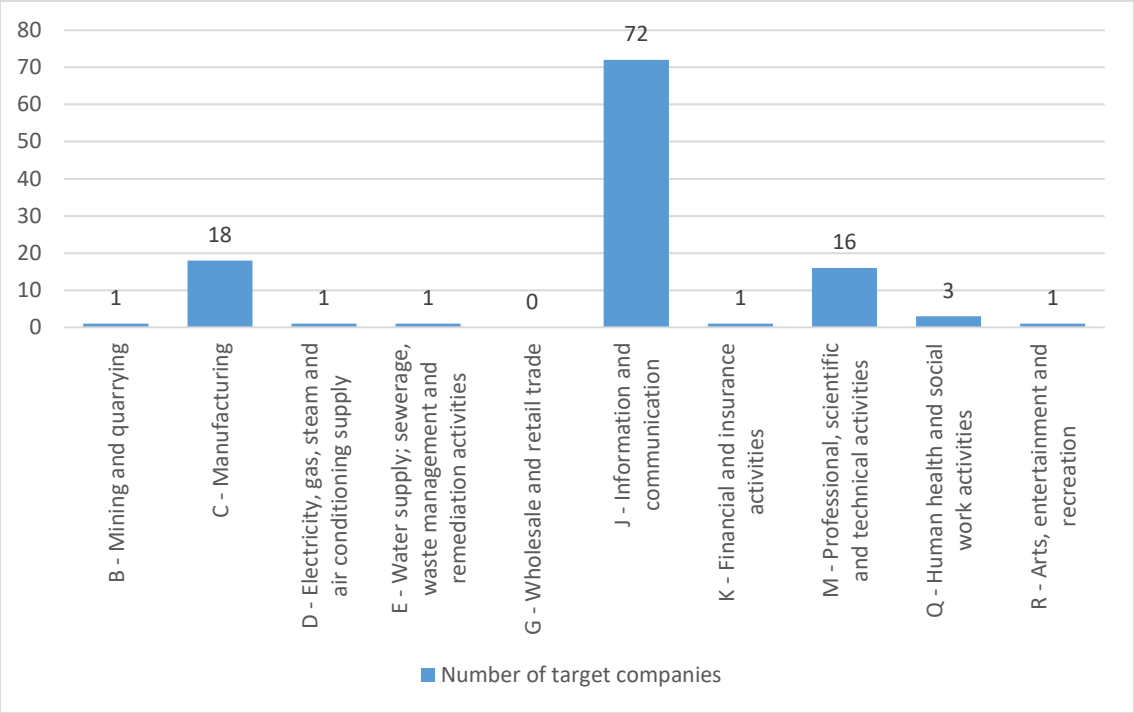

Figure 7. NACE Rev. 2 main section industries[2]

The data collection process from the financial statements were affected by slight quality issues. Although Finnish companies are liable to report their financials information to NBPR, the financials contained some missing values. Such values have been estimated based on the procedures presented in table 2. Nevertheless, missing values represents less than 5% of the total sample.

Table 2. Estimation of missing data values

This table presents the procedure used estimating missing data points in the sample. The purpose of such estimation is to avoid decrease the number of firm observations. Estimations have been executed only in the limits of reliability, otherwise firm observations are excluded from the sample.

Type of missing value	Estimation procedure
Missing value between two existing values	Missing value is linearly interpolated
Missing value is the last for an inactive company	Missing value is zero
First value is missing	Missing value is zero

[2] More detailed industries for target companies are presented in the appendix 1.

Survivorship bias have also taken into account, so that the sample includes also portfolio companies that have been liquidated or otherwise the investments have not led to successful exit.

5.1.2 Regression variables

The variables utilized in the empirical analysis have selected to accurately reflect the various elements in the scope with the respect of data limitations. Table 3 represents those variables.

Table 3. Regression variables

This table presents the variables, their abbreviations and detailed description that are utilized in the empirical analysis.

Variable	Abbreviation	Description
Dependent Variables		
Sales growth	S	Natural logarithm of delta total sales during the investment period
Enterprise value	EV	Natural logarithm of delta equity value plus net debt during the investment period
New patents	NEW_PAT	= 1 if new patents applied post investment, else 0
Foreign VC	FGN_VC	= 1 if foreign backed VC one of the investors, else 0
Independent variables		
Asset turnover	ATO	Average of total assets over total sales
Operating profit	EBITDA	Average of earnings before interest, taxes, depreciation and amortization over total sales
NWC	NWC	Average of current assets less current liabilities over total sales
Employee efficiency	EEF	Average of personnel costs over total sales
Development costs	DC	Average of development costs over total sales
Current ratio	CR	Average of current assets over current liabilities
Leverage	LVG	Average of total debt over total assets
Patent count	PAT	Natural logarithm of delta patent count
Patents prior	PAT_PRI	= 1 if new patents applied prior investment, else 0
Employee count	EMP	Natural logarithm of delta employee count
Board size	BS	Natural logarithm of delta board headcount

Firm age	AGE	Natural logarithm of target firm age at the investment year plus one
Holding period	HP	Natural logarithm of period between the investment and exit in years plus one
Syndication	SYND	= 1 if syndication of VCs, else 0
Government VC	GVC	= 1 if government backed VC one of the investors, else 0
VC chair	VC_CHR	= 1 if venture capitalist nominated as chairman post investment, else 0
CEO change	CEOC	= 1 if new CEO nominated post investment, else 0
Chair change	CHRC	= 1 if new chairman nominated post investment, else 0
CEO as chairman	CEO_CHR	= 1 if CEO = chairman, else 0
Female board	FEMB	= 1 if board of directors includes female members, else 0
Gaming industry	GME	= 1 if firm is in gaming industry, else 0
Tech industry	TCH	= 1 if firm is in technology industry, else 0

Dependent variables for evaluating the value creation in terms of financial performance are total sales (S) and enterprise value (EV), which have been calculated as deltas. Equations 1 presents the calculation method.

$$(x) = \ln\left(\frac{x_{exit\ year}}{x_{investment\ yeaer}}\right), \quad (1)$$

where x stands for S and EV respectively.

As covered in previous chapter, sales growth has been the most used measure to evaluate VC-backed firms' performance in previous studies (see e.g. Wiklund & Shepheard, 2003; Chandler, McKelvie & Davidsson, 2009; Chemmanuer et al., 2011; Puri & Zarutskie, 2012; Croce, Marti & Murtinu, 2013). In addition, we decided to choose another measure and evaluate whether the VCs have been able to increase the firm value in terms of enterprise value, in comparison to not only accelerating the top line growth. Such measure has not been used in previous studies.

In terms of innovation, three different measures have been used in previous studies: research and development expenses (R&D), patent count and intangible assets (see e.g. Kortum & Lerner, 2000; Dushnitsky & Lenox, 2006; Quas, Marti & Reverte, 2021). Due to different accounting policies, the grade of how precisely R&D expense have been accounting varies between the geographics. Therefore this paper utilize two patent count based measures, as well as combination of R&D expenses and intangible assets as proxies for innovation. Development costs (DC) are calculated as an average ratio of development costs accounted in income statement plus activated in balance sheet over total sales (similar than in equation 3). According to Finnish accounting policies, it is not mandatory to report the development costs in income statement as a separate line item. However, notes to financial statement covered such information comprehensively, and how much firms have activated of their total R&D costs into the balance sheet. In addition, development costs have to be presented as a separate line item in intangible assets, and therefore intangible assets as a whole do not represent accurately enough the propensity of innovation. In terms of patent count, we have chosen two different variables to ensure the fit for the purpose. First, patent count (PAT) represents number of valid filled patent applications in the portfolio and have been calculated as in equation 2.

$$PAT = \ln\left(\frac{cumulative\ patent\ count_{exit\ year}}{cumulative\ \ patent\ count_{investment\ yeaer}}\right) \quad (2)$$

Due to that the actual date when patent is granted is not available, therefore cumulative count of applied patents in a given year has used as a proxy for estimation patent activity. Second, new patent (NPAT) is a dummy variable, and receives a value of 1 if a company has filled patent applications post investment. Such variable has chosen in order to evaluate whether VCs are already investing in innovative companies rather than nurturing innovativeness.

Observing controls to be used as proxies for financial efficiency, prior studies have utilized variation of multiple different variables. Those mostly relates to firm profitability or capability to generate cash flows, firm efficiency, financial health, leverage ratio, as well

as employee efficiency. Most typical approach measuring operative profitability has been utilizing EBITDA margin or alternatively return on sales (ROS), which reflects the profitability of the core business when variable and fixed costs are deducted from the sales as a percentage of sales (see e.g. Botazzi et al., 2002; Florin, 2005; Guo & Jiang, 2013). Therefore we are also including operating profit (EBITDA) as one of the controls. In terms of operating efficiency, variables typically used are measuring the efficient use of company's assets, such as return on assets (ROA) and asset turnover (see e.g. Bottazzi et al., 2002; Florin, 2005; Chemmanuer et al., 2014; Nahata, 2008). However ROA is calculated as ratio of net income to total assets, and it is likely that VC-backed companies are generating negative net income. Therefore we see asset turnover (ATO) as more relevant proxy. In relation to leverage, the most common approach in the literature has been evaluating whether difference in leverage ratio referred as ratio of debt to assets has impact on financial performance, similar than we are utilizing (see e.g. Dushintsky et al., 2005; Bottazzi et al., 2002). In relation to short-term financial health, we decided to utilize to different controls, current ratio (CR) for measuring liquidity impact and net working capital (NWC) for measuring short-term financial health impact. The short-term liquidity impact evaluation has not performed frequently in prior studies, but we are utilizing the same approach for liquidity as Alperovych and Hubner's (2013) study. In relation to NWC which have calculated as current assets less current liabilities over sales, have not been used in prior studies. However we believe that the amount of capital a company requires running its daily business in relation sales might have explanatory power, as we assume that more efficiently the working capital is management refers to better financial performance. Lastly employee efficiency (EEF), which we have calculated as a ratio of personnel costs to sales, is similar approach than Guo and Jiang (2013) have used evaluating whether difference in personnel cost base levels have explanatory power. All financial efficiency controls have been calculated as ratios in order to avoid firm size bias. Equation 3 presents the calculation method.

$$AVG(x) = \frac{(x_{year\,0} + x_{year\,1} + x_{year\,2} + \dots + x_{year\,n})}{\mathrm{n}}, \quad (3)$$

where x represents performance measures ATO, EBITDA, NWC, EEF, CR and LVG

respectively.

Furthermore, there are several dummy variables that are proxies for corporate governance actions and VC fund types. In terms of corporate governance, previous studies have found that VCs are acting in active role finding new CEO and board members (e.g. Wesserman, 2003; Hellman & Puri, 2012; Luukkonen, et al., 2013). However, impact of VC investor's nomination as a chairman for financial performance has not been studied before, which for variable VC chair (VC_CHR) stands for. In addition, variables measuring the changes occurred in corporate governance, hence increase of professionalism in target companies have been included in the model. Such variables are CEO change (CEOC), VC as chairman (VC_CHR) and new variable female board (FEMB), which have not been studied in prior VC related literature. FEMB refers to whether the target's board of directors includes at least one female member, thus it is a proxy for gender diversity. Variable is similar than e.g. Joecks et al. (2013), Rose (2007) and Adams and Ferreira (2009) have used in their non-VC-backed related studies.

In terms of fund types, previous studies have examined what is the role of government and foreign VCs involvement in the deals for creating post-investment firm value (see e.g. Lockett et al., 2008; Chemmanur et al., 2011; Cumming & Dai, 2010; Moeser, 2010; Devigne et al., 2013). In addition, similar comparison between syndicates and individual investments have covered in prior literature (see e.g. Tian, 2001; Du, 2011; Bubna et al., 2011). Moreover, foreign VC involvement impact in the post-investment value creation have been in the academics' scope as well (see e.g. Lockett et al., 2008; Devigne et al. 2013). Hence we are utilizing three different fund type dummy variables FGN_INV, GVC and SYND. Those receives value of 1 if company has either foreign or government investors onboard or multiple VC investors have invested in the target company.

Moreover, industry effects are controlled with two separate variables. Technology industry (TECH) variable is similar than e.g. Dushnitsky and Lenox (2006) and Chemmaneur et al. (2011) have used. In addition, we decided to include gaming industry (GME) dummy,

due to that the underlying data includes relative high number of companies operating in such industry, and such companies have able to deliver extremely high growth. Furthermore, typically firm age and employee count growth has seen having an impact for the financial performance. Therefore we have control for firm age (AGE) similar than for instance Guo and Jiang (2013) and Quas et al. (2021) have used, as well as for change in employee count (EMP) similar than for instance Bottazzi et al. (2002) and Quas et al. (2021) have used in their studies.

5.1.3 Descriptive statistics

The descriptive statistics for the full sample is presented in table 4. The purpose of such statistic is having insight to the data sample.

Table 4. Descriptive statistics

This table presents descriptive statistic for the whole sample. Financials are presented in thousand Euros.

	Mean	SD	Min	Max
Δ Total sales	19 002,00	143 763,35	-81 092,91	1 544 383,79
ln(Δ total sales +1)	1,96	1,67	0,01	8,09
Δ Enterprise value	11 658,56	91 036,62	-12 482,20	984 737,57
ln(Δ enterprise value +1)	1,67	1,35	0,02	7,04
New patents	0,45	0,50	0,00	1,00
Foreign VC	0,52	0,50	0,00	1,00
Asset turnover	38,00	168,98	0,30	1 300,53
Operating profit	-7,94	25,97	-160,54	5,71
NWC	16,76	107,14	-52,36	1 075,01
Employee efficiency	4,16	13,80	0,00	108,41
Development costs	7,16	37,72	0,00	289,93
Current ratio	5,93	19,56	0,22	182,53
Leverage	1,07	1,02	0,06	8,00
Δ Patent count	8,56	19,22	-1,00	120,00
ln(Δ patent count +1)	0,42	0,83	-0,69	3,53
Patents prior	0,45	0,50	0,00	1,00
Δ Employee count	19,12	40,60	-52,00	238,00
ln(Δ employee count +1)	0,49	0,92	-3,00	2,55
Δ Board size	0,14	1,42	-4,00	4,00
ln(Δ board size +1)	0,73	0,23	0,00	1,61
Syndication	0,68	0,47	0,00	1,00

Government VC	0,44	0,50	0,00	1,00
Firm age	4,80	8,36	0,00	79,00
ln(firm age)	1,32	0,88	0,00	4,38
Holding period	4,56	2,95	1,00	15,00
ln(holding period)	1,30	0,69	0,00	2,71
VC chair	0,46	0,50	0,00	1,00
CEO change	0,13	0,34	0,00	1,00
Chair change	0,50	0,50	0,00	1,00
CEO as chairman	0,13	0,34	0,00	1,00
Female board	0,24	0,43	0,00	1,00
Gaming industry	0,09	0,29	0,00	1,00
Tech industry	0,53	0,50	0,00	1,00
Observations	3 042	3 042	3 042	3 042

Table 4 shows that sales growth for target companies are on average 19 002 thousand Euros, which equals to circa 9 335% growth during the investment period. In contrast enterprise value growth on average has been circa 11 659 thousand euros, equaling to circa 2 941% growth. Furthermore, on average target firms have hired 19 new employees during the investment period.

In terms of fund types, most of the deals are IVC backed, roughly 56%, and GVC have involved in 44% of the deals, while foreign VCs are involved in circa 53% of the deals. In turn syndicates formed by at least two or more VCs represents 68% of the deals. Sample does not include CVC deals. When considering holding period of investments, it ranges between 1 and 15 years, average being 4.56. While an average age of target company has been 4.8 years at time when target company have received VC funding. Hence it indicates that most of the deals are early-stage investments. Furthermore, most of investment have been directed to technology sector (53%).

In terms of corporate governance actions, chairman have been changed in 50% of the deals while VC investor have been nominated as chairman in 46% of the deals post investment. In contrast, the CEO change rate have been relatively low in the target companies, being 13%.

5.2 Methodology

The methodology is divided into three parts in order to fit the purpose of the thesis. The first part aims to comprehensively review what are the factors that affects the value creation in terms of financial performance. Other two parts examines deeper the innovation propensity and foreign VC involvement propensity, hence what are the factors that increases such propensities.

5.2.1 Firm performance and value creation

The aim of the logistic regression is measuring the value creation of VC-backed firms, more precisely, what is the impact of VCs' activities, innovativeness and other characteristics in value creation in terms of financial performance. The financial performance is measured from two point of views, sales growth and growth in enterprise value. It is typical for such pre-mature companies that business might be unprofitable, as the focus is on growing the sales. Especially when venture capitalists are involved, the funding raised enables to cover the losses and continuum of growth. In terms of target company performance, as mentioned before, sales growth is the commonly used performance measure. Therefore we are utilizing the sales growth as the key performance measure as well. However, at the same time the aim is explore whether the firm value is created in terms of enterprise value. Equations 4 and 5 presents both models.

$$\ln(S+1)_i = \alpha + \beta_1 \ln(PAT+1)_i + \beta_2 \mathrm{DC}_i + \beta_3 \mathrm{PRE\_PAT}_i + \beta_4 \ln(BS+1)_i + \beta_5 SND_i + \beta_6 GVC_i + \beta_7 FGN\_VC_i + \beta_8 VC\_CHR_i + \beta_9 CEOC_i + \beta_{10} CHRC_i + \beta_{11} CEO\_CHR_i + \beta_{12} FEMB_i + control\ variables_i \,. \quad (4)$$

$$\ln(EV+1)_i = \alpha + \beta_1 \ln(PAT+1)_i + \beta_2 \mathrm{DC}_i + \beta_3 \mathrm{PRE\_PAT}_i + \beta_4 \ln(BS+1)_i + \beta_5 SND_i + \beta_6 GVC_i + \beta_7 FGN\_VC_i + \beta_8 VC\_CHR_i + \beta_9 CEOC_i + \beta_{10} CHRC_i + \beta_{11} CEO\_CHR_i + \beta_{12} FEMB_i + control\ variables_i \,. \quad (5)$$

Dependent variables for the models are natural logarithm of delta sales and natural logarithm of delta enterprise value for a firm *i*. Moreover, α is constant and β_j represents the estimated coefficient for each measure. Independent variables consist of measures we expect to have explanatory power in changes of innovation intensity and corporate governance of the firm. In addition, we believe that fund types involved in the deal have explanatory as well. The control variables comprise firm efficiency measures, employee count, firm age and holding period, as well as industry dummies.

5.2.2 Innovation propensity

The aim of the logistic OLS regression is to measure what are the factors that affects the propensity for a target company to apply new patents post investment, and whether VCs have contributed on increasing the propensity. Such method has not been tested in prior studies. Equation 6 presents the model.

$$NEW\_PAT\{1,0\} = \int(\beta_1 \ln(PAT+1)_i + \beta_2 DC_i + \beta_3 PRE\_PAT_i + \beta_4 \ln(BS+1)_i + \beta_5 SND_i + \beta_6 GVC_i + \beta_7 FGN\_VC_i + \beta_8 VC\_CHR_i + \beta_9 CEOC_i + \beta_{10} CHRC_i + \beta_{11} CEO\_CHR_i + \beta_{12} \mathrm{FEMB}_i + control\ variables_i) \,. \quad (6)$$

The dependent variable is binary variable that receives value of 1 if a target firm *i* has filled new patents post investment. Moreover, β_j represents the estimated coefficient for each measure. In terms of independent variables, the model includes measures we expect to have explanatory power in changes of innovation intensity, corporate governance of the firm. In addition, we believe that fund types involved in the deal have explanatory as well.

5.2.3 Foreign investors

The aim for the logistic regression method is to measure the factors affecting the propensity for a target firm have received funding from foreign VCs. Equation 7 presents the model.

$$FGN\_VC\{1,0\} = \mathrm{f}(\beta_1 \ln(S+1)_i + \beta_2 \ln(EV+1)_i + \beta_3 \ln(PAT+1)_i + \beta_4 DC_i + \beta_5 PRE\_PAT_i + \beta_6 \ln(BS+1)_i + \beta_7 SND_i + 7_8 GVC_i + \beta_9 FGN\_VC_i + \beta_{10} VC\_CHR_i + \beta_{11} CEOC_i + \beta_{12} CHRC_i + \beta_{13} CEO\_CHR_i + \beta_{14} FEMB + control\ variables_i) . \quad (7)$$

The dependent variable is binary variable that receives value of 1 if a target firm *i* foreign VC(s) has been involved in the deal. Moreover, β_j represents the estimated coefficient for each measure. In terms of independent variables, the model includes measures we expect to have explanatory power in changes of financial performance, innovation intensity, corporate governance of the firm. In addition, we believe that fund types involved in the deal have explanatory as well.

6 Empirical results

The empirical analysis part of this thesis presents results for models introduced in section 5.2. This chapter comprises three sections. The first part presents the results for value creation in terms of financial performance. Second section presents the results for what the factors increasing the propensity that VC-backed companies are applying new patents. Lastly, the results for factors that increases the propensity of foreign VCs are involved in the deal are presented. Main findings are presented at the end of sections 6.2 and 6.3, in respect to research questions related to role of innovation and foreign VC involvement impact on VC-backed company's financial performance.

6.1 Firm performance

The aim of the logistic regression is measuring the value creation of VC-backed companies, more precisely, what is the impact of VCs' activities, innovativeness and other characteristics in the financial performance. Table 5 presents the results for the two financial performance proxies, sales growth and enterprise value growth.

Table 5. Firm performance

This table presents the result of logistic regression where dependent variables are (1) sales growth and (2) enterprise value growth. Model uses heteroskedasticity consistent Huber-White standard errors and covariance. T-statistic is presented in parenthesis.

	(1) Sales growth	(2) Enterprise value
EBITDA-%	-0.028	**-0.068*** **
	(-0.820)	(-3.863)
Asset turnover	**-0.007*** **	0.002
	(-3.767)	(1.606)
NWC	**0.005** **	0.000
	(2.156)	(0.029)
Employee efficiency	0.025	**-0.114*** **
	(0.419)	(-3.218)
Development costs	-0.001	**-0.024*** **
	(-0.107)	(-3.664)
Current ratio	**0.012*** **	0.000

	(3.588)	(0.107)
Leverage	-0.023	-0.032
	(-0.431)	(-0.638)
Patent count	**0.480*** **	**0.336***
	(2.781)	(1.846)
Patents prior	0.296	0.457
	(1.019)	(1.651)
Employee count	**0.487*** **	**0.575*** **
	(3.029)	(4.149)
Board size	-0.065	-0.070
	(-0.160)	(-0.210)
Firm age	-0.219	**-0.275***
	(-1.564)	(-1.895)
Holding period	**0.309***	**0.419*** **
	(1.985)	(2.744)
VC chair	0.154	-0.296
	(0.659)	(-1.335)
CEO change	-0.259	-0.311
	(-1.159)	(-1.445)
Chair change	-0.111	-0.059
	(-0.443)	(-0.218)
CEO as chairman	-0.260	0.082
	(-1.255)	(0.337)
Female board	0.003	-0.172
	(0.012)	(-1.014)
Foreign VC	**0.597*** **	**0.408****
	(3.022)	(2.161)
Syndication	-0.073	0.231
	(-0.308)	(1.114)
Government VC	0.087	-0.179
	(0.370)	(-0.837)
Tech industry	**0.363***	**0.440****
	(1.672)	(2.190)
Gaming dummy	0.894	**0.859***
	(1.394)	(1.729)
Constant	0.563	0.575
	(1.318)	(1.587)
Sample observations	1 117	1 117
Firm observations	117	117
R-square	0.730	0.648
Adjusted R-square	0.664	0.560

* p<0.1, ** p<0.05, *** p<0.01

For innovation activities, increase in patent count indicates increasing effect on both sales and enterprise value growth, as one percentage point increase in patent activity indicates 48.0% increase in sales and 33.6% in enterprise value. However, the effect on enterprise value growth stays not as significant as for sales growth. In turn, companies that have higher intensity on development cost appears to have 2.4% decreasing effect on enterprise value, while for sales growth the results are insignificant. Moreover, patents applied prior investment seems not to have statistically significant impact on value creation.

Corporate governance actions, on the other hand, do not show statistically significant results in either of the measures. However, there is highly statistically significant result on the recruiting activities, as increase in employee count have statistically high increasing effect on both sales growth and enterprise value.

Observing VC fund types, if foreign backed VC funds are involved in the deal, it shows to have 59.7% and 40.8% increase on sales and enterprise value growth respectively. Both findings are statistically significant. Interesting finding is that both syndicates and GVC involvement seems not to have statistically significant impact on either sales or enterprise value growth.

In terms of firm efficiency, results show statistically significant impact for multiple variables, but on absolute level, impacts are relative low on both sales and enterprise value growth. One percentage point increase in asset turnover shows to have 0.7% decreasing impact on sales growth. While firms having higher liquidity and better short-term financial health, in other words current ratio and NWC, it has 0.1% and 0.5% increasing impact in sales growth respectively. From the firm value point of view, one percentage point increase in EBITDA margin and employee efficiency appears to have decreasing effect of 0.7% and 0.1% on the enterprise value growth respectively.

Observing the other controls, holding period, industry dummies and firm ages shows mostly slightly statistically significant results. Hence, increase in holding period have increasing effect on both sales growth and enterprise value, and the impact on enterprise value growth is highly significant. In turn, higher the target company age at the investment, it has decreasing impact in only enterprise value growth. Moreover, if target company have operated in technology industry, it has increasing impact on both measures. While gaming industry shows slight significant evidence on increase in enterprise value.

Model 1 seems to have substantial and model 2 moderate fit in terms of R-square, as independent variables explains over 70% and 50% of the variation in dependent variables respectively. Moreover, both models do not indicate serial correlation or heteroscedasticity. However, both models are violating normality when Jarque-Bera test is applied. In order to secure the robustness of outcomes across the sample, quantile regression for both models in 25th, 50th and 75th percentiles are employed, and results are presented in table 7.

Table 6. Firm performance quantile regression

This table presents the results of quantile regression where dependent variables are (1) sales growth and (2) enterprise value growth. T-statistic is presented in parenthesis.

	25th percentile		50th percentile		75th percentile	
	(1) S	(2) EV	(1) S	(2) EV	(1) S	(2) EV
EBITDA-%	-0.029	**-0.063****	-0.038	**-0.095*****	**-0.069***	**-0.086*****
	(-1.125)	(-2.097)	(-1.259)	(-3.62)	(-1.931)	(-3.082)
Asset turnover	**-0.007****	0.002	**-0.005****	**0.004***	-0.002	0.003
	(-2.503)	(0.940)	(-2.076)	(1.865)	(-0.837)	(1.395)
NWC	**0.006****	0.000	0.004	0.000	-0.001	-0.001
	(2.385)	(-0.055)	(1.539)	(0.041)	(-0.116)	(-0.373)
Employee efficiency	0.016	**-0.100***	-0.002	**-0.167*****	-0.036	**-0.146*****
	(0.353)	(-1.684)	(-0.03)	(-3.307)	(-0.521)	(-3.000)
Development costs	0.003	-0.019	-0.007	**-0.031*****	**-0.021***	**-0.030*****
	(0.312)	(-1.593)	(-0.664)	(-3.266)	(-1.855)	(-2.669)
Current ratio	**0.015*****	0.003	**0.015*****	0.001	0.013	0.002
	(5.470)	(1.258)	(4.348)	(0.358)	(0.853)	(0.137)
Leverage	0.016	-0.079	0.017	-0.032	0.005	0.046

	(0.313)	(-0.794)	(0.283)	(-0.528)	(0.066)	(0.497)
Patent count	**0.412****	0.093	**0.63*****	**0.621*****	**0.856*****	**0.787*****
	(1.988)	(0.371)	(3.682)	(3.852)	(3.850)	(3.205)
Patents prior	0.040	0.166	-0.142	0.044	-0.137	0.028
	(0.192)	(1.039)	(-0.615)	(0.195)	(-0.484)	(0.093)
Employee count	**0.479*****	**0.500*****	**0.472*****	**0.486*****	**0.418***	**0.565*****
	(3.445)	(4.705)	(3.079)	(3.972)	(1.909)	(2.940)
Board size	-0.434	-0.154	0.083	-0.314	-0.234	-0.319
	(-0.747)	(-0.394)	(0.153)	(-0.8)	(-0.363)	(-0.701)
Firm age	-0.016	-0.132	-0.180	-0.127	-0.202	-0.044
	(-0.123)	(-1.09)	(-1.177)	(-1.155)	(-1.528)	(-0.308)
Holding period	0.240	0.169	0.194	**0.239***	0.115	0.160
	(1.559)	(1.162)	(1.241)	(1.901)	(0.594)	(0.803)
VC chair	0.045	-0.238	0.211	**-0.594****	0.221	**-0.691****
	(0.152)	(-0.793)	(0.764)	(-2.200)	(0.537)	(-2.445)
CEO change	-0.141	-0.146	-0.241	-0.340	-0.181	-0.175
	(-0.647)	(-0.566)	(-0.972)	(-1.449)	(-0.679)	(-0.812)
Chair change	-0.030	-0.057	-0.011	0.329	-0.062	0.077
	(-0.116)	(-0.178)	(-0.043)	(1.064)	(-0.180)	(0.251)
CEO as chairman	0.073	0.339	0.118	0.252	-0.292	0.212
	(0.307)	(1.591)	(0.531)	(1.049)	(-1.135)	(0.502)
Female board	-0.046	0.069	-0.092	-0.035	0.179	**-0.512****
	(-0.201)	(0.384)	(-0.362)	(-0.207)	(0.629)	(-2.39)
Foreign VC	0.361	0.112	0.357	0.189	**0.669****	**0.712*****
	(1.503)	(0.600)	(1.573)	(0.986)	(2.425)	(2.739)
Syndication	-0.168	0.116	-0.075	0.134	-0.130	0.028
	(-0.651)	(0.681)	(-0.312)	(0.702)	(-0.471)	(0.100)
Government VC	0.093	-0.105	0.174	-0.091	0.162	-0.181
	(0.390)	(-0.714)	(0.659)	(-0.494)	(0.639)	(-0.734)
Tech industry	0.313	0.097	0.265	0.211	0.061	0.098
	(1.528)	(0.449)	(1.205)	(1.049)	(0.225)	(0.451)
Gaming dummy	0.642	0.170	-0.035	0.472	1.352	0.706
	(1.18)	(0.458)	(-0.066)	(0.847)	(1.465)	(1.494)
Constant	0.387	**0.847***	0.611	**0.978****	**1.315****	**1.448*****
	(0.703)	(1.835)	(1.143)	(2.401)	(2.325)	(3.098)

* p<0.1, ** p<0.05, *** p<0.01

Results shows that for sales growth, innovation in terms of patent count have statistically significant impact through all percentiles, indicating that one percentage point increase in patent activity have increasing impact on sales growth ranging between 41.2% and 85.6%. As for enterprise value growth, the significance is moderate, as 50th and 75th

percentiles remains highly significant. In terms of R&D costs, only 50th and 75th percentiles remain highly significant in relation to enterprise value, showing that R&D cost have roughly 3.0% decreasing impact. Interesting finding is that patents applied prior investment do not have statistically significant impact.

When observing change in corporate governance, impact on value creation remains weak. However, if VC has been nominated as chairman of the board, it has decreasing impact on the enterprise value growth. As the measure is binary variable resulting either values 1 or 0, in a such distribution when the median (50th) and highest (75th) percentile remains significant, we can presume that the relationship is significant. However, in terms of if board of directors has included female members, the decreasing impact on enterprise value growth shows significant only at 75th percentile. At the same time logistic regression 2 in table 6 shows statistically insignificant results for the relationship. As significance of finding is conflicting, the evidence is weak. Finding related to corporate governance are conflicting to prior studies, as consensus suggest that change of key executives and/or board members prior VC investments increases the professionalism, hence operative performance (see e.g. Pfeffer and Salanick, 1978; Zahara, Neubam and Huse, 2000).

In terms of fund types and Foreign VC involvement, only 75th percentile remains significant, even though logistic regressions 1 and 2 in table 6 shows significant results. Hence we can conclude that foreign VC involvement has increasing impact on both sales and enterprise value growth.

For firm efficiency impact on sales growth, asset turnover and current ratio remains statistically significant at 25th and 50th percentiles, while NWC has weaker explanatory power, as only at 25th percentile remains significant. In terms of enterprise value growth, interesting finding is that both increase in EBITDA-margin and employee efficiency shows to have negative impact in all percentiles. The relationship related to EBTIDA might be

due to that VC investors prefer highly growing firms over profitable. Hence more profitable firms have been less likely to be involved in follow-on financing rounds, and capitalizing unprofitable company increases the enterprise value, under assumption that business is burning cash.

6.2 Patent propensity

The aim of the logistic regression is to measure what are the factors that affects the propensity for a target company to apply new patents during the investment period. Innovation proxies are controlled Table 7 presents the results. Robustness of results have been tested by adding and removing main regressors in models 1-4.

Table 7. Patent propensity

This table presents the result of logistic regression where dependent variables is binary variable "New patents". Model uses heteroskedasticity consistent Huber-White standard errors and covariance. T-statistic is presented in parenthesis.

	(1)	(2)	(3)	(4)
Patent count	**0.236*** **		**0.297*** **	
	(5.927)		(7.589)	
Patents prior	**0.342*** **	**0.518*** **		
	(3.454)	(4.955)		
EBITDA	0.005	**0.023*** **	-0.004	**0.019***
	(0.645)	(2.686)	(-0.402)	(1.946)
Asset turnover	**-0.002** **	**-0.003*** **	-0.001	**-0.003*** **
	(-2.436)	(-3.599)	(-1.468)	(-3.433)
NWC	**0.001***	**0.002** **	0.001	**0.002** **
	(1.708)	(2.507)	(1.278)	(2.245)
Employee efficiency	0.011	**0.045*** **	-0.007	**0.036***
	(0.679)	(2.633)	(-0.385)	(1.821)
Development costs	**0.007** **	**0.014*** **	0.004	**0.013*** **
	(2.383)	(3.792)	(1.424)	(3.42)
Current ratio	0.001	0.000	0.000	0.000
	(1.296)	(0.457)	(0.361)	(0.119)
Leverage	0.014	-0.003	0.028	0.023
	(0.506)	(-0.091)	(1.073)	(0.744)
Employee count	0.007	0.019	-0.055	0.015
	(0.451)	(1.337)	(-1.089)	(0.835)
Board size	-0.007	0.025	-0.039	0.005

	(-0.115)	(0.368)	(-0.277)	(0.066)
Firm age	0.027	-0.013	0.055	0.032
	(0.621)	(-0.241)	(1.109)	(0.519)
Investment age	0.081	**0.130****	0.094	**0.161****
	(1.495)	(2.019)	(1.644)	(2.19)
VC chair	-0.131	-0.098	**-0.181***	-0.188
	(-1.361)	(-0.864)	(-1.735)	(-1.423)
CEO change	**-0.193***	-0.134	**-0.258****	-0.202
	(-1.96)	(-1.085)	(-2.603)	(-1.498)
Chair change	0.054	-0.009	0.191	0.165
	(0.490)	(-0.067)	(1.595)	(1.078)
CEO as chairman	-0.005	-0.081	-0.016	-0.131
	(-0.048)	(-0.645)	(-0.134)	(-0.902)
Female board	-0.093	-0.126	**-0.133***	**-0.22****
	(-1.099)	(-1.256)	(-1.687)	(-2.134)
Foreign VC	0.094	0.118	0.082	0.084
	(1.393)	(1.483)	(1.057)	(0.777)
Syndication	-0.010	0.075	0.013	0.138
	(-0.108)	(0.651)	(0.136)	(1.047)
Government VC	**0.163***	0.122	**0.218****	0.171
	(1.883)	(1.125)	(2.301)	(1.408)
Tech industry	-0.074	-0.039	**-0.151***	**-0.184***
	(-0.862)	(-0.401)	(-1.709)	(-1.75)
Gaming dummy	**-0.216***	-0.190	**-0.246***	-0.312
	(-1.903)	(-1.307)	(-1.874)	(-1.425)
Constant	0.040	0.027	0.139	0.158
	(0.299)	(0.174)	(0.808)	(0.906)
Sample observations	1 117	1 117	1 117	1 117
Firm observations	117	117	117	117
R-square	0.643	0.485	0.578	0.318
Adjusted R-square	0.555	0.364	0.480	0.167

* p<0.1, ** p<0.05, *** p<0.01

Results shows highly statistically significant relationship if target have applied patents prior investment, hence it has increased the propensity of applying new patents. In turn when observing change in corporate governance, if target company have nominated new CEO post investment or the board of directors have been including female members, it has decreased the propensity of applying new patents. However, the significance is moderate across the models.

Interesting finding is that GVC involvement shows at least slightly statistically significant impact for the likelihood applying patents post investment according to models 1 and 3. Finding is similar than Brander et al. (2010) and Bertoni and Tykova (2012) have made. When observing industry dummies, gaming and tech industries shows to have slightly statistically negative impact on the likelihood of applying new patents. Such phenomenon might be explained that nature of developing of games or running a software company do not require technology or immaterial rights that can be patented into a large extent.

Models seems to have moderate or weak fit in terms of R-square. In model 1 when regressing both patent count and patents prior show the best fit, as independent variables explains over 50% but less than 70% of the variation in dependent variable. Moreover, models are tested against normality, heteroscedasticity and serial correlation, and it does not show violation in any of the conditions.

The key findings related to innovation intensity can be concluded based on table 6 and 7. Table 6 shows that increase in innovation intensity have increasing impact on both value creation measures, hence financial performance post-investment. While table 7 indicates that VCs are investing in already innovative firms rather than increasing innovation intensity. Findings are similar than Engel and Keilbach (2007) and Caselli et al. (2009) have made. Hence we can reject the null hypothesis “increase in innovation intensity decreases financial performance of the target company”.

6.3 Foreign investors

The aim for the logistic regression method is to measure the factors affecting the propensity for a target company to attract foreign investors. Table 9 presents the results. Robustness of the results have been tested by adding and removing main regressors in models 1-4.

Table 8. Foreign VC prospensity

This table presents the result of logistic regression where dependent variable is binary variable "Foreign VC". Model uses heteroskedasticity consistent Huber-White standard errors and covariance. T-statistic is presented in parenthesis

	(1)	(2)	(3)	(4)
Sales growth	**0.118****	**0.130*****		
	(2.100)	(3.515)		
Enterprise value	0.030		**0.107****	
	(0.415)		(2.122)	
EBITDA	-0.004	-0.006	-0.002	-0.008
	(-0.242)	(-0.421)	(-0.167)	(-0.564)
Asset turnover	**0.002***	**0.003****	0.001	0.002
	(1.833)	(2.398)	(1.291)	(1.425)
NWC	**-0.003****	**-0.003*****	**-0.002****	**-0.002****
	(-2.463)	(-2.724)	(-2.244)	(-2.044)
Employee efficiency	-0.014	-0.018	-0.003	-0.012
	(-0.435)	(-0.65)	(-0.099)	(-0.442)
Development costs	-0.004	-0.005	-0.003	-0.005
	(-0.68)	(-0.973)	(-0.542)	(-0.802)
Current ratio	0.000	0.000	0.001	0.000
	(-0.254)	(-0.263)	(0.896)	(0.233)
Leverage	**-0.046***	**-0.048***	**-0.049***	**-0.053***
	(-1.683)	(-1.755)	(-1.737)	(-1.920)
Patent count	-0.041	-0.040	-0.013	0.035
	(-0.689)	(-0.685)	(-0.219)	(0.628)
Patents prior	-0.170	-0.156	-0.170	-0.146
	(-1.431)	(-1.365)	(-1.433)	(-1.238)
Employee count	-0.005	-0.003	0.000	0.021
	(-0.272)	(-0.164)	(-0.007)	(1.196)
Board size	0.032	0.035	0.039	0.039
	(0.256)	(0.945)	(1.067)	(0.287)
Firm age	0.024	0.017	0.019	0.000
	(0.355)	(0.265)	(0.278)	(0.003)
Investment age	-0.047	-0.041	-0.048	-0.021
	(-0.616)	(-0.533)	(-0.617)	(-0.27)
VC chair	0.011	0.024	0.079	0.015
	(0.072)	(0.158)	(0.555)	(0.097)
CEO change	-0.041	-0.028	-0.026	-0.068
	(-0.317)	(-0.215)	(-0.195)	(-0.51)
Chair change	0.040	0.020	0.009	0.052
	(0.255)	(0.126)	(0.057)	(0.335)
CEO as chairman	0.077	0.082	0.040	0.042
	(0.499)	(0.544)	(0.251)	(0.273)

Female board	0.076	0.071	0.089	0.054
	(0.655)	(0.585)	(0.771)	(0.449)
Syndication	**0.382*** **	**0.397*** **	**0.378*** **	**0.423*** **
	(3.772)	(4.069)	(3.621)	(4.241)
Government VC	**-0.252** **	**-0.259*** **	**-0.240** **	**-0.288*** **
	(-2.467)	(-2.651)	(-2.28)	(-2.801)
Gaming industry	-0.309	-0.312	-0.300	-0.184
	(-1.567)	(-1.590)	(-1.377)	(-0.872)
Tech industry	-0.084	-0.074	-0.076	-0.038
	(-0.811)	(-0.735)	(-0.703)	(-0.355)
Constant	**0.319***	**0.328***	**0.354** **	**0.443** **
	(1.896)	(1.964)	(2.078)	(2.565)
Sample observations	1 117	1 117	1 117	1 117
Firm observations	117	117	117	117
R-square	0.346	0.351	0.329	0.289
Adjusted R-square	0.175	0.190	0.163	0.123

* p<0.1, ** p<0.05, *** p<0.01

Related to value creation measures, results shows that only sales growth have been statistically significant impact on increasing the probability that foreign VC is going to be involved in the deal across the models.

In terms of other fund types, results shows that syndicates have been positively contributing to VC involvement, while GVC involvement have been negative impact on the likelihood of attracting foreign VCs. Positive relationship between syndicates and foreign VC involvement are similar than e.g. Cumming and Dai (2010), Moeser (2010) and Chemmanur et al. (2011) have found.

Another interesting finding related to financial health, as increase in both leverage ratio and short-term financial health (NWC) have been decreasing the propensity of foreign VC involvement. The relationship can be interpreted that foreign VCs avoid highly levered and financially unhealthy companies, or companies they have been invested in have more professional finance management procedures.

Most of the models seems to have weak fit in terms of R-square, as independent variables explains over 30% but less than 50% of the variation in dependent variable. Therefor

it indicates that there seems to be more other criteria that VCs consider in their investment decision. Moreover, models are tested against normality, heteroscedasticity and serial correlation, and it does not show violation in any of the conditions.

The key findings related to involvement of foreign VCs can conclude based on table 6 and table 8. According to table 6, we can conclude that foreign VC involvement has significant impact on increase in financial performance. Moreover, table 8 indicates strong evidence that increase in sales growth increases the propensity of foreign VC being involved. Hence, the null hypothesis “involvement of foreign VC decreases financial performance of the target company” can be rejected. Findings are similar than e.g. Frenhaber an McDougall-Covin (2009) and Lutz and George (2010) have made. However, our findings are slightly differing compared to Lockett et al. (2008) and Devigne et al.’s (2013), as we could not find any indication that firm age, hence firm development stage has differing impact on propensity of foreign VC involvement. In contrast, they have argued that foreign VCs have higher contribution on rather later- than early-stage firms.

7 Conclusion

This study investigates the innovation intensity and foreign VCs involvement impact on the financial performance of Finnish VC-backed companies based on actual executed exits between years 2005 and 2020. The study utilizes unique data set which comprises 117 exited deals, and the empirical analysis for post-investment value creation is executed utilizing logistic regression methods. The main results have been robustness checked by adding and removing main regressors in the models or employing quantile regression.

Theory part of this thesis comprises literature from European and U.S. due to lack of studies from Finnish VC industry. The theory part and covering the findings from prior empirical studies builds the foundation for the empirical analysis part. The academics have debated whether VC-backed companies are overperforming non-VC-backed equivalents, and what are they value creating activities behind the increase of target's financial performance. Most of the studies highlights innovation as one of the most crucial success factor for long-term performance. However, academics have debated about the contribution of the different fund types and whether they differ in terms of delivering firm value.

Prior empirical results related to innovation suggest that VCs have a significant role to spur the innovativeness in their target companies. However, among academics, there is also contradictory findings arguing that VCs are investing already innovative companies rather than pursuing the innovation. In terms of VC type, foreign VC involvement in the deal have seen in general having increasing impact on target company's performance. However, there are few arguments that suggest the contribution to be higher for later- than early-stage companies.

They key findings in relation to innovation shows that increase in innovation in terms of patent count have increasing impact to financial performance. However, VCs are investing in already innovative firms rather than increasing innovation intensity. Increase in

financial performance applies to both measures sales growth and enterprise growth, which of the latter have not been studied in prior studies. In terms of foreign capital, foreign VC involvement has significant impact on increase in financial performance in terms of sales growth. However, we could not find that firm age, hence development stage has differing impact on the ability to create value.

According to both our findings and prior academic evidence, innovation has seen as one of the key elements for sustainable financial growth. However, VCs contribution to accelerate the innovativeness of it its target companies leading superior financial performance can be questioned. Hence the secret recipe of such superior proceeds remains open. Prior literature suggest that it is crucial for VC to have access in deal flow, and hence screening the winning horses seems to be at least halfway to the success. On the other hand, target companies are short on growth funds and resources such as networks, and hence VCs involvement and sharing of proceeds occurred through superior financial growth seems to be justified.

Because of the supposition that there is a lot of factors outside of the VCs' magic wand sphere of influence affecting the increase in financial performance, this study could be extended in the future by examining for instance founder's capabilities related to characteristics such as whether education and their prior VC experience have impact on creating firm value. Another point of view could be examining VCs reputational impact on financial performance, in other words, whether VCs involved in successful exits have been able to duplicate the recipe.

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Appendices

Appendix 1. NACE Rev. 2 industry codes detailed

Code	NACE Rev. 2 description	Count
09	Mining support service activities	1
20	Manufacture of chemicals and chemical products	2
22	Manufacture of rubber and plastic products	1
26	Manufacture of computer, electronic and optical products	6
27	Manufacture of electrical equipment	3
28	Manufacture of machinery and equipment n.e.c.	2
31	Manufacture of furniture	1
32	Other manufacturing	3
35	Electricity, gas, steam and air conditioning supply	1
38	Waste collection, treatment and disposal activities; materials recovery	1
46	Wholesale trade, except of motor vehicles and motorcycles	2
47	Retail trade, except of motor vehicles and motorcycles	1
58	Publishing activities	3
61	Telecommunications	2
62	Computer programming, consultancy and related activities	60
63	Information service activities	7
66	Activities auxiliary to financial services and insurance activities	1
70	Activities of head offices; management consultancy activities	2
71	Architectural and engineering activities; technical testing and analysis	4
72	Scientific research and development	8
74	Other professional, scientific and technical activities	2
86	Human health activities	3
93	Sports activities and amusement and recreation activities	1
Total		**117**