

**A Study on the Composition of the Investment Portfolio of German Venture
Capital Firms: Which Factors Influence the Decision of German VCFs to
Diversify or Specialize along the Industry and Geographic Dimension?**

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Resumo

O presente trabalho tem como objectivo ampliar a investigação sobre as estratégias de investimento de fundos de capital de risco alemães. Analisa os factores sectoriais e regionais específicos que influenciam a diversificação e especialização das estratégias de VCFs, ao longo dessas dimensões geográficas e de sector. Com esse intuito, foi aplicado um inquérito para determinar o foco de investimento e classificar a relevância de cada factor, analisando assim os seus padrões subjacentes. Uma avaliação dos dados sobre a relevância dos factores e estratégia do portfólio evidencia que as variáveis internas, incluindo: experiência histórica e conhecimento sobre um sector são mais relevantes para os VCFs especializados num sector em particular do que as condições externas que abranjam factores de mercado específicos dos sectores. Por sua vez, as variáveis externas recebem maior relevância dos VCFs que prosseguem uma estratégia de diversificação de sectores. No entanto, não foi encontrada nenhuma evidência estatística que os VCFs especializem-se num sector em particular devido ao nível de conhecimento da sua equipa nesse sector. Inclusive, a análise verifica que VCFs com uma estratégia diversificada atribuem maior importância aos riscos específicos dos sectores. O estudo conclui que o investimento é diversificado em vários sectores de forma a mitigar os riscos idiossincráticos associados a um sector específico, o que corrobora a teoria moderna do portfólio. Outra conclusão demonstra que os VCF's especializam-se numa determinada região devido a diferenças nos quadros legislativos e regulatórios entre países. Esta dissertação propõe uma *framework* para os factores mais relevantes que influenciam as estratégias de investimento dos VCF's e a sua consequente selecção de portfólio.

JEL: G11: Escolha da carteira, Decisões de investimento

G24: Capital de risco

Palavras-chave: Capital de risco, Especialização, Diversificação, Alemanha

Abstract

This dissertation is conducted to extend the research on independent German Venture Capital Firms' investment strategies. It analyzes the regional and industry specific factors that influence the VCF's diversification and specialization strategies along the geographic and industry dimension. A survey determining the investment focus and rating the relevance of each factor was administered to analyze the underlying patterns. An assessment of data on factor ratings and portfolio strategies discloses that internal factors, including: track record and expertise within the industry are more relevant to VCFs specializing on a particular industry than external factors that comprise industry specific market factors. In correspondence, the external factors receive higher relevance from VCFs following an industry diversification strategy. However, there is no statistical evidence that VCFs specialize on a particular industry because of the team's level of expertise within the industry. Further, the analysis presents that diversified VCFs assign higher significance to industry specific risk. The dissertation concludes that they diversify across industries to mitigate idiosyncratic risk associated with a single industry, which supports modern portfolio theory. Another finding depicts that VCFs specialize on a particular region because of differences in legal and regulatory frameworks across countries. This dissertation constructs a framework for the most relevant factors that are influencing VCF's investment strategies and resulting portfolio selections.

JEL: G11: Portfolio Choice, Investment Decision

G24: Venture Capital

Key words: Venture Capital, Specialization, Diversification, Germany

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Declaration of Honor

Dissertation delivery

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List of Abbreviations

Adtech	Advertising Technology
AI	Artificial Intelligence
AR	Augmented Reality
B2B	Business to Business
BVK	Bundesverband Deutscher Kapitalbeteiligungsgesellschaften (German Private Equity and Venture Capital Association)
CAPM	Capital Asset Pricing Model
CVC	Corporate Venture Capital
E-Sports	Electronic Sports
EUR	Euro
Fintech	Financial Technology
GP	General Partner
ICT	Information and Communication Technology
IPO	Initial Public Offering
LP	Limited Partner
M&A	Mergers & Acquisitions
Mdn	Median
MNC	Multinational Corporation
MPT	Modern Portfolio Theory
n	Number of observations
NTBF	New Technology Based Firm
R&D	Research & Development
SaaS	Software as a Service
SPSS	Statistical Package for the Social Sciences
TMT	Top Management Team
US	United States of America
USD	US Dollar
VC	Venture Capital
VCF	Venture Capital Firm
VR	Virtual Reality

1 Introduction

Venture capital is highly important for the financing and development of young and innovative companies, which operate in emerging, fast growing, and high-technology industries. For these companies the expertise of the venture capital firms (VCFs), their knowledge of markets, their financial support, and their business contacts are extremely valuable to realize the growth potential of the start-up (Bottazzi, et al., 2004; Gompers, 1995; Lerner, 1995). In 2016, venture funding reached 933.8 million EUR in Germany – excluding buyouts, growth, and turnaround investments – Germany’s total private equity deal volume reached 5.69 billion EUR (see Appendix I & II). In 2016, Germany was Europe’s second biggest market after the UK for VC deals (KPMG, 2017). Overall, venture capital is a main driver for Germany’s technological advancement, innovation, and contributes to the overall economic growth of the country (EY, 2016). The area of investigation lies in the investment portfolio composition of German venture capital firms. More precisely, the dissertation looks at the underlying factors that influence the decision of German VCFs to specialize on a specific industry or selected industries and on a specific region¹ or selected regions, plus the factors that drive VCFs to diversify across regions and industries. However, the factors are not analyzed in regards to the VCF’s fund size, headcount, and performance. Also, the dissertation does not cover syndication strategies between German VCFs.

The dissertation is empirically based on a survey sent out to 120 German independent VCFs (see Appendix VI). The final sample comprises 32 valid responses. The analysis of the survey responses depicts the significance of each factor. In addition, it looks at the similarities and differences between German VCFs that are grouped according to their respective investment strategies. Moreover, it establishes relationships and patterns amongst the regional and industry specific factors and tests four hypotheses corresponding to previous research and findings within the venture capital industry.

Although there are numerous types of VCFs, including: independent, institutional, and corporate VCFs and each individual setup will have different implications on the factors that influence their investment strategy, the dissertation’s focus is set on independent VCFs. The

¹ The terms region and geography are used interchangeably throughout this dissertation.

exclusion of the captive² VCFs insures that factors such as the corporate strategy of the parent company, or regional development motivations of governmentally backed VCFs will not impact the results of this dissertation (Carpenter et al., 2004). These exclusions intend to lead the empirical findings toward more precise and unbiased factors that influence the VCFs decision to diversify or specialize along the geographic and industry dimension.

The aim is to capture the most important factors that are influencing VCFs' specialization and diversification strategies, and thus determine the pre-selection bias of VCFs. In general, this dissertation aspires to build a framework regarding the underlying factors for diversification and specialization strategies of VCFs, plus to provide deeper insights into an industry that is shaping our technological development (Florida and Kenney, 1988; Samalia and Sorenson, 2009). Past research studies in the same field have focused on diversification and specialization strategies in the US to investigate specific investment strategies in regards to industry sector, geography, fund type, fund size, venture stage, and profitability. However, all these studies did not specifically focus on the underlying factors that provoke the VCFs to follow a particular strategy (Cumming, 2006; Kanninen and Keuschnigg, 2003; Cumming and Dai, 2009; Gupta and Sapienza, 1992; Norton and Tenenbaum, 1993, Patzelt et al., 2008; Gompers et al., 2009).

² Captive VCF = A venture capital firm that raises capital from their parent organisation and has no or limited outside investors. These firms are generally subsidiaries of financial institutions, corporations, governments, and universities (Rocca, 2017).

2 Overview of the German Venture Capital Market

2.1 Definition of Venture Capital

As stated in section 1, venture capital describes equity stakes in unlisted small and medium-sized enterprises that are considered to have a large growth potential. However, there are variations in the definition across the globe up to which stage in the company's life-cycle investments should be considered venture capital investments. The Anglo-American definition of venture capital considers merely the venture deals that occur in early stages of a firm's life-cycle. In contrast to that, the broader definitions that are prevailing in Europe and Asia also include later stage growth financing, buyouts, mezzanine financing, and turnarounds in the definition of venture capital (Deutsche Bundesbank, 2000). In order to gain a complete and non-skewed picture of the German venture capital market this dissertation will consider the latter, as a number of German VCFs invest across different stages in a company's life-cycle to diversify their portfolio across venture stages, and thus would have to be excluded from the sample under the first definition. Additionally, the broader definition allows for an analysis regarding the differences and similarities of the influencing factors in respect to the VCF's venture stage focus³; respective results are presented in section 7.2.3 and 7.2.4.

2.2 The Venture Capital Market in Germany

Over the past eight years, venture capital investment volumes have increased by 41.7% in Germany. They grew from 658.9 million EUR in 2009 up to 933.8 million EUR in 2016 (see Appendix I)⁴. In the last three years seed capital investments and later stage funding exhibit the largest increase in funding volumes with an increase of 58.8% and 100.8%, respectively. By contrast, early stage investments remained rather stagnant over the past 3 years (see Appendix I). However, the majority of growth investments and later-stage financing rounds in Germany are still led by international investors, most noticeable is this effect in Berlin, where 77% of all financing rounds are still led by non-locals (Friedrich, 2016). On the plus side, this indicates further development potential of the German growth and late stage financing market (EY, 2017). In addition, despite that the number of VC deals is slightly decreasing with 724 ventures

³ The dissertation considers three stages of venture capital financing, namely: early stage financing; expansion stage financing, and late stage investments.

⁴ Note: Following numbers about the German venture capital market are extracted from the BVK database and comprise seed investments, early-stage investments, and later stage investments.

funded in 2015 opposed to 966 ventures funded in 2010, the individual deal volumes have been increasing, resulting in an overall increase in venture capital funding in Germany (BVK, 2017a). These developments present a trend towards greater deal scrutiny, higher valuation levels, and larger individual ticket sizes (KPMG, 2017; EY, 2017).

Key locations for venture capital funding in Germany are its major cities. Albeit, looking at Germany's venture capital market by state reveals that Berlin and Bavaria account for 70% of all venture capital funding in Germany (EY, 2017; see Appendix III). In addition, 63% of the German top 100 start-ups⁵ are based in Berlin, demonstrating that Germany's capital remains at the center of the German VC eco-system (EY, 2017; see Appendix IV). The fundraising of the German private equity market amounted to 2.33 billion EUR in 2016 compared to 1.13 billion EUR in 2009, depicting a healthy development over the past 8 years (see Appendix V). Furthermore, major independent and institutional funds with investment activities in the German VC market disclosed aggregated fund volumes of over 6 billion EUR in 2016, including large foreign VCFs such as: Accel, Atomico, EQT, Verdane Capital; and VCFs that are backed by large multinational corporations (MNCs), including SAP, BMW, Allianz, Porsche, and Siemens (EY, 2017). In addition, Rocket Internet one of the largest VCFs in the German VC eco-system disclosed a funding volume of 795.97 million EUR⁶ in November 2016 (EY, 2017). Since 2012, Rocket Internet participated in 80% of the +50 million EUR funding rounds in Germany, making it a key player for later stage funding in Germany (Frontline Ventures and Point 9 Capital, 2016). In 2013⁷, according to the BVK (2017a) all private equity and venture capital funds in Germany were raised from the following investors: 30.2% private investors, 16.3% insurances, 13.3% funds of funds, 13% pension funds, 10.4% family offices, 5.2% foundations, 3.3% public sector, 1.6% financial institutions, 0.5% corporates, 0.5% asset manager, 5.9% unknown.

Turning to the market trends that developed over the past couple of years, the following sectors were very prominent: food, retail, fintech, adtech, software, and healthtech (EY, 2017; Prequin, 2016). The BVK statistics for 2016 reveal that three quarters of private equity investment volumes are constituted of business to business (B2B) products and services, information and communication technology (ICT), and consumer goods and services (BVK, 2017a).

⁵ Including Unicorns such as: Delivery Hero, Auto 1, and Hello Fresh, as well as emerging Unicorns like Check24 and Kreditech (EY, 2017).

⁶ Calculated with an USD/EUR exchange rate of 0.92, date: 03.05.2017.

⁷ The numbers for 2016 displayed in the statistics of the BVK showed very high levels of unknown sources with over 90%, and thus are not displayed in this dissertation as of their limitations regarding their significance (BVK, 2017a).

Looking at the global VC market, the US market declined significantly in both VC deals and VC investments in 2016, after two strong years. Total investment volumes dropped down to 63.29 billion EUR⁶, compared to 72.64 billion EUR⁶ in 2015 (KPMG, 2017). In addition to that, Europe also experienced a drop in both, VC funding and VC deals in 2016 over the previous year, however in comparison with its counterparts Asia and Americas, the region displayed more resilience in the fourth quarter of 2016 (KPMG, 2017). Overall, the outlook for the European VC market is positive, with new technology hubs emerging in Scandinavia and France, plus established hubs in the UK, Germany, and Ireland continue to evolve (KPMG, 2017). Furthermore, it is anticipated that fintech, software as a service (SaaS), and healthtech sectors will stay strong areas for VC investments in Europe and that emerging sectors such as artificial intelligence (AI), augmented reality and virtual reality (AR/VR), machine learning, and electronic sports (E-Sports) will become more relevant over the next years (GP Bullhound, 2016; KPMG 2017). The outlook on the German VC market predicts that the interest from non-European VCFs will increase, the Brexit will continue to expedite the German VC eco-system, and Germany will surpass the UK in total VC funding (Frontline Ventures and Point 9 Capital, 2016).

3 Literature Review

Previous research about the venture capital industry focused on investigating and finding evidence on investment strategies, fund performances, and the economic implications of venture capital. Research on investment strategies includes specialization as well as diversification strategies regarding industry sector, geography, fund size, fund type, and venture stage (Cressy et al., 2012; Cumming, 2006; Kannianen and Keuschnigg, 2003; Cumming and Dai, 2009; Gupta and Sapienza, 1992; Norton and Tenenbaum, 1993, Patzelt et al., 2008; Gompers et al., 2009). In addition, studies regarding VCFs' investment strategies also investigated syndication evidence and networking effects within the venture capital industry (Bruining et al., 2005; Gompers and Lerner, 1999; Cumming and Walz, 2010; Sorenson and Stuart, 2001; Lerner, 1994). For instance, the study by Cumming and Walz (2010) provides empirical evidence that syndication increases the investment returns of VCFs, which is consistent with the view of Lerner (1994) that the syndication of venture capital investments adds value. Next, studies tied to fund performance measured the success of each VCF either by the number of exits via IPOs and trade sales from their respective investment portfolios or by the fund returns of the VCF. Most studies that investigate fund performance are associated with specialization and diversification strategies, regarding: industry, geography, fund size, and venture stage, and thus will be further reviewed in section 3.3 of this dissertation (Cressy et al., 2012; Gompers et al., 2009; Bartkus and Hassan, 2009; Gao, 2011). Last, research that investigates the economic implications of venture capital evidences that an increased supply of venture capital funding within a region has positive effects on the number of emerging new ventures, the level of employment, and the overall income within the region (Samalia and Sorenson, 2009). Moreover, VC literature finds that higher levels of venture capital funding leads to an increase in patent rates and therefore contributes significantly to the intensity of technological development and level of innovation within the region (Kortum and Lerner, 2000). On top of that, VC has helped to overcome an array of barriers to technological innovation, including the lethargy of established corporations, the risk aversion of financial markets, and the financial requirements to foster technological change (Florida and Kenney, 1988). Empirical research related to the dissertation on the factors that influence German VCFs to diversify or specialize along the geographic and industry dimension can broadly be categorized into three main areas: (1) diversification evidence from the venture capital industry (2) specialization evidence from the venture capital industry (3) and venture capital portfolio strategies in relation to fund performance.

3.1 Diversification Evidence from the VC Industry

Modern portfolio theory (MPT), argues that diversification across an investment portfolio is the optimal approach to minimize unsystematic risk (Bartkus and Hassan, 2009; Markowitz 1952; Sharpe, 1964). Building upon this theory various researchers investigated diversification strategies within the VC industry. For instance, Cumming and Dai (2009) focus on the local bias in VC investments. Their regression analysis on 122,248 company-round observations from 1,908 VCFs illustrates that more reputable⁸ VCFs exhibit less local bias opposed to VCFs without a comparable reputation, suggesting higher levels of regional diversification. Furthermore, Zhang, Templeton, and Gallo's (2015) study finds that portfolio strategies that incorporate related diversification⁹ are associated with better VC fund performance. In order to extract these findings, their study applies a panel regression analysis on US based VCFs. Furthermore, the regression analysis of Patzelt, zu Knyphausen-Aufseß, and Fischer (2008) on 136 European based VCFs reveals that top management teams (TMTs) with stronger backgrounds in management education diversify their portfolios more across industries. Additionally, they find that more international experience amongst the TMT members leads to higher levels of diversification regarding the scope of their investment portfolio. Their data was retrieved from the European Venture Capital Association database. Their analysis rests on the upper echelon theory, suggesting that strategic decisions at the organizational level – e.g. the choice of the VCF's portfolio strategy – are concluded by entire top management teams (TMTs) rather than individual VC managers. An additional study by Cumming (2006) that focused on the portfolio size of VCFs shows that VC funds with more managers also have larger portfolios. The portfolio size is affected by the composition of the portfolio in terms of high-tech and early stage. Additionally, portfolio sizes are larger during boom periods. The results were obtained through a regression analysis on 214 Canadian venture capital funds. Further research by Kang, Burton, and Mitchell (2011) developed a decision model for VC specialization and diversification strategies, in which the key factors were denominated as: potential knowledge transfer between projects and the consideration of post-investment monitoring and management assistance. Their study reveals that VC post-investment monitoring and management assistance is a non-monotonic function of strong performance variations, especially for highly diversified VCFs. Matusik and Fitza (2012) focus their study on the degree of diversification in relation to the performance of the VCF. They identified a U-shaped relation between performance and the level of diversification. Hence, performance levels rise for both, highly diversified VCFs and

⁸ reputable VCFs = VCFs that are longer operating, with greater IPO exit track records, and broader networks

⁹ related diversification = portfolio extension on ventures operating in similar industries as existing ones

low diversified (specialized) VCFs. VCFs with moderate diversification levels accounted for the worst results within their sample of 4,583 VCFs. Their study used data from VentureXpert and covered investments over a 40-year period from 1960 until 2000. The results were produced by a regression analysis.

3.2 Specialization Evidence from the VC Industry

Financial intermediation theory and resource based theory, point out that lower financial risk associated with diversification implies lower returns (Barney, 1996; Allen and Santomero, 1998; Cressy et al., 2012). Furthermore, resource based theory looks at the firm's resources and individual capabilities. It suggests that a firm's unique ways to source knowledge and learn result in firm-specific core competencies (Pavitt, 1991; Teece et al., 1990). Looking at specialization evidence, Norton and Tenenbaum's (1993) investigate the information sharing and networking view, established by Bygrave (1987). Bygrave's view suggests that in order to control risk VCFs should focus on one specific or a few connected stages, rather than diversify across all venture stages. Norton and Tenenbaum's (1993) survey on 98 VCFs unveils that early stage investors show lower levels of diversification along the industry dimension. Moreover, VCFs which are strongly participating in seed rounds show less venture and industry diversification compared to VCFs that diversify across venture stages. Other studies find similar evidence in regards to early stage investors and their investment focus, for instance Gupta and Sapienza (1992) who statistically analyzed 169 US based VCFs – data extracted from Pratt's Guide – present that VCFs specializing in early stage ventures favor less industry diversity and a narrower geographic scope opposed to VCFs that focus on later stage businesses. Furthermore, the study of Patzelt, zu Knyphausen-Aufseß, and Fischer (2008) on the composition of TMTs in VCFs and their influences on portfolio strategies depicts that a higher proportion of TMT partners with a background in science or engineering and entrepreneurial experience are more likely to invest in early stage ventures. Besides that, Kang, Burton, and Mitchell (2011) find that cross-sectional and sequential knowledge transfers enhance the performance of VCFs following a specialization strategy over VCFs holding diversified venture portfolios. Opposed to this finding, Knill (2009) argues that neither a diversification strategy, nor a "pure-play" or specialization strategy optimizes VC growth and the duration to exit. She highlights the urgency for limited partners to define fund objectives at the time of the fund's establishment.

3.3 VC portfolio strategies related to fund performance

Empirical research about diversification and specialization strategies in relation to the level of venture success or performance of the respective VCF's portfolio has been conducted by several researchers. Gompers, Covner, and Lerner (2009) show that VCFs with more investment specialists¹⁰ within their team tend to outperform VCFs with a team of generalists¹¹. Their initial hypothesis suggested otherwise by indicating that generalists would be better at allocating capital across industries. They obtained this result by conducting a cross-tabulation analysis as well as a regression analysis on 3,518 venture capitalists from 822 VCFs extracted from the VentureOne database. An additional result of their study shows that the respective experience of a VCF is another important factor influencing performance, since VCFs with more experience tend to outperform the ones with fewer experience in venture capital financing. The research paper by Cressy, Malipiero, and Munari (2012) also looked at the diversification efforts of VCFs in relation to the overall performance of the fund. Their sample study of 649 VC funds from the UK – extracted from the Venture Expert database – reveals on one hand that higher diversification by industry does in fact lower VC fund success rates. On the other hand, it shows that geographical diversification by region does increase returns of the respective VCF. They obtained the results by applying a number of regression analyses including the use of the Quasi-Maximum Likelihood Estimator (QLME) regression model. Bartkus and Hassan (2009) depict that VCFs diversify across various venture stages in order to yield better results measured in the number of IPOs and trade sales of their portfolio ventures. Their data sample stems from the VentureXpert database and includes 1,247 US VC funds. The results were obtained via a multivariate two-limit tobit model. They also find that industry specialization has no significant impact on a VCF's success rate. Gao (2011) also looks at portfolio performances of VCFs who follow specialization strategies for selected industries. He finds a positive relation between these strategies and portfolio performance. On top of that, his regression analysis on 188,489 company-round observations of VC backed companies evidences that early stage investors are more specialized compared to VCFs that invest in more developed businesses. He retrieved his sample from the VentureXpert database.

The literature review reveals various studies that focused on diversification and specialization strategies along the geographic and industry dimension. However, it also shows that there is not a case of detecting the underlying factors for those strategies. Moreover, various factor analyses

¹⁰ Specialists = investment professionals with industry experience

¹¹ Generalists = investment professionals with an education background in management

within the venture capital industry mainly focused on the selection process of venture proposals rather than on VCFs' investment strategies, e.g. Macmillan, Siegel, and Subba Narashimha (1985) with their study on the criteria that is used by venture capitalist investors to evaluate new venture proposals or the study by Kaplan and Strömberg (2000) which investigates how venture capital investors choose their investments.

To sum up, most studies looked at empirical evidence for diversification and specialization strategies and their influences on the performance of the venture fund. The most common methodology applied to assess the data of these studies has been the statistical analysis of the sample via a regression analysis. Most research focused on the US market, as it is the largest market for venture capital investments, offering sufficient data on the venture capital industry. Most common sources for the analyzed samples included: Dow Jones VentureSource, VentureXpert, and Pratt's Guide to Private Equity and Venture Capital Sources (Dow Jones Venture Source, 2016; Thomson One, 2016; Pratt, 2015).

4 Theory and Hypothesis Development

The composition of the TMTs influences business strategies on an organizational level, as suggested by the upper echelon theory (Hambrick and Mason, 1984). In the past, various researchers referred to the upper echelon theory in order to investigate cognitive characteristics of managers as well as indications for TMTs strategic inclinations (Carpenter et al., 2004; Grimm and Smith, 1991; Hambrick and Mason, 1984; Jensen and Zajac, 2004; Michel and Hambrick, 1992; Patzelt et al., 2009). Patzelt, zu Knyphauser-Aufseß, and Fischer (2009) – who analyze to which degree the composition of TMTs affects the portfolio strategy selection of VCFs – argue that education and professional experiences are both relevant factors that influence the perceptions of general partners (GPs) in VCFs and thus their portfolio strategy choice. Furthermore, the study by Gompers, Kovner, and Lerner (2009) finds a positive relationship between the degree of specialization of a VCF and its success. Building on their findings, this dissertation investigates the significance of the TMT's level of expertise – gained through their professional experience in the industry – for German VCFs that follow an industry specialization strategy. Taking the previous research into account, the following hypothesis should be true:

H₁: VCFs specialize on an industry or selected industries because of the level of expertise within the industry amongst the firms' team members, therefore VCFs following an industry specialization strategy assign higher relevance to this factor compared to VCFs that diversify across industries.

H_a: There is no significant difference between the two groups.

An additional theory relevant to this dissertation is the resource-based theory (Barney, 1996). This theory looks at the firm's resources and capabilities and suggests that firms have unique methods of learning and knowledge gathering, resulting in capabilities and competencies that are specific to the firm (Pavitt, 1991; Teece et al., 1990). This theory implicates that the scope of specialization of VCFs is closely related to the creation of core competencies. In order to accurately evaluate investment proposals, appropriately monitor portfolio ventures, and to provide valuable management support a VCF needs to acquire particular skill sets. One approach is to specialize on a particular region or selected geographies (Christensen, 2007). By contrast, traditional financial theory suggests to diversify investments to reduce risks, however

the nature¹² of venture capital investments entails that the mitigation of risk can be attained by specializing in certain investment fields (Christensen, 2007). The second hypothesis further investigates this theory by looking at the track record within the region.

H₂: VCFs specialize on a specific geography or selected regions because of their core competencies within the region, and thus VCFs that specialize on a specific region impute a higher rating to the track record within the region opposed to VCFs that diversify across regions.

H_a: There is no significant difference between the two groups.

Furthermore, previous research has proven that VCFs seek to mitigate and control risk (Driscoll 1974; MacMillan et al., 1985). One method to manage risk is the screening and selection process of the portfolio ventures, where only 1-3% of the analysed proposals receive VC funding (Norton and Tenenbaum, 1993). Additionally, VCFs try to mitigate and control risks even further by managing micro risk¹³ and macro risk¹⁴ (Norton and Tenenbaum, 1993). Looking at macro risk in more detail, modern portfolio theory (MPT) suggests that investors can reduce their unsystematic risk by diversifying their portfolio across ventures and markets (Markowitz, 1959). Furthermore, under the assumptions of the capital asset pricing model (CAPM), financial markets only reward systematic risk (market risk) with greater returns, illustrating that exposure to unsystematic risk is not rewarded (Sharpe, 1964). However, VCFs are exposed to high levels of unsystematic risk in each of their portfolio ventures, thus following hypothesis is tested:

H₃: VCFs diversify across multiple industries in order to reduce idiosyncratic risk associated with a single industry, and thus VCFs following an industry diversification strategy assign higher relevance to industry specific risk compared to VCFs that specialize on a particular industry.

H_a: There is no significant difference between the two groups.

Next, numerous researchers report that the European venture capital market has shown slower development patterns compared to the US market, since a variety of institutional and market factors have strong impacts on the supply of venture capital in Europe (Cowie, 1999; Martin et

¹² Venture capital investments are mostly unique as the term innovative and young ventures suggests, resulting in individual monitoring and information processes. Therefore, the VCF's ability to learn from each deal entails a large degree of sunk cost (Christensen, 2007).

¹³ Micro risk = all risks occurring on an individual investment basis

¹⁴ Macro risk = all risks occurring on a portfolio basis

al., 2002; Wright et al., 1999). Martin, Sunley, and Turner (2002) also state that there are significant disparities in legal, fiscal, and regulatory frameworks across the European countries. Moreover, they argue that the fiscal and regulatory complexity has inflicted negative consequences on the demand and supply of venture capital in Europe. Building on their work following hypothesis is tested:

H₄: VCFs specialize on a particular region because of differences in legal and regulatory frameworks across countries, hence VCFs that follow a regional specialization strategy will rate the region's laws and regulations higher than VCFs that diversify across regions.

H_a: There is no significant difference between the two groups.

To sum up, all hypotheses stated above are tested for their validity against the responses from the selected sample. Their individual significance on the investment strategies and resulting portfolio selections of German VCFs is depicted in the section 7.4.

5 Data and Sources

In contrast to “Fortune 500” businesses or stock listed companies, the majority of VCFs are either privately held corporations or subsidiaries of larger parent companies (Gupta and Sapienza, 1992). Thus, there is very limited publicly available information on their investment strategies and the underlying factors behind their strategic decisions. The lack of publicly available data on independent German VCFs and the factors that influence their investment strategies, contributed to the decision to use a survey as the main empirical tool of this dissertation. This survey was sent out to 120 German independent VCFs. Similar methods have been used by various researchers analyzing the VC industry (e.g. Gupta and Sapienza, 1992; Macmillan et al., 1985). The sample represents a selection of merely independent VCFs, all captive VCFs are excluded from the sample. A second condition for the sample selection was that only VCFs that are based in Germany were included in the sample. The identification of the sample resulted from various sources, including the membership database of the German Private Equity and Venture Capital Association e.V., the Ernst and Young report on Venture Capital and Start-ups in Germany 2016, and mailing lists from previous fundraising activities in Germany (BVK, 2016; EY, 2017). The majority of independent VCFs were selected from the membership database of the BVK, as it provided a good coverage of the German VC market with over 70 VCFs that met the selection criteria. Two additional sources were added to increase the sample size in order to reach higher significance levels and to enhance the randomness of the sample selection. The link to the questionnaire was send out via Email to the selected VCFs; the online survey tool Survio automatically collected the responses. According to modern survey methodology, the two main flaws of this method are the quality of the data and a low response rate. In order to minimize these flaws, the response rate was increased via sequential submission reminders to reach the highest possible response rate and coverage of the German VC industry. Moreover, to insure a better quality of the data, there was an extensive analysis and testing while formulating the questionnaire and, additionally, the received responses were checked for internal consistency. As a result of this process, one response was excluded from the analysis, as the response entailed many discrepancies. Furthermore, out of the 120 selected VCFs 33 VCFs participated in the survey, thus a response rate of 27.5% was achieved. However, since one response was excluded only 32 responses were analyzed.

The survey consisted of three pages¹⁵. The first page comprised six question to determine the key aspects of the firm: current fund volume, headcount, investment sweet spot¹⁶, as well as information on their investment strategy, including: venture stage focus, industries of interest, plus geographic and or industry specific specialization or diversification. The second page required the respondent to rate the industry specific factors on a four point Likert scale, where four denotes factors that are highly relevant to VCFs' investment strategies and one denotes factors that are the least important to their investment strategy. The third page was structured in a similar way, asking the respondent to rate the geography specific factors. The factors were pre-selected by investigating previous research studies on the VC industry, including the works of: Bartkus and Hassan, 2009; Christensen, 2007; Cressy et al., 2012; Cumming and Dai, 2009; Gao, 2011; Gompers and Lerner, 2001; Gompers et al., 2009; Gupta and Sapienza, 1992; Kannianen and Keuschnigg, 2003; Norton and Tenenbaum, 1993; Macmillan et al., 1985; Matusik and Fitza, 2012; Patzelt et al., 2009; and Zhang et al., 2015. Additionally, the factors were examined and validated by the supervisor of this dissertation. The factors will be presented in more detail in section 7.

¹⁵ A copy of the survey is attached, see Appendix V

¹⁶ Sweet spot = range of typical investment size targeted by the firm

6 Methodology

This dissertation applies several statistical methods in order to analyze the results obtained from the surveyed sample. First, the dissertation displays descriptive statistics, including: mode, range, frequencies, minima, and maxima of all industry and geography related factors, in order to characterize the obtained responses. These statistical measures are applied, since the data was gathered on an ordinal scale (Allen and Seaman, 2007). In addition, this analysis reveals the significance of each factor in regards to the overall investment strategies of German VCFs. The results are individually assessed in respect to the factors under analysis. Furthermore, the medians of the factor ratings are presented in order to analyze and compare the regional and industry specific factors in regards to the VCFs specific diversification and specialization strategies. Additionally, the analysis looks at the regional and industry specific factors in regards to the venture stage focus of the VCFs within the sample. Next, two principal component analyses are applied in order to determine if the responses of the VCFs show specific relationships and patterns within the industry specific factors as well as the regional factors. An oblique¹⁷ rotation method is selected, since correlations amongst the factors cannot be excluded. Furthermore, the Kaiser criterion is utilized, hence only eigenvalues¹⁸ greater than 1 calculated for the correlation matrix are selected to determine the number of components within the model (Kaiser, 1960). Microsoft Excel and IBM SPSS Statistics are used to perform the statistical computations for this dissertation. Factors rated as not relevant are removed from the analysis to concentrate on the relevant factors within the sample. Similar methods were applied by Macmillan, Siegel, and Subba Narasimha (1985) who studied the criteria used by VCFs to evaluate new venture proposals to identify the underlying patterns within the sample. Finally, the four hypotheses stated in section 4 are tested for statistical significance. The dissertation applies a non-parametric test, the Mann-Whitney U test. This test is used to determine the difference between the medians of the two groups of VCFs following their respective investment strategy. Additionally, it is the preferred method to analyze data aggregated on an ordinal scale, since it encompasses fewer statistical assumptions, e.g. even though it does assume the same distribution and variance between the two groups, it does not assume any particular distribution, such as a normal distribution (Allen and Seaman, 2007; DeCoster, 2006).

¹⁷ Oblique rotation = a rotation method that allows for correlation amongst the factors

¹⁸ Eigenvalues = a special set of scalars related to a linear system of equations, e.g. a matrix equation (Weisstein, 2017).

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The analysis also looks at the frequencies in order to determine which factors were assigned greater significance when comparing the VCFs in regards to their respective investment strategies.

7 Analysis and Results

The analysis considers specialization and diversification strategies along the geographic and industry dimension. The industry specific factors considered by this dissertation are: the growth potential over the next five to ten years, the current market size, market trends¹⁹, the overall economic conditions²⁰, market liquidity - considering the fraction of trade sales and IPOs to VC investments, barriers to entry, required investment size, the VCF's level of expertise within the team, the track record of the VCF, laws and regulations, competitors²¹, Limited Partner (LP)²² preferences, the availability and quality of human resources, required fund size, the historic rate of return, the technological development²³, and the industry specific risk. The geography specific factors are mirrored by this dissertation, e.g. the region's growth potential over the next five to ten years or the region's laws and regulations. The region's required fund size is the only factor excluded from this dissertation, since it is a factor that is rather relevant to capital intensive industries, than to specific regions. The next sections present the empirical results of this dissertation.

7.1 Descriptive statistics

Table 1 below depicts the mode, range, minima, and maxima of the industry related factors. Likewise, Table 2 presents those results for the geography related factors. In addition, all frequencies and their percentages are displayed in Table 3. These three tables are compiled in order to demonstrate the significance of each factor in regards to the VCFs investment strategies.

7.1.1 Industry related Factors

Starting with the industry specific factors, the industry's growth potential over the next five to ten years, the team's level of expertise, and competitors within the industry are the three most relevant factors considered by the sample of 32 German VCFs. Table 1 shows that these three factors all reached a mode of four, meaning that they were considered highly significant by the sample, since a rating equal to four occurred most often for those factors within the sample.

¹⁹ Market trends are defined as an increasing number of VC investments or a decline in VC funding.

²⁰ Economic conditions include: fiscal policy, state of global economy, unemployment levels, and inflation.

²¹ Competitors = This factor includes the number of operating businesses and their respective size within the industry.

²² LPs = Limited partners are the main capital providers to the VC fund. They sign a limited partnership agreement with the general partners (GPs), who invest the capital on their behalf. On a side note, LPs cannot actively engage in the fund's investment activities, hence compensation is the most important mechanism to align incentives between LPs and GPs (Gompers and Lerner, 1999).

²³ Including the stage of technological development as well as current technological breakthroughs.

However, all three factors show a range of three, pointing out that most but not all VCFs considered those factors as highly relevant. Moreover, the industry's growth potential has the highest relevance, since it reached the highest frequency of maxima²⁴. The frequency table shows that 59.4% of all VCFs rated this factors as very important (see Table 3). This factor is closely followed by the team's level of expertise and the competitors within the industry, which are the second highest rated industry specific factors within the dissertation. Table 3 also shows that both factors achieved the same frequencies amongst the 32 VCFs, with over 80% of ratings ≥ 3 . These factors are followed by the industry's barriers to entry, industry specific risk, technological development within the industry, and the VCF's track record within the industry. These factors are ranked by the sum of grade three and grade four ratings, respectively (see Table 3). Furthermore, all four factors achieved a mode of 3. Therefore, these factors should definitely be considered influencing factors when analyzing a VCF's investment strategy. All other industry related factors only achieved a mode of 2, indicating that those factors display lower relevance towards the strategic direction of a VCF. The three lowest rated factors are the Limited Partner preferences for or against a particular industry, the availability and quality of human resources, and the historic rate of return within the industry. Ten VCFs still considered LP preferences as a significant factor with ratings ≥ 3 , which represents 31.2% of the sample. The industry's human resources account for seven ratings ≥ 3 (21,9 %) and the historic rate of return only aggregated six of these scores or 18.8% of significant ratings within the sample (see Table 3). In addition, the low range of 2 depicted in table 1, highlights that most VCFs considered the historic rate of return related to a specific industry as rather insignificant. Moreover, the results show that the historic rate of return is the minimum within the sample regarding the industry specific factors.

²⁴ A grade four rating, indicating highly significant factors is also the maximum.

Table 1: *Industry Factors and Results*

Industry's	Mode	Range	Minima	Maxima
Growth potential	4.0	3.0	1.0	4.0
Market size	2.0	2.0	2.0	4.0
Market trends	2.0	3.0	1.0	4.0
Economic conditions	2.0	3.0	1.0	4.0
Market liquidity	2.0	3.0	1.0	4.0
Barriers to entry	3.0	2.0	2.0	4.0
Required size of investment	2.0	3.0	1.0	4.0
Team's level of expertise	4.0	3.0	1.0	4.0
Track record	3.0	3.0	1.0	4.0
Laws and regulations	2.0	3.0	1.0	4.0
Competitors	4.0	3.0	1.0	4.0
Limited Partner preferences	2.0	3.0	1.0	4.0
Human Resources	2.0	3.0	1.0	4.0
Required fund size	2.0	3.0	1.0	4.0
Historic rate of return	2.0	2.0	1.0	3.0
Tech development	3.0	3.0	1.0	4.0
Specific risk	3.0	2.0	2.0	4.0

n = 32; Factors were rated on a scale from 1 to 4, where 1 represents the least relevant factors and 4 represents highly significant factors

7.1.2 Geography related Factors

A closer look at the geography related factors reveals that the team's level of expertise, overall economic conditions, barriers to entry, laws and regulation, and regional specific risk are the five most important factors considered by the sample. Table 2 displays that all these factors achieved a mode ≥ 3 . However, all these factors account for a range of 3, presenting considerable discord amongst the German VCFs regarding the significance of the geography specific factors. The highest rated factor with a mode of 4 is the team's level of expertise within the region. Over 68% of respondents rated this factor ≥ 3 , making it the maximum within the geography specific factors under analysis. Next, the region's laws and regulations, regional specific risk, the growth potential over the next five to ten years, and the overall economic conditions were rated most significant. These factors account for a mode and range of 3. Thus, indicating that all these factors are considered to have significant impact on the VCF's investment strategy as they were most often rated to be relevant, nonetheless not all VCFs agree upon their individual significance. The remaining factors achieved a mode of 2. However, factors such as the region's growth potential, market liquidity, and technological development still accounted for considerable amounts of ratings ≥ 3 , with 56.3%, 50.1%, 43.8%,

respectively. Therefore, these factors should still be considered when studying VCF's investment strategies. The factors with the least importance are: the competitors within the region, LP preferences for or against a specific region, and the historic rate of return, since they achieved the lowest frequencies for factor ratings ≥ 3 (Table 3). The consensus on the historic rate of return and its low significance can be seen by looking at the range presented in table 2. It is the only factor with a range of two, indicating that the majority of VCFs considered this factor as rather insignificant. Additionally, the historic rate of return is again the minimum within the sample, indicated by the lowest frequencies in relevant ratings. One could argue that the historic rate of return of a VCF within a region or within an industry is the least relevant factor and could be excluded from future research within the VC industry. Furthermore, this proves that the VC industry is continuously evolving, since it is driven by technological and economic advancement, and thus their investment strategies are least effected by historic achievements but rather driven by the future potential of a market, industry, or a new business opportunity.

Table 2: *Regional Factors and Results*

Region's	Mode	Range	Minima	Maxima
Growth potential	2.0	3.0	1.0	4.0
Market size	2.0	3.0	1.0	4.0
Market trends	2.0	3.0	1.0	4.0
Overall economic conditions	3.0	3.0	1.0	4.0
Market liquidity	2.0	3.0	1.0	4.0
Barriers to entry	3.0	3.0	1.0	4.0
Required size of investment	2.0	3.0	1.0	4.0
Team's level of expertise	4.0	3.0	1.0	4.0
Track record	2.0	3.0	1.0	4.0
Laws and regulations	3.0	3.0	1.0	4.0
Competitors	2.0	3.0	1.0	4.0
Limited Partner preferences	2.0	3.0	1.0	4.0
Human Resources	2.0	3.0	1.0	4.0
Historic rate of return	2.0	2.0	1.0	3.0
Tech development	2.0	3.0	1.0	4.0
Specific risk	3.0	3.0	1.0	4.0

n = 32; Factors were rated on a Likert scale from 1 to 4, where 1 represents the least relevant factors and 4 represents highly significant factors

Table 3: Frequency Table

<u>Industry's growth potential</u>				<u>Region's growth potential</u>			
	Rating	Freq.	%		Rating	Freq.	%
	Insignificant	1	3.1		Insignificant	2	6.3
	Significant	12	37.5		Lower significance	12	37.5
	Very significant	19	59.4		Significant	12	37.5
	Total	32	100.0		Very significant	6	18.8
<u>Industry's market size</u>					Total	32	100.0
	Rating	Freq.	%	<u>Region's market size</u>			
	Lower significance	17	53.1		Rating	Freq.	%
	Significant	13	40.6		Insignificant	1	3.1
	Very significant	2	6.3		Lower significance	17	53.1
	Total	32	100.0		Significant	13	40.6
<u>Industry's market trends</u>					Very significant	1	3.1
	Rating	Freq.	%		Total	32	100.0
	Insignificant	5	15.6	<u>Region's market trends</u>			
	Lower significance	14	43.8		Rating	Freq.	%
	Significant	12	37.5		Insignificant	4	12.5
	4.00	1	3.1		Lower significance	14	43.8
	Total	32	100.0		Significant	11	34.4
<u>Industry's overall economic conditions</u>					Very significant	3	9.4
	Rating	Freq.	%		Total	32	100.0
	Insignificant	2	6.3	<u>Region's overall economic conditions</u>			
	Lower significance	12	37.5		Rating	Freq.	%
	Significant	12	37.5		Insignificant	3	9.4
	Very significant	6	18.8		Lower significance	8	25.0
	Total	32	100.0		Significant	17	53.1
<u>Industry's market liquidity</u>					Very significant	4	12.5
	Rating	Freq.	%		Total	32	100.0
	Insignificant	2	6.3	<u>Region's market liquidity</u>			
	Lower significance	16	50.0		Rating	Freq.	%
	Significant	11	34.4		Insignificant	2	6.3
	Very significant	3	9.4		Lower significance	14	43.8
	Total	32	100.0		Significant	14	43.8
<u>Industry's barriers to entry</u>					Very significant	2	6.3
	Rating	Freq.	%		Total	32	100.0
	Lower significance	7	21.9	<u>Region's barriers to entry</u>			
	Significant	19	59.4		Rating	Freq.	%
	Very significant	6	18.8		Insignificant	4	12.5
	Total	32	100.0		Lower significance	11	34.4
					Significant	14	43.8
					Very significant	3	9.4
					Total	32	100.0

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<u>Industry's required size of investment</u>				<u>Region's required size of investment</u>			
	Rating	Freq.	%		Rating	Freq.	%
	Insignificant	3	9.4		Insignificant	4	12.5
	Lower significance	13	40.6		Lower significance	14	43.8
	Significant	10	31.3		Significant	13	40.6
	Very significant	6	18.8		Very significant	1	3.1
	Total	32	100.0		Total	32	100.0
<u>Team's level of expertise within the industry</u>				<u>Team's level of expertise within the region</u>			
	Rating	Freq.	%		Rating	Freq.	%
	Insignificant	1	3.1		Insignificant	2	6.3
	Lower significance	5	15.6		Lower significance	8	25.0
	Significant	13	40.6		Significant	10	31.3
	Very significant	13	40.6		Very significant	12	37.5
	Total	32	100.0		Total	32	100.0
<u>VCF's track record within the industry</u>				<u>VCF's track record within the region</u>			
	Rating	Freq.	%		Rating	Freq.	%
	Insignificant	3	9.4		Insignificant	4	12.5
	Lower significance	13	40.6		Lower significance	16	50.0
	Significant	15	46.9		Significant	8	25.0
	Very significant	1	3.1		Very significant	4	12.5
	Total	32	100.0		Total	32	100.0
<u>Industry's laws and regulations</u>				<u>Region's laws and regulations</u>			
	Rating	Freq.	%		Rating	Freq.	%
	Insignificant	2	6.3		Insignificant	1	3.1
	Lower significance	15	46.9		Lower significance	9	28.1
	Significant	13	40.6		Significant	13	40.6
	Very significant	2	6.3		Very significant	9	28.1
	Total	32	100.0		Total	32	100.0
<u>Competitors within the industry</u>				<u>Competitors within the region</u>			
	Rating	Freq.	%		Rating	Freq.	%
	Insignificant	1	3.1		Insignificant	4	12.5
	Lower significance	5	15.6		Lower significance	14	43.8
	Significant	13	40.6		Significant	13	40.6
	Very significant	13	40.6		Very significant	1	3.1
	Total	32	100.0		Total	32	100.0
				<u>Limited Partner preferences for/against a region</u>			
					Rating	Freq.	%
					Insignificant	10	31.3
					Lower significance	10	31.3
					Significant	9	28.1
					Very significant	3	9.4
					Total	32	100.0

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<u>Limited Partner preferences for/against the industry</u>				<u>Region's human resources</u>			
	Rating	Freq.	%		Rating	Freq.	%
	Insignificant	9	28.1		Insignificant	3	9.4
	Lower significance	13	40.6		Lower significance	18	56.3
	Significant	5	15.6		Significant	6	18.8
	Very significant	5	15.6		Very significant	5	15.6
	Total	32	100.0		Total	32	100.0
<u>Industry's human resources</u>				<u>VCF's hist. rate of return in the region</u>			
	Rating	Freq.	%		Rating	Freq.	%
	Insignificant	4	12.5		Insignificant	5	15.6
	Lower significance	21	65.6		Lower significance	19	59.4
	Significant	5	15.6		Significant	8	25.0
	Very significant	2	6.3		Total	32	100.0
	Total	32	100.0				
<u>Industry's required fund size</u>				<u>Region's technological development</u>			
	Rating	Freq.	%		Rating	Freq.	%
	Insignificant	4	12.5		Insignificant	2	6.3
	Lower significance	15	46.9		Lower significance	16	50.0
	Significant	11	34.4		Significant	10	31.3
	Very significant	2	6.3		Very significant	4	12.5
	Total	32	100.0		Total	32	100.0
<u>VCF's hist. rate of return in the industry</u>				<u>Regional specific risk</u>			
	Rating	Freq.	%		Rating	Freq.	%
	Insignificant	7	21.9		Insignificant	3	9.4
	Lower significance	19	59.4		Lower significance	8	25.0
	Significant	6	18.8		Significant	16	50.0
	Total	32	100.0		Very significant	5	15.6
					Total	32	100.0
<u>Industry's technological development</u>							
	Rating	Freq.	%				
	Insignificant	2	6.3				
	Lower significance	11	34.4				
	Significant	13	40.6				
	Very significant	6	18.8				
	Total	32	100.0				
<u>Industry specific risk</u>							
	Rating	Freq.	%				
	Lower significance	11	34.4				
	Significant	13	40.6				
	Very significant	8	25.0				
	Total	32	100.0				

n = 32; Factors were rated on a Likert scale from 1 to 4, where 1 represents the least relevant factors and 4 represents highly significant factors

7.2 Median Comparison

Next, the dissertation compares the medians of the industry specific and geography specific factors in regards to the VCFs' underlying investment strategies and venture stage focuses in order to present the similarities and differences between them as well as to explore further evidence regarding the behavior of the VC industry.

7.2.1 Industry Specialization vs. Industry Diversification

First, the dissertation looks at VCFs that specialize on an industry or selected industries versus VCFs that diversify across industries in regards to the industry specific factors. The results displayed in table 4 reveal that VCFs specializing on a particular industry or selected industries assign a higher rating to internal factors²⁵, such as the team's level of expertise and the VCF's track record compared to VCFs that diversify across industries, with medians of 3.5 and 3 opposed to medians of 3 and 2 for VCFs following a diversification strategy. These results confirm the findings of Patzelt, zu Knyphausen-Aufseß, and Fischer (2008) who found that a higher proportion of TMT partners with entrepreneurial experience are more likely to specialize in early stage ventures and show lower levels of portfolio diversification. VCFs that diversify across industries assign higher ratings to external factors²⁶, including the industry's growth potential over the next five to ten years, overall economic conditions, market liquidity, laws and regulations, technological development, and industry specific risk, with medians of 4, 3, 3, 2.5, 3, and 3, respectively (see Table 4). These results indicate that VCFs follow a diversification strategy in order to pursue growth opportunities across all industries and may favor the participation in financing rounds that occur in industries that benefit from favorable market conditions. Additionally, it verifies MPT suggesting that investors diversify their portfolio in exchange for lower unsystematic risk, by displaying that VCFs diversifying their investments assign a larger significance to industry specific risk (Markowitz, 1959; see Table 4).

²⁵ Internal factors = factors related to the VCF, its team, and their achievements

²⁶ External factors = factors related to the market and extrinsic conditions

Table 4: *Industry Specialization vs. Industry Diversification – A Median Comparison of the Industry Factors*

Industry's	VCFs specializing on an industry	VCFs diversifying across industries
Growth potential	3.0	4.0
Market size	2.5	2.5
Market trends	2.0	2.0
Overall economic conditions	2.0	3.0
Market liquidity	2.0	3.0
Barriers to entry	3.0	3.0
Required size of investment	3.0	2.0
Team's level of expertise	3.5	3.0
Track record	3.0	2.0
Laws and regulations	2.0	2.5
Competitors	3.5	3.0
Limited Partner preferences	2.0	2.0
Human Resources	2.0	2.0
Required fund size	2.0	2.5
Historic rate of return	2.0	2.0
Technological development	2.5	3.0
Specific risk	2.0	3.0

n=10 (industry specialization); n=18 (industry diversification); Factors were rated on a Likert scale from 1 to 4, where 1 represents the least relevant factors and 4 represents highly significant factors

7.2.2 Regional Specialization vs. Regional Diversification

Further, the dissertation compares the medians of VCFs that follow a particular investment strategy in regards to the regional specific factors. In table 5 the survey results are filtered in order to displays VCFs that specialize on a particular region or selected regions versus VCFs that diversify across regions. The table displays that the region's growth potential is the only factor that reached a median of 3 for both groups, indicating that fewer regional specific factors were considered significant by the respondents compared to the industry specific factors. These results direct towards the arguments of Nelson and Wright (1994), who report that ventures face more similar economic conditions, as the opportunities for international commerce have increased and internal economic conditions became more identical. Furthermore, a look at the differences between VCFs specializing on a region and VCFs diversifying across regions reveals that the team's level of expertise, the barriers to entry, and overall economic conditions present opposing results compared to the industry specific factors, since an internal factor, namely the team's level of expertise within the region is rated higher by VCFs that diversify across industries with a median of 3 and the external factors are rated lower by the same group

(see Table 5). However, these results have minor significance, since these are the only differences depicted by the median comparison. A majority of factors has the same median. In summary, the analysis of the regional factor ratings of VCFs that specialize on a region and VCFs that diversify across regions displayed a few opposing results compared to results depicted by the comparison of the medians regarding the industry specific investment strategies and factors. In addition, the regional specific factors received lower ratings, and hence were mostly considered to have a lower relevance compared to the industry specific factors.

Table 5: Regional Specialization vs. Regional Diversification – A Median Comparison of the Regional Factors

Region's	VCFs specializing on a region	VCFs diversifying across regions
Growth potential	3.0	3.0
Market size	2.0	2.0
Market trends	2.0	2.0
Overall economic conditions	3.0	2.0
Market liquidity	2.0	2.0
Barriers to entry	2.5	2.0
Required size of investment	2.0	2.0
Team's level of expertise	2.0	3.0
Track record	2.0	2.0
Laws and regulations	2.0	2.0
Competitors	2.0	2.0
Limited Partner preferences	2.0	2.0
Human Resources	2.0	2.0
Historic rate of return	2.0	2.0
Technological development	2.0	2.0
Specific risk	2.0	2.0

n=20 (regional specialization); n=7 (regional diversification); Factors were rated on a Likert scale from 1 to 4, where 1 represents the least relevant factors and 4 represents highly significant factors

7.2.3 Industry specific Factors regarding VCF's Venture Stage Focus

This section analyses the industry specific factors in relation to the VCFs' preferred venture stage. The survey asked the participants to indicate their venture stage focus. Possible selections included: early stage, expansion financing, and late stage. However, participants were able to select more than one category. For the purpose of this analysis all respondents that selected more than one stage are categorized as VCFs that diversify across venture stages. Table 6 depicts that VCFs focusing on early stage ventures rate the industry's growth potential as a highly significant factor. In addition, they rate internal factors, such as the team's level of

expertise and the track record within the industry higher than VCFs focusing on expansion financing with medians of 3 and 3, respectively. External factors show that VCFs with an early stage venture focus value the industry's market size, overall economic conditions, market liquidity, barriers to entry, industry specific risk, and competitors within the industry higher than the availability and quality of human resources, the technological development, market trends, and the industry's laws and regulation. On the contrary, VCFs focusing on expansion financing classify the industry's barriers to entry as the most important factor with a median of 4. Besides that, they assign a lower relevance to internal factors, e.g. the VCF's track record within the industry only achieves a median of 2, which is the lowest rating for this factor when categorizing the sample by the venture stage focus. Additionally, they are the only group that rates the Limited Partner preferences for or against a particular industry as a significant factor with a median equal to 3, hinting that these VCFs show stronger affiliations to their LPs and their investment preferences. Further, table 6 displays that late stage VCFs also rate the industry's growth potential highest. Aside from that, they also tend to rate the internal factors higher, with medians of 3.5 and 2.5 for the team's level of expertise and the VCF's track record. Another significant factor considered by VCFs that focus on late stage financing is the competitors within the industry, which received a median of 3.5. The relevance of this factor for late-stage investors can be explained by looking at the late stage environment, which has a significantly higher number of competitors and copycats, since the business models are already proven (EY, 2011). Lastly, looking at VCFs that diversify across various venture stages reveals that they also rate the industry's growth potential and the team's level of expertise as highly relevant, with medians of 3.5 and 3.5, respectively. This is in line with the analysis of the industry specific factors in section 7.1.1, which shows that these factors account for the highest relevance amongst the entire sample as well. Moreover, industry specific risk is considered a relevant factor with a median of 3, thus supporting the underlying assumption that VCFs diversify their portfolio in order to reduce unsystematic risk (Markowitz, 1959). Besides that, VCFs diversifying across venture stages are the only group considering the industry's historic rate of return a significant factor with a median of 3. This result contradicts the findings from section 7.1.1 and 7.1.2, which stated that this factor is considered the least relevant factor amongst the entire sample.

Table 6: *Venture Stage Focus – A Median Comparison of the Industry Factors*

Industry's	VCFs specializing on early stage ventures	VCFs specializing on expansion financing	VCFs specializing on late stage financing	VCFs diversifying across venture stages
Growth potential	4.0	3.0	4.0	3.5
Market size	3.0	2.0	2.0	2.5
Market trends	2.0	3.0	2.0	2.0
Economic conditions	3.0	3.0	2.5	3.0
Market liquidity	3.0	2.0	2.5	2.0
Barriers to entry	3.0	4.0	3.0	3.0
Required size of investment	2.0	3.0	2.0	3.0
Team's level of expertise	3.0	3.0	3.5	3.5
Track record	3.0	2.0	2.5	2.5
Laws and regulations	2.0	2.0	3.0	2.5
Competitors	3.0	3.0	3.5	3.5
Limited Partner preferences	2.0	3.0	2.0	2.0
Human Resources	2.0	2.0	2.0	2.0
Historic rate of return	2.0	2.0	2.0	3.0
Technological development	2.0	2.0	2.0	2.0
Specific risk	3.0	2.0	2.5	3.0

n=13 (early stage); n= 3 (expansion stage); n= 6 (late stage); n= 10 (stage diversification). Factors were rated on a Likert scale from 1 to 4, where 1 represents the least relevant factors and 4 represents highly significant factors

7.2.4 Regional specific Factors regarding VCF's Venture Stage Focus

Table 7 illustrates that the VCFs with a focus on early stage companies tend to rate regional specific factors higher than VCFs focusing on expansion stage financing. They categorize 10 out of the 16 regional factors as significant with medians of 3. Regional factors that are considered significant by early stage VCFs are presented in the first column of table 7 and include: the region's growth potential, market size, economic conditions, market liquidity, barriers to entry, team's level of expertise, laws and regulations, technological development, and regional specific risk. On the contrary, VCFs focusing on expansion stage financing only consider two regional factors as significant: market trends and regional specific risk (see Table 7). Furthermore, they are the only group of VCFs that considers regional market trends as a relevant factor that is impacting their investment strategy, suggesting that VCFs with an expansion stage focus have higher considerations for regional market trends opposed to their peers focusing on different stages in the firm's life cycle. Further, an analysis of VCFs that are specializing on late stage financing shows that they strongly consider the team's level of expertise within the region, laws and regulations, and regional specific risk as relevant regional

factors that are influencing their investment strategies (see Table 7). All other VCFs assigned lower aggregated ratings to these three factors. Comparing these results to the industry specific factor ratings, it shows that there are some discrepancies, since there are no clear patterns emerging regarding the internal and external factors. For instance, external factors, such as the overall economic conditions, the region's growth potential over the next 5 to 10 years, the region's market liquidity and regional specific risk are rated with medians ≥ 3 , whereas other external factors like the technological development, the region's human resources, the market size, and market trends are assigned with a lower significance. This dissertation finds similar results for the internal factors. Furthermore, they do not rate competitors within the region as a relevant factor. Therefore, previous conclusions that the larger quantity of competitors and copycats in the late stage environment is responsible for the high relevance of this factor when looking at investors in the late stage environment cannot be verified when analyzing the regional specific factors. VCFs diversifying across venture stages display similar trends in favor of certain regional factors as the late stage VCFs, but they do assign lower overall ratings to the regional specific factors. For example, they also consider the region's laws and regulations, its growth potential, economic conditions, and specific risk as relevant factors with medians of 3.

Table 7: *Venture Stage Focus – A Median Comparison of the Regional Factors*

Regional Factors	VCFs specializing on early stage ventures	VCFs specializing on expansion financing	VCFs specializing on late stage financing	VCFs diversifying across venture stages
Growth potential	3.0	2.0	3.0	3.0
Market size	3.0	2.0	2.0	2.0
Market trends	2.0	3.0	2.0	2.0
Overall economic cond.	3.0	2.0	3.5	3.0
Market liquidity	3.0	2.0	3.0	2.0
Barriers to entry	3.0	2.0	2.5	3.0
Required size of inv.	2.0	2.0	3.0	2.5
Team's experience	3.0	2.0	4.0	3.0
Track record	2.0	2.0	2.5	2.0
Laws and regulations	3.0	2.0	4.0	3.0
Competitors	2.0	2.0	2.0	3.0
LP preferences	2.0	2.0	2.5	2.0
Human Resources	2.0	2.0	2.0	2.0
Hist. rate of return	2.0	2.0	2.0	2.0
Tech development	3.0	2.0	2.0	2.0
Specific risk	3.0	3.0	4.0	3.0

n=13 (early stage); n= 3 (expansion stage); n= 6 (late stage); n= 10 (stage diversification). Factors were rated on a Likert scale from 1 to 4, where 1 represents the least relevant factors and 4 represents highly significant factors

7.3 Principal Component Analysis

The dissertation applies two principal component analyses in pursuance of the underlying relationships and patterns within the responses of the VCFs. Since various factors are considered rather insignificant, the analyses only consider factors with a median considerably greater than 2.0; therefore, only factors with a median equal to or greater than 2.5 will be considered for the analysis. Furthermore, in order to adjust for linear correlation amongst the industry specific variables, the factor representing the quantity and size of the competitors within the industry is removed from the analysis. After the adjustment, the analysis reaches statistical significance indicated by the KMO and Bartlett's test that reports a P value of 0.007 (Bartlett, 1950). The principal component analysis of the regional specific factors has a P value of < 0.001, thus indicating statistical significance without further adjustments.

The selected rotation method is direct oblimin²⁷ with Kaiser normalization. As a consequence of employing an oblique rotation method the analysis will interpret the results depicted by the pattern matrix.

7.3.1 Principal Components of the Industry Specific Factors

The principal component analysis on the industry specific factors resulted in 3 overall components, presented in the pattern matrix exhibited in Table 8. These three components all exceeded an eigenvalue of 1, and thus are considered relevant components to describe relationships amongst the underlying variables (see Appendix VIII). These three principal components explain 67 percent of the total variance amongst the selected industry related factors. Table 8 also reveals that for the first component the following factors load together: the industry's growth potential, technological development within the industry, and industry specific risk²⁸. These three factors positively correlate with the first component with values of 0.77, 0.77, and 0.84, respectively. Therefore, the principal component analysis suggests a relation between these three external factors and the first established component. These results suggest that the first component categorizes merely external factors that are related to the risk-return relationship, which has a significant presence in the VC industry, since VCFs operate within high-technology industries that are exposed to high risks and returns. Next, the second component displays that the industry's barriers to entry and the required size of investment for a particular industry load together. They produce positive correlation towards the second component that meet the cut off criterion of 0.7, and thus present the variables that most strongly correlate with the second component. The industry's barriers to entry and required size of investment are both external factors that represent hurdles towards VC investments within industries where these factors have a strong presence, and thus can be categorized as hindering factors. Furthermore, the variables industry's overall economic conditions and the VCF's track record within the industry are categorized by the third component. These factors have corresponding positive correlation values of 0.85 and 0.79, and thus surpass the cut off criterion. However, since this component is explained by an internal as well as an external component, only the statistical correlation can be determined.

²⁷ Direct oblimin is the standard rotation method when one wants to apply an oblique rotation.

²⁸ This analysis applies a cut off criterion of ± 0.7 to ensure that only highly correlated factors are selected for the interpretation.

Table 8: *Pattern Matrix compiled for the Industry Factors*

Industry's	Component		
	1	2	3
Growth potential	.77	.12	-.27
Overall economic conditions	.12	.01	.85
Barriers to entry	.29	.78	-.06
Team's level of expertise	.47	-.54	.04
Technological development	.77	-.19	-.02
Specific risk	.84	.22	.19
VCF's track record	-.11	.01	.79
Required size of investment	-.07	.76	.10

n=32; Factors were rated on a Likert scale from 1 to 4, where 1 represents the least relevant factors and 4 represents highly significant factors

7.3.2 Principal Components of Regional Specific Factors

This section looks at the principal component analysis on the regional specific factors, which established two major components that categorize all significant regional factors as presented in table 9. Both components exceeded an eigenvalue of 1, and thus are considered relevant components to describe the relationships amongst the underlying factors (see Appendix IX). Additionally, they explain 68.37 percent of the total variance amongst the selected regional related factors. Table 9 also shows that overall economic conditions within the region and the team's level of expertise within the region positively correlate with the first component. They achieve positive correlation values of 0.76 and 0.78, in regards to the first component²⁹. However, since this component is also explained by an internal as well as an external component, only the statistical correlation can be determined. The second component demonstrates strong negative correlation with two factors, the region's growth potential and barriers to entry. Both variables have negative correlation values above the cut off criterion of -0.7, and thus present the variables that most strongly correlate with the second component. Hence, the second component is explained by merely external factors that present a relationship between the two variables. The relationship can be explained by the interdependencies between the two factors. As strong barriers to entry within a region may result in lower levels of foreign competition, and thus can have positive implications on the region's growth potential. However, further research needs to be conducted to verify this relationship between the two factors.

²⁹ The principal component analysis on the regional specific factors also considers a cut off criterion of ± 0.7 .

Table 9: *Pattern Matrix compiled for the Regional Factors*

Region's	Component	
	1	2
Growth potential	.02	-.79
Overall economic conditions	.76	-.22
Barriers to entry	.04	-.86
Team's level of expertise	.78	.38
Laws and regulations	.53	-.53
Specific risk	.69	-.39
Market liquidity	.68	-.18

n=32; Factors were rated on a Likert scale from 1 to 4, where 1 represents the least relevant factors and 4

In conclusion, the two principal component analyses find five subsets of variables – three components in regards to the industry specific factors and two for the regional specific factors – to categorize the significant regional and industry specific factors. However, common limitations of this technique are that the component names may not accurately represent the variables within the component (Yong and Pearce, 2013). Furthermore, the small sample size of 32 observations may impute limitations regarding the significance of the acquired results. Further research on the relationships and interdependencies amongst the factors covering a larger number of VCFs is recommended.

7.4 Hypothesis Testing

The four hypotheses presented in section 4 are analyzed for statistical significance in order to further investigate which factors influence the decision of German VCFs to specialize or diversify along the industry and geographic dimension. The Mann-Whitney test is used to examine the difference between the medians of one particular factor in regards to two groups of VCFs following a particular investment strategy (DeCoster, 2006).

7.4.1 Hypothesis 1

Starting with Hypothesis 1, which argues that the team's level of expertise within the industry should be rated higher by VCFs following an industry specialization strategy, since previous research found significant evidence of success regarding VCFs with higher degrees of

specialization, plus showed that the educational background and experience of the VCF's team members influences their strategic inclinations. The Mann-Whitney U test indicates that the team's level of expertise is not rated significantly different for VCFs following a specialization strategy (Mdn=3.5) than for VCFs that diversified across industries (Mdn=3), $U=83$, $p=0.719$, $r=0.0680$. Therefore, the alternative hypothesis is true, there is no significant difference between the two groups regarding the team's level of expertise within the industry at a significance level of 5% (see Table 10). Looking at the frequency table, which shows that 80% of VCFs following an industry specialization strategy rate the factor ≥ 3 and 77.8% of VCFs that follow an industry diversification strategy rate the factor ≥ 3 underlines this result (see Appendix IX).

Table 10: *Mann-Whitney U Test Results – Hypothesis 1*

	Team's level of expertise within the industry
Mann-Whitney U	83.0
Wilcoxon W	254.0
Z	-.360
Asymp. Sig. (2-tailed)	.719
Exact Sig. [2*(1-tailed Sig.)]	.759

n=10 (industry specialization); n=18 (industry diversification); Factors were rated on a Likert scale from 1 to 4, where 1 represents the least relevant factors and 4 represents highly significant factors

7.4.2 Hypothesis 2

The second hypothesis argues that VCFs that specialize on a specific region assign a higher rating to the VCF's track record within the region. Regarding this hypothesis, previous studies covering resource-based theory suggest that the VCFs scope of specialization is strongly related to the building of core competencies resulting from its learning abilities. The Mann-Whitney U test shows that the VCF's track record within the region has not received significantly different ratings from VCFs following a regional specialization strategy (Mdn=2) opposed to VCFs following a regional diversification strategy (Mdn=2), $U=38$, $p=0.058$, $r=0.3648$ (see Table 11). However, the frequency table indicates that 60% of VCFs following a regional specialization strategy rated the VCF's track record ≥ 3 , whereas only 44.4% of VCFs following a diversification strategy assigned a rating ≥ 3 to the same factor (see Appendix X). In conclusion, at a significance level of 5% the alternative hypothesis is true, indicating that there is no significant difference between the two groups. Nonetheless, increasing the significance level slightly to 6% would lead to a verification of the second hypothesis.

Hence, further investigations on this hypothesis looking at a larger sample of independent VCFs is recommended.

Table 11: *Mann-Whitney U Test Results – Hypothesis 2*

	VCF's track record within the region
Mann-Whitney U	38.0
Wilcoxon W	66.0
Z	-1.896
Asymp. Sig. (2-tailed)	.058
Exact Sig. [2*(1-tailed Sig.)]	.081

n=20 (regional specialization); n=7 (regional diversification); Factors were rated on a Likert scale from 1 to 4, where 1 represents the least relevant factors and 4 represents highly significant factors

7.4.3 Hypothesis 3

The third hypothesis – which argues that VCFs that diversify their investments across industries impute a higher value to industry specific risk compared to VCFs that specialize on a particular industry – is tested for statistical significance. The hypothesis found its support in MPT, which argues that investors diversify their portfolio in order to reduce non-systematic risk. The results of the Mann-Whitney U test show that VCFs following an industry diversification strategy rate industry specific risk higher (Mdn=3) than VCFs that specialize on a particular industry or selected industries (Mdn=2), $U=46$, $p=0.022$, $r=0.4325$ at a significance level of 5% (see Table 12). In addition to that, the frequency table highlights this result. It shows that 77.8% of diversified VCFs along the industry dimension rated this factor significant (≥ 3) opposed to just 40 % of VCFs following an industry specialization strategy (see Appendix XI).

Table 12: *Mann-Whitney U Test Results – Hypothesis 3*

	Industry specific risk
Mann-Whitney U	46.0
Wilcoxon W	101.0
Z	-2.289
Asymp. Sig. (2-tailed)	.022
Exact Sig. [2*(1-tailed Sig.)]	.035

n=10 (industry specialization); n=18 (industry diversification); Factors were rated on a Likert scale from 1 to 4, where 1 represents the least relevant factors and 4 represents highly significant factors

7.4.4 Hypothesis 4

The forth hypothesis argues that VCFs following a regional specialization strategy assign a higher relevance to the region's laws and regulations compared to VCFs diversifying across regions because of differences in legal and regulatory frameworks across countries. The hypothesis relies on previous research that looked at market factors, such as legal, fiscal, and regulatory disparities amongst European countries which is influencing the demand and supply of venture capital. The results presented in table 13 show that there are significant differences between the two groups of VCFs, even though they both achieved the same median score of 2 (see Table 5). The Mann Whitney U test displays the following results: $U=18$, $p=0.002$, $r=0.5831$, thus the null hypothesis is retained at a significance level of 5% which implies that there are significant statistical differences between the medians of the two groups. A look at the frequencies clarifies the results further, as 80% of VCFs following a regional specialization strategy rated the factor as relevant (≥ 3), but only 14.3% of VCFs that diversify across regions rated the factor as relevant in regards to their investment strategy selection (see Appendix XII). In conclusion, the fourth hypothesis is true, and thus the region's laws and regulations have higher relevance for VCFs that are specializing on a particular region.

Table 13: *Mann-Whitney U Test Results – Hypothesis 4*

	Region's laws and regulations
Mann-Whitney U	18.0
Wilcoxon W	46.0
Z	-3.03
Asymp. Sig. (2-tailed)	.002
Exact Sig. [2*(1-tailed Sig.)]	.003

n=20 (regional specialization); n=7 (regional diversification); Factors were rated on a Likert scale from 1 to 4, where 1 represents the least relevant factors and 4 represents highly significant factors

8 Conclusion

This dissertation examines which factors influence the strategic decision of German independent VCFs to diversify or specialize along the industry and geographic dimensions. The dissertation found that VCFs specializing on a particular industry assign higher relevance to internal factors, such as: the team's level of expertise and the VCF's track record within the industry. By contrast, VCFs that diversify across industries favor external factors. The dissertation provides further evidence that a higher proportion of entrepreneurial experience within the VCF's team leads to higher degrees of specialization and lower levels of portfolio diversification (Patzelt et al., 2008). Further, the dissertation finds additional evidence supporting MPT, which suggests that investors diversify their portfolio in order to mitigate idiosyncratic risk. The analysis shows that industry specific risk receives higher significance ratings from VCFs that diversify across industries, and thus the hypothesis stating that VCFs diversify across multiple industries in order to reduce idiosyncratic risk associated with a single industry, is true. In general, industry specific factors receive higher significance ratings opposed to regional specific factors. Hence, they have a stronger influence on the investment strategy selection of German VCFs, which contributes to the arguments of Nelson and Wright (1994) who report that ventures face more similar economic conditions, as the opportunities for international commerce are steadily increasing and internal economic conditions are becoming more identical. Another finding is that VCFs which are specializing on early stage investments assign high relevance to internal factors, providing further support to previous literature that early stage VCFs account for greater proportions of TMT members with a background in science, engineering, and entrepreneurial experience (Gupta and Sapienza, 1992; Patzelt et al., 2007). Findings related to the VCF's venture stage focus show that late stage VCFs assign high relevance ratings to the competitors within the industry. This finding supports a previous market study about late stage VCFs, which shows that they operate in an environment that is exposed to a significantly higher number of competitors and copycats, since business models are already validated by market (EY, 2011). Furthermore, the hypothesis suggesting that VCFs specializing on a particular region assign higher relevance to the region's laws and regulations compared to VCFs diversifying across regions because of differences in legal and regulatory frameworks across countries, is verified. Therefore, providing further evidence for the arguments of Martin et al. (2002) who state that there are significant disparities in legal, fiscal, and regulatory frameworks across the European countries.

The scope of this dissertation is limited to the analysis of the regional and industry specific factors in regards to industry and geography specialization and diversification strategies as well as the preferred venture stage for the VCF's investment strategy. Thus, the factors are not analyzed in regards to the VCF's fund size, headcount, and fund performance. Also, the dissertation does not consider syndication strategies and networking effects between German VCFs. Additionally, the data collection proved to be challenging, as merely 27.5% of German independent VCFs responded to the continuous survey submission reminders, resulting in a sample size of 32 responses, which limits statistical significance.

Further research within the field is suggested in order to investigate the relationship between the region's barriers to entry and the region's growth potential, as first indications for this relationship are depicted by the second principal component analysis. Additionally, testing the second hypothesis on a larger sample of VCFs will provide stronger implications whether VCFs specialize on a specific geography or selected regions because of their core competencies within the region.

Bibliography

- Allen, F., & Santomero, A. M. 1998. The theory of financial intermediation. *Journal of Banking & Finance*, 21: 1461-1485.
- Allen, E. & Seaman, C. 2007. *Likert Scales and Data Analyses*. Accessed [online] on 03.05.2017. Retrieved at: <http://rube.asq.org/quality-progress/2007/07/statistics/likert-scales-and-data-analyses.html>.
- Barney J. 1996. The resource-based theory of the firm. *Organizational Science*, 7: 469.
- Bartkus, J. R., Hassan, M. K. 2009. Specialization versus diversification in venture capital investing. *Journal of Financial Regulation and Compliance*, 17 (2): 134 – 145
- Bartlett, M. S. 1950. Tests of Significance in Factor Analysis. *British Journal of Statistical Psychology*, 3: 77–85.
- Bottazzi, L., Da Rin, M. & Hellmann, T.F. 2004. *Active Financial Intermediation: Evidence on the Role of Organizational Specialization and Human*. ECGI - Finance Working Paper No. 49/2004. Retrieved at: <https://ssrn.com/abstract=569602>
- Bruining, H., Wright, M., Verwaal, E., Lockett, A. & Manigart, S. 2005. *Firm Size Effects on Venture Capital Syndication: The Role of Resources and Transaction Costs*. ERIM Report Series Reference No. ERS-2005-077-STR. Available at SSRN: <https://ssrn.com/abstract=870128>.
- BVK. 2016. BVK Members. Accessed [online] on: 05.11.2016. Retrieved at: <http://www.bvkap.de/en/bvk/members>
- BVK. 2017. *Interactive Charts*. Accessed [online] on 02.02.2017. Retrieved at: <http://www.bvkap.de/markt/interaktive-charts>
- BVK. 2017a. *BVK-Statistik: Das Jahr in Zahlen 2016*. Accessed [online] on: 02.03.2017. Retrieved at: <http://www.bvkap.de/markt/statistiken>
- Bygrave, W. D. 1987. Syndicated investments by venture capital firms: A networking perspective. *Journal of Business Venturing*, 2 (2): 139-154.
- Carpenter, M.A., Geletkanycz, M.A. & Sanders, W.G. 2004. Upper echelons research revisited: Antecedents, Elements and Consequences of Top Management Team Composition. *Journal of Management*, 30 (6), 749–778.
- Child, D. 2006. *The essentials of factor analysis*. (3rd ed.). New York: Continuum International Publishing Group.
- Christensen, J. L. 2007. The Development of Geographical Specialization of Venture Capital. *European Planning Studies*, 15 (6): 817-833.
- Coval, J.D. & Moskowitz, T.J. 1999. Home bias at home: Local equity preferences in domestic portfolios. *The Journal of Finance*, 6: 2045-2073.
- Cowie, H. 1999. *Venture Capital in Europe*. London: The Federal Trust.
- Cressy, R., Malipiero, A. & Munari, F. 2012. Does VCF fund diversification pay off? An empirical investigation of the effects of VCF portfolio diversification on fund performance. *International Entrepreneur Management Journal*, 10: 139–163.
- Cumming, D. J. 2006. The Determinants of Venture Capital Portfolio Size: Empirical Evidence. *The Journal of Business*, 79 (3): 1083-1126.

Influencing Factors for Venture Capital Investment Strategies

- Cumming, D. J. & Dai, N. 2009. Local Bias in Venture Capital Investments. *Journal of Empirical Finance*, 17 (3): 362–380.
- Cumming, D. J. & Walz, U. 2010. Private Equity Returns and Disclosure around the World. *Journal of International Business Studies*, 41 (4): 727-54.
- DeCoster, J. 2006. *Testing Group Differences using T-tests, ANOVA, and Nonparametric Measures*. Accessed [online] on 23.04.2017. Retrieved at: <http://www.stathelp.com/notes.html>.
- Deutsche Bundesbank, 2000. Monthly Report October 2000. Accessed [online] on 21.11.2016. Retrieved at: https://www.bundesbank.de/Redaktion/EN/Downloads/Publications/Monthly_Report_Articles/2000/2000_10_venture_capital.pdf?__blob=publicationFile
- Dimov, D.P. & Shepherd, D.A. 2005. Human capital theory and venture capital firms: exploring “home runs” and “strike outs”. *Journal of Business Venturing*, 20 (1): 1–21.
- Dow Jones Venture Source. 2016. Accessed [online] on 02.02.2017. Retrieved at: <http://www.dowjones.com/products/pevc/>
- Driscoll, F. 1974. *Venture capital: the risk-reward business*. IEEE International Convention.
- EY, 2011. *Globalizing venture capital – Global venture capital insights and trends report*. Accessed [online] on 21.02.2017. Retrieved at: [http://www.ey.com/Publication/vwLUAssets/Globalizing_venture_capital_VC_insights_and_trends_report_CY0227/\\$FILE/Globalizing%20venture%20capital_VC%20insights%20and%20trends%20report_CY0227.pdf](http://www.ey.com/Publication/vwLUAssets/Globalizing_venture_capital_VC_insights_and_trends_report_CY0227/$FILE/Globalizing%20venture%20capital_VC%20insights%20and%20trends%20report_CY0227.pdf).
- EY. 2016. *Global Venture Capital Trends 2015*. Accessed [online] on 05.01.2017. Retrieved at: <http://www.ey.com/Publication/vwLUAssets/ey-global-venture-capital-trends-2015/%24FILE/ey-global-venture-capital-trends-2015.pdf>
- EY. 2017. *Funding, Growth and Profitability: Tech Start-ups finding the right balance*. Accessed [online] on 03.03.2017. Retrieved at: http://start-up-initiative.ey.com/wp-content/uploads/2017/02/EY-Studie_Venture_Capital_and_Start_ups_in_Germany_2016.pdf
- Florida, R. L. & Kenney, M. 1988. Venture capital-financed innovation and technological change in the USA. *Research Policy*, 17 (3): 119-137.
- Friedrich, M. 2016. *Local VCs in Berlin—A Network Analysis*. Accessed [online] on 02.04.2017. Retrieved at: <https://hackernoon.com/why-berlin-needs-more-local-vcs-a-network-analysis-90f903ab519a>
- Frontline Ventures & Point 9 Capital. 2016. *The German Startup and VC Ecosystem*. Accessed [online] on 22.03.2017. Retrieved at: <https://www.slideshare.net/FrontlineVC/the-german-startup-and-vc-ecosystem>.
- Gao, L.S. 2011. Portfolio Industry Strategy in Venture Capital Investments. *The Journal of Private Equity*, 14 (2): 59–71.
- Gompers, P. 1995. Optimal Investment, Monitoring, and the Staging of Venture Capital. *The Journal of Finance*, 50 (5): 1461–1489.
- Gompers, P., Kovner, A. & Lerner J. 2009. Specialization and Success: Evidence from Venture Capital. *Journal of Economics and Management Strategy*, 18 (3): 817-844.
- Gompers, P. & Lerner, J. 1999. An analysis of compensation in the U.S. venture capital partnership. *Journal of Financial Economics*, 51: 3 – 44.
- Gompers, P. & Lerner, J. 2001. The Venture Capital Revolution. *The Journal of Economic Perspectives*, 15 (2): 145-168.
- GP Bullhound. 2017. *Technology Predictions 2016*. Accessed [online] on 21.02.2017. Retrieved at:

<http://www.gpbullhound.com/wp-content/uploads/2016/12/GP-Bullhound-Technology-Predictions-2017.pdf>

Grimm, C. M. & Smith, K. G. 1991. Management and Organizational Change: A Note on the Railroad Industry. *Strategic Management Journal*, 12 (7): 557-562.

Gupta, A. & Sapienza, H.J. 1992. Determinants of Venture Capital Firms' Preferences Regarding the Industry Diversity and Geographic Scope of Their Investments. *Journal of Business Venturing*, 7 (5): 347-362.

Hambrick, D. C. & Mason, P.A. 1984. Upper Echelons: The Organization as a Reflection of Its Top Managers. *The Academy of Management Review*, 9 (2): 193-206.

Jensen, M. & Zajac, E. J. 2004. Corporate elites and corporate strategy: how demographic preferences and structural position shape the scope of the firm. *Strategic Management Journal*, 25: 507-524.

Kaiser, H.F. 1960. The application of electronic computers to factor analysis. *Educational and Psychological Measurement*, 20: 141-151.

Kang, H., Burton, R. M. & Mitchell, W. 2011. *Specialization and Diversification of Venture Capital Funds: The Effect of VC Effort*. Accessed [online] on 02.01.2017. Retrieved at: https://faculty.fuqua.duke.edu/~willm/bio/cv/working_papers/2011-02-VC.pdf

Kannianen, V. & Keuschnigg, C. 2003. The optimal portfolio of start-up firms in venture capital finance. *Journal of Corporate Finance*, 9: 521 – 534.

Kaplan, S.N. & Strömberg, P. 2000. *How venture capitalists choose their Investments*. Accessed [online] on 21.12.2016. Retrieved at: <https://de.scribd.com/document/201710349/How-Do-Venture-Capitalists-Choose-Investments>

Knill, A. 2009. Should Venture Capitalists Put All Their Eggs in One Basket? Diversification versus Pure-Play Strategies in Venture Capital. *Financial Management*, 38 (3): 441-486.

Kortum, S. & Lerner, J. 2000. Assessing the Contribution of Venture Capital to Innovation. *The RAND Journal of Economics*, 31 (4): 674-692.

Lerner, J. 1994. The Syndication of Venture Capital Investments. *Financial Management*, 23 (3): 16-27.

Lerner, J., 1995. Venture Capitalists and the Oversight of Private Firms. *The Journal of Finance*, 50 (1): 301-318.

Macmillan, I.C., Siegel, R. & Subba Narasimha, P. N. 1985. Criteria used by venture capitalists to evaluate new venture proposals. *Journal of Business Venturing*, 1 (1): 119-128.

Matusik, S.F., Fitza, M.A. 2012. Diversification in the venture capital industry: Leveraging knowledge under uncertainty. *Strategic Management Journal*, 33 (4): 407-426.

Markowitz, H. M. 1959. *Portfolio Selection – Efficient Diversification of Investments*. New York: John Wiley & Sons, Inc.

Martin, R., Sunley, P. & Turner, D. 2002. Taking risks in regions: the geographical anatomy of Europe's emerging venture capital market. *Journal of Economic Geography*, 2 (2): 121-150.

Michel, J. G. & Hambrick, D.C. 1992. Diversification Posture and Top Management Team Characteristics. *The Academy of Management Journal*, 35 (1): 9-37.

Nelson, R. & Wright, G. 1994. The erosion of US technological leadership as a factor in post-war economic convergence, in: Baumol, W. J., Nelson R. & Wolff, E. N. (Eds) *Convergence of Productivity. Cross-National Studies and Historical Evidence*, pp. 129-163. Oxford: Oxford University Press.

Influencing Factors for Venture Capital Investment Strategies

- Norton, E., Tenenbaum, B.H. 1993. Specialization Versus Diversification as a Venture Capital Investment Strategy. *Journal of Business Venturing*, 8 (5): 431-442.
- Patzelt, H., zu Knyphausen-Aufsess, D. & Fischer, H.T. 2009. Upper echelons and portfolio strategies of venture capital firms. *Journal of Business Venturing*, 24 (6): 558-572.
- Pavitt, K. 1991. Key characteristics of the large innovating firm. *British Journal of Management*, 2 (1): 41 – 50.
- Pratt, S.E. 2015. *Pratt's Guide to Private Equity & Venture Capital Sources*. (2nd ed.). California: Capital Pub.
- Prequin. 2016. *Private Equity & Venture Capital Spotlight*. Accessed [online] on 21.03.2017. Retrieved at: <https://www.prequin.com/docs/newsletters/pe/Prequin-Private-Equity-Spotlight-November-2016.pdf>
- Rocca, G. 2017. *Captive vs. Independent Private Equity Firms*. Accessed [online] on 05.01.2017. Retrieved at: <http://yourbusiness.azcentral.com/captive-vs-independent-private-equity-firms-27887.html>.
- Sharpe, W. 1964. Capital asset prices: a theory of market equilibrium under conditions of risk. *Journal of Finance*, 19(3):425-442.
- Sorenson, O. & Stuart, E. 2001. Syndication Networks and the Spatial Distribution of Venture Capital Investments. *American Journal of Sociology*, 106 (6): 1546–88.
- Teece, D., Pisano, G. & Schuen, A. 1990. *Firm Capabilities, Resources, and the Concept of Strategy*, CCC Working Paper No. 90-8 (Berkeley, CA: University of California).
- Thomson One. 2016. Accessed [online] on 08.01.2017. Retrieved at: <https://www.thomsonone.com/DirectoryServices/20060401/Web.Public/Login.aspx?brandname=www.thomsonone.com&version=3.7.9.18833&protocol=0>
- Weisstein, E. W. 2017. *Eigenvalue*. Accessed [online] on 20.06.2017. Retrieved at: <http://mathworld.wolfram.com/Eigenvalue.html>
- Williamson, O. E. 1981. The Modern Corporation: Origins, Evolution, Attributes. *Journal of Economic Literature*, 19: 1537-1568.
- Wright, M., Robbie, K., Mason, C., Harrison, R. 1999. *Venture Capital in Europe*. International Intelligence Reports. London: TSO.
- Yong, A. G. & Pearce, S. 2013. A Beginner's Guide to Factor Analysis: Focusing on Exploratory Factor Analysis. *Tutorials in Quantitative Methods for Psychology*, 9 (2): 79-94.
- Zhang P., Templeton M. & Gallo, A. 2015. Is more better? Diversification strategy in the venture capital market. *Journal of International Business Disciplines*, 10 (1): 41-56.

Appendix I

Venture Capital-Investitionen in Deutschland seit 2008

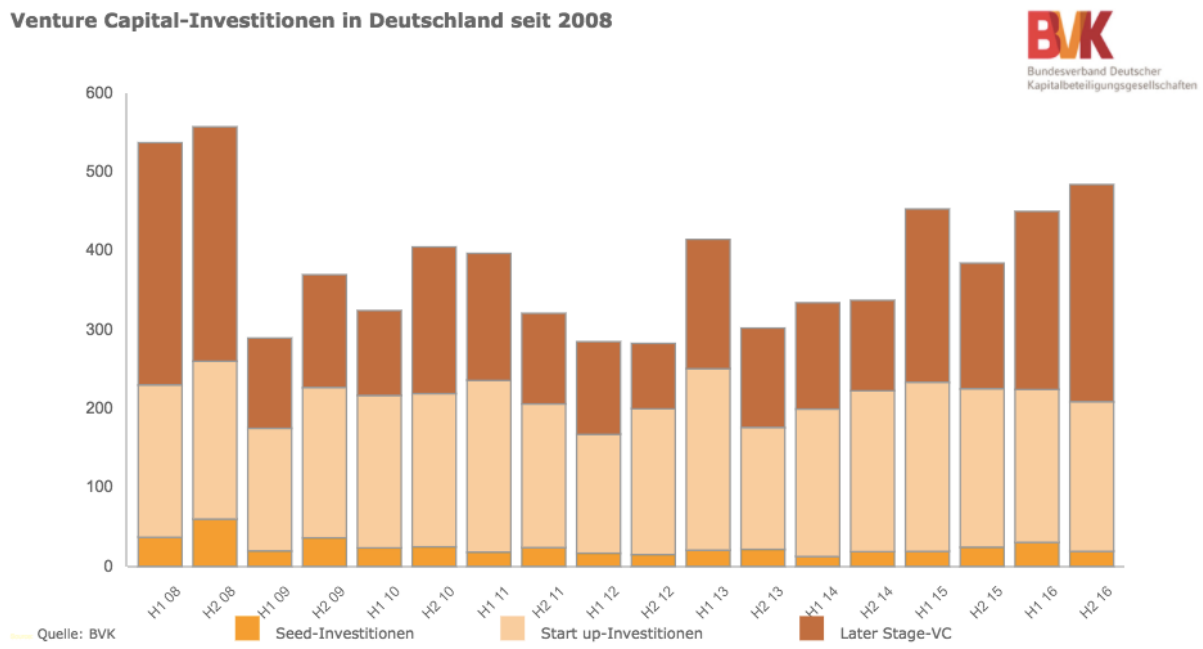


Figure 1: Venture Capital Investments in Germany since 2008 (BVK, 2017)

Appendix II

Private Equity-Investitionen in Deutschland seit 2008

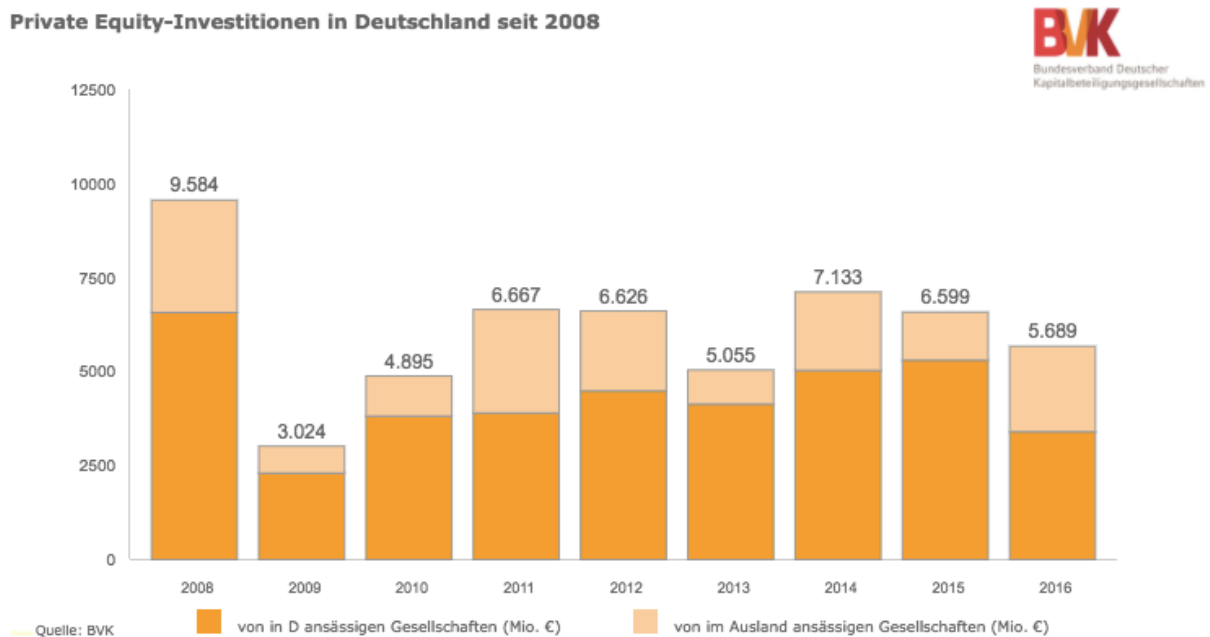


Figure 2: Private Equity Investments in Germany since 2008 (BVK, 2017)

Appendix III

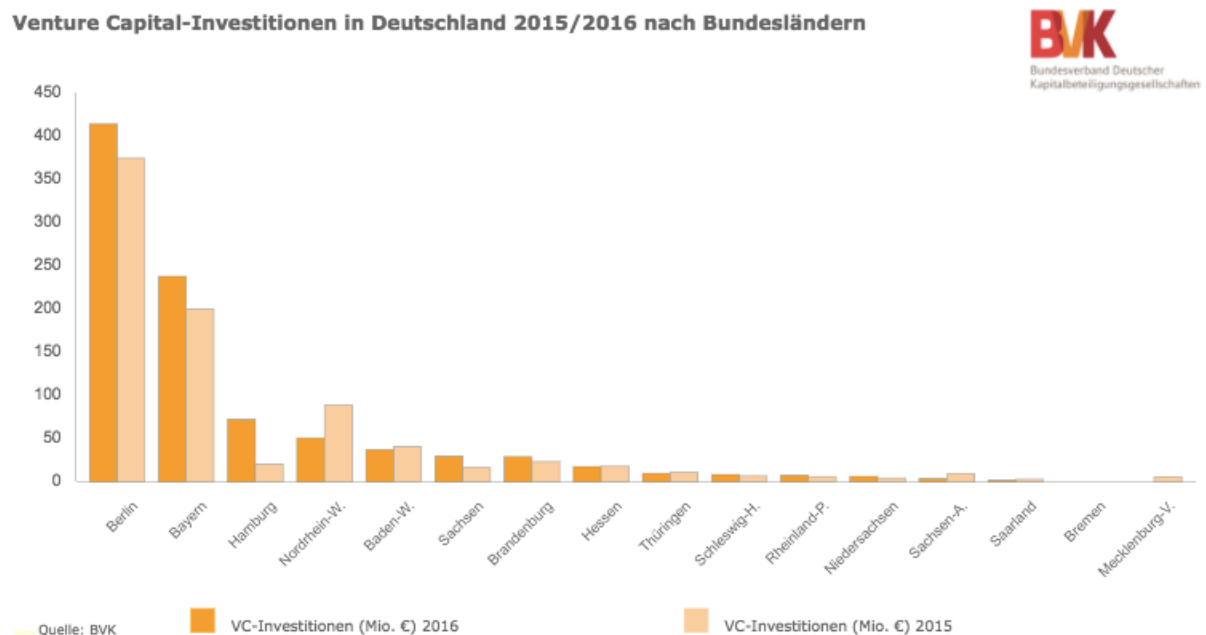


Figure 3: Venture Capital Investments in Germany by State 2015/2016 (BVK, 2017)

Appendix IV

Key locations of Top 100 start-ups in terms of funding

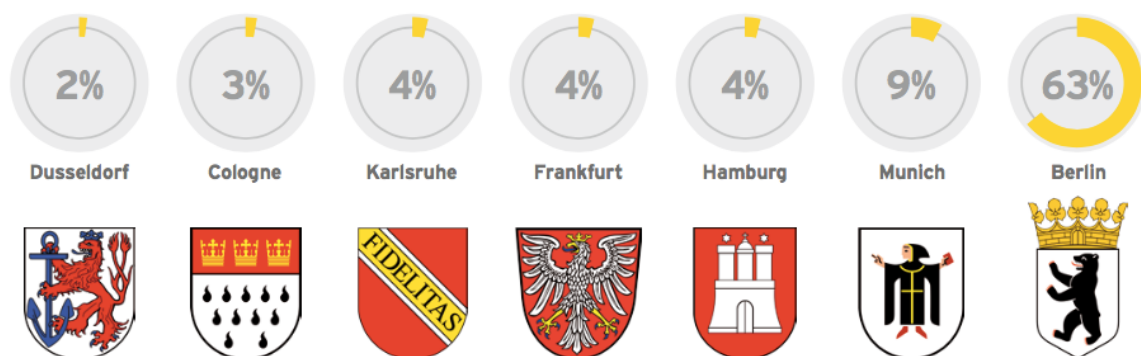


Figure 4: Key Locations for Venture Capital Funding in Germany (EY, 2017)

Appendix V

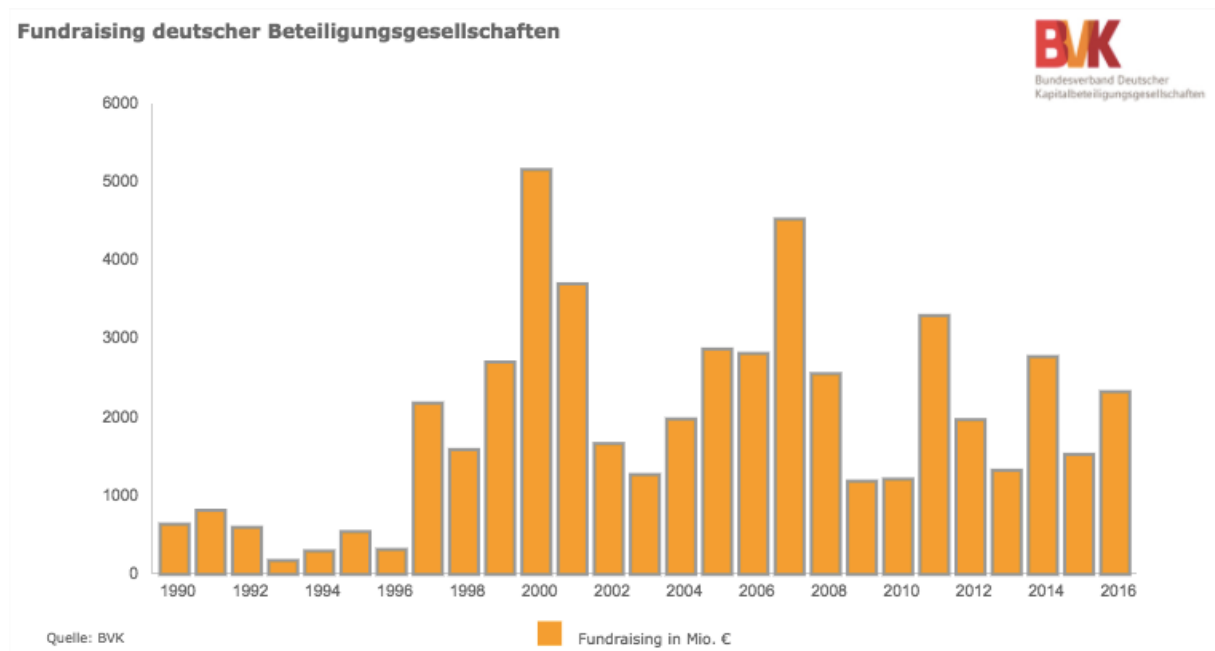


Figure 5: Fundraising of German Venture Capital Firms (BVK, 2017)

Appendix VI: Survey

Dear Sir / Madam,

thank you for taking the time to fill out this survey. The following 3 pages can be filled out in around 5 minutes. As it is part of my master thesis I would very much appreciate a full and true set of responses. All answers will be anonymised!

① **Please enter your current fund volume: ★**

Please enter a monetary value in EUR.

Type an answer...

500

② **Please enter the headcount of your firm: ★**

Please enter a number.

Type an answer...

500

③ **Please enter the industry/ industries you focus on/ diversify across: ★**

e.g. fintech, medtech, martech, AR/VR, mobile, IoT, electronics, energy and utilities, etc.

Type an answer...

500

④ **What is your typical investment size/ sweet spot? ★**

You can enter a range. Please enter all values in EUR amounts.

Type an answer...

500

⑤ **Please select your venture stage focus: ★**

You may select more than one option if your fund invests across different stages.

- ☐ Early stage
- ☐ Expansion stage
- ☐ Late stage

⑥ **Which of the following investment strategies does your firm/ current fund follow? ★**

You may select two answers if a combination of general strategies applies.

- ☐ Industry specialization
- ☐ Industry diversification
- ☐ Regional/ geographic specialization
- ☐ Regional/ geographic diversification

7 Please rate the industry specific factors below in regards to importance of your funds overall investment strategy. Where 1 represents insignificant factors; 2 represents factors of lower importance; 3 represents significant factors; and 4 represents factors that are very important. ★

All factors below are industry specific factors.

	1	2	3	4
Industry's growth potential for the next 5 to 10 years	☐	☐	☐	☐
Industry's current market size	☐	☐	☐	☐
Industry's market trends (e.g. increasing number of VC investments or decreasing number VC investments)	☐	☐	☐	☐
Industry's overall economic conditions (fiscal policy, state of global economy, unemployment levels, inflation)	☐	☐	☐	☐
Industry's market liquidity (percentage of trade sales and IPOs to number of VC investments in this industry)	☐	☐	☐	☐
Industry's barriers to entry	☐	☐	☐	☐
Required size of investment for the industry	☐	☐	☐	☐
Team's level of expertise within the industry	☐	☐	☐	☐
VCP's track record for the industry	☐	☐	☐	☐
Industry's laws & regulation	☐	☐	☐	☐
Competitors in the industry (e.g. number of operating businesses and size of competitors)	☐	☐	☐	☐
Limited partner preferences for/ against the industry	☐	☐	☐	☐
Industry's human resources (availability and quality of human resources)	☐	☐	☐	☐
Required fund size for the industry	☐	☐	☐	☐
Industry's historic rate of return	☐	☐	☐	☐
Industry's technological development (stage of technological development and current technological breakthroughs)	☐	☐	☐	☐
Industry specific risk	☐	☐	☐	☐

< BACKWARD

FORWARD >

8

Please rate the geography specific factors below in regards to importance of your funds overall investment strategy. Where 1 represents insignificant factors; 2 represents factors of lower importance; 3 represents significant factors; and 4 represents factors that are very important. ★

All factors below are regional/ geography specific factors.

	1	2	3	4
Region's growth potential for the next 5 to 10 years	☐	☐	☐	☐
Region's current market size	☐	☐	☐	☐
Region's market trends (e.g. increasing number of VC investments or decreasing number VC investments)	☐	☐	☐	☐
Region's overall economic conditions (monetary and fiscal policy, state of global economy, unemployment levels, exchange rate, inflation)	☐	☐	☐	☐
Region's market liquidity (percentage of trade sales and IPOs to number of VC investments in the region)	☐	☐	☐	☐
Region's barriers to entry	☐	☐	☐	☐
Required size of investment for the region	☐	☐	☐	☐
Team's level of expertise for the region	☐	☐	☐	☐
VCF's track record for the region	☐	☐	☐	☐
Region's laws & regulation	☐	☐	☐	☐
Competitors in the region (e.g. number of operating businesses and size of competitors)	☐	☐	☐	☐
Limited partner preferences for/ against a region	☐	☐	☐	☐
Region's human resources (availability and quality of human resources)	☐	☐	☐	☐
Historic rate of return for the region	☐	☐	☐	☐
Region's technological development (stage of technological development and current technological breakthroughs)	☐	☐	☐	☐
Regional specific risk	☐	☐	☐	☐

← BACKWARD

SUBMIT SURVEY

Appendix VII

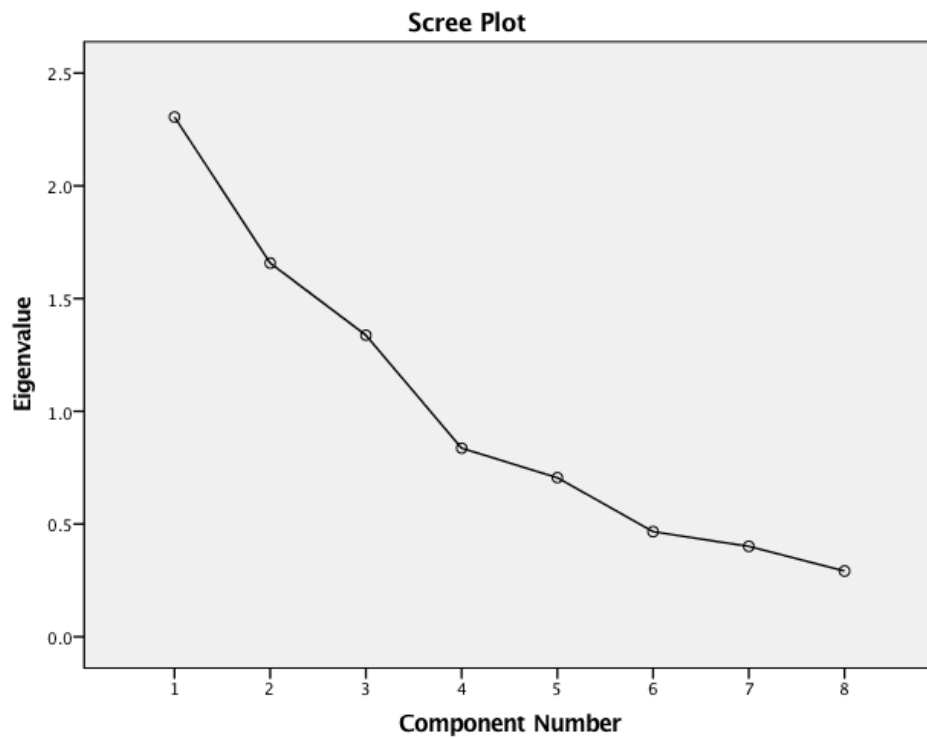


Figure 6: Scree Plot for the Industry Specific Factors

Appendix VIII

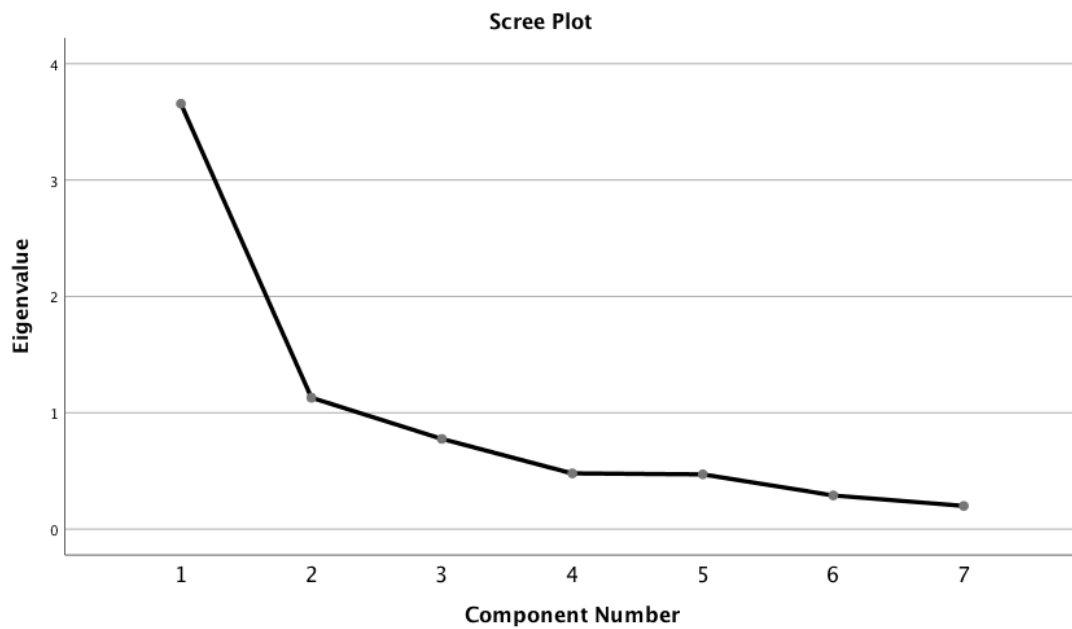


Figure 7: Scree Plot for the Regional Specific Factors

Appendix IX: Frequencies related to the team's level of expertise within the Industry – Industry Specialization vs. Industry Diversification Strategies

Team's level of expertise within the industry

Industry Specialization vs. Diversification		Freq.	%	Cum. %
Industry Specialization	1.00	1	10.0	10.0
	2.00	1	10.0	20.0
	3.00	3	30.0	50.0
	4.00	5	50.0	100.0
	Total	10	100.0	
Industry Diversification	2.00	4	22.2	22.2
	3.00	7	38.9	61.1
	4.00	7	38.9	100.0
	Total	18	100.0	

n=10 (industry specialization); n=18 (industry diversification); Factors were rated on a Likert scale from 1 to 4, where 1 represents the least relevant factors and 4 represents highly significant factors

Appendix X: Frequencies related to the VCF's track record within the industry – Industry Specialization vs. Industry Diversification

VCF's track record within the industry

Industry Specialization vs. Diversification		Freq.	%	Cum. %
Industry Specialization	2.00	4	40.0	40.0
	3.00	5	50.0	90.0
	4.00	1	10.0	100.0
	Total	10	100.0	
Industry Diversification	1.00	3	16.7	16.7
	2.00	7	38.9	55.6
	3.00	8	44.4	100.0
	Total	18	100.0	

n=10 (industry specialization); n=18 (industry diversification); Factors were rated on a Likert scale from 1 to 4, where 1 represents the least relevant factors and 4 represents highly significant factors

Appendix XI: Frequencies related to the industry specific risk – Industry Specialization vs. Industry Diversification

Industry specific risk

Industry Specialization vs. Diversification		Freq.	%	Cum. %
Industry Specialization	2.00	6	60.0	60.0
	3.00	4	40.0	100.0
	Total	10	100.0	
Industry Diversification	2.00	4	22.2	22.2
	3.00	9	50.0	72.2
	4.00	5	27.8	100.0
	Total	18	100.0	

n=10 (industry specialization); n=18 (industry diversification); Factors were rated on a Likert scale from 1 to 4, where 1 represents the least relevant factors and 4 represents highly significant factors

Appendix XII: Frequencies related to the region's laws and regulations – Regional Specialization vs. Regional Diversification

Region's laws and regulations

Regional Specialization vs. Diversification		Freq.	%	Cum. %
Regional Specialization	2.00	4	20.0	20.0
	3.00	8	40.0	60.0
	4.00	8	40.0	100.0
	Total	20	100.0	
Regional Diversification	1.00	1	14.3	14.3
	2.00	5	71.4	85.7
	3.00	1	14.3	100.0
	Total	7	100.0	

n=20 (regional specialization); n=7 (regional diversification); Factors were rated on a Likert scale from 1 to 4, where 1 represents the least relevant factors and 4 represents highly significant factors