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Diversification, risk, and returns in venture capital

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ABSTRACT

We explore an alternative, finance theory-based explanation for the documented positive relationship between fund diversification (or lack of fund specialization) and performance in venture capital (VC). Our proposed “Risk Hypothesis” posits that the expected negative impact of diversification on fund risk induces fund managers to endogenously select riskier investments, which in turn leads to higher performance of more diversified funds. While other channels may also be at play, we provide results that support this hypothesis for an international sample of VC funds. However, this effect is weakened when expertise is limited. The study offers implications of how VC fund managers’ investment decisions are influenced by strategic portfolio considerations, which in turn affect which innovative ventures receive funding.

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Executive summary

Prior research has investigated whether diversification is beneficial for the VC industry. Managing VC investments is typically viewed as requiring highly specialized skills, knowledge, and time to select and assist investee companies. This suggests excessive diversification should come at a cost. Existing studies on whether diversified VC funds underperform specialized VC funds provide contradictory results, although most recent studies tend to indicate a premium for diversified VC funds. This conclusion was recently attributed to knowledge-sharing effects across different industries and stages of development.

Understanding the impact of diversification versus specialization is particularly crucial for VC because fund managers aim to build a portfolio of promising firms and much of the value-adding may come from their capacity to actively assist investees and create synergies between them. In this paper, we explore an alternative explanation for the diversification premium based on risk effects from diversification to argue that diversification may lead to higher fund returns (which we call the “Risk Hypothesis”). We explore the joint interaction among risk, diversification, and performance. Greater diversification reduces fund risk, enabling risk-averse managers to select riskier investments in the first place and, thus, investments with higher expected returns. In this framework, greater diversification represents more investments in riskier ventures. However, the increased risk of individual ventures is compensated in part by greater diversification at the fund level. Ultimately, given the higher risk of each venture, the average return should be higher.

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Our sample originates from the CEPRES database that includes detailed information of VC investments at the deal and fund levels, including cash flow data. We use an international sample of 308 VC funds that invested in 10,131 portfolio companies. We employ two measures of diversification: industry and stage of development. Our analysis indicates that greater industry diversification leads to a higher fraction of funds invested in riskier, hi-tech ventures; similarly, greater stage diversification represents in our sample of VC funds a greater fraction of funds invested in early-stage ventures. Both represent increased investments in riskier ventures, consistent with underlying assumptions of the Risk Hypothesis.

Using multivariate analyses, we find that both dimensions of diversification (industry and stage of development) leads to higher return (measured by fund IRR), provided the VC fund is run by experienced managers. For less experienced VC funds, we find no relationship. Thus, these results support the idea that experienced VC fund managers who are able to access better deals benefit from diversifying in more industries and/or stages of development. We further find that diversification affects both types of risk, upside and downside risks. Overall, we conclude that our findings support the Risk Hypothesis. Finally, we find evidence for strong persistence in the level of diversification over time by VC firms, which suggests that part of the diversification strategy is determined by the accumulated expertise of VC managers. When managers diversify primarily into industries in which they lack experience, we show that greater industry diversification can even have a negative overall impact on fund performance. This study offers implications of how VC fund managers' investment decisions are influenced by strategic portfolio considerations, which in turn affect which innovative ventures receive funding.

1. Introduction

The question whether diversification is detrimental to venture capital (VC) has attracted a great deal of attention but is still under debate among entrepreneurship and finance scholars. Managing VC investments is viewed as requiring highly specialized skills, knowledge, and time to select and assist investee companies well (Dimov and De Clercq, 2006; Norton and Tenenbaum, 1993). This leads to a smaller number of investments (Bernile et al., 2007; Jackson et al., 2012; Kannianen and Keuschnigg, 2003) or investments in a smaller set of industries (Cressy et al., 2007; Humphery-Jenner, 2013), which means that a discount (lower performance) rather than a premium for more diversified funds should be expected. Thus, managing VC investments in entrepreneurial firms is a strategic choice (generally described from the beginning in the private placement memorandum) that directly affects the type of ventures that will more easily receive capital.

While different studies have explored costs and benefits of diversification, the existence of such a diversification discount for VC funds (and private equity funds more generally) remains unclear. Humphery-Jenner (2013) documents a premium, which he explains by the enhanced knowledge-sharing capacity across more investments and reduced managerial risk aversion when the fund is more diversified. Other studies also document a positive relationship between fund diversification and performance (Humphery-Jenner, 2012; Knill, 2009; Lossen, 2009), though without testing specific economic channels of this relationship.¹

In this paper, we explore an alternative, more direct explanation for the diversification premium based on endogenous risk effects from diversification. We investigate a cost-side factor of fund specialization by arguing that specialization also increases expected managerial exposure to risk, which in turn affects the selection process of investments themselves. Thus, this paper is the first to jointly (1) assess the impact of diversification on fund performance and fund risk, while explicitly taking into account the asymmetric nature of VC returns, and (2) explore how deviations from past diversification experience of the VC firm affect the relationship among current diversification, performance, and risk. Thus, we examine to which extent expertise matters to explain these relationships.

Understanding the impact of diversification versus specialization is particularly crucial for VC because fund managers aim to build a portfolio of promising firms and much of the value-add may come from their capacity to actively assist investees and create synergies between them (Cressy et al., 2007; Humphery-Jenner, 2013; Norton and Tenenbaum, 1993). In the same vein, entrepreneurs want to receive funds from investors who devote enough time and have the right knowledge and skills to help add value. While the finance literature argues that risk reduction is a primary benefit of diversification (Markowitz, 1991), its impact on portfolio building in the context of active managers is particularly important in VC, given the significant investment risks involved in these types of investments (Cochrane, 2005; Cressy et al., 2014; Ewens et al., 2013). Much of the literature focuses on the relationship between diversification and performance without considering the simultaneous impact on fund risk.

In this study, we explore the interaction among risk, diversification, and performance. We expect a positive impact of diversification on fund performance as a result of a risk channel (which we call the "Risk Hypothesis"), in which greater diversification reduces fund risk, enabling risk-averse managers to select riskier investments in the first place and, thus, investments with higher expected returns. For example, it may induce VC managers with a stronger diversification strategy to invest more in early-stage ventures, which tend to be riskier than later-stage ventures. However, the increased risk from investing in more early-stage ventures is compensated in part by greater diversification. Ultimately, given the higher risk of each venture, the average return may eventually be higher (as ventures with the highest potential also entail higher risk). A similar outcome may result through a larger diversification across industries, as industries also vary greatly in terms of risk and return.² To test our Risk Hypothesis

¹ Other studies find a negative relationship (e.g., Dimov and De Clercq, 2006; Gompers et al., 2009; Han, 2009), or even a non-linear relationship (Matusik and Fitza, 2012; Yang et al., 2014). We discuss these studies and the differences in performance measures used in these different studies in Section 2.

² As will become clear below, we use a large sample of VC funds to test this prediction. The claims made here with regards to what diversification means for risk are backed by our data. For instance, a greater stage diversification in our sample (which we measure by 1 – Herfindahl index of the stages of development in which the fund invested) is positively correlated with a greater fraction of funds invested in early-stage ventures. Similarly, greater industry diversification in our sample is correlated with a greater fraction of funds invested in hi-tech industries. Both, early-stage and hi-tech ventures, are considered riskier investments, consistent with the examples presented here.

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