



# Venture capital investment and the performance of entrepreneurial firms: Evidence from China

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## ABSTRACT

We examine the contributions of venture capital investment to entrepreneurial firms in China. Based on a panel dataset of Chinese manufacturing firms, we investigate the performance and R&D activities of venture capital-backed (VC-backed) and non-VC-backed firms during the period 1998 to 2007. We explore whether VC-backed firms in China generally outperform their non-VC-backed counterparts, and if so, whether this outperformance is mainly attributed to the ex-ante screening or ex-post monitoring efforts of venture capitalists (VCs). We then determine whether the different types of VCs and investment approaches affect the ex-post monitoring efforts of VCs, and consequently, the performance and R&D activities of the VC-backed firms. Our analysis shows that VC-backed firms outperform non-VC-backed firms in terms of profitability, labor productivity, sales growth, and R&D investment. First, VCs select firms with higher profitability, labor productivity, and sales growth, as well as firms that invest more in R&D activities. Moreover, the differences in profitability and labor productivity are significantly magnified after VC entry. After receiving investment from VCs, firms on average achieve magnified higher ROS, ROE, and labor productivity compared to non-VC-backed firms. However, no evidence demonstrates the magnified improvement in sales growth or R&D investment of the VC-backed firms after the venture investment is made. We distinguish the screening and value added effects by using propensity score matching. We also use instrumental variables to determine whether the post-investment performance improvements of the firms are driven by the venture capital investment. Finally, we find different types of VCs and investment approaches affect the performance of the firms after the investment is made. Foreign VCs add more value to the firms they invest in compared to domestic VCs. Firms backed by syndicated investment perform better and invest more in R&D after the investment is made compared to those backed by non-syndicated investment and non-VC-backed firms.

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## 1. Introduction

Venture capital investment is one of the most effective ways to finance newly established innovative firms, which hardly have access to other types of external investment. Practitioners and researchers suggest that venture capitalists (VCs) not only provide funds, but also exert intensive monitoring efforts and provide value-added support to projects with growth potential. Thus, VCs differentiate themselves from traditional financiers in terms of efficiently dealing with profound information and uncertainty issues associated with the investment (Gompers and Lerner, 2001; Sahlman, 1990). From this context emerge two questions on the role of VCs in the growth and R&D activities of entrepreneurial firms: (1) Do VC-backed firms outperform non-VC-backed firms in terms of growth and innovation? (2) If so, can the performance of VC-backed firms be attributed to VCs' ability to choose better companies ex ante, or their capacity to monitor and help entrepreneurial firms to perform better after making an investment?

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The impact of venture capital investment on entrepreneurial companies has attracted intensive interest from researchers in the past two decades. Kortum and Lerner (2000) find that based on industry-level data, venture capital activities significantly increase the propensity to patent inventions. Similarly, based on a survey of entrepreneurial firms in Silicon Valley, Hellmann and Puri (2000) report that more innovative firms have higher chances to be selected by VCs compared to imitators. Moreover, VC-backed firms introduce new products to the market faster than non-VC-backed firms do. Hellmann and Puri (2002) also reveal that VC intervention is important in the professionalization and development of young companies, particularly in the formulation of human resource policies and adoption of strategic management decisions. Puri and Zarutskie (2012) find that VC-backed firms grow more rapidly in scale compared to their non-VC-backed counterparts. Additionally, the authors report that VC-backed firms are less likely to fail in the first four years after initially receiving venture investment. Chemmanur et al. (2011) examine the total factor productivity (TFP) of VC-backed and non-VC-backed firms using U.S. census data. The authors find that VC-backed firms outperform non-VC-backed ones in terms of TFP, and this outperformance is attributed to the ex-ante project screening and ex-post monitoring efforts of the VCs.

Studies have also focused on the role of venture capital investment in the initial public offerings (IPOs) of entrepreneurial firms. The findings, however, are mixed. Megginson and Weiss (1991) and Barry et al. (1990) find that VC-backed IPOs are less underpriced than non-VC-backed IPOs. Brav and Gompers (1997) further prove that when returns are equally weighted, VC-backed IPOs outperform non-VC-backed IPOs over a five-year period. However, Bradley and Jordan (2002) assert that after controlling for industry effects and underwriter quality, no difference exists in the underpricing of VC-backed and non-VC-backed IPOs. Moreover, after dealing with potential selectivity biases, Lee and Wahal (2004) point out that VC-backed IPOs are significantly more underpriced than non-VC-backed IPOs.

Although most existing studies have shown evidence that VC-backed firms generally outperform non-VC-backed firms, an important but under-investigated question remains: Are the performance differences between VC-backed and non-VC-backed firms caused by the ex-ante project selection or post-investment monitoring and support efforts of VCs? Filling this research gap enables us to understand the fundamental mechanism of venture capital investment; that is, whether VCs primarily contribute to firms by providing funds to better projects or fostering rapid growth (or by accomplishing both tasks).

The study of Chemmanur et al. (2011) is the first systematic analysis that detangles the screening and monitoring effects of VCs based on firm-level data. Using three different approaches to address the selection and identification issues, the authors confirm that in the United States, VCs not only choose to invest in firms with higher efficiency, but also help the firms to improve the efficiency after the investment is made. Moreover, the authors report that the improved efficiency is mainly contributed by the sales growth of the firms. Finally, the authors reveal that the efficiency improvement of the VC-backed firms is heterogeneous depending on the reputation of the VCs; that is, firms backed by VCs with higher reputation experience significantly higher post-investment efficiency improvement than those backed by VCs with lower reputation.

Our analysis attempts to extend the findings of Chemmanur et al. (2011) by examining the contribution of venture investment to entrepreneurial firms in China. Almost all previous studies on venture capital investment are based on data from developed economies. The issue of whether venture capital investment may also contribute to the performance and innovation of entrepreneurial firms in developing countries such as China, where the institutions are complicated and different from those in industrialized countries, has attracted less scrutiny. China, including Hong Kong, has been the second largest venture capital market in the world since 2001.<sup>1</sup> Venture capital investment plays a major role in the startup of high-tech firms in China. Guo (2008) reports that over 62% of venture capital investment in China are in the high-tech sectors. The impact of venture capital investment is also evident in the global market. From 2000 to 2010, over 500 VC-backed Chinese firms went public. In the first half of 2011, 207 of 339 new IPOs in 13 major global exchange markets were Chinese firms, 94 of which were VC-backed firms with proceeds of US\$16.64 billion. These figures suggest that the development of the venture capital market affects not only China's sustainable growth, but also the world's economic growth. However, systematic analysis on this market remains very limited.

The present study attempts to fill the existing gap by comparing the pre- and post-investment performance and innovation of VC-backed and non-VC-backed firms in China using firm-level panel data in the period 1998 to 2007. The dataset we use is a census panel survey covering all manufacturing firms in China that generate annual revenue of over five million RMB. Matching VC-backed firms in China listed in the Venture Expert dataset to this panel dataset yields 258 VC-backed firms for the estimations.

We first examine whether VC-backed firms in China outperform their non-VC-backed counterparts in terms of profitability, labor productivity, sales growth, and R&D activities. If VC-backed firms indeed outperform non-VC-backed firms, we further determine whether this outperformance is mainly caused by the project screening conducted by VCs or their monitoring efforts on the entrepreneurial firms after the investment is made. We then explore whether different VCs vary in project selection and ex-post monitoring activities by examining the performance of the firms backed by foreign venture capital firms (FVCFs) and those backed by domestic venture capital firms (DVCFs). Lastly, we determine whether different investment approaches have different effects on improving entrepreneurial firms by focusing on syndicated investment.

Our results indicate that VC-backed firms outperform non-VC-backed firms in several aspects, including profitability, labor productivity, sales growth, and R&D investment. Moreover, similar to the findings of Chemmanur et al. (2011), we find that this outperformance of VC-backed firms is caused by the project selection and ex-post monitoring efforts of VCs in China. That is, we find that VCs select firms with higher profitability, labor productivity, and sales growth, as well as firms investing more in R&D activities.

<sup>1</sup> This ranking was calculated based on the data provided by the Asian Venture Capital Journals (2002).

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