

How does Venture Capital Financing Improve Efficiency in Private Firms? A Look Beneath the Surface.

Abstract

Using a unique sample from the Longitudinal Research Database (LRD) of the U.S. Census Bureau, we study how venture capitalist (VC) investment is related to efficiency of entrepreneurial firms. We find that that firms backed by VCs are more efficient to begin with (i.e., screening) and experience significant gains in efficiency after the VC investment (i.e., monitoring). High reputation VCs are related to higher efficiency gains in portfolio firms than low reputation VCs. Efficiency gains generated by VC backing arise primarily from improvement in sales; however for higher reputation VCs, the additional efficiency gains arise from both an additional improvement in product market performance as well as from reductions in the growth of various input costs. Finally, both the level of efficiency of VC backed firms prior to receiving financing and the growth in efficiency subsequent to VC financing positively affect the probability of a successful exit (IPO or acquisition).

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Executive Summary

Academics and practitioners have argued that, in addition to providing funding for private firms, venture capitalists add value to firms by providing certain non-pecuniary services, such as hiring competent management, providing access to network of contacts among potential suppliers and customers, and monitoring the firm management and employees. In addition, higher reputation venture capitalists are seen to be better in terms of providing these services than low reputation venture capitalists: see, e.g., Sahlman (1997) who states, “From whom you raise venture capital is often more important than the terms.”

This paper considers the question of whether venture capitalists add such “extra-financial” value to the firms that they invest in. Specifically, there are three important questions this paper tries to answer. First, do venture capitalists select more efficient firms to begin with (screening) or do they positively impact the efficiency of the firms that they invest in (monitoring)? Second, what are the channels through which venture capitalists improve the efficiency of the firms they invest in: specifically, do venture capitalists reduce costs, or increase sales, or both? Third, what is the impact of such efficiency gains of portfolio firms on the probability of successful VC exit through IPOs and M&A?

We attempt to answer the above-mentioned questions using a unique dataset covering both private and public firms in the U.S. manufacturing sector, obtained from

the Longitudinal Research Database (LRD) maintained by the *Center of Economic Studies* of the U.S. Census Bureau. We use this dataset to conduct the first large sample study in the literature on the role of venture capital backing in improving the operating efficiency and the performance of the firms backed by them.

Our measure of firm efficiency is Total Factor Productivity (TFP). This measure the level of sales of a firm that is independent of the production input and production technology in place. Thus, an increase in the TFP is interpreted as the increase in the overall efficiency of the firm, since more output can be produced for the same level of production inputs. This measure has been used in the literature to study various corporate events (e.g., Maksimovic and Philips (2001), Schoar (2002), Chemmanur and Nandy (2003), Chemmanur, He, and Nandy (2005)). Venture capital financing involves the injection of additional capital into the firm which may increase the scale of the firm. Therefore, TFP is also an appropriate measure of efficiency for our purposes since it captures productivity changes after accounting for increases in the scale of production.

Our main results are as follows. We find that the overall efficiency of venture backed firms (as measured by TFP) is higher than that of non-venture backed firms. In particular, we find that the efficiency of venture backed firms prior to receiving venture financing is higher than that of non-venture backed firms. Further, the growth in efficiency subsequent to receiving venture financing, is greater for venture backed firms relative to non-venture backed firms. We thus find evidence of both a screening and a monitoring role for venture capitalists in improving firm efficiency.

In our analysis of the dynamics of productivity growth, we first show that the efficiency of venture backed firms relative to non-venture backed firms increases over the

four years subsequent to the year of the first round of venture financing, and remains at this higher level till exit. We show that while the efficiency of firms prior to venture capital financing is higher for low reputation VC backed firms, the growth in efficiency subsequent to financing is significantly higher for firms backed by higher reputation VCs compared to those backed by lower reputation VCs. This finding suggests that while lower reputation VCs may be better at selecting (screening) more efficient firms to begin with, it is the higher reputation VCs who have greater monitoring ability and are thus able to improve the efficiency of the firms they invest in even further, compared to lower reputation VCs. We are the first paper to document the above findings in the literature.

We find similar results when we analyze efficiency improvements over various rounds and show that most of the efficiency gains for VC backed firms is achieved within the first couple of rounds after the VC's involvement with the firm. When analyzing this efficiency increase for high versus low reputation VC backed firms, we find that significantly higher efficiency in every round subsequent to receiving financing for high reputation VC backed firms compared to low reputation VC backed firms. Further, as before, the increase in TFP after receiving financing is only evident in firms backed by higher reputation VCs, again suggesting greater monitoring ability for such VCs.

Using a "switching regressions with endogenous switching" methodology, we are able to answer the following question: what would the efficiency improvement have been for a firm that received venture financing, had it not received such financing? The intuition behind this analysis is as follows: in order to be able to state that VCs perform a monitoring role, we need to establish that venture backed firms would have performed worse had they not received VC financing. This econometric methodology allows us to

run exactly such a hypothetical analysis. Consistent with our earlier results, our switching regression results indicate a significantly positive effect of venture capital monitoring on efficiency growth. Specifically, we find that efficiency for VC backed firms declines had they not received VC financing. Interestingly, we also find that efficiency of non-VC backed firms declines had they received VC financing. Thus, our results indicate that VC backed firms are better off getting VC financing and non-VC firms are better off not getting VC financing. This makes intuitive sense since not all firms require or benefit from the monitoring and services that VCs provide. If such monitoring is costly, then firms that do not require it are better off not using venture capital. Examples of firms that may not need the monitoring services provided by VCs can include old-economy or low growth firms.

We also match our sample of venture backed firms to non-venture backed private firms along the following dimensions: firm size, industry, and average efficiency growth over the five years prior to receiving venture financing. Consistent with our earlier results, we find that the efficiency growth of venture backed firms subsequent to receiving financing is significantly greater than that of matching firms, thus confirming the monitoring effect of venture backing on efficiency growth. Our matched sample analysis further shows that the above monitoring effect of venture backing is greater for higher reputation venture capitalists compared to lower reputation venture capitalists, again consistent with our earlier results.

Our results on the channels through which venture backing improves efficiency can be summarized as follows. First, venture backed firms are characterized by higher sales than non-venture backed firms prior to receiving venture financing. Further, these

firms are characterized by a greater increase in sales in the years subsequent to receiving venture financing compared to non-venture backed firms. Second, total production costs are greater for venture backed firms compared to non-venture backed firms prior to receiving venture financing; the growth in these costs subsequent to receiving financing is also greater for venture backed firms relative to non-venture backed firms. Third, while total employment is similar for venture backed and non-venture backed firms prior to receiving venture financing, total salaries and wages are greater for venture backed firms prior to receiving financing. Additionally, the growth in total salaries and wages subsequent to receiving financing is greater for venture backed firms relative to non-venture backed firms, though the growth in the level of employment remains comparable across the two kinds of firms. Overall, the above results indicate that on average, the primary channel through which venture backing improves efficiency is by improving product market performances (sales) and this increase in sales could partially be attributed to a better quality workforce employed by VC backed firms.

Our split-sample analysis of the channels through which high reputation and low reputation venture capitalists improve efficiency in firms backed by them indicate the following. First, the level of sales prior to receiving financing is greater for higher reputation venture capitalists compared to lower reputation venture capitalists and the growth in sales subsequent to financing (in the first four years) is also greater for higher reputation venture backed firms. Second, total production costs prior to venture financing is slightly lower for higher reputation venture backed firms compared to lower reputation venture backed firms and the growth in total production costs subsequent to financing is also lower for higher reputation venture backed firms compared to low reputation venture

backed firms. Based on the above two results, it appears that higher reputation VCs are able to obtain greater increase in sales (output) with lower increases in production costs, thus leading to greater improvements in the TFP of firms backed by them, compared to lower reputation VCs. Total labor costs and total employment prior to receiving venture financing are higher for higher reputation venture backed firms compared to lower reputation venture backed firms; the growth in these variables subsequent to financing is also higher for higher reputation venture backed firms initially (during the first four years), however in the long run (from year five till exit), both employment levels and labor costs are lower for higher reputation VCs compared to lower reputation VCs. These results indicate that in the initial years higher reputation VCs employ a greater number or quality of workers in order to boost productivity quickly, however once that is achieved, they tend to cut back on labor costs in order to maintain a more efficient firm as it gets closer to exit. Overall, these results are consistent with the notion that the primary channel through which both high and low venture capitalists improve efficiency is through improvements in product market performance (sales), however the additional improvements in efficiency generated by high reputation VCs arise through both improvements in product market performance (sales) and also through reductions in input costs.

Finally, the results of our analysis on the impact of efficiency improvements of venture backed firms on the probability of a successful exit can be summarized as follows. First, the efficiency of venture backed firms prior to receiving financing and the growth in efficiency subsequent to financing positively affects the probability of a successful exit (either through an IPO or an acquisition). Second, our split sample

analysis of high reputation versus low reputation venture backed firms indicate that, for high reputation venture backed firms, the probability of an exit through an IPO is relatively higher and increasing in both the level of efficiency prior to financing and the efficiency growth subsequent to financing. In contrast, for low reputation venture backed firms, it is the probability of an acquisition that is relatively higher and increasing in the above two variables. The above results are consistent with the notion that the efficiency improvements due to venture backing are long-lived and indeed result in successful outcomes. They also suggest that firms with higher levels of efficiency improvements are more likely to exit through an IPO rather than an acquisition.