



# Founder's human capital, external investment, and the survival of new high-technology ventures

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## ABSTRACT

The effect of founder characteristics in attracting external investment and enhancing survival of new high-technology ventures is explored using human capital theory and signalling theory. We test the effect of founder characteristics on external investment in and survival of new high-technology ventures by tracking a random sample of 193 high-technology start-ups, all participants in the Israeli Technology Incubator Program. Founder's business management expertise and academic status attracted external investment, but founder's general technological expertise did not. Founder's business management expertise and general technological expertise positively affected venture survival, but founder's academic status did not. Possible implications for entrepreneurs, investors, policy and further research are discussed.

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## 1. Introduction

High-technology new ventures are an important means for the commercialisation of new technological discoveries. Often, such ventures introduce disruptive technologies and perform the role of Schumpeterian entrepreneurship, or “creative destruction”, in the economy (Timmons and Bygrave, 1986, p. 162). In seeking to commercialise new technologies, however, these ventures find it difficult to obtain funding from the banking system to advance sufficient finance to fund market and organisational expansion (Colombo and Grilli, 2007; Peneder, 2008). Venture capital (VC) is a possible solution to this problem (Gompers and Lerner, 2001; Colombo and Grilli, 2009).

Understanding what influences survival and growth of new high-technology ventures is of policy interest because of the role such firms play in innovation (Krabel and Mueller, 2009). There is considerable interest among governments worldwide in encouraging the growth of high-technology, venture capital-backed ventures (Lerner, 2009).

While there is a considerable literature on factors affecting survival of new firms, relatively few of these focus on high-technology-based new ventures, and even fewer studies focus on the individual founders of such ventures (Colombo and Grilli, 2009;

Krabel and Mueller, 2009). Previous studies on the effect of human capital on survival have often employed an insufficient range of types of human capital or inappropriate proxies (Gimmon and Levie, 2009). Previous studies that have considered human capital effects on external investment tend to have been conducted by asking investors what they look for (e.g. MacMillan et al., 1985; Hall and Hofer, 1993; Levie and Gimmon, 2008). Because investors do not always make decisions in the way they think they do (Shepherd, 1999), observing their actual investment decisions might yield more accurate results than asking investors what they look for (Zacharakis and Shepherd, 2001; Kaplan and Strömberg, 2004).

Our study employs insights from human capital theory and signalling theory to address the research question “to what extent does the human capital of founders of new high-technology ventures attract external investors and facilitate survival?” We use human capital theory (Becker, 1993; Piazza-Georgi, 2002; Lazear, 2004) and signalling theory (Spence, 1973, 1974; Podolny, 1993, 2005) to develop hypotheses that predict the effect of different human capital factors on funding and on survival of new high-technology ventures. We then test these hypotheses using a unique longitudinal database of 193 new high-technology ventures, representing a 30% sample of all ventures incubated in the Israeli Technology Incubator Program that started between 1991 and 2001. This research setting controls for a range of variables, enabling us to home in on human capital and signalling effects on external investment and survival.

All founders in our sample were first time founders, and all were required to seek external funding. This was a requirement of entry to the incubator program, which provided initial funding and advice

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to all founders. This enables us to control for previous founding experience, which is a very strong signal for many funders (Hsu, 2007), and to select a sample of new high-technology ventures all of whom were in the same market for funding. In human capital terms, prospective investors were left with a choice of general human capital signals, such as level of education, or specific human capital signals, such as relevant business management expertise or technological expertise. Our research design enables us to uncover which of these forms of human capital were employed as attractive signals by investors and which affected survival.

Forty-one percent of this sample obtained funding from external investors up to 2001. By late 2003, only 40% of the sample were still active, with an additional 26% in a state of suspended animation and the rest (34%) closed for good. Controlling for a range of other factors, including industry sector, incubator location, and technology commercialisation strategies, we find that investors selected on business management expertise and academic status but not on founder's technological expertise. Founder's technological expertise and business management expertise positively affected survival but founder's academic status did not. The effect of external investment on survival was marginally significant.

In the following sections we review the literature on factors affecting new venture survival, attraction of external investment, and the effect of external investment on new venture survival. We describe a simple theoretical model of founder's human capital, investment and venture survival and deduce a core set of hypotheses. We describe the research method, sample, and variables used to test the hypotheses. Results of multivariate logistic regressions of external investment and venture survival as alternative dependent variables against an identical set of independent human capital and control variables are then reported. We also report the reflections of four different experienced investors on our results. We conclude by noting the implications for entrepreneurs, investors, researchers and policymakers and the limitations of our research.

## 2. Literature review and hypotheses

This section surveys the literature on human capital and employs signalling theory to propose how investors might receive and interpret signals of human capital, how investment might affect venture survival, and how human capital of founders might affect venture survival directly. We propose that the business management expertise, technology expertise, and academic status of new high-technology venture founders serve as signals of quality to external investors and enhance the chances of survival of the venture through their value in use. Our theoretical model of human capital effects on external investment and survival is displayed as Fig. 1 and we develop the specific hypotheses numbered in the theoretical model below.

### 2.1. Human capital theory, signalling theory and attraction of external investors

Piazza-Georgi (2002, p. 463) has defined human capital as “a stock of personal skills that economic agents have at their disposal”. Rauch et al. (2005) distinguished between three types of human capital: an individual's education, experiences, and skills that help in the tasks of getting one's work done. Other authors have distinguished between general and specific human capital, demonstrating the importance of the task context (Becker, 1993; Madsen et al., 2003; Bosma et al., 2004).

The human capital of founding entrepreneurs features in studies of investors' decision criteria (MacMillan et al., 1985; Muzyka et al., 1996; Baum and Silverman, 2004; Levie and Gimmon, 2008). Colombo and Grilli (2005, p. 812) built upon studies emphasizing

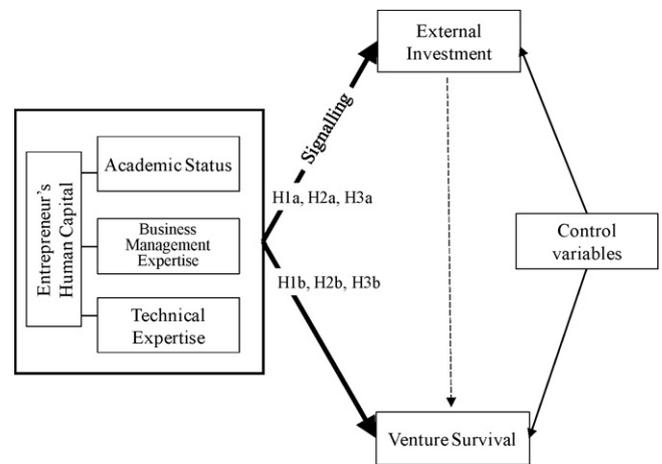


Fig. 1. Theoretical model of relationships between founders' human capital, attraction of external investors and new high-technology venture survival.

capital market imperfections to propose that founders with greater human capital have access to greater financial resources; this they termed the “wealth effect” of founders' human capital.

We link human capital theory to signalling theory (Spence, 1973, 1974) to build our hypotheses on founders' human capital and external investment, on the view that if human capital is to be a useful predictor of future performance to potential investors, it must be recognised as such by investors. Investors can choose from a range of human capital signals. Signalling theory aids in the prediction of which signals investors might choose to look out for or take note of. It was originally developed by Spence as an explanation of how job seekers' investments in building human capital through gaining educational qualifications served as “costly” observable characteristics and therefore honest signals of their value to prospective employers. There are clear parallels with funding of entrepreneurial ventures, and signalling theory has been employed in this domain by many researchers (Elitzur and Gaviols, 2003; Janney and Folta, 2003; Busenitz et al., 2005; Higgins and Gulati, 2006; Hsu, 2007; Kleer, 2008).

Studies have shown that venture capitalists look for founders with relevant experience (Maidique, 1986; Hall and Hofer, 1993; Kaplan and Strömberg, 2004). Perhaps the most powerful human capital signal for funders is previous start-up management experience (Hsu, 2007). But what do investors do if they are faced with a ‘market’ of only first time entrepreneurs of early-stage high-technology ventures, such as our sample? Such a market would be a very uncertain one, as the investor could rely neither on previous start-up experience of the entrepreneur, nor previous venture investment experience with the entrepreneur (Hsu, 2007). Alternative signals of ability could include expertise in business management and in technology, or academic status. We discuss each of these in turn below.

Some researchers have found that managerial and leadership experience is an important criterion for VC decision-making (MacMillan et al., 1987; Kaplan and Strömberg, 2004; Zacharakis and Shepherd, 2005). Muzyka et al. (1996) investigated the trade-offs made by European professional VCs in investment decisions and found that management criteria were ranked highest – higher than criteria related to functional capabilities, or product-market, fund or deal criteria. Recently, Colombo and Grilli (2009) found that in a study of 439 surviving new technology-based Italian firms, 10.5% of which had received venture capital, that industry-specific technical expertise had a large direct effect on predicted firm size in their model, but no indirect effect through VC funding. Management and/or economic university education had large direct

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