Journal of Business Venturing 25 (2010) 610–626

Contents lists available at ScienceDirect

Journal of Business Venturing

On growth drivers of high-tech start-ups: Exploring the role of founders' human capital and venture capital ☆

Massimo G. Colombo *, Luca Grilli

Politecnico di Milano, Department of Management, Economics, and Industrial Engineering, P.za Leonardo da Vinci 32, 20133 Milan, Italy

ARTICLE INFO

JEL classification:
M13
L25
O33

Keywords:
New technology-based firms
Growth
Human capital
Venture capital

ABSTRACT

In this paper, we jointly analyze the effects of the human capital of founders and access to venture capital (VC) financing on the growth of 439 Italian new technology-based firms (NTBFs). We rely on econometric models that control for survivorship bias and the endogeneity of VC financing. As to non-VC-backed firms, the competence-based argument that the capabilities of NTBFs coincide with founders' skills is confirmed. Nonetheless, once a NTBF obtains VC, this coincidence vanishes, pointing to the "coach" function performed by VC investors. Conversely, the view that sees the "scout" function as the main task performed by VC investors is not supported.

1. Executive summary

The entrepreneurship literature generally agrees that the human capital of founders and access to venture capital (VC) are two key drivers of the success of new technology-based firms (NTBFs). Nonetheless, there is no consensus on the reasons for this. In this paper we shed new light on the relative importance of the *mechanisms* through which founders' human capital and VC investments enhance the growth performances of NTBFs. While addressing this research question, we add to the extant theory on the growth of NTBFs providing a better understanding of the respective roles of NTBFs' founders and VC investors and of the nature of their contribution to the success of these firms.

As to founders' human capital, the competence-based view contends that higher human capital individuals establish more successful firms; in other words, there is a *direct* positive effect of founders' human capital on firm growth. Studies in the entrepreneurial finance literature argue that NTBFs created by higher human capital individuals enjoy an advantage in attracting VC. In turn, VC investments lead to superior growth. According to this latter argument, the positive effect of founders' human capital on growth is *indirect*, being mediated by the attracting of VC. As to VC, previous studies (e.g. Baum and Silverman, 2004) again highlight different motives explaining why access to VC propels the growth of NTBFs. On one hand, VC investors may have better "scout" capabilities than other investors and so they may be able to pick high-growth prospect firms. On the other hand, they may provide portfolio firms with additional competencies and resources, thus exerting mainly a "coach" function. We claim that to shed new light on the mechanisms through which founders' human capital and VC financing contribute to the growth of NTBFs, these factors need to be examined jointly.

☆ The support of PRIN 2006 funds and a grant from the Venture Fun project of the PRIME Network of Excellence are gratefully acknowledged. We are indebted to Andrea Bonaccorsi, Elena Cefis, Enrico Santarelli, Federico Signorini, David Storey, Otto Toivanen, participants in the *28° Convegno de L'Industria*, the *2005 IIOC Conference*, and the *2005 EARIE Conference*, and two anonymous referees for helpful comments on this and related work. Responsibility for any errors lies solely with the authors. The authors are jointly responsible for the work, though Massimo G. Colombo wrote Sections 1, 2 and 3, and Luca Grilli wrote the remaining sections.

* Corresponding author. Tel.: +39 02 2399 2748; fax: +39 02 2399 2710.
E-mail address: massimo.colombo@polimi.it (M.G. Colombo).

0883-9026/$ – see front matter © 2009 Elsevier Inc. All rights reserved.
doi:10.1016/j.jbusvent.2009.01.005

In the empirical section of the paper, we consider a sample of 439 Italian NTBFs, which operate both in manufacturing and services. We first follow the "endogenous treatment effect" literature (Heckman, 1990; Vella and Verbeek, 1999) and assess the effects of the human capital of founders and VC investments on firm growth, measured by both employees and sales, while controlling for the endogenous nature of VC investments. Controls for a possible survivorship bias in sample data are also considered. Second, we allow the effects of founders' human capital on firm growth to differ depending on whether firms are VC-backed or not. For this purpose, we resort to an endogenous switching regression approach (Maddala, 1983; Greene, 2003).

The econometric estimates show that even after controlling for sorting, VC financing has a large positive effect on growth. More interesting, the human capital of the founding team has both a direct positive effect on growth and an indirect effect through the attracting of VC financing. Nevertheless, the specific human capital characteristics of founders that are directly associated with firm growth partially differ from those that positively influence access to VC. In addition, the human capital characteristics explaining the growth of NTBFs not resorting to VC financing lose their explanatory power for VC-backed firms. These results indicate that there is a close relation between the knowledge and skills of firms' founders and firms' distinctive capabilities; however once a NTBF obtains VC, this relation vanishes.

To sum up, the results of this paper are in line with the argument of the competence-based stream that founders' knowledge and skills are a fundamental ingredient of the growth of NTBFs. They also highlight that VC investors are an important source of additional resources and capabilities for NTBFs due to the "coach" role they perform to the advantage of portfolio firms. So their function goes far beyond the provision of financing to high-prospect, financially constrained NTBFs. Conversely, the view that sees the "scout" function as the *main* task performed by VC investors is not supported by our findings. Last, this study indicates the need for a more thorough modeling of the matching process between NTBFs and VC investors in order to expand the theory of the growth of NTBFs.

2. Introduction

New technology-based firms (NTBFs) are an important source of new jobs and provide a crucial stimulus to national economies (Audretsch, 1995). So the factors that drive their performances have increasingly attracted the attention of scholars, practitioners, and policy makers. For these firms rapid growth generally is an indication of wide market acceptance of their products or services. However, growth is difficult to achieve, with most NTBFs remaining small after several years from their establishment. In this work we follow previous studies (e.g. Feeser and Willard, 1990; Fischer and Reuber, 2003; Barringer et al., 2005) in considering growth as an indicator of the business success of NTBFs. The human capital of founders and access to venture capital (VC) are often mentioned as two key drivers of the growth of these firms. Nonetheless, the *mechanisms* through which these two factors affect firm growth have not received sufficient attention in the extant literature. In fact, different theoretical approaches provide different explanations of *why* founders' human capital and VC investments enhance growth. The aim of this paper is to shed new light on these mechanisms and to assess their relative importance. While addressing this research question, we extend the extant theory on the growth of NTBFs, obtaining a better understanding of the respective roles of NTBFs' founders and VC investors and of the nature of their contribution to the success of these firms.

For this purpose, we argue that these two factors need to be examined jointly. If the advantage of NTBFs that are established by individuals with greater human capital primarily lies in attracting VC investments, variables capturing the human capital of founders will have a positive effect on the likelihood of obtaining VC; they will also have an *indirect* positive effect on growth mediated by VC-backing, but their *direct* effect will be negligible. Conversely, if human capital variables are found to have a direct positive effect on growth over and beyond the indirect one, this evidence will argue in favor of the competence-based argument that NTBFs established by more competent individuals possess distinctive capabilities that cannot be matched by other NTBFs. Let us now assume that founders' human capital has a direct positive effect on the growth of NTBFs. If VC investors primarily have a role as a "scout", the human capital variables that enhance firm growth will also attract VC investments (see Baum and Silverman, 2004 for a similar argument). Moreover, the positive effect on growth of these human capital variables will be greater for VC-backed firms than for non-VC-backed ones, as VC financing leads to the removal of the financial constraints that absent VC, slow down growth. Conversely, if VC investors mainly act as a "coach" and fundamentally transform the resources and capabilities of portfolio companies, the human capital of founders will have smaller explanatory power of growth for VC-backed firms than for their non-VC-backed counterparts, as the advent of the VC investor weakens the link between founders' and firms' capabilities.[1]

We test these arguments on a sample of 439 Italian NTBFs that operate both in manufacturing and services. The econometric models that we use control for both a possible survivorship bias in sample data and the endogenous nature of VC investments. Moreover, they allow the effects of founders' human capital on growth to differ depending on whether firms are VC-backed or not.

The paper proceeds as follows. In the next Section, we illustrate a conceptual model of the relation between the human capital of NTBFs' founders, VC investments, and firm growth, and we derive the theoretical hypotheses. Then we briefly synthesize the extant empirical literature relating to these aspects. In the following sections we describe the data set, and we present the empirical methodology and the dependent and explanatory variables of the econometric models. The illustration of the results of the econometric analysis follows. A discussion of the main findings and their implications for theory concludes the paper.

[1] Note that the above arguments are contingent on the presence of a direct positive effect of founders' human capital on the growth of NTBFs. Absent such effect, our research design would not allow to disentangle the "scout" and "coach" functions of VC investors. In fact, one would expect founders' human capital not to influence the growth of VC-backed NTBFs, independently of the role as a "scout" or as a "coach" played by the VC investor.