European Economic Review 86 (2016) 109–117

Contents lists available at ScienceDirect

European Economic Review

journal homepage: www.elsevier.com/locate/eer

On the economic performance of nascent entrepreneurs

Dora Gicheva, Albert N. Link*

Department of Economics, University of North Carolina, Greensboro, United States

ARTICLE INFO

Available online 28 August 2015

JEL Codes:
L26
O31
O33
O38

Keywords:
Entrepreneurship
R&D
Commercialization
Innovation
SBIR program

ABSTRACT

This paper assesses the R&D performance of nascent and established technology-based small firms that receive a Phase II R&D award from the U.S. Small Business Innovation Research (SBIR) program. Our empirical analysis is based on a two-stage selection probit model, which is used to estimate the probability of commercialization conditional on the Phase II project having not failed. Our model predicts, and our analysis confirms, that nascent firms are more likely to fail in their SBIR-supported R&D endeavors. Further, we find that nascent firms that do not fail have a higher probability of commercializing their developed technology.

1. Introduction

Much of the recent economics literature on the economics of entrepreneurship has focused on the relationship between firm performance and firm size. Performance has generally been quantified in terms of employment and job growth, and size has been measured by number of employees or sales. Only a few of these studies (e.g., Link and Scott, 2012; Haltiwanger et al., 2013) have considered the age of the firm in their analyses.[1]

Job growth is certainly an important dimension of firm performance, whether it be growth in young or established firms, but so are other performance dimensions. One important dimension that has been overlooked is technology-based performance especially in new or nascent firms.[2] This void in the literature is noteworthy; public policy, in both the United States and in other industrialized nations, continues to focus on R&D- and subsequent technology/innovation-based economic growth while also emphasizing the importance of entrepreneurship in new firms as a driver of economic growth.[3]

Our focus in this paper is on the commercialization of new technology by nascent compared to established firms is an effort not only to expand the literature but also to address the need for a greater policy understanding of the nexus of entrepreneurship and technology-based growth.

* Corresponding author.
E-mail addresses: d_gichev@uncg.edu (D. Gicheva), anlink@uncg.edu (A.N. Link).

[1] See Link and Scott (2012) for a summary of the economics literature related to firm age and employment growth, but their review does not emphasize nascent firms or nascent entrepreneurship per se.

[2] In the aftermath of the Great Recession, the White House has focused on job growth and its antecedents (National Economic Council 2011, p. 22): "Entrepreneurship plays an essential role in generating innovation and stimulating U.S. economic growth. New firms account for most net job growth, and small businesses employ 30% of high-tech workers. Yet market obstacles limit entrepreneurship, as would-be entrepreneurs struggle to raise funding without an established reputation or without giving ideas away."

[3] See for example the previous footnote 2 and National Economic Council (2011).

http://dx.doi.org/10.1016/j.euroecorev.2015.07.018
0014-2921/

The foundation for research on nascent entrepreneurship is over two decades old.[4] Generally considered under this topic are studies on the motivations that guide the economic behavior of the founders of new firms compared to the owners/managers of more established firms, the factors that affect the discovery and exploitation of ideas that lead to new establishments, and the economic performance of newly founded firms compared to those that are more established. While the breadth of topics that have been considered under the rubric of nascent entrepreneurship is varied, the generally accepted definition of a nascent firm is narrow—one who starts a new endeavor such as a business or an organization.

The remainder of this paper is outlined as follows. In Section 2, we offer a theoretical framework for how one might study differences between nascent and established firms as related to their R&D-based performance. Our theory predicts that nascent firms are relatively more likely to fail in their R&D endeavors, but those nascent firms that succeed may be relatively more successful in commercializing their technologies than established firms. In Section 3, we describe the U.S. Small Business Innovation Research (SBIR) program project database that we use to operationalize the theoretical framework developed in Section 2. Also, in Section 3, we discuss the key variables considered in our empirical analysis and we present relevant descriptive statistics. Empirically, in Section 4, we employ a two-part selection probit model to estimate the probability of commercialization conditional on the SBIR-funded project having not failed. Our model in Section 2 predicts, and our analysis in this section confirms, that nascent firms are more likely to fail in their SBIR-supported R&D endeavors. Further, we find that nascent firms that do not fail have a higher probability of commercializing their developed technology. Section 5 concludes the paper with a summary of our findings and with brief remarks about their policy relevance.

2. A comparative theoretical framework

Our theoretical framework is based on the assumption that there is uncertainty in the ex-post-value of R&D endeavors (Y_i) that firms undertake. Suppose that ex-ante, firm i knows that the value Y_i of a new R&D project has distribution, $F_i(Y)$, characterized by mean and dispersion parameters m_i and s_i, respectively.[5] Firms are either one of two types: nascent ($i=0$) or established ($i=1$).

We assume that projects undertaken by nascent firms are inherently riskier because of a lack of information, and this means that $s_0 > s_1$. The unconditional expected value of nascent firms' projects, m_0, may be higher or lower than the expected value of projects undertaken by established firms. If firms face a decreasing marginal returns to R&D schedule, and if firms complete the R&D endeavor with the highest expected returns first, then $m_0 > m_1$. On the other hand, Audretsch (1991), for example, and the literature that followed, showed that the survival of firms is related to the extent of their innovative behavior and their ability to achieve scale economies in the production of their technology. Nascent firms are likely to perform at lower levels in both dimensions compared to established firms (i.e., they will do worse in terms of innovative behavior and the ability to achieve scale economies), and in the underlying distribution it may be the case that $m_0 < m_1$.

We define failure to occur when the value of the R&D project Y_i falls below a certain threshold level, $\overline{Y}$. Under many parameterizations of F and values of m_0, m_1, s_0, s_1 and $\overline{Y}$, it would hold that $F_0(\overline{Y}) > F_1(\overline{Y})$; nascent firms have a higher probability of failure because the higher risk inherent in the R&D projects they undertake translates to a thicker left tail of the project value distribution.

There exists another threshold level, Y^*, that determines commercialization; projects result in sales when $Y > Y^*$. Then, conditional on not failing, the probability of commercialization, P_i is given by:

$$P_i = \frac{1-F_i(Y^*)}{1-F_i(\overline{Y})}.$$

As one example, assume that Y is distributed logistically.[6] Let $m_1=0$ and $s_1=1$. Then $F_0(\overline{Y}) > F_1(\overline{Y})$ holds true when

$$\frac{1}{1+\exp\left[-\left((\overline{Y}-m_0)/s_0\right)\right]} > \frac{1}{1+\exp\left[-\overline{Y}\right]},$$

or $\overline{Y} < -m_0/(s_0-1)$. The conditional probability of commercialization is higher for nascent firms than for established firms when:

$$\frac{1+\exp\left((\overline{Y}-m_0)/s_0\right)}{1+\exp\left((Y^*-m_0)/s_0\right)} > \frac{1+\exp(\overline{Y})}{1+\exp(Y^*)}. \tag{1}$$

Whether or not inequality (1) holds depends on the values of the parameters. Fig. 1 shows the difference in the probability of commercialization for nascent and established firms, P_0-P_1, under a range of values for Y^* when $s_1=1.5$ and $\overline{Y}=-1.1$. We consider for illustrative purposes two cases: $m_0=0.5$ and $m_0=-1$. The range of values of Y^* for which $P_0-P_1>0$ expands as m_0 increases, but the fact that $F_0(\overline{Y}) > F_1(\overline{Y})$ does not predetermine the sign of P_0-P_1. Empirically, we observe $F_0(\overline{Y})$, $F_1(\overline{Y})$, P_0 and P_1 but not the actual thresholds $\overline{Y}$ and Y^*.

[4] Davidsson (2006) attributes the first research paper on nascent entrepreneurship to Reynolds and White (1992).

[5] In our empirical work we hold constant other firm and project characteristics that may affect the distribution $F(Y)$.

[6] Our empirical work is based on the normal distribution, but the logistic distribution, while taking a similar shape, offers the advantage of being analytically more tractable.