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## Determinants of young firms' innovative performance: Empirical evidence from Europe

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### ABSTRACT

This paper explores the effect of diverse firm resources and competences such as founders' human capital, workforce human capital and acquisition of knowledge from external sources on the innovation performance of young firms. The empirical analysis is based on data from a rich European survey that examined small firms between three and ten years of age across a wide industrial spectrum of knowledge-intensive services and manufacturing sectors in ten countries. The study provides evidence that aspects of both internal factors, especially those encapsulated in the human capital of founders such as prior exposure to R & D, team functional diversity and educational background, and external firm characteristics, such as technology collaborations and networking with universities are important in explaining young firms' innovative activity.

### 1. Introduction

New firms have been identified as engines for growth, innovation and wealth creation. While a good share of young, small firms are expected to be short lived, exiting the market within a few years from their formation (Headd, 2003; OECD, 2014), surviving young firms, and especially a relatively small share of them that manages to grow, account for a significant share of new job creation (Criscuolo et al., 2014; Coad et al., 2014). Young, small firms that innovate successfully increase their chances of survival, and are highlighted as the main drivers for introducing new technologies and products as well as increasing long-term productivity (Aghion and Howitt, 2005), stimulating, therefore, economic development and growth. The low share of young innovative firms within European industries, both manufacturing and services, have attracted greater attention on this group of firms among scholars and policy makers alike (Audretsch et al., 2014). However, little is known about their innovative activities compared with those of established firms (Criscuolo et al., 2012).

Despite the enormous growth in literature on the economics of technological change and innovation during the last 20 years (e.g. Fagerberg et al., 2005; Stoneman, 1995; Hall and Rosenberg, 2010) the progress in advancing our empirical understanding of the determinants of innovative activity of firms has been uneven. There is a need for more and better data on the range of the independent variables

considered to affect the innovative performance of firms, i.e. industry-level variables, firm attributes, and most importantly, individual-level variables (Cohen, 2010). In comparison to our understanding of the influence of industry-level variables, our understanding of the role of firm-level variables on firm innovation is less developed, perhaps reflecting the challenge of collecting suitable data. In particular, the suggestion that individuals' characteristics may matter for industrial innovation even after controlling for firm effects could fruitfully expand the consideration of the determinants of industrial innovation beyond the features of industries and firms (Cohen, 2010).

In addition, the methodological difficulty involved in integrating existing theoretical perspectives – mainly from the fields of industrial organization and strategic management – has led researchers to analyse industry characteristics and firms' internal features separately and pay little attention to identifying the links or complementarities between different groups of factors (Vega-Jurado et al., 2008). Furthermore, the literature on the innovative activity of firms has traditionally focused on the role of firm characteristics such as size, cash flow, and diversification especially in large established enterprises (see Cohen, 2010 for an overview). Few empirical studies have broadened the scope to also consider managerial or human capital characteristics especially in conjunction with firm-level attributes and even fewer have employed such characteristics to examine the innovative activity of small young firms (Lynskey, 2004; Arvanitis and Stuchi, 2012).

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Against this backdrop, the present research departs in several aspects and aims to extend the empirical knowledge on the determinants of firms' innovative performance by offering primarily four new elements. First, it refers to young firms which are not necessarily start-ups but newly established firms that have survived the first round of shakeout in their lifecycles. Second, it focuses on one type of resource that is particularly relevant for the innovative performance of young firms, which is the human capital encapsulated in its founders (Davidsson and Honing, 2003; Eisenhardt, 2013). In doing so, it uses multiple measures that capture heterogeneous but also complementary aspects of the founders' knowledge and skills. Specifically, the study not only employs traditional (e.g. founders' generic and specific human capital) or more sophisticated human capital measures (e.g. functional and occupational team diversity), but most importantly attempts to capture certain combinations of functional expertise (e.g. coexistence of technical and marketing expertise) that may be particularly conducive to young firms' innovation. Third, it considers the joint effect exercised by factors external and internal to the young firm's innovative performance by complementing founder-specific characteristics with a wide spectrum of firm-specific and industry-specific factors. Fourth, it uses a unique, particularly rich dataset, from a wide range of sectors (high-tech and low-tech manufacturing, knowledge-intensive business services) which pertains to 10 European countries with different institutional contexts so as to ensure a wide generalizability of our findings.

Young enterprises suffer from the liability of newness compared to older more established firms, a phenomenon which is partially due to skill gaps and information (Stinchcombe, 1965). Founders' characteristics, including their educational attainment, prior experience, age, and expertise, can constitute an important strategic asset for such firms because a) they develop firm strategies and coordinate the required resources to implement them, and b), as these firms are small, the capabilities of founders themselves serve disproportionately as critical resources to the creation of competitive advantage and early growth (Arvanitis and Stuchi, 2012; Miozzo and DiVito, 2016). In addition to the human capital of founders, firms require an adequate stock of qualified manpower to absorb new technological and market knowledge, as well as create and transfer new technological information that may foster innovative activity (Romijn and Albaladejo, 2002).

Moreover, although knowledge stock encapsulated in a young firm's human capital is crucial for innovative activity, young firms 'cannot rely only on internal capabilities; rather they establish formal and informal networks which allow them to obtain knowledge and expertise' (Malerba and Torrisi, 1992). Access to external information and knowledge are pivotal elements of a firm's absorptive capacity and hence for its innovative activities (Caloghirou et al., 2004). This paper empirically explores the determinants of product innovation and R&D intensity of young firms by defining a model that considers the joint effect exercised by factors that are both internal and external to the firm on its innovative performance. The analysis is supported by detailed survey information on a large sample of small companies 3–10 years old from diverse sectors pertaining to 10 European countries.

The rest of the paper proceeds as follows: Section 2 provides a brief literature review relating to the determinants of innovative activity of young firms and derives the main research hypotheses. Section 3 describes the dataset, the dependent and explanatory variables and the econometric framework. Section 4 presents the results of the empirical analysis. Finally, section 5 offers a discussion of the main findings along with some interesting policy implications.

## 2. Theoretical background and hypotheses

The resource-based view of the firm focuses on the importance of firm resources and the circumstances under which these can be a source

of sustainable competitive advantage (Amit and Schoemaker, 1993; Barney, 1991). Following this perspective, the human capital of top management teams, encapsulated in their strategic decisions, composition, ability to learn and organizational skills, can have a significant influence on the performance of entrepreneurial firms. Most importantly, in such young and small firms, these teams often have more opportunities to shape the course of their firms compared to managers of large, well-established firms (Eisenhardt, 2013).

Human capital characteristics, including education, knowledge and skills, have long been considered as a critical resource for success in entrepreneurial firms (e.g. Unger et al., 2011 Maschke and zuKnyphausen-Aufseß, 2012; Klotz et al., 2014). Due to the idiosyncratic, non-contractible nature of entrepreneurial judgment and the high costs of coordinating knowledge dispersed among different individuals, the distinctive capabilities of young firms are closely related to the knowledge and skills of their founders (Colombo and Grilli, 2005).

An important dimension of a young firm's human capital also includes the knowledge and skills brought into the firm by the workforce. Firms require an adequate stock of qualified manpower to sense new market and technology opportunities and to absorb new knowledge that might be turned into innovative products and services. The inability to recruit high quality staff (e.g. engineers, scientists) can be a serious impediment to a firm's subsequent growth and innovation (Romijn and Albaladejo, 2002).

It is essential for young small firms to overcome the liability of newness and smallness by using external sources of knowledge and networking activities in order to identify innovative opportunities and complement their limited resource base with additional resources and new knowledge. More specifically, knowledge emanating from universities can be very important to innovative firms, especially those that have not accumulated enough R&D assets through their own in-house efforts, such as newly-established companies (Lynskey, 2004). Furthermore, various types of collaboration appear to play a special role for new firms in developing or acquiring the resources and capabilities required for new product development, R&D and innovation (Haeussler et al., 2012; Yli-Renko et al., 2001).

### 2.1. Determinants of innovative performance

#### 2.1.1. Founders' human capital

Most young companies have to deal with initial and ongoing resource limitations and need to make trade-offs. Furthermore, it is not clear whether an abundance of resources necessarily results in increased performance outcomes and success (Baker and Nelson, 2005). Therefore, as inadequate resources are common in young firms, it is important to gain better knowledge on what founders' characteristics are most important and thus should be prioritized when establishing new firms or forming entrepreneurial teams (Klotz et al., 2014). In addition, as founders can directly shape the initial structure and processes of their firms, their impact has long-lasting imprinting effects that continue to influence firm strategy, often long after most members of a founding team may have decided to exit the team or have been replaced (Beckman and Burton, 2008). Thus, increased understanding of the characteristics of founders or founding teams may help strategy researchers acquire "a fuller understanding of how firms evolve and what factors influence their ability to develop and maintain competitive advantages in their industries" (Klotz et al., 2014).

A distinction is often made in the literature between generic and specific dimensions of human capital (Becker, 1964). Generic human capital relates to the general knowledge acquired through formal education and professional experience. Specific human capital includes capabilities of individuals that can directly be applied to the

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