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New product introduction and product tenure: What effects on firm growth?

Marco Cucculelli*, Barbara Ermini[1]

Faculty of Economics "Giorgio Fuà" – Department of Economics and Social Sciences, Università Politecnica delle Marche, Piazzale Martelli, 8, 60100 Ancona, Italy

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ABSTRACT

This study contributes to the recent empirical literature on the innovation–firm performance relationship by investigating the effect of product introduction on firm growth in a sample of Italian firms from 2000 to 2006. We adopted a novel approach that exploits the interpretative content of the tenure of the last product introduced (i.e., the number of years since its first introduction) as an additional variable into the explanatory scheme of firm sales growth rate. This variable aims to capture peculiar characteristics of new goods, such as their novelty and complexity. The estimated results confirmed the relevance of this model specification and helps in understanding the reason why previous studies have failed to find a statistically robust relationship between product innovation and growth. Moreover, we found the following: first, the release of a new product enhances growth opportunity among multiproduct firms; second, product development promotes the growth of firms belonging to sectors with stronger commitment to research and development; and third, new product development enhances firm growth substantially in those sectors that absorb externally originated patents.

1. Introduction

Many theoretical articles have investigated the presence of links between firm performance (productivity or firm size growth) and product innovation (Klette and Griliches, 2000; Klette and Kortum, 2001, 2004; Thompson, 2001; Lentz and Mortensen, 2005). Most of these articles have focused on extending the interpretative notion of the endogenous growth models of Grossman and Helpman (1991) and Aghion and Howitt (1992), which operate at a macro-level perspective, assuming heterogeneity across firm behaviors with regard to innovation propensity and research and development (R&D) investment. Earlier, other models approached the investigation of the relationship between research expenditure and firm performance on the basis of deterministic assumptions on innovation activity (Dasgupta, 1985; Phillips, 1971; Hopenhayn, 1992). They all reached conclusions that point to a positive correlation.

Besides, the "active learning" model, developed by Ericson and Pakes (1995) and Pakes and Ericson (1998), stresses the importance of learning by undertaking investments in innovative activities as a key determinant of firm dynamics. In this model, firms could modify their own level of efficiency over time by increasing their investments. This model is counterbalanced by the passive learning model of Jovanovic (1982), wherein firms that are endowed with a time-invariant relative efficiency, which they do not know ex-ante, learn about their true abilities, and their costs over time by entering the market and production. The most efficient firms survive and grow, whereas others shrink or exit from the market. Here, learning is time-driven and shows diminishing returns.

Finally, evolutionary theories (Nelson and Winter, 1982; Dosi, 1988; Dosi et al., 1995) suggest that firms with a strong commitment to R&D and learning activities experience a higher growth rate. They are more likely to develop a finer ability to innovate and exploit the results of their research activity in the product market. They acquire superior "absorptive capacity," which is firm specific and not imitable, and can foster innovation opportunities (Cohen and Levinthal, 1990). Innovative activity provides an inexhaustible source of competitive advantage and, hence, long-lasting success.

The growing empirical literature that focuses on investigating the relationship between innovativeness and firm performance confirms the relevance of this topic (Hall, 1987; Evans, 1987a,b; Amirkhalkhali and Mukhopadhyay, 1993; Doms et al., 1995; Liu et al., 1999; Nurmi, 2004; Lööf and Heshmati, 2006; Del Monte and Papagni, 2003; Yang and Huang, 2005). However, empirical investigation has concentrated more on the relationship between innovation inputs (R&D intensity and patenting indicators) rather than on innovation counting (object approach), such as the introduction of new products (Flor and Oltra, 2004; Becheikh et al., 2006, for a survey).

* Corresponding author. Tel.: +39 071 2207162; fax: +39 071 2207102.
E-mail addresses: m.cucculelli@univpm.it (M. Cucculelli), b.ermini@univpm.it (B. Ermini).
[1] Tel.: +39 071 2207096; fax: +39 071 2207102.

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This study contributes to this strand of literature by investigating the effect of new product introduction on firm growth for a sample of Italian medium-sized companies from 2000 to 2006. We adopted a novel approach that exploits the interpretative content of the tenure of product, i.e., years passed since its launch into the market, in addition to the records of new product introduction. Firm innovative activity can be proxied by the release of a new product by the firm.[2]

However, we argue that this indicator alone cannot detect all the links among innovation and growth, especially in the case of multiproduct firms. Indeed, empirical analysis failed to find robust correlation when the analysis is carried out at the level of an individual firm and when the "counting object" approach is assumed (Becheikh et al., 2006). As an enhancement to the current literature, we introduced the market tenure of the latest introduced product as an additional variable into the explanatory scheme of growth rate of firm sales. This variable aims to capture peculiar characteristics of new goods, such as their novelty and complexity. The importance of better accounting for quality aspects in the measurement of innovative output has been widely acknowledged: mere algebraic count of new products spits out an incomplete picture of the innovative efforts of the firm (Tether, 1998; Lööf and Heshmati, 2006). To our knowledge, this variable has not been used in growth analysis at the firm level while, in a different setting, it has been shown that product tenure is a prevalent product characteristic that is strictly connected to firm productivity and strategic decision on the firm's own product portfolio (Bernard et al., 2008; Schott, 2011; Moral and Jaumandreu, 2007). Traditional models of firm growth restrict the analysis to one firm–one product. Starting with Jovanovic (1982), firm dynamics has been explained through firm heterogeneity as captured by the size and age of the firm. However, when we assume multiproduct firms, firm age and product age can vary greatly, and firm age is not sufficient for representing firm specificity. Therefore, accounting for product-specific characteristics, such as product tenure, can return a more complete model of firm dynamics.

As an additional element of originality, we carry out our analysis exploiting the panel dimension of a unique original Italian firm-level data set which collects information also at the firm-product level.

This article is organized as follows: Section 2 reviews the relevant literature, Section 3 describes the econometric specification of the corporate growth model adopted in the empirical analysis and the data, Section 4 presents the results and some robustness checks and, Section 5 presents the conclusions.

2. Role of innovation activity in firm growth

When analyzing firm growth, a common starting point is to specify a firm growth model that considers the impact of the size and age of the firm. These variables are intended to depict firm dynamics as postulated by Gibrat, who stated that firm growth is a random variable that is independent of the current and past size of the firm, and by Jovanovic (1982) in the "passive learning model." This theory states that firms uncover their true efficiency level over time through a Bayesian learning process. Assuming that the output is a decreasing convex function of managerial inefficiency, this model implies that smaller and younger firms tend to grow faster than their older counterparts.

On empirical grounds, research has failed to confirm Gibrat's law under any circumstances. Erratic growth rates are more realistic while considering the growth process of a mature firm. In contrast, as predicted by Jovanovic (1982), small and young firms appear to grow faster (Evans, 1987a,b; Hall, 1987; Dunne and Hughes, 1994; Lotti et al., 2003; see Audretsch et al., 2004, for a review on related studies). Recently, some empirical evidence reported positive correlation between firm growth and age, a result that has been adduced to the specific feature of very innovative output of firm activity (Das, 1995; Heshmati, 2001; Ermini, 2008; Teruel-Carrizosa, 2010)

Besides age and size, a common approach explains the heterogeneous firms' dynamics accounts for innovation activity as a key factor of firm growth.

Different articles have analyzed the impact of technological innovation on the productivity of a firm (OECD, 1986; Crepon et al., 1998, 1998; Bönte, 2003; Hall et al., 2008a; Ortega-Argilés et al., 2009; see reviews in Mairesse and Sassenou, 1991, and Lööf and Heshmati, 2006). By adopting indicators based on R&D or alternative measures of innovation effort (e.g., innovative sales or number of patents), empirical results seem to suggest that innovation activity significantly enhances firm productivity. Less copious is the investigation on innovation output and firm growth. Because our article contributes to this topic, we reviewed major studies in this field. Moreover, as we adopted the introduction of new products as a proxy for innovation, we intend to focus on similar approaches.

In a survey on econometric studies of innovation activity and firm growth, Del Monte and Papagni (2003) list a number of articles where the authors have detected a positive impact of R&D intensity on firm sales or employment growth (Nolan et al., 1980; Hall, 1987; Singh, 1994; Lefebvre et al., 1998); these articles have examined, over the years, various typologies of firms and countries. Similar results are reported by Amirkhalkhali and Mukhopadhyay (1993), Nurmi (2004), Yang and Huang (2005), and Coad and Rao (2008). In contrast, Mishra (2005) found that R&D activity does not significantly affect the growth of Indian firms operating in the computer industry. Results are more puzzling when patents are used as innovation indicators. When sales growth is considered, results are split between positive and unrelated relations (Geroski, 1995; Geroski et al., 1997; Coad and Rao, 2008; Hölzl, 2009).

The use of these innovation indicators has not been exempt from criticism. It has been observed that traditional indicators, such as R&D activity indexes, were not appropriate to assess links between firm performance and innovativeness (see Kleinknecht et al., 2002; Becheikh et al., 2006, for a review). It cannot be assumed that these indicators resume all the innovation and learning activities that take place within a firm, especially when small–medium firms or multiplant companies are involved (Crepon et al., 1998; Kleinknecht et al., 2002; Hall et al., 2008a). In addition, it can happen that firms encounter difficulties in separating R&D expenditure from other manufacturing expenditures (Mishra, 2005). More importantly, knowledge improvement can take place effectively via informal mechanisms (e.g., learning by doing, interactions with partners, etc.) instead of organized labs or structured research activities (Dosi et al., 1995; Michie, 1998; Flor and Oltra, 2004). These weaknesses cause downward bias in the estimates of the impact of innovation on firm performance. Some drawbacks also emerge while using patent counts. Not any single patent has a commercial implementation (sometimes, they act as a barrier to potential competitor), and neither is any discovery patented, because patenting is sector- and firm-size biased (Arundel and Kabla, 1998; Becheikh et al., 2006).

In this article, we approached the subject of innovativeness, focusing on the output of the innovation activity. We assessed the impact of new product introduction on firm sales growth. Some authors have written about the superiority of indicators, based on

[2] We do not directly tackle the question of innovativeness either for the market or for the firm. However, our specification of the empirical model indirectly reflects these properties, which actually determine the adoption by consumers and product tenure in the market (Barlet et al., 2000).