



Risk attitude, product innovation, and firm growth. Evidence from Italian manufacturing firms

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ABSTRACT

We study the impact of individual risk attitude on the relationship between product innovation and firm performance, in a model of firm growth with endogenous product selection. We exploit a unique dataset collecting firm-level data on new product introductions and individual attitudes towards risk elicited from a lottery.

Empirical evidence shows that the introduction of a new product affects firm growth significantly only in the sample of risk-loving individuals, thus supporting the hypothesis of a negative correlation between the firm growth and the risk aversion of the decision maker.

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1. Introduction

A large literature has addressed the issue of how individual risk preferences shape the behavior of the entrepreneur and the process of decision making. However, a clear relationship linking elicited risk preference, firm strategic decisions and firm performance has not received a definite empirical validation yet (Andersen et al., 2008). Cramer et al. (2002) conjecture that this is probably due to a lack of surveys from which a direct individual measure of risk attitude can be obtained and used in subsequent empirical analysis.

This article aims at contributing to this literature by studying the impact of individual risk attitude on the relationship between firm growth and product innovation. We first address the issue of the impact of product innovation on firm performance, in a two-step model of firm growth with endogenous product selection. Then, we consider the role of individual risk attitude on the innovation–performance relationship.

We obtained information on risk attitude and new products from a survey on 178 entrepreneurs in a sample of Italian manufacturing firms. Following Cramer et al. (2002), a snapshot proxy of individual attitudes towards risk has been elicited from a lottery in which individuals had to respond as to how much they would pay for a ticket in a lottery with 10 tickets and a single prize (Cramer et al., 2002; Andersen et al., 2008). We relate this information to the innovation policy of the firm, i.e. the decision to introduce a new product.

We take into account the role of individual risk propensity by estimating the model separately for risk averse and risk loving entrepreneurs (Elston and Audretsch, 2010, 2011). Despite some contributions offering evidence to the claim that risk-loving decision-makers achieve better firm performance (Binswanger, 1981; Soderbom and Pattillo, 2000), results from empirical literature are still largely controversial (Forlani and Mullins, 2000; Avlonitis and Salavou, 2007; Harrison et al., 2007). To our knowledge, the sensitivity of the firm growth–product innovation relationship to an elicited measure of risk attitude has not been previously put into an empirical test.

Empirical results show that risk-loving individuals select products with larger potential impact on the firms' revenues: the contribution of the new product to firm growth is larger in the case of risk loving entrepreneurs, whereas risk-averse individuals appear to select products that affect firm growth less intensely.

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Therefore, a negative correlation between the firm growth rate and the entrepreneur risk aversion is supposed to come out as a result of the selection process of new products, moderated by the risk attitude of the decision maker. The paper is organized as follows. Section 2 reports the empirical analysis. Section 3 presents results and Section 4 concludes.

2. Empirical analysis

2.1. Sample

Our analysis exploits a unique dataset containing detailed information at firm-level on product portfolio and a proxy of individual risk attitude.² The questionnaire was addressed to the “person in charge of major company decisions”, i.e. the Chief Executive Officer (CEO), the chairman/president, or highest ranking executives, who were targeted because they are the most knowledgeable persons in their firms. The survey dataset has been matched to financial data obtained from Cerved.³ Information on product portfolio and individual risk attitude are available for 178 companies. The balanced panel does not permit control for sample selection bias because we ignored the exit and entry of firms.

2.2. Risk attitude

Data on risk attitude has been obtained by asking entrepreneurs the following two questions:

Q1. *What is the largest amount the firm can invest? Answer: X*

Q2. *How much would you pay for a ticket in a hypothetical lottery with 10 tickets and a single prize of the same amount of the investment you have specified in the previous question, i.e. X?*

The question we used to elicit individual attitudes is the same as in Cramer et al. (2002). Despite it having the same drawback due to its ex post character, it has also the same element of originality in that it uses a direct measure of risk aversion rather than an ex post revealed attitude. In order to take into account the positive correlation between the wealth status of a person and his risk attitude, we adjusted the lottery prize by asking each entrepreneur the maximum investment that the firm would be able to sustain (the amount at risk) and we used this information to calibrate the prize of the lottery. The reservation price is the price respondents would pay for the ticket. The simplest way to use the reservation price as a measure of risk aversion is a transformation (TP) of the reservation price (Cramer et al., 2002):

$$TP = 1 - \frac{P_1}{X/10}$$

where P_1 is the reservation price and $X/10$ is the fair value of the lottery.

A more sophisticated approach is to use the Arrow–Pratt measure of absolute risk aversion ρ , which we have calculated following the procedure illustrated in Cramer et al. (2002). Table 1 reports some descriptive statistics on the sample composition, according to the risk parameters TP and ρ . About 76.4% of interviewed decision makers are risk averse, 17% are risk neutral,

² The survey has been run in 2007 by the Merloni Foundation, a non-profit Italian research institute that promotes research and policy initiatives on economic development, firm growth and entrepreneurship (<http://www.fondazione-merloni.it>).

³ Cerved is an authoritative source of information on Italian companies, that gets official data from the Italian Registry of Companies and from financial statements filed at the Italian Chambers of Commerce. Information is provided on more than 600,000 joint stock, public and private limited share companies, and limited liability Italian companies (Spa and Srl), that furnish data on a compulsory basis. Each company's financial statement is updated annually.

Table 1

Descriptive statistics by risk attitude. Absolute risk aversion ρ and TP.
Source: A. Merloni Foundation Survey.

	n	%	TP	Absolute $\rho (\times 10^{-3})$
Risk averse	136	76.4	0.6978	1.9601
Risk neutral	30	16.8	0	0
Risk loving	12	6.7	−0.5727	−0.0368
Total sample	178	100.0	0.4927	1.4782

Table 2

Descriptive statistics by risk attitude. Risk-averse and risk-loving individual according to the sample median score of the absolute risk aversion coefficient (ρ median value = 0.484×10^{-3}).

Source: A. Merloni Foundation Survey.

Firm variables	Risk loving	Risk averse	Total sample average	Tstat	P value ($T > t $)
Firm age	38.5	35.0	36.8	3.376	0.001
Employees	181.3	74.8	127.4	5.094	0.000
Sales	39,477	15,737	27,462	4.023	0.000
Sales growth	0.068	0.055	0.061	2.950	0.003
Number of products	1.876	1.762	1.818	2.113	0.035
New products in 2000–2006	0.026	0.020	0.023	0.807	0.420

and 7% are risk lovers. These results are very close to those estimated by Cramer et al. (2002) in a larger sample, who report 80%, 17%, and 3%, respectively, for risk averse, risk neutral, and risk lovers in their subsample of entrepreneurs. Furthermore, our estimate of the risk aversion coefficient ($\rho = 1.4782 \times 10^{-3}$) for the total sample is very close to that estimated by Cramer et al. (2002), that ranges from $\rho = 1.5563 \times 10^{-3}$ for employees to $\rho = 1.3836 \times 10^{-3}$ for entrepreneurs.

When firms are split by the individual risk attitude, their economic and financial profile shows significant differences (Table 2). Firms managed by risk-loving decision makers are larger and have experienced a more sustained growth of sales. They have also introduced more products during their lifetime. Conversely, differences in the introduction of new products in the period 2000–2006 are far more limited and not statistically significant. Therefore, the differential impact of the new product introduction on firm growth may be probably related to a different potential of the new product to foster company sales.

2.3. New product introduction

The type of new product introduction that we have considered involves a radical change in the product portfolio of the company and a substantial enhancement of the firm technical and commercial capabilities (Bernard et al., 2010). We do not consider small refinements or negligible enhancements in the features of existing products.⁴ Data on product introduction has been obtained by asking the following questions: “After having listed all the products present in your portfolio, please give separately for each product: (i) a detailed description of the product characteristics and a comparison with other products in the portfolio; (ii) the year of introduction of the product”. By using the detailed product description from question (i), we coded manually each product in a five-digit classification in order to define the whole firm product portfolio. On the date of the survey, the firms in the sample had about 340 products in their portfolios, which corresponds to nearly 1.8 products per firm on average.

⁴ This (strict) definition of new product could underestimate somewhat the true impact of product innovation.

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