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Firms' Proactiveness During the Crisis: Evidence from European Data

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Abstract:

This paper contributes to the literature on the entrepreneurial behavior of firms during the economic crisis, by investigating the determinants of proactive behavior on a large sample of European companies during the 2008–2009 financial crisis. We explore various dimensions of proactive behavior, including: investments in innovation, expanding product offer, undergoing quality certification, investing in tangible assets and avoiding layoff. Our findings show a surprising heterogeneity of determinants in the case of different proactivity measures, especially when considering the impact of public policies which support entrepreneurship. We also provide some evidence supporting the organizational learning hypothesis with regard to proactiveness, as we show that the previous crisis experience matters in the case of the adoption of proactive or reactive strategy by a firm.

Keywords: proactive behavior, crisis reaction, organizational learning, investment, innovation, entrepreneurial orientation

JEL classification: C51, D81, L26

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1 Introduction

Venkatraman (1989) defined proactiveness as the process of anticipating and acting on future needs by seeking new opportunities and introducing new products and brands ahead of competition. Proactive firms anticipate future business situations by recognizing and identifying the opportunities that are hidden for most firms (Lumpkin and Dess 1996, 2001). An analysis of this process may be particularly relevant in the context of economic and financial downturns, when growth opportunities are rare to find and firms' profitability, innovation activities and employment levels reduce (Paunov 2012; Archibugi, Filippetti, and Frenz 2013a and 2013b). A recent literature shows that while some companies may be less willing to invest in long-term projects with uncertain returns during economic recessions, the firms "swimming against the stream" may perceive the crisis as a chance to increase their competitiveness and act proactively (Archibugi, Filippetti, and Frenz 2013; Latham 2009; Gupta et al. 2016; Brzozowski and Cucculelli 2016; Yang and Ju 2017). This paper contributes to this literature by studying the nature of the firm response to the crises and the role of past crisis experiences in shaping the company reactivity to economic downturn.

The entrepreneurship literature has conceptualized proactiveness as one of the three dimensions of the entrepreneurial orientation (EO) including also innovativeness, and risk-taking (Covin and Slevin 1989; Miller 1983; Miller and Friesen 1982; Mishra 2017).¹ Although an entrepreneurial firm would exhibit high scores on all three dimensions (Miller 1983), recent studies argue that proactiveness is the leading and primary factor in encouraging and enabling the other dimensions of EO (Green, Covin, and Slevin 2008; Tang et al. 2009). Yet, being aware of complex and burgeoning studies on this topic (Tran and Santarelli 2013; Covin and Miller 2014; Funk 2015; Stambaugh et al. 2017), our paper considers only the proactiveness dimension of the EO. Recognizing that firms can exhibit variations in intensity of entrepreneurial orientation over time (Wales 2016), we want to investigate in particular how a disposition to proactive behavior is manifested in the times of increased uncertainty. Therefore, the aim of this paper is chiefly empirical: we study firm proactiveness as a component of the firm's entrepreneurial orientation in the context of the recent financial crisis. To this aim, we first investigate whether firm proactiveness is procyclical (or rather counter-cyclical) by analyzing whether firms experiencing turnover reductions during the 2008–2009 financial turmoil were more (or less) likely to behave proactively

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with the business cycle (pro-cyclicality vs. counter-cyclicality hypotheses). Then, as previous crises experience may affect companies' response to incoming downturns (Cucculelli and Bettinelli 2016), we examine whether firms hit by the 2003 economic recession were more likely to be proactive in 2009, thus testing the organizational learning hypothesis with reference to firm proactive behavior.

In order to perform our empirical analysis, we draw information about firm economic performance during the financial crisis and selected proxies for proactiveness from the EU-EFIGE Bruegel survey. The dataset covers a sample of 14,759 manufacturing companies operating in seven European countries (Austria, France, Germany, Hungary, Italy, Spain and UK) in the period 2007–2009. Balance sheet data of the surveyed firms for the years 2001–2009 have been recovered from the BvD-Amadeus database, the most comprehensive and widely used source of financial information for public and private enterprises in Europe. Data about companies' past performance allowed us to identify those firms hit by the 2003 economic recession and test the proactiveness learning hypothesis.

As the large and still growing literature on EO does not agree on how to define operational measures of proactivity (Venkatraman 1989; Rauch et al. 2009; Soininen et al. 2012b; 2012; Herhausen 2016), we start our analysis using a composite measure of proactivity obtained as a sum of elementary proxy indicators of proactiveness. We then investigate the issue in detail by separately analyzing the set of five (basic) indicators of proactiveness that are: investments in innovation, product range expansion, quality certification, tangible investments, and employment policies. Section 2 and 3 will provide more information on the motivations behind the selection of the measures from the survey. As these five dimensions of proactiveness are complementary to each other, we believe that they provide a holistic insight on the phenomenon if taken together.

Our results confirm the pro-cyclical hypothesis, as most of the companies who were hit hardest in 2008–2009 have also adopted the most restrictive strategies. Yet, we have also found some evidence for organizational learning and this effect is somehow mixed. While the companies who only experienced hardships in 2002–2003 period tended to behave more reactively in 2009, the most interesting thing happens in the case of double-hit firms. Those enterprises which were affected both in 2002–2003 and 2008–2009 periods tend to behave more proactively than all the other groups, thus supporting the idea that proactiveness can also be sensitive to the business cycle, in addition to the inherent characteristics of the company and the entrepreneur.

Our contribution to the field of study on the entrepreneurial responses to recession is manifold. Firstly, by adopting a more holistic approach to proactivity of the firm based on a composite measure of proactiveness, we are able to explore the heterogeneous set of responses to the 2008–2009 crisis in the case of European companies and check how the propensity for proactive behavior changes across various measures of proactiveness. Secondly, we provide evidence supporting the hypothesis that proactiveness has a significant dynamic component which depends on the magnitude of turnover reduction faced by the company, and that summarizes the ability of the organization to react and learn from previous experience. This means that also the contribution of proactiveness to EO has to be considered with caution if the role of past performance is not taken into account properly. Thirdly, our findings indicate that the proactive behavior may be also endogenous to business cycle, as they show a clear pro-cyclical dynamic in addition to the (expected) time-invariant characteristics of the individual entrepreneur. Fourthly, taking the advantage of the large and representative EFIGE dataset on European firms (Altomonte and Aquilante 2012), we are able to compare the business responses by enterprises in different European economies. Thus, we are able to generalize the results of our analysis beyond the specific institutional contexts considered by previous studies (China – Bao, Olson, and Yuan 2011; Italy – Cerrato, Alessandri, and Depperu 2016; Canada – Su and Tang 2016). Finally, we analyze proactiveness within the concept of organizational learning, an issue which so far has been rarely exploited in the literature.

The structure of this paper is as follows: the second section analyses the literature and provides argumentation for hypotheses building. The third section describes the dataset and the methods. The fourth section presents the results of empirical analysis, while the last one concludes the paper, discussing the political implications, limitations of the study and puzzles for further research.

2 Background Literature and Hypotheses Development

Despite the relevance of economic downturns for firms' profitability and survival, the literature on companies' behavior during crisis is still incomplete. Although several studies evaluate the effects of different ownership and governance models on firms' performance during economic recession (Leung and Horwitz 2010; Liu, Uchida, and Yang 2012), there are only a few papers investigating firms' reaction to crisis by adopting an entrepreneurial perspective (Latham 2009; Soininen et al. 2012a).

2.1 Proactiveness and Business Cycles

When considering the impact of the business cycle on the firm's proactive behavior, we first turn to the literature on innovation. In this context, reactive strategies towards the crisis have been particularly visible within the decision-making processes concerning innovation (Paunov 2012; Archibugi, Filippetti, and Frenz 2013a, 2013b; Verhaal, Dobrev, and Bigelow 2017). Archibugi, Filippetti, and Frenz (2013a) propose two contrasting hypotheses on the relation between innovation activities and business cycles. On the one hand, following the cyclical hypothesis, they argue that investments in innovation increase in periods of prosperity and decrease during economic recession. While profit margins and optimistic behaviors are negatively affected by economic crises, in periods of economic expansion new possibilities arise for the introduction of new ideas, technologies and products (Freeman, Clark, and Soete 1982; Caballero and Hammour 1996; Archibugi, Filippetti, and Frenz 2013b). This view is also confirmed by the theoretical research on the demand impact on innovation: the rising demand during economic booms provides more fertile ground for product absorption than recession periods (Stiglitz 1993; Geroski and Walters 1995; Cefis 2003; Barlevy 2007; Raymond et al. 2010; 2012). Moreover, as firms have only a limited period of advantage over their competitors, it is safer for them to come up with such activities when the economy is growing (Schumpeter 1939; Breschi, Malerba, and Orsenigo 2000). On the other hand, as most of the companies tend to play safe in periods of economic expansion by exploiting the existing rents, Mensch (1979) claims that innovation tends to be rather counter-cyclical (Filippetti and Archibugi 2011; Archibugi, Filippetti, and Frenz 2013a). In this case, the ability of the firm to renew and reshape its competitive profile through investments in innovation may benefit from difficult times, as companies may be induced to get rid of non-profitable techniques and products (Caballero and Hammour 1996).

Consistently with these views, by measuring the magnitude of the last economic recession through the reduction in turnover experienced by the companies, we test the following two competing hypotheses:

Hypothesis 1a:

(Pro-cyclicity hypothesis) Companies experiencing turnover reduction are less likely to be proactive during the crisis.

Hypothesis 1b:

(Counter-cyclicity hypothesis) Companies experiencing turnover reduction are more likely to be proactive during the crisis.

2.2 Organizational Learning and Proactiveness

Since Cyert and March (1963)'s seminal work, the economic literature has considered organizational learning a key strategic capability in explaining firm success, as it allows a continuous adaptation to the rapidly changing market conditions (March 1991; Bapuji and Crossan 2004; Kandemir and Hult 2005). As shown by the empirical research, companies are more likely to modify their behavior when they underperform with respect to competitors or expected and desired results. However, the firm's propensity to change may also be correlated with slack resources, thus making the probability of observing strategic changes and entrepreneurial phenomena dependent on both bad and good performance.

Some recent studies address the benefits of organizational learning in several business areas: organizational performance (Azadegan and Dooley 2010), market orientation (Santos-Vijande et al. 2005; Stein and Smith 2009), service quality (Tucker, Nembhard, and Edmondson 2007), and human resource performance (Bhatnagar 2007). After the recent economic crisis, many economists have also started to investigate the role of organizational learning within the crisis reaction framework, by examining whether those companies that experienced previous crises reacted better to the last economic downturn. Desai (2014) analyzes whether and how public reporting of details about recent failures affect companies' organizational learning in terms of new failures experience. Herbane (2014) investigates whether organizations have learned thanks to the introduction of crisis management planning and whether new information sources, such as SMEs networks and forums, have been important in shaping the learning process. More related to our paper, Cucculelli and Bettinelli (2016) analyze how organizational learning and firm internal factors, such as CEO's origin, tenure and turnover, affect the firm's reactions to the economic recession. Overall, these empirical studies claimed that former negative events and experiences affect companies' management actions and decision-making process. Hence, firms facing economic shocks should be more likely to adopt proactive strategies in subsequent crisis frameworks as an outcome of the learning process stimulated by the previous crisis experience.

Coherently with these theories, we formulate our second testable hypothesis as follows:

Hypothesis 2:

(Organizational learning hypothesis) Firm proactiveness is affected by previous crises experience.

3 Data and Method

3.1 Dataset

In order to test the study's hypotheses, we build our dataset by drawing information from two main sources: (i) the EU-EFIGE Bruegel-UniCredit survey on "European Firms in a Global Economy"; (ii) and the BvD-Amadeus database. The EU-EFIGE survey collects detailed qualitative and quantitative information about firm ownership and governance structure, workforce characteristics, innovation and internationalization activities, financial conditions, market structure and competition. The dataset covers a representative sample (at the country and industry level) of 14,750 manufacturing firms with more than ten employees coming from seven European countries: Austria, France, Germany, Hungary, Italy, Spain and UK. As the survey was run in early 2010, information is mostly collected as a cross-section for the year 2008, although some questions cover the period 2007–2009 or companies' behavior during the crisis.² To all the surveyed firms, we attach balance-sheet data for the period 2001–2009 provided by BvD-Amadeus, the most comprehensive and widely used source of financial information for public and private enterprises in Europe. With the inclusion of these data, the initial cross-sectional dataset has been enriched by the panel dimension. This enables us to take into account all the information about companies' past performance and to know whether the firms were hit by the 2002–2003 economic recession.

Table 2 provides some descriptive statistics for the variables included in the empirical analysis. As the surveyed firms have been in business for an average of 26 years, our analysis mainly focuses on well established corporations rather than newcomers into the market. Moreover, most of the surveyed companies belong to the category of small and medium sized enterprises, both in terms of total turnover and number of employees. The majority of firms are located in Germany, Italy and Spain (80% of the total), while 14% of the companies operate in UK, 3.3% in Hungary and 3% in Austria; alternatively, 82.7% of the firms belong to the Eurozone. Regarding the industry sector, most of the surveyed companies operate in traditional industries (50%), 26% work in specialized sectors, 18% operate in economies of scale industries, whereas only 4% belong to a high-tech industry.

Table 1: Variable definitions.

Variable	Description
Innovation continued	Dummy that takes the value of one if the firm kept investing in innovation in 2009, and zero otherwise. Source: EFIGE Survey.
Product offer expanded	Dummy that takes the value of one if the firm expanded its product offer in 2009, and zero otherwise. Source: EFIGE Survey.
Quality certification	Dummy that takes the value of one if the firm went through a non-mandatory quality certification in 2009, and zero otherwise. Source: EFIGE Survey.
No investments reduction	Dummy that takes the value of one if the firm avoided tangible investments reduction in 2009, and zero otherwise. Source: EFIGE Survey.
Avoiding layoffs	Dummy that takes the value of one if the firm avoided workforce reduction in 2009, and zero otherwise. Source: EFIGE Survey.
Total proactiveness	Computed as the sum of all the proactiveness measures. Source: Authors computations.
Turnover reduction i^{th} quartile 2008–09	Quartile distribution of the firm's turnover reduction between 2008 and 2009. Source: BvD-Amadeus.
Turnover reduction survey	Categorical variable assuming the values 0,1,2,3,4 according on whether the firm declared to experience a turnover reduction lower than 0 %, between 0 and 10 %, between 10 and 30 %, and higher than 30 %, respectively. Source: EFIGE Survey.
Turnover reduction dummy 2007–08	Dummy that takes the value of one if the firm experienced a turnover reduction between 2007 and 2008, and zero otherwise.

Turnover reduction i th quartile 2007–08	Source: BvD-Amadeus. Quartile distribution of the firm's turnover reduction between 2007 and 2008.
Crisis 2002–03	Source: BvD-Amadeus. Dummy that takes the value of one if the firm experienced a turnover reduction between 2002 and 2003, and zero otherwise.
Age	Source: BvD-Amadeus. Number of years from the firm's inception.
Size	Source: BvD-Amadeus. Logarithm of the number of employees.
Debt ratio	Source: BvD-Amadeus. Ratio of total debt on total assets.
Liquidity ratio	Source: BvD-Amadeus Survey. Ratio of current assets on current liabilities.
Family firm	Source: BvD-Amadeus. Dummy that takes the value of one if the firm is owned by a family or an individual, and zero otherwise.
CEO age	Source: EFIGE Survey. Age of the CEO.
Ownership concentration	Source: EFIGE Survey. Ownership share of the firm's first shareholder.
Public financial incentives	Source: EFIGE Survey. Dummy that takes the value of one if the firm receive public financial incentives in 2009, and zero otherwise.
Public tax incentives	Source: EFIGE Survey. Dummy that takes the value of one if the firm receive public fiscal incentives in 2009, and zero otherwise.
Group	Source: EFIGE Survey. Dummy that takes the value of one if the firm belongs to a group, and zero otherwise.
Foreign	Source: EFIGE Survey. Dummy that takes the value of one if the firm is foreign owned, and zero otherwise.
Economies of scale industry	Source: EFIGE Survey. Dummy that takes the value of one if the firm operates in an economies of scale industry (according to the Pavitt classification), and zero otherwise.
High-tech industry	Source: EFIGE Survey. Dummy that takes the value of one if the firm operates in a high-tech industry (according to the Pavitt classification), and zero otherwise.
Specialized industry	Source: EFIGE Survey. Dummy that takes the value of one if the firm operates in a specialized industry (according to the Pavitt classification), and zero otherwise.
Traditional industry	Source: EFIGE Survey. Dummy that takes the value of one if the firm operates in a traditional industry (according to the Pavitt classification), and zero otherwise.

Table 2: Summary statistics.

Variables	Observations	Mean	Median	Std Dev.
<i>Dependent variables:</i>				
Innovation continued	14,759	0.645	1	0.478
Product offer expanded	14,759	0.490	0	0.500
Quality certification	11,175	0.238	0	0.426
No investments reduction	14,759	0.484	0	0.500
Avoiding layoffs	14,759	0.520	1	0.500
Total proactiveness	14,759	2.320	2	1.237

<i>Main independent variables:</i>				
Turnover reduction 2008–09	8,749			
Turnover reduction dummy 2007–08	9,594	0.471	0	0.499
Turnover reduction survey <0%	14,738	0.323	0	0.468
Turnover reduction survey 0–10%	14,738	0.173	0	0.378
Turnover reduction survey 10–30%	14,738	0.327	0	0.469
Turnover reduction survey >30%	14,738	0.177	0	0.381
Crisis 2002–03	14,759	0.193	0	0.395
<i>Control variables:</i>				
Age	14,759	26.50	21	22.57
Number of employees	9,647	130.95	27	3745.65
Debt ratio	13,371	69.23	68.27	84.12
Liquidity ratio	12,508	1.506	1	2.872
Family firm	14,727	0.704	1	0.457
CEO age	14,701	52.46	50.00	10.15
Ownership concentration	14,052	66.95	60.00	28.47
Public financial incentives	14,759	0.182	0	0.386
Public tax incentives	14,759	0.172	0	0.377
Group	14,759	0.221	0	0.415
Foreign	14,302	0.096	0	0.294
Economies of scale industry	14,075	0.265	0	0.441
High-tech industry	14,075	0.046	0	0.210
Specialized industry	14,075	0.189	0	0.392
Traditional industry	14,075	0.500	0	0.500
<i>Country:</i>				
Austria	14,759	0.030	0	0.171
France	14,759	0.201	0	0.401
Germany	14,759	0.199	0	0.399
Hungary	14,759	0.033	0	0.179
Italy	14,759	0.205	0	0.403
Spain	14,759	0.192	0	0.394
UK	14,759	0.140	0	0.347

3.2 Variable Definitions

3.2.1 Firm Proactiveness

The current literature defines proactiveness as the process of anticipating and acting on future needs by seeking new opportunities, introduction of new products, services and brands ahead of competition (Venkatraman 1989; Koellinger 2008; Soinenen et al. 2012b; Gupta et al. 2016). Lumpkin and Dess (2001) expand on this concept, by adding that proactive actions not only tend to anticipate future events, but they are induced with an intention “to create change and shape the environment” (Lumpkin and Dess 2001, 431). Other scholars stress that proactive attitude is connected to the entrepreneurial propensity to introduce and implement innovations (Kickul and Gundry 2002).

Following this idea, we introduce a composite measure of *Total proactiveness* which combines five elementary dimensions of proactivity, namely: (i) *Innovation continued*, a dummy equal to one if the firm kept investing in innovation in 2009, and zero otherwise (question C29 of the EFIGE survey); (ii) *Product offer expanded*, a dummy equal to one if the firm expanded its product offer in 2009, and zero otherwise (question Ea of the EFIGE survey); (iii) *Quality certification*, a dummy equal to one if the firm went through a non-mandatory quality certification in 2009, and zero otherwise (questions E8 and E9 of the EFIGE survey); (iv) *No investments reduction*, a dummy equal to one if the firm avoided tangible investments reduction in 2009, and zero otherwise (question C13a of the EFIGE survey); (v) *Avoiding layoffs*, a dummy equal to one if the firm avoided workforce reduction in 2009, and zero otherwise (question B21 of the EFIGE survey).³ Consequently, our main dependent variable *Total proactiveness* is an ordinal variable that takes the values (0,1,2,3,4,5). Additionally, we consider each of these components of the main variable separately, looking for possible heterogeneous strategies in terms of the proactive behavior within our sample. Therefore, our empirical exercise involves six dependent variables considered as measures of proactive behavior: *Total proactiveness*, *Innovation continued*, *Product offer expanded*, *Quality certification*, *No investments reduction* and *Avoiding layoffs*. The reason for selecting such indicators was motivated not only by data availability, but also by the view that the enterprise can exhibit very different dimensions of

proactivity. To go into detail with each of these proxies, the innovation activities seemed for us the most obvious manifestation of such propensity. Then, the introduction of the new products on the market, the extension of the range of products and the efforts connected to ensuring the increased quality of the services and products constitute another set of proactive activities during downturns. Finally, cutting expenses by reducing the employment and resigning from investments in tangible assets are another aspects we believe signal proactiveness when firms face economic recession. Therefore, we consider the firms that act counter-intuitively in this aspect as proactive and, consequently, we argue that these dimensions of proactiveness are complementary to each other.

In Table 2 we report the summary statistics for the dependent variables employed in the econometric specification. As can be noted, 65 percent of the surveyed firms did not postpone their investments in innovation in 2009, whereas almost half of the companies expanded their product offer, invested in tangible assets and did not reduce the number of employees in the same period. A lower percentage of firms behaved proactively in terms of quality certification: only 18 percent of the surveyed companies started the process of non-mandatory quality certification in 2009.

3.3 Econometric Specification

In order to test the hypotheses developed in the previous section, we estimate the following baseline regression:

$$\Pr(\text{Proactivity}_i) = \alpha + \beta_1 * \text{Turnover Reduction}_i + \beta_2 * \text{PreviousCrisis}_i + \beta_3 * (\text{Turnover Reduction}_i * \text{PreviousCrisis}_i) + \beta_4 * X_i + \varepsilon_i \quad (1)$$

where *Proactivity_i* represents either the total proactiveness indicator (i.e. *Total proactiveness*) or the set of our single proactiveness measures (i.e. *Investments in innovations*, *Product offer expanded*, *Quality certification*, *No investments reduction* and *Avoiding Layoff*); *Turnover_Reduction_i* is the reduction in turnover experienced by the firm in 2008, measured through a categorical variable proxying the quartile distribution of the continuous variable (according to balance-sheet data provided by BvD-Amadeus); *Previous_Crisis_i* is a dummy variable accounting for previous crisis experience in 2003; *X_i* is a set of control variables, including detailed firm-specific characteristics (size, age, innovation and internationalization activities, ownership concentration, financial dependence), some CEO-specific controls (age and gender), industry and geographical dummies⁴; ε_i is the error term.

As our composite measure of proactiveness ranges from 0 to 5, we employ an ordered probit model, whereas we employ a simple probit model for estimating the probability of firms adopting one of the proactiveness indicators.

The first hypotheses to test is to investigate whether companies reacted in a proactive way or not to the economic downturn (pro-cyclicality vs. counter-cyclicality hypotheses). As we measure the magnitude of the last economic crisis through the reduction in turnover experienced by the firms, we expect that: (i) $\beta_1 < 0$, if the pro-cyclical hypothesis is confirmed, i.e. if companies experiencing turnover reduction are less likely to behave proactively during the crisis; $\beta_3 < 0$, if the counter-cyclical hypothesis is confirmed, i.e. if companies experiencing turnover reduction are more likely to behave proactively during the economic downturn. As for the organizational learning phenomenon, we argue that the adoption of proactive strategies depends on previous crisis experience. Therefore, in equation (1), the effect of organizational learning on companies' behavior is captured by the variable indicating the former crisis experience and its interaction with the present crisis. Specifically, in line with Hypothesis 3 (learning hypothesis), we expect that the combined effect of current crisis and of the former crisis experience (interaction of Turnover Reduction with Previous Crisis variable) does matter for the adoption of proactive or reactive behavior. Therefore, we expect $\beta_3 \neq 0$. As the methodological literature on the usage and interpretation of interaction effects in logit and probit models suggest cautious usage of interactions with continuous variables (Ai and Norton 2003; Norton, Wang, and Ai 2004), in our case we apply the interaction of dummy variables.

Before turning to the description of results, we have to mention the limitations of our empirical approach. As we mostly rely on the cross-sectional data and exploit information on turnover reduction for 2008–2009 period as crucial independent variable and the proactivity of the firm in year 2009, there is a potential problem of endogeneity and reverse causation: reactive measures taken in former periods could have affected the economic performance of the firm. In spite of the fact that we are trying to perform some robustness checks, by using information on turnover reduction in a previous year (2007–2008) to deal with this issue, we have to admit that we are not able to fully control for potential endogeneity. Therefore, we are observing not the causal effects of the turnover change on proactivity, but rather the correlation between those variables.

4. Results

4.1 Baseline Regression

The results obtained from the estimation of eq. (1) are reported in Table 3.⁵ In columns (1) we report regression coefficients for the overall proactiveness indicator (i.e. *Total proactiveness*), whereas in columns (2)–(6) we report estimation results for the single proactiveness measures. Starting with *Total proactiveness* (column 1), the estimates indicate that the firm's proactive behavior declines with the reduction of the turnover. The coefficients for the four quartiles of the distribution of turnover reduction in the case of larger reductions of turnover are increasing and always statistically significant. This evidence supports the pro-cyclicality hypothesis (hypothesis 1a) and reject the alternative one (hypothesis 1b). When it comes to the organizational learning hypothesis (Hypothesis 2), the dummy variable indicating the previous crisis experience dummy is negative and statistically significant

Table 3: Baseline results.

VARIABLES	Ordered Probit Model	Probit Model				
	Total proactive- ness (1)	Innovation continued (2)	Product offer expanded (3)	Quality certification (4)	No investments reduction (5)	Avoiding layoffs (6)
Turnover reduction 1st quartile 2008–09	−0.256*** (0.051)	−0.122* (0.065)	0.014 (0.063)	−0.110 (0.081)	−0.278*** (0.063)	−0.373*** (0.067)
Turnover reduction 2nd quartile 2008–09	−0.506*** (0.052)	−0.213*** (0.066)	−0.115* (0.063)	−0.106 (0.081)	−0.440*** (0.064)	−0.730*** (0.067)
Turnover reduction 3rd quartile 2008–09	−0.886*** (0.053)	−0.434*** (0.065)	−0.212*** (0.063)	−0.187** (0.082)	−0.743*** (0.064)	−1.154*** (0.068)
Turnover reduction 4th quartile 2008–09	−1.078*** (0.053)	−0.530*** (0.065)	−0.406*** (0.063)	−0.088 (0.081)	−0.915*** (0.065)	−1.284*** (0.068)
Crisis 2002–03	−0.142* (0.073)	−0.064 (0.093)	−0.076 (0.089)	−0.114 (0.116)	−0.066 (0.092)	−0.169* (0.097)
Turnover reduction 1st quartile * Crisis 2002–03	0.071 (0.100)	0.036 (0.128)	0.014 (0.122)	0.123 (0.160)	0.055 (0.124)	0.077 (0.129)
Turnover reduction 2nd quartile * Crisis 2002–03	−0.020 (0.097)	−0.016 (0.124)	0.053 (0.119)	−0.011 (0.156)	−0.140 (0.122)	0.081 (0.125)
Turnover reduction 3rd quartile * Crisis 2002–03	0.263*** (0.098)	0.220* (0.124)	0.148 (0.119)	0.166 (0.156)	0.103 (0.122)	0.238* (0.126)
Turnover reduction 4th quartile * Crisis 2002–03	0.226** (0.096)	0.079 (0.120)	0.217* (0.117)	0.143 (0.151)	0.146 (0.121)	0.123 (0.126)
Age	0.001 (0.001)	0.002 (0.001)	−0.001 (0.001)	0.001 (0.002)	−0.000 (0.001)	0.001 (0.001)
Size	−0.008 (0.017)	0.034* (0.020)	0.038* (0.020)	0.142*** (0.026)	0.039* (0.020)	−0.176*** (0.021)
Debt ratio	−0.003*** (0.001)	−0.003*** (0.001)	−0.001 (0.001)	0.001 (0.001)	−0.003*** (0.001)	−0.003*** (0.001)
Liquidity ratio	−0.007 (0.009)	0.027 (0.020)	−0.031* (0.018)	−0.015 (0.018)	0.015 (0.014)	−0.022 (0.014)
Family firm	−0.065** (0.031)	−0.172*** (0.040)	0.081** (0.039)	−0.007 (0.050)	−0.060 (0.039)	−0.039 (0.041)
CEO age	0.002 (0.001)	0.002 (0.002)	−0.003** (0.002)	−0.000 (0.002)	0.001 (0.002)	0.005*** (0.002)
Ownership concentration	0.001 (0.001)	0.001** (0.001)	−0.001 (0.001)	0.001 (0.001)	0.000 (0.001)	0.000 (0.001)

Public financial incentives	0.074** (0.037)	−0.128*** (0.045)	0.168*** (0.045)	0.125** (0.056)	0.068 (0.045)	0.040 (0.047)
Public tax incentives	0.080** (0.035)	−0.067 (0.044)	0.185*** (0.043)	0.123** (0.055)	0.027 (0.043)	0.016 (0.045)
Group	−0.025 (0.042)	−0.091* (0.051)	0.067 (0.050)	0.187*** (0.067)	−0.097* (0.051)	−0.024 (0.053)
Foreign	−0.069 (0.059)	−0.027 (0.073)	−0.073 (0.071)	−0.059 (0.095)	−0.047 (0.073)	0.023 (0.074)
Economies of scale industry	−0.039 (0.034)	−0.074* (0.043)	−0.059 (0.041)	0.145*** (0.054)	−0.053 (0.042)	0.024 (0.043)
High-tech industry	0.281*** (0.067)	−0.093 (0.090)	0.623*** (0.092)	0.155 (0.115)	0.148* (0.088)	0.164* (0.091)
Specialized industry	−0.018 (0.038)	−0.136*** (0.047)	0.101** (0.046)	0.120** (0.058)	−0.082* (0.046)	−0.027 (0.048)
Observations	5,798	5,798	5,798	4,545	5,798	5,798

Notes: All of the variables are defined in Table 1. The reference category for the industry sector is “Traditional Sector”. Three, two and one star (*) mean, respectively, a 99, 95 and 90 percent level of significance. Robust standard errors reported in parentheses.

(−0.142*), thus suggesting that the companies that experienced only the 2003 recession - and not the 2009 one - actually reduce their proactive behavior. By contrast, the firms that experienced the 2003 crisis and the 2009 recession in fact increase their proactiveness and their reaction is stronger the greater the impact of the 2009 crisis on their revenues, as shown by the interaction term of the turnover reduction in the 3rd and 4th quartile of the distribution).

Regarding the single measures of firm proactiveness, in column (2) we report regression results for *Investments in innovation*. The estimates indicate that as turnover reduces (and the magnitude of the economic crisis increases) the companies are more likely to stop investing in innovation activities (the estimated coefficients go from −0.122* to −0.530***). Hence, we find support for the pro-cyclicality hypothesis (hypothesis 1a) also in the case of investment in innovation. Regarding the previous crisis experience dummy (Crisis 2002–03), the variable results turn out not to be statistically significant, suggesting that the experience of previous economic recessions does not simply affect the probability of proactive behaviour. However, the combined effect of previous crisis experience and turnover reduction is again positive and statistically significant at the 3rd quartile of turnover reduction distribution (the coefficient is 0.220*). This result confirms the organizational learning hypothesis (hypothesis 2): companies experiencing previous recessions were more proactive during the last financial and economic crisis in terms of innovation activities. Moreover, it signals a potential threshold effect: the combined negative experience of both crises can result in more proactive behavior, but only when the magnitude of the contemporary economic downturn is strong enough. In such a case, the firm is more likely to try new proactive approaches towards the downturn.

As for the second indicator of proactiveness, that is *Product offer expanded*, the coefficients reported in column (3) confirm that the firm’s proactive behavior is rather pro-cyclical (hypothesis 1a). The turnover reductions in the 2nd, 3rd and 4th quartile of the distribution strongly reduce the probability of the firms expanding the product offer (the estimated coefficients are −0.115*, −0.212***, −0.406***, respectively). With regard to the previous crisis experience dummy, also in this case the 2003 crisis variable is not significantly related to our indicator of firm proactiveness: the companies that experienced the 2003 recessions, but not the 2009 financial crisis, are not significantly associated with a higher probability of behaving proactively. On the contrary, we find support for the organizational learning hypothesis (hypothesis 2): the companies experiencing the 2003 recessions that were largely hit by the 2009 crisis (with a turnover reduction in the 4th quartile of the distribution) are found to be positively associated with the *Product offer expanded* indicator.

Moving on to the *Quality certification* dummy, the estimation results reported in column (4) slightly support the pro-cyclicality hypothesis (hypothesis 1a). Only when the turnover reduction belongs to the 3rd quartile of the distribution does it have a negative effect on our proactiveness proxy (the estimated coefficient is −0.187**). This suggests that going through non-mandatory quality certifications is an activity mostly independent of the economic cycle. Once again, the impact of previous crisis experience remains statistically non-significant, and the organizational learning hypothesis is not supported. In fact, the interaction between the current and past crises does not significantly affect the probability of firms going through quality certifications.

When it comes to the variable *No investments reduction*, the estimation results shown in column (5) confirm the pro-cyclicality hypothesis (hypothesis 1a). As the reduction of turnover increases (and the quartile of the distribution shifts from the 1st to the 4th), the probability of investing in tangible assets reduces substantially (the estimated coefficients are −0.278***, −0.440***, −0.743*** and −0.915***, respectively). Hence, as for the other proactiveness indicators, we reject hypothesis 1b (i. e. the counter-cyclicality hypothesis). Moving on to the previous crisis experience variable, it turns out not to be statistically significant, both when entered alone in

the estimation and when interacted with the turnover reduction variables. Therefore, as in the case of *Quality certification*, we do not confirm the organizational learning hypothesis (hypothesis 2) for this indicator.

Finally, estimation results for the *Avoiding layoff* dependent variable (column 6) further confirm the pro-cyclicality of firm proactiveness. As turnover reduces, the probability of firms avoiding layoffs reduces as well. The estimated coefficients are -0.373^{***} , -0.730^{***} , -1.154^{***} and -1.284^{***} for the four quartiles of the distribution, respectively. With regard to the organizational learning hypothesis, our findings are more complicated: albeit the previous crisis experience dummy alone proves to be negatively associated with firm proactiveness (-0.169^*), the interaction between the 2003 economic recession and the current turnover reduction becomes positively related to the probability of avoiding layoffs (0.238^*). This confirms the organizational learning hypothesis (hypothesis 2) and suggests the existence of a threshold effect for the adoption of proactive behavior when the company was hit by a previous crisis.

As for the control variables, estimation results indicate that larger companies (Size) were more likely to keep investing in innovation, expand the product offer, go through non-mandatory quality certification and invest in tangible assets during the recent financial and economic crisis (columns 2–5), whereas they were less likely to avoid layoffs (column 6). Second, as expected, more levered firms were less likely to behave proactively, both when we consider our single measures and the overall proactiveness indicator (*Total proactiveness*). Third, companies that received financial and tax incentives during the crisis were associated with a higher probability of expanding the product offer (column 3) and go through non-mandatory quality certifications (column 4), while these measures did not affect - or adversely impact - the probability of investing in innovation (column 2). Finally, firms operating in high-tech industries significantly increased their proactive behavior during the crisis, independently of the variable used to measure it.

4.2 Robustness Check

In order to test the robustness of our results, in Table 4 we perform several robustness tests. First, we use the firm's assessment of turnover reduction included in the EFIGE survey, instead of actual financial data. As firms are asked to indicate the percentage of turnover reduction experienced between 2008 and 2009, in Panel A of Table 4 we use this variable as the main independent variable. Estimation results indicate that turnover reductions higher than 30 percent are negatively associated with most of our measures of firm proactiveness, namely, total proactiveness, innovation continued, product offer expanded, no investments reduction and avoiding layoffs. These findings further confirm the pro-cyclicality hypothesis: the firms experiencing higher turnover reductions are associated with a lower probability of undertaking proactive strategies. When the turnover reduction variable is interacted with the dummy accounting for previous crisis experience, we find support for the existence of non-linearities in the organizational learning hypothesis. More specifically, the firms that experienced the 2003 economic recession made fewer reductions in innovation investments when the turnover reduction in 2009 was in the 10–30 percent range (column 2). On the contrary, the probability of expanding the product offer increases more when the turnover reduction in the companies experiencing the previous crisis was higher than 30 percent (column 3). Finally, the likelihood of avoiding layoffs increases when the firm's previous crisis experience is combined with a turnover reduction lower than 10 percent or higher than 30 percent (column 6).

Table 4: Robustness checks.

VARIABLES	Ordered Probit Model	Probit Model	Product offer expanded (3)	Quality certifica- tion (4)	No investments reduction (5)	Avoiding layoffs (6)
	Total proactive- ness (1)	Innovation contin- ued (2)				
<i>Panel A: Turnover reduction survey question</i>						
Turnover reduction survey <10%	-0.146^{***} (0.049)	-0.071 (0.060)	0.016 (0.058)	-0.045 (0.075)	-0.143^{**} (0.059)	-0.273^{***} (0.060)
Turnover reduction survey 10–30%	-0.525^{***} (0.040)	-0.279^{***} (0.048)	-0.109^{**} (0.047)	-0.085 (0.062)	-0.460^{***} (0.048)	-0.717^{***} (0.049)
Turnover reduction survey >30%	-0.907^{***} (0.048)	-0.455^{***} (0.058)	-0.350^{***} (0.058)	-0.082 (0.075)	-0.776^{***} (0.060)	-1.103^{***} (0.061)

Crisis 2002–03	−0.124** (0.051)	−0.037 (0.062)	−0.088* (0.060)	−0.131 (0.080)	−0.021 (0.060)	−0.155** (0.061)
Turnover reduction <10% * Crisis 2002–03	0.132* (0.092)	0.059 (0.118)	0.047 (0.113)	0.040 (0.146)	0.070 (0.113)	0.211* (0.115)
Turnover reduction 10–30% * Crisis 2002–03	0.125* (0.071)	0.147* (0.088)	0.148* (0.085)	0.093 (0.114)	−0.043 (0.087)	0.094 (0.087)
Turnover reduction >30% * Crisis 2002–03	0.226*** (0.083)	0.102 (0.103)	0.159* (0.102)	0.196 (0.133)	0.107 (0.105)	0.182* (0.107)
Observations	6,924	6,924	6,924	5,295	6,924	6,924
<i>Panel B: 2007–2008 Turnover reduction dummy</i>						
Turnover reduction dummy 2007–08	−0.304*** (0.032)	−0.150*** (0.039)	−0.016 (0.038)	−0.107** (0.049)	−0.309*** (0.038)	−0.407*** (0.039)
Crisis 2002–03	−0.136*** (0.043)	−0.011 (0.053)	−0.099* (0.052)	−0.013 (0.067)	−0.092* (0.052)	−0.171*** (0.052)
Turnover reduction dummy 2007–08 * Crisis 2002–03	0.120** (0.057)	−0.010 (0.071)	0.164** (0.069)	−0.055 (0.091)	0.081* (0.070)	0.111* (0.070)
Observations	6,426	6,426	6,426	4,984	6,426	6,426
<i>Panel C: 2007–2008 Turnover reduction (quartile distribution)</i>						
Turnover reduction 1st quartile	−0.200*** (0.051)	−0.124** (0.062)	0.013 (0.061)	−0.068 (0.078)	−0.213*** (0.061)	−0.270*** (0.061)
Turnover reduction 2nd quartile	−0.282*** (0.049)	−0.108* (0.062)	−0.013 (0.061)	−0.178** (0.082)	−0.292*** (0.061)	−0.339*** (0.061)
Turnover reduction 3rd quartile	−0.347*** (0.048)	−0.156*** (0.059)	−0.050 (0.059)	−0.179** (0.076)	−0.319*** (0.059)	−0.467*** (0.059)
Turnover reduction 4th quartile	−0.386*** (0.050)	−0.209*** (0.060)	−0.010 (0.059)	−0.011 (0.075)	−0.411*** (0.061)	−0.552*** (0.061)
Crisis 2002–03	−0.135*** (0.043)	−0.010 (0.053)	−0.098* (0.052)	−0.014 (0.067)	−0.091* (0.052)	−0.168*** (0.052)
Turnover reduction 1st quartile * Crisis 2002–03	0.041 (0.091)	−0.043 (0.112)	0.138 (0.110)	−0.101 (0.144)	−0.085 (0.111)	0.115 (0.110)
Turnover reduction 2nd quartile * Crisis 2002–03	0.185** (0.084)	−0.072 (0.111)	0.303*** (0.108)	−0.033 (0.144)	0.140 (0.109)	0.116 (0.109)
Turnover reduction 3rd quartile * Crisis 2002–03	0.138* (0.088)	0.013 (0.109)	0.082 (0.108)	0.089 (0.139)	0.117 (0.108)	0.139 (0.108)
Turnover reduction 4th quartile * Crisis 2002–03	0.113 (0.085)	0.054 (0.107)	0.132 (0.105)	−0.174 (0.138)	0.146* (0.106)	0.075 (0.108)
Observations	6,426	6,426	6,426	4,984	6,426	6,426

Notes: Three, two and one star (*) mean, respectively, a 99, 95 and 90 percent level of significance. Robust standard errors reported in parentheses.

As both turnover reduction and proactive measures are taken in 2009, our analysis may suffer from reverse causality. In order to partially account for this problem, in Panel B and Panel C of Table 4 we measure turnover reduction between 2007 and 2008. Estimation results broadly confirm our previous findings. First, we find support for the counter-cyclical hypothesis of firm proactiveness: turnover reductions diminish the probability of firms undertaking proactive strategies, both when we use the turnover reduction dummy and the quartile distribution of the continuous variable. Second, we confirm the organizational learning hypothesis: the firms experiencing the 2003 economic recessions reduced proactive behavior less often.

5 Concluding Remarks

Our results reveal very heterogeneous answers to economic crises: in the case of different measures of proactivity, the impact of current (2009) and previous crisis experience (2003) was somehow different. We have confirmed the pro-cyclical hypothesis (Hypothesis 1): firms that have experienced larger turnover reductions are also the ones that adopt more reactive stance. Yet, the impact of the previous crisis experience is much more ambiguous. Most of the companies that have suffered in 2003 tend to adopt more reactive measures than those that went through these troubled times unharmed. This finding partially provides evidence for organizational learning (Hypothesis 2).

Yet, an interesting thing happens to doubly-disadvantaged companies that experienced both turnover reduction in 2003 and 2009. Such firms tend to adopt a more proactive approach. These companies see that the conservative stance does not pay off during the crisis and a more courageous strategy is needed. Moreover, there is a potential threshold effect: the proactivity is usually visible in the case of the companies who suffered the most in 2009 in terms of turnover reduction (being in the 3rd or 4th quartile of turnover reduction) and – at the same time – shared the experience of previous crisis in 2002–2003. This behavior could be interpreted within the myopic loss aversion framework (Chrisman and Patel 2012): the decision-makers within the companies whose performance is below aspiration levels, tend to accept higher risk and adopt more proactive strategies.

Our paper provides some puzzles for further research on the linkage between organizational learning and proactive behavior of firms. In the case of our results, we have demonstrated that the effect of organizational learning is not present and significant on all adopted measures of proactive behavior. Therefore, future studies on that topic should include a wider range of measures for proactiveness, as a limited number of indicators can lead to biased results.

Our study also offers some insights for policy-makers. As many countries have adopted policies aiming at supporting the proactivity of entrepreneurs during the financial crisis, our results clearly demonstrate that these measures had limited influence on European firms. More precisely, the financial and tax incentives had a small or non-significant effect on the measure most important from the employment policy perspective, that is, avoiding layoffs and saving jobs in companies. Moreover, the impact of public financial incentives on the innovation activities was actually negative. Yet, the public support proved to be efficient in the case of the expansions of product range and on the quality certification. Therefore, when designing new policies for encouraging entrepreneurship that mainly occurs through entrepreneurial proactiveness, public authorities should consider whether these are the desired outcomes of their actions.

Of course, we should remind about the limitations of our data-set. We could not fully control for potential endogeneity and reverse causality between the turnover reduction and proactivity of firms. Therefore, our results indicate rather correlations between those variables, and not the direct causality.

Moreover, our story remains unfinished. As Wales points out, not all EO firm activities, including the proactive ones, turn out to be successful, as entrepreneurial actions are always connected to risk and may fail to bring economic return (Wales 2016). Unfortunately, due to the limitations of the dataset, we are not able to see the long-term results of this proactive strategies adopted during the 2009. Were the proactive firms more successful than the reactive ones? This question remains unanswered and therefore we call for further investigations in this direction, that would also require the usage of panel data.

Notes

- 1 Covin and Slevin (1988) extended Miller's work and defined entrepreneurial orientation as the extent to which the top managers are inclined to take business-related risks (the risk taking dimension), to favour change and innovation in order to obtain a competitive advantage for their firm (the innovation dimension), and to compete aggressively with other firms (the proactiveness dimension) (Covin and Slevin 1988, 218).
- 2 For additional information about the EU-EFIGE survey, see Altomonte and Aquilante (2012).
- 3 The survey questions used to build the proactiveness indicators are reported in Appendix 1.
- 4 All of the variables are defined in Table 1.
- 5 We have also carried out a multivariate probit regression, as suggested by anonymous referee to control for potential correlation between our dependent variables (measures of proactivity). Yet, as our dependent variables are weakly correlated and the results of the multivariate probit estimation did not vary substantially from our baseline results, we decided to keep them out of the paper. Still, the results of multivariate probit are available upon request.

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