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DETERMINANTS OF INTER-FIRM R&D COLLABORATIONS

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ABSTRACT

This paper explores the determinants of R&D collaborations of SMEs using a unique dataset derived from a survey of 3500 Greek SMEs. In doing so four categories of factors are examined for their potential role in the engagement of firms in R&D collaborations referring to (a) technological competencies, (b) multinational activity, (c) competitive strategies, and (d) internal organization. The descriptive statistics show that SMEs located in the Region of Western Greece tend to exhibit a greater cooperative R&D intensity compared to the total sample of SMEs under examination. The empirical analysis is based on the estimation of ordered probit models for different age groups of SMEs. Our main results indicate that firms' technological competencies seem to significantly increase the likelihood of older firms to participate in inter-firm R&D collaborations. Moreover, we find that international diversity of export activity raises the probability of older as well as middle-aged SMEs to participate in inter-firm R&D collaborations. Finally, professional management appears to play a significant role in firms' decision to participate in R&D projects especially in the case of young SMEs. Policy and managerial implications of our findings highlight the need to stimulate SMEs' internationalization activities and support the development of firms' technological competencies.

Keywords: R&D collaborations, SMEs, technological competencies, strategies, multinational activity, internal organization.

ΠΡΟΣΔΙΟΡΙΣΤΙΚΟΙ ΠΑΡΑΓΟΝΤΕΣ ΤΩΝ ΕΠΙΧΕΙΡΗΜΑΤΙΚΩΝ ΣΥΝΕΡΓΑΣΙΩΝ ΣΕ ΕΡΕΥΝΑ ΚΑΙ ΑΝΑΠΤΥΞΗ

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Περίληψη

Η παρούσα εργασία διερευνά τους προσδιοριστικούς παράγοντες των συνεργασιών σε Έρευνα και ανάπτυξη (Ε&Α) αξιοποιώντας μία μοναδική βάση δεδομένων που προήλθε από μια εκτενή έρευνα πεδίου για 3500 ελληνικές μικρομεσαίες επιχειρήσεις (ΜΜΕ). Στο πλαίσιο αυτό εξετάζονται τέσσερις κατηγορίες παραγόντων για τον πιθανό ρόλο τους στην ανάπτυξη συνεργασιών σε Ε&Α μεταξύ των επιχειρήσεων και οι οποίοι αφορούν (α) στις τεχνολογικές ικανότητες, (β) στην πολυεθνική δραστηριότητα, (γ) στις ανταγωνιστικές στρατηγικές, και (δ) στην εσωτερική οργάνωση. Η περιγραφική ανάλυση των στατιστικών στοιχείων δείχνει ότι οι ΜΜΕ που χωροθετούνται στην Περιφέρεια Δυτικής Ελλάδος τείνουν να αναπτύσσουν σε μεγαλύτερη ένταση συνεργατική Ε&Α σε σχέση με το συνολικό δείγμα των ΜΜΕ που εξετάζονται. Η εμπειρική ανάλυση στηρίζεται στην εκτίμηση υποδειγμάτων ordered probit για διαφορετικές ηλικιακές ομάδες ΜΜΕ. Τα βασικά ευρήματα φανερώνουν πως οι τεχνολογικές ικανότητες των επιχειρήσεων ενισχύουν σημαντικά την πιθανότητα οι μεγαλύτερης σε ηλικία επιχειρήσεις να συμμετέχουν σε δια-επιχειρηματικές συνεργασίες Ε&Α. Επιπλέον, τα ευρήματα υποδεικνύουν ότι η διεθνής διασπορά της εξαγωγικής δραστηριότητας αυξάνει την πιθανότητα για τις μεγαλύτερης και μέσης ηλικίας ΜΜΕ να συμμετέχουν σε δια-επιχειρηματικές συνεργασίες Ε&Α. Τέλος, η επαγγελματική διοίκηση εμφανίζεται να διαδραματίζει σημαντικό ρόλο στην απόφαση των επιχειρήσεων να συμμετέχουν σε προγράμματα Ε&Α και ιδιαίτερα στην περίπτωση των νέων ΜΜΕ. Οι προεκτάσεις των ευρημάτων αυτών για τους διαμορφωτές πολιτικής και τα στελέχη των επιχειρήσεων υπογραμμίζουν την ανάγκη να υποστηριχθεί η διεθνοποίηση και η ανάπτυξη των τεχνολογικών ικανοτήτων των ΜΜΕ.

1. INTRODUCTION

Inter-firm collaborative R&D is increasingly recognized by academics and policy makers as a key mechanism to produce innovation since it is largely linked to accessing external resources, efficient knowledge diffusion and technology transfer, shared capabilities, and organizational learning. Complexity of innovative processes, high risk of innovative activities, high cost of R&D investments, as well as the lack of expertise and knowhow are common reasons for firms to pursue collaborations in R&D projects, especially in the case of SMEs (Vrande et al., 2009; Veugelers, 1997). R&D collaboration facilitates the creation of technology platforms and technological innovations from which new knowledge can be generated and existing knowledge can be developed (Narula, 2004).

Within the theoretical context of strategic management and based on internal organization of firms' activities, the motivation for R&D cooperative actions comes from the need of firms to exploit complementary capabilities and shared knowledge (e.g. Teece, 1986; Kogut and Zander, 1992). In addition, transaction cost economics can be used to provide theoretical argumentation according to which R&D cooperation allows firms to develop a hybrid form of organization which in certain circumstances seems to be a preferred strategic choice compared to "buy" (from the market) or "make" (vertical integration) solutions (Hagedoorn et al. 2000). Furthermore, from the theoretical perspective of industrial organization a number of studies highlight the role of incentives for firms to conduct R&D cooperative projects with their competitors and the potential impact of this specific type of R&D cooperation (the so called co-opetition) on social welfare (e.g. D'Aspremont and Jacquemin, 1988; Kamien et al., 1992).

Empirical studies on R&D collaborative activities of firms have mainly provided evidence from large enterprises (Gassmann et al., 2010; Teirlinck and Spithoven, 2013). SMEs have attracted relatively limited research interest, even though the

attributes of SMEs that may affect positively or negatively their involvement in R&D alliances have been highlighted from a theoretical perspective (Veugelers, 1997; Narula, 2004; Rothwell and Dodgson, 1991). Focusing on the empirical literature, van de Vrande et al. (2009) based on a sample of Dutch SMEs, provide evidence according to which medium-sized firms, on average, are more heavily involved in open innovation than their smaller counterparts. Moreover, they argue that the main barrier to open innovation in SMEs refers to organisational and cultural issues which arise when SMEs start to interact and collaborate with external partners. An empirical study (Teirlinck and Spithoven, 2013) referring to Belgian firms indicates that in very small and small firms, the share of PhD holders among research managers and R&D experts increases the likelihood of engaging in research cooperation, while for medium-sized firms, it is the presence of research managers rather than PhD holders that promotes research cooperation.

Even though relevant literature has highlighted the rather low performance of Greece in R&D and innovation indicators (e.g. Kontolaimou, 2014; Herrmann and Kritikos, 2013; OECD, 2014), empirical evidence on the determinants of inter-firm R&D collaborations in the Greek context is very limited, if not totally absent. A recent study (Gypali et al., 2017) based on a sample of Greek manufacturing firms employs a structural equation model to investigate the complex interplay between internal innovation efforts, knowledge sourced from R&D collaborations and firm innovation performance. The results show that the diversity of R&D collaboration sources affects firm innovation performance only indirectly and negatively; this negative impact being attributed to search, management and transaction costs associated with the development of R&D partnerships.

Given the above, the paper contributes to the literature by exploring the determinants of inter-firm R&D collaborations utilizing a unique dataset derived from a survey of 3500 SMEs operating in Greece. In doing so four categories of factors are examined for their potential role in the engagement of Greek firms in R&D collaborations

referring to (a) technological competencies (personnel's ICT skills, R&D effectiveness), (b) multinational activity, (c) internal organization, and (d) competitive strategies. Furthermore, this paper attempts to explore whether these potential drivers of inter-firm R&D collaborations differ among age groups of SMEs (young, middle-aged and old firms), taking into account firm- and environment-specific factors (firm size, competition intensity, sector activity, firm location).

The rest of the paper is structured as follows. First, we describe the survey data, the variables and the methodology used in the empirical analysis. Next, we report and discuss the estimation results. Finally, we conclude and provide some policy implications.

2. DATA AND METHODOLOGY

2.1 Description of the Survey

The empirical analysis is based on a large dataset that includes rich information at the firm level on 3500 SMEs in Greece. The data were collected through a large-scale survey conducted in 2012 on behalf of the Hellenic Organization for Medium- and Small-Size Enterprises and Handicrafts, commonly referred to by its acronym, EOMMEX. The aim of the project was to identify and analyze the factors that determine the level of competitiveness of Greek SMEs and formulate an appropriate methodological tool for monitoring its progress.

The survey was based on a structured questionnaire with four distinct sections referring to a firm's internal organization, human capital, utilization of ICTs and innovation activities. It addressed exclusively SMEs defined in accordance with the EU-related recommendation (2003/361), i.e., firms that simultaneously meet two criteria: (i) they have fewer than 250 employees and (ii) their annual turnover does not exceed 50 million Euros. A pilot telephone-based survey was initially conducted leading to 50 filled questionnaires. The questionnaires in the main survey were primarily filled through personal telephone-based interviews (based on a CATI

system) and complemented by the interviewees online using a web-based application designed to serve the purposes of the research. The contact person was the CEO of the firm, or the general manager. Specifically in the case of micro and small firms, it was usually the owner who participated in the survey.

The survey targeted a range of industries of the Greek economy based on their competitiveness. To this end, a number of key indicators were used for the sector selection, including labor cost, export performance, growth in terms of gross value added, total factor productivity and employment growth. A total of 21856 firms were contacted to achieve the target of 3500 responses[1], resulting in a 16% response rate[2]. The sample distribution by firm size and industry is presented in Table 1. Clearly, the sample is dominated by micro enterprises as well as manufacturing and firms in services-trade industries, largely reflecting the main structural characteristics of entrepreneurial activity in Greece.

<Insert Table 1 about here>

2.2 Variables and Model Specification

The dependent variable in our analysis is *Inter-firm R&D Collaborations* measured by the extent to which the firm has participated in research projects/collaborations with other firms during the last five years. This is an ordered 7-category variable taking values from 1 (=The firm has not participated in any research projects/collaborations with other firms) to 7 (=Participation in research projects/collaborations is common practice for the firm).

The explanatory variables used in this paper were classified into four broad categories as follows:

[1] Since no information was available for the rest 18356 firms that were initially contacted, it was not possible to take into account heterogeneity or sample selection concerns in the analysis.

[2] However, the majority of firms were in the process of recalls or reminders when the survey was closed, as the targets were completed. Refusal to answer the survey was recorded for only 5,156 firms at the closure of the survey. Therefore, the current response rate of 16% underestimates the actual survey performance.

(a) Technological competencies

Personnel with ICT skills: This ordered 7-category variable measures the percentage of the firm's employees that use ICT with respect to the firm's total staff. (1= a negligible share of employees in the firm's total personnel; 7= the vast majority of employees).

R&D Effectiveness: This ordered 4-category variable measures the percentage of technologies/products/systems used by the enterprise that results from internal or collaborative R&D processes (1=negligible percentage; 2=small percentage; 3=significant percentage; 4=the largest percentage).

(b) Multinational activity

Export diversification: This ordered 7-category variable measures the extent to which exports are geographically diversified (1=no exports, 7=the exports are highly diversified).

(c) Competitive strategies

Low Cost Strategy: This ordered 7-category variable measures the extent to which the competitive advantage of the firm lies on cost efficiencies (1= the firm charges higher than its competitors, 7=the firm is an absolute cost leader).

Product Differentiation Strategy: This ordered 7-category variable measures the extent to which the competitive advantage of the firm lies on product differentiation (1= the firm's products/services are inferior in terms of quality/features as compared to those of competitors, 7=the firm's products/services are highly valued by customers since they are extensively differentiated as compared to those of competitors).

(d) Internal organization

Hierarchical Decentralization: This ordered 7-category variable measures how decentralized is the decision-making process within the firm (1= high centralized, 7= high decentralized).

Professional Management: This ordered 7-category variable measures the extent to which the management of the company is professional (1= The top management team consists of mainly friends/family, 7= The top management team exclusively consists of professionals).

We also control for firm- and environment-specific characteristics referring to firm size, competition, sector and location. More particularly, three size dummies are included, i.e., micro, small and medium, with the latter being considered as the reference size group. In addition, we control for competition intensity by using an ordered 7-category variable which measures the extent to which the competitive advantage of the company is easily replicated by competitors (1= easy to replicate, 7=hard to replicate). As regards sectors, a dummy variable is included to indicate whether the firm belongs to the manufacturing sector (manufacturing). Finally, we include a location dummy indicating whether the firm is located in one of the two largest urban centers in Greece, namely, Athens or Thessaloniki. The correlation matrix in Table 3 indicates the absence of any significant correlation among the main independent variables used, which in turn ensures that the econometric estimates are not biased due to multicollinearity problems.

<Insert Table 3 about here>

The econometric analysis is based on the estimation of the following model:

$$RDColl_i = \beta_1 TechComp_i + \beta_2 MultAct_i + \beta_3 CompStrat_i + \beta_4 IntOrg_i + \beta_5 Z_i + \varepsilon_i \quad (1)$$

In equation (1) the dependent variable, $RDColl_i$, stands for the cooperative R&D of firm i with other firms. $TechComp_i$ is a vector of technological competencies of the

SME, $MultAct_i$ refers to the multinational activity of the SME, $CompStrat_i$ is a vector of competitive strategies that the SME pursues, $IntOrg_i$ represents a set of organizational attributes of the firm, Z_i is a vector of the control variables, and ε_i is the random error term assumed to be normally distributed. Parameters β denote the marginal effects to be estimated.

Since our dependent variable, i.e. the inter-firm R&D collaboration, is a categorical ordinal variable, we employ an ordered probit model to estimate the effects of the explanatory variables on the probability for a firm to develop R&D collaborations with other firms. Table 2 reports the frequencies of the dependent variable per category for the total sample and for the Region of Western Greece as well. Interestingly, the large majority of SMEs (83%) in our sample has not participated in any research collaborations with other firms. Looking at the firms that operate in the Region of the Western Greece a relevant picture holds with a slightly smaller percentage since 78% of SMEs report no participation in R&D collaboration. On the other hand, adding the percentages for the three largest categories of the dependent variable, in order to capture the share of SMEs with extensive inter-firm R&D collaborations, the picture is again better for the Region of Western Greece (18%) compared to the total sample (13%) implying that firms in the Region of Western Greece tend to be more intensive in terms of cooperative R&D compared to the total sample of SMEs.

In addition, for the purposes of our empirical analysis we classify SMEs in three age groups as follows: (a) 1–6 years denoted as ‘‘young’’ firms[3], (b) 7–15 years denoted as ‘‘middle-aged’’ firms, (c) more than 15 years denoted as ‘‘old’’ firms. The age of the firm was computed as the difference between the survey year and the year of establishment reported by the firm.

[3] Following the definition provided by Veugelers and Cassiman 2010; Evans 1987, Fotopoulos and Giotopoulos 2010, Lotti et al. 2003.

3. RESULTS

The estimation results for the model described above are reported in Table 4. The table presents the marginal effects of the regressor variables on the probability associated with the highest category of the dependent variable (R&D collaborations) relative to the lowest category. The second column provides the empirical results obtained from the total sample of 3500 SMEs while the next three columns present the estimation results for each of the examined age group as described above.

<Insert Table 4 about here>

Focusing on firms' technological competencies, we can see that employing personnel with ICT skills facilitates the participation in collaborative R&D projects for the total sample of SMEs and in the case of elder firms. The organizational knowledge accumulated in established firms constitutes a critical firm-specific intangible resource (Grant, 1996), and consequently much of a firm's knowledge residing in its human capital can be used to create firm value (Hitt et al., 2001). Hence, the advanced ICT skills of firms' employees seem to significantly increase the likelihood of older firms to be engaged in inter-firm R&D collaborations, raising thus their likelihood to innovate.

Moreover, we find that R&D effectiveness increases the probability of inter-firm R&D collaborations, this effect being statistical significant again in the case of the total sample as well as older firms. This interesting result may be explained on the grounds of the theoretical framework of absorptive capacity -defined as a firm's ability to value, assimilate, and commercially utilize new, external knowledge efficiently (Cohen and Levinthal, 1990). Hence, our findings appear to be in the same line with studies demonstrating that absorptive capacity is inextricably and strongly linked with R&D capacity (Berchicci, 2013).

In addition, we provide empirical evidence that the international diversity of exporting activity raises the likelihood of old and middle-aged firms to participate in

R&D collaborations, while this linkage does not hold for young firms. Therefore, this finding is in accordance with the view that exposure to diverse environments tends to facilitate technological learning at the firm-level (Zahra et al., 2000) with experience playing a supportive role in this direction. Looking at the total sample of SMEs, we also found a significant and positive impact of multinational activity on inter-firm R&D collaborations.

Regarding the strategic factors and relying on Porter's (1985) generic strategies that firms adopt in order to obtain a competitive advantage over their rivals we find weak evidence that young firms with a strategic position of product differentiation are more likely to participate in collaborative R&D projects (significant at 10% level of significance). On the other hand, product differentiation strategy does not seem to matter either for the other age groups examined or for the total sample. Moreover, the strategic positioning of low cost was not found to affect inter-firm R&D collaborations in any significant way. Regarding the total sample of SMEs, our findings do not reveal any significant linkage between competitive strategies and inter-firm R&D collaborations.

With respect to internal organization variables, we find that professional management is particularly important for inter-firm R&D collaborations, as indicated by the significant marginal effects of the respective variable in the models of young and middle-aged SMEs. This also holds for the total sample but not for old SMEs. Agency theory suggests that authority should be granted to professional managers of a certain firm's size and scale since managers represent a unique organizational resource (Daily, Certo, and Dalton, 2000). On the contrary, a decentralized structure in the decision-making process does not appear to play any significant role for firms to be engaged in R&D collaborations. Finally, with respect to the control variables, medium-sized firms and manufacturing enterprises seem to be more likely to engage in R&D collaboration in some of our models. On the other hand, competition

intensity and location are not found to be important for the involvement of SMEs in R&D collaborative projects in any case.

Overall our results for the age groups under examination show that middle-aged firms' participation in R&D collaborations is dependent on companies' multinational activity as well as the existence of professional management; the latter also found particularly significant for the involvement of young firms in collaborative R&D activities. Older firms' participation in collaborative research projects is mainly attributed to their technological competencies (i.e. advanced ICT skills of employees and R&D effectiveness) and the international diversity of exports. Finally, the results for the total sample of SMEs indicate that professional management, technological competencies and multinational activity favour the development of inter-firm R&D collaborations. Notably, the results referring to the Region of Western Greece, even though they are based on a rather small sample, appear to be more or less in the same direction[4].

4. CONCLUDING REMARKS

The main purpose of this paper is to explore the determinants of R&D collaborations of SMEs by using a unique dataset derived from a survey of 3500 Greek SMEs. In doing so four categories of factors are examined for their potential role in the engagement of firms in R&D collaborations referring to (a) technological competencies (e.g. personnel with ICT skills; R&D effectiveness), (b) multinational activity, (c) competitive strategies (e.g. low-cost strategy; product differentiation strategy), and (d) internal organization (e.g. decentralization; professional management). Furthermore, this paper attempts to explore whether these potential drivers of inter-firm R&D collaborations differ among age groups of SMEs (young, middle-aged and old firms).

[4] The rather small number of observations (40 taking into account missing values) underlines the need for the findings concerning the Region of Western Greece to be treated with caution. In any case, the related results are available upon request.

The main empirical findings derived from ordered probit models indicate that firms' technological competencies seem to significantly increase the likelihood of older firms to participate in inter-firm R&D collaborations. Moreover, we find that international diversity of export activity raises the probability of older as well as middle-aged SMEs to participate in inter-firm R&D collaborations. On the other hand, professional management appears to play the most important role (in terms of statistical significance) in firms' decision to participate in R&D projects in the case of young SMEs. The results for the total sample of SMEs show that all aforementioned factors, i.e. technological competencies, multinational activity and professional management contribute to the development of inter-firm R&D collaborations in Greece. Regression results based on SMEs located in the Region of Western Greece seem to be in the same direction. Notably, descriptive analysis of our data indicates that firms in the Region of Western Greece tend to be more intensive in terms of cooperative R&D than firms in the total sample.

Our findings have important policy and managerial implications highlighting the need to stimulate SMEs' internationalization and support the development of firms' technological competencies in order to encourage the establishment of effective inter-firm R&D partnerships. In specific, from a policy perspective, and as far as the Greek case is concerned, emphasis should be placed on how to stimulate international new ventures and SMEs (e.g. through taxation motives for exporting firms) and strengthen interactions, ties and networks among new ventures and successful established firms (e.g. by organizing and financing annual conferences/seminars). Also, government should determine the policies for the taxation and financing of cooperative R&D investment. On the other hand, managers should ensure that employees engaged in external R&D collaborations balance the knowledge giving and receiving acts in order to protect the company's strategically important knowledge. However, at the same time managers should make the venture attractive as a collaborating partner

incorporating significant knowledge stock in order to participate in successful R&D alliances.

The study is based on a large-scale survey targeting SMEs from all over the country. However, it would probably be of value to repeat the survey paying special attention to the regional dimension. In this way, the research would potentially lead to region-specific findings and policy implications particularly relevant for the Region of Western Greece.

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Table 1. *Firm distribution per size group and economic activity*

NACE 1.1 codes	Description	Micro	Small	Medium	Total
1, 5, 10, 13, 14	Primary sector (agriculture, fishing and mining)	42	35	9	86
15, 17-33, 35, 36, 37	Manufacturing	1026	631	209	1866
45	Construction	63	56	16	135
51, 52	Trade (wholesale and retail)	397	183	39	619
50, 55, 63, 64, 72, 74, 80, 92	Services	489	246	59	794
Total		**2017**	**1151**	**332**	**3500**

Table 2. *Frequencies of the dependent variable*

	Total Sample		**Region of Western Greece**	
Inter-firm R&D Collaborations	No of SMEs	%	No of SMEs	%
(1)	2.909	83.11%	80	78.43%
(2)	50	1.43%	0	0%
(3)	37	1.06%	2	1.96%
(4)	44	1.26%	2	1.96%
(5)	228	6.51%	8	7.84%
(6)	113	3.23%	5	4.9%
(7)	119	3.4%	5	4.9%
Total	3500	100%	102	100%

Table 3. *Correlation matrix of the independent variables*

	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Personnel with ICT skills (1)	1						
R&D Effectiveness (2)	0.296	1					
Export diversification (3)	0.062	0.049	1				
Low Cost Strategy (4)	0.082	0.064	-0.014	1			
Product Differentiation (5)	0.138	0.153	0.123	0.126	1		
Hierarchical Decentralization (6)	0.230	0.158	0.078	-0.012	0.163	1	
Professional Management (7)	0.257	0.144	0.054	-0.023	0.060	0.214	1

Table 4. *Determinants of R&D collaborations for different age groups of SMEs*

	Total Sample	**Young firms**	**Middle-aged firms**	**Old firms**
Personnel with ICT skills	0.006**	0.005	0.006	0.006**
	(0.003)	(0.011)	(0.004)	(0.003)
R&D Effectiveness	0.007***	0.004	0.004	0.009***
	(0.002)	(0.01)	(0.004)	(0.003)
Export diversification	0.008***	0.005	0.011**	0.007**
	(0.002)	(0.01)	(0.005)	(0.003)
Low Cost Strategy	0.002	0.005	0.006	0. 00001
	(0.003)	(0.018)	(0.006)	(0.004)
Product Differentiation	0.004	0.039*	0.003	0.003
	(0.004)	(0.02)	(0.007)	(0.004)
Hierarchical Decentralization	0.00	-0.028	-0.002	0.002
	(0.003)	(0.017)	(0.005)	(0.003)
Professional Management	0.006***	0.023**	0.007*	0.004
	(0.002)	(0.01)	(0.004)	(0.003)
Small	-0.001	0.129*	-0.002	-0.009
	(0.011)	(0.072)	(0.02)	(0.013)
Medium	0.04**	0.273*	-0.017	0.052**
	(0.019)	(0.149)	(0.026)	(0.024)
Competition Intensity	0.002	-0.01	0.004	0.001
	(0.003)	(0.012)	(0.005)	(0.003)
Manufacturing	0.024**	0.005	0.036**	0.021*
	(0.01)	(0.056)	(0.018)	(0.012)
Location	-0.015	-0.011	-0.025	-0.010
	(0.011)	(0.054)	(0.021)	(0.012)
Number of firms	2451	145	832	1474
Pseudo R^2	0.034	0.110	0.031	0.042

Notes: The table reports marginal effects of ordered probit regressions. *Significant at 10% level. **Significant at 5% level. ***Significant at 1% level. Standard errors are reported in parentheses.