CREATIVITY PAYS OFF

INNOVATION, INNOVATION STRATEGY AND INTERNATIONALIZATION

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Creativity pays off
Innovation, innovation strategy, and internationalization

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Abstract

A lot of recent empirical research points to the superior performance of exporting firms in comparison to non-exporters. Exporters on average are found to be larger, more productive, more capital and skilled-intensive than non-exporters At the same time, innovation and exporting seem to be inextricably linked at firm-level.
Apart from several recent studies, the literature on it for Poland is scarce. This paper analyses the relationship between innovation behaviour, declared innovation strategy and internationalization in a panel of firms from Poland from an extensive survey conducted by the Institute for Development. The results support the idea that the superior performance of the exporters is linked to a large extent to their superior innovation performance. Exporters prove to be more focused on innovations, are more aware of the need to implement changes, and are better prepared to introduce them in reality. They are more probable to be creative and are more likely to behave in a more strategic manner assuming the position of a market leader.
We positively identify critical linkages between the declared innovation strategy and export states of Polish companies. Utilizing the classification of Hobday, Rush & Bessant (2004) and controlling for the significance of innovation (firm or market) level, we show that innovatively passive firms have, ceteris paribus, a significantly lower probability of obtaining exporter status. The introduction of innovations at ad hoc manner has a positive however statistically insignificant effect. Only permanent innovators or creative firms enjoy a clear and robust increase in their exporting probability potential. It simply pays off to be innovative. At the same time, our results support the postulates by Altomonte et al. (2013), on the close connection between innovation and internationalization extents.

JEL Classification: *F14, C83, C21, D22, L25*
Keywords: *Innovation, Innovation strategy; Internationalization; Trade; Firms survey; Logit modelling*

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1. Introduction

In the process of internationalization of their activities enterprises usually go through some different stages, starting from the simplest exporting and gradually advancing to other forms of international involvement such as outsourcing, FDI by acquisition (brownfield investments), greenfield investments, or joint venturing (e.g. Vernon, 1966). Exporting is a preferred internationalization strategy for SMEs as it involves comparatively low levels of commitment, fixed costs, and risk.

Before the emergence of the heterogeneous firms theories (the so-called new new trade theory, Melitz 2003) international trade models assumed symmetry between firm. Thus, either all companies within a given industry were exporters or all of them were domestic. The growing micro-econometric evidence from both developed and developing countries clearly contradicted that statement (e.g. Bernard & Jensen 1999 for the United States; Clerides, Lach & Tybout 1998 for Colombia, Mexico, and Morocco; Aw, Chung & Roberts 2000 for South Korea and Taiwan and the survey in Tybout 2002). Substantial firm heterogeneity was discovered. Firm differences within sectors were found to be larger than differences between sector averages. Most firms even in traded goods sectors are domestic only. Of those companies that export, only a few export a significant fraction of their production. At the same time, at least some companies export in every industry. The share of exporting firms is mainly a function of the industry's comparative advantage. Companies that export are different from non-exporters in some ways - they are: bigger, more productive, pay higher wages more capital and skilled labour intensive than non-exporters. It seems that only the most productive firms can export and survive in export markets - companies that have reached a certain productivity level necessary to compete for international markets (e.g. Bernard, Jensen & Schott 2006).

One of the factors at play in internationalization is firm's innovation activity. Hirsh & Bijaoui (1985), Enthorf, Krader & Pohlmeier (1988), Kumar & Siddhrthan (1994), Wakelin (1998) or Basile (2001), among others, showed that innovation activity measured both from the point of its inputs or outputs is a major factor explaining probability of exports and export intensity at firm level. The direction of the impact is not always positive (e.g. product innovations lowering export probability for firms in Germany or the United Kingdom (Wakelin 1998). There is also substantial evidence that firms make a joint decision on

innovation and export market participation decisions (e.g. Aw, Roberts & Winston 2007, Trefler 2004).

The studies on the nexus between innovation and internationalization of firms in Central and Eastern Europe are scarce. Most of the studies so far have concentrated on the advanced industrialized economies with high or above average performance of national innovation systems. Therefore, the study on Polish firms should be of particular importance representative for states at the lower level of overall development and significantly weaker innovation system framework.

The overall level of innovation of the Polish economy is low. In the last Innovation Union Scoreboard 2015 (EC 2015) Poland was classified as a moderate innovator exceeding the results of only Bulgaria, Latvia and Romania classified as modest innovators and of Lithuania. The more detailed analysis shows that Poland is on the EU average only in human capital endowment and lags significantly in linkages and entrepreneurship, in the quality of the research systems and number of innovators. At the same time, Polish firms are poorly internationalized with both extensive and intensive firm margin of trade at very low levels. Poor innovation performance of Polish firms could be one the reasons of low extent of internationalization of their activities.

The main objective of the paper is an empirical investigation of the linkage between innovation activities and declared innovation strategy and the extent of internationalization of Polish firms with the use of econometric modelling.

Following previous studies (among others Wakelin 1998, Basile 2001) we verify the impact of innovation both on the probability to export and the intensity of exports (in a sample restricted only to exporters). Different conditioning factors are considered upon review of the theoretical and empirical literature as potential determinants of export performance: innovation activity and innovation strategy, the industry as well as basic firms characteristics – firm size, firm productivity, ownership structure.

In contrast to previous studies, we utilize a unique firm-level financial based on individual firm-level financial data collected by InfoCredit (provider of data to Amadeus database) and

augmented with the results of an extensive qualitative survey allowing us to control for many qualitative aspects.

Second, in contrast to previous empirical studies, we will not only control for innovation inputs or outputs in a narrow sense but will distinguish and examine declared innovation strategies of companies.

Thirdly, our study will lead to specific recommendations for economic policy in Poland, other transition economies as well as universal recommendations.

The structure of the rest of the paper is as follows. Section 2 shortly reviews theoretical literature. Section 3 reviews empirical literature on the nexus between export performance and firm innovativeness in general and in the case of Cental European economies. Section 4 describes the survey and financial data utilized in our study and explains the logic of logit modelling. Section 5 present general results of the survey on innovation activity and export performance of Polish firms and discusses the choice of the measure for firm productivity. Section 6 presents estimation results and discusses them. The last section concludes.

2. Review of theoretical literature

Vernon (1966) introduced the concept of a product life-cycle in international trade pointing to a potentially significant role of innovation in trade and in particular to trade based on the gap in the level of technology. It was formerly developed by Krugman (1979) and Dollar (1986) in their models of North-South trade. In Krugman (1979) firms in the North produce only new goods, while the Southern firms produce only old goods.

In the case of a dynamic model of Dollar (1986) enterprises in the North have the incentive to move production to the South, while firms in the South have the incentive to learn to imitate the Northern products. The pattern of international trade is constantly evolving. New products, as well as whole industries, develop in industrialized countries, while other industries decline in the face of competition from developing nations based on lower costs. The pace of innovation, diffusion of innovation, and capital movements are tied up to trade-determined prices leading to endogeneity.

Jensen and Thurby (1987) incorporated R&D investments into a dynamic North-South trade model with the pattern of trade similar to Vernon's product life cycle. Innovation took a form of a new product development which could be accomplished only by a Northern industry devoting labour to R&D activities. Initially, this industry enjoyed a monopoly position in the production of the new goods, but after some time, a lower wage and thus competitive Southern economy learnt to produce these goods so that a product-cycle trade pattern emerged. The model endogenized the rate of innovation as profit maximizing firms must devote resources to R&D to innovate and these resources have alternative uses in production within the R&D sector or in a competitive nontraded goods sector.

The seminal papers by Krugman (1979, 1980) analysed trade relations in the presence of horizontal product differentiation, increasing returns, and monopolistic competition in a simplified world with symmetric firms. As a result of the assumption of homogeneity of companies, all enterprises from within an exporting industry were said to export.

The theory stresses the possibility that exports may be a cause of innovative activities. It is predicted by global economy models of endogenous innovation and growth (Grossman and Helpman, 1989, 1990, 1991a, 1991b; Segerstrom, et al. 1990; Young, 1991; Aghion & Howitt 1998). These new growth theory models endogenized the rate of innovation and predicted dynamic effects of international trade on innovative activity. They were due to foreign imitation, due to fiercer competition in international markets forcing exporters to improve their products and processes (increasing the likelihood of innovation) or due to learning by exporting by gaining access to knowledge from their buyers on foreign markets not available to non-exporting firms.

Segerstrom et al. (1990) constructed a dynamic general equilibrium model of North-South trade that combines the product-life-cycle hypothesis of Vernon (19566) with Schumpeter's (1942) description of product innovation (Schumpeterian creative destruction). They modelled each R&D race between firms as an "invention lottery" in which the probability of winning the race was proportional to resources allocated to R&D by each firm. The duration of each R&D race was a deterministic, decreasing function of the amount of aggregate resources dedicated to R&D. Every time a new product was discovered, a new R&D race between firms in the North began with the winner earning dominant firm profits for an exogenously given patent period, after which perfect competition prevails.

Most of the models above employed the notion of horizontal product differentiation in the monopolistic competition economy while some utilize the quality ladders approach with vertical product differentiation based on quality (e.g. Eaton & Kortum 2001).

The path-breaking paper by Melitz (2003) extended the Krugman's analysis by allowing for and incorporating firm level productivity differences or firm heterogeneity. The model postulates the selection–mechanism in which only the most productive firms enter foreign markets, and the least productive firms are eliminated from the market. It has to be stressed, however, that selection mechanisms were already modelled by Jovanovic (1982) when he analysed the role of selection in the evolution of an industry. Within an industry, smaller firms grow faster but at the same time are more likely to fail than larger companies. In the presence of incomplete information, firms learn their efficiency only when they start operating in the industry and enter a given market. The efficient companies grow and survive the inefficient decline and eventually fail.

In a monopolistic competitive model of trade with firm heterogeneity and endogenous markups of Melitz & Ottaviano (2008) market size and trade affect the intensity of competition. That, in turn, has an impact on the selection of producers and exporters in that market along the extensive and intensive margin of trade (number of exporters/average exports per firm). Both the size of the market and the extent of market integration affects the aggregate productivity and average mark-ups.

In a paper by Constantini & Melitz (2008) the authors built a model in which firms make joint decisions to innovate and/or to enter the export market testing for different liberalization scenarios. The comparison across different trade liberalization scenarios shows, that certain non-technological factors, such as the speed and anticipation of trade liberalization, can affect the perceived causation link between firm's export status and productivity. The model shows that the current response of companies not only depends on concurrent trade costs, but also, inextricably, on the firms prior expectations about those current trade costs, and their expectations for future trade costs. Firms expectations do matter.

Atkeson& Burstein (2010) built a model of endogenous change in aggregate productivity that arises in the general equilibrium framework as companies exit or export and in which process and product innovation decisions respond to changes in international trade costs. Firms produce differentiated products that are traded internationally subject to fixed and marginal costs of exporting. Each firm has a stock of a firm-specific factor that determines its

current product opportunities. The model includes two forms of innovation: investment to increase the stock of firm-specific factor in an existing firm (process innovation) and investment to create a new company with a new initial stock of the firm-specific factor (product innovation). The model predicts that as long as only a subset of companies export, the magnitude, and dynamics of responses to liberalization critically depend on the elasticity of process innovation to changes in trade costs and the details of firm dynamics.

Aw, Roberts & Xu (2011) show that the marginal benefit of simultaneous exporting and innovating increases with productivity, with self-selection effect driving a large part of the observed complementarity.

Grossman, Helpman & Szeidl (2006**)** show diverse integration strategies of multinational firms that face a rich array of choices typical for an international organization. Each firm manages its operations from the headquarters located in the country of origin but can produce its intermediate inputs and conduct assembly operations in one or more of locations. They study in particular the equilibrium choices of firms that differ in productivity levels, focusing on the role that industry characteristics such as fixed costs of foreign subsidiaries, the transport costs of intermediate or final goods, and the composition of the consumer regional market play in determining firms' optimal strategies.

3. Review of empirical literature

The empirical literature on the nexus between innovation and internationalization of activities at firm or plant-level is quite extensive. Most of the studies, in the analysed literature, treat the notion of innovation in a very simplified manner. It is usually proxied by R&D spending or in-house R&D activity (e.g. Cieślik et al. 2014). Innovation itself is a much broader term and innovation activities taken within and outside of an organisation are numerous (Tidd & Bessant 2009, Keeley et al. 2013). It is not only R&D-spending that matters in firms internationalization. Non-R&D innovation activities seem to matter as well.

Various variables are utilized to approximate innovative activity at the firm level. They include both innovation inputs as well as innovation outputs. The most popular are the general R&D expenditures or R&D expenditures per employee being the most popular (Hirsch & Bijaoui 1985; Kumar & Siddharthan 1994; Braunerhjelm 1996; Basile 2001).

The results of early empirical studies (e.g. Hirsch & Bijaoui 1985, and Schlegelmilch & Crook 1988) were mixed. A growing number of studies used survey data with precise information on the actual innovations activities at the level of individual firms (e.g. Wagner 1996, Wakelin 1998; Bernard &Jensen 1999; Roper & Love 2002; Lachenmaier & Wößmann 2006; Cassiman & Martínez-Ros 2007).

Wagner (1996) utilize data collected in 1994 in interviews with the owners/managers of 1025 establishments from all industries in Lower Saxony within the project Das Hannoveraner Firm panel to estimate in a tobit model the determinants of exports (as a share of total sales) of German enterprises. The estimated coefficients on firm size, firm size (squared), human capital intensity, and product innovator have the expected signs and are statistically significant. Firms were classified as product innovators if they declared to have introduced (at least) one new product in 1993.

Cassiman & Golovko (2011) show in a panel of Spanish firms that product and, to a lesser extent process innovation, drive firms' exports. The successful introduction of product innovation can lead to a decision by an SME to enter the foreign market through exports. The direct effect is boosted by the indirect impact of innovation on firm's productivity. Rising productivity further increases the likelihood of the company entering the export market. According to Cassiman & Golovko (2011), the high positive association between firm productivity and exports relates mainly to the company's earlier innovation decisions. The role of productivity is minimized when one controls for previous product innovation. Simultaneously, previous successful innovation increases the probability of firms innovation in the future – innovation in this sense is autoregressive.

Garcia-Quevedo, Pellegrinoa &Vivarellic (2014) show that previous R&D experience is a fundamental determinant of the behaviour of both incumbents and new entrants. Innovation determinants depend on to a large extent on firm's age. Younger firms' innovation behaviour as measured by R&D spending is found to be more erratic and less persistent and driven mostly by demand-pull variables. Incumbents' innovation spending is much more persistent and driven primarily by technological and market (supply-side) determinants, for instance, the degree of market concentration or the extent of product diversification.

Altomonte, Aquilante, Békés & Ottaviano (2013) show a positive, broad, strong and robust correlation between the extent of internationalization, productivity and innovation activities at firm-level. They do it in the panel of manufacturing entities from seven European states (Austria, France, Germany, Hungary, Italy, Spain, United Kingdom). In contrast to Cassiman & Golovko (2011), the positive association between internationalization and innovation exists even if one controls for productivity, with some evidence of causality running from the latter to the former. The analysis has important repercussions for an economic policy suggesting among others that sole export promotion is unlikely to lead to the sustainable internationalization of firms for the reason that internationalization goes beyond export and that in the medium run innovation is the driver of internationalization. According to authors, coordination of export promotion and innovation policies is necessary and could bring clear benefits.

Not only R&D spending but also other non-R&D innovation activities seem to matter. For instance, Sterlacchini (1999) in a study of small Italian firms in non-R&D-intensive industries shows that the likelihood of becoming an exporter is affected positively by firm's size and negatively by its nature as a sub-contractor. At the same time innovative non-R&D activities, and in particular the amount of expenditure on design, engineering and pre-production developments, exerts a significant and positive impact on the share of exports in total sales.

Wakelin (1998) conducted an interesting study on a sample of UK firms comparing the determinants of internationalization behaviour of both innovating and non-innovating firms. Export behaviour was defined both as the probability of exporting and the propensity to the export of the exporting firms. The determinants were found to vary between innovators and non-innovators. Surprisingly, non-innovative firms were found to be more likely to export than innovative firms when one controlled for their size. Within the group of innovators, larger firms were found to be more liable to enter foreign markets and smaller ones, with one or two innovations, were more likely to service the domestic market alone. It seems that fixed costs associated with entering foreign markets could be too large for smaller innovative firms. Nevertheless, the number of past innovations had a positive impact on the probability to export. At the same time, improved quality of sectoral innovation system was noticed to improve the likelihood of exporting of both innovative and non-innovative firms. The study showed that innovators with higher unit labour costs were more likely to export and had a

higher propensity to export and higher average wages which could reflect either better utilization of more skilled labour (human capital) or their higher overall productivity. Wakelin (1998) concluded that the capacity to innovate changed the behaviour of the firms in comparison to non-innovators.

Roper & Love (2002) compared determinants of export performance of British and German manufacturing plants identifying significant differences. Overall, non-innovators differed from innovators particularly in the absorption of spillover effects. Product innovation had a robust and positive impact on the probability and propensity to export in both states. Innovation activity was found to be higher in Germany. However, the scale of innovation activity had a positive impact on export propensity in the UK, while it was negative in Germany. Surprisingly, co-location of other innovative firms was found to discourage exporting (argument against industrial clustering).

Basile (2001) analysed the export behaviour of Italian manufacturing firms finding that innovation capabilities were among the most important competitive factors and to a large extent explained observed heterogeneity in export behaviour. The export intensity of innovating firms was systematically higher than that of non-innovators.

Nassimbeni (2001) conducted an empirical analysis of a sample of 165 small Italian manufacturing firms comparing exporters and non-exporters regarding technology, ability to innovate, and some other structural factors (such as size and age). The propensity of small firms to export was strictly linked to their capacity to introduce product innovations and to develop strong inter-organisational relations. It was to a lesser extent related to firm's technological profile. Larger size increased the propensity to export, although small firms were found not to be totally precluded from entering foreign markets. Firm's age also proved to be the factor. Differentiating between product and process innovations, Nassimbeni showed that product innovations were of greater importance for small exporters. Technology and process innovations were identified as not discriminant for exporters. Smaller exporters ability to enter foreign markets and to successfully compete against the local offer was found to be linked to a wider product range and the availability of novel products. At the same time, Nassimbeni (2001) pointed to the issue of the reverse causality because exporters, facing more diverse market demands and overall fiercer

competition, were stimulated to improve their product innovation or customization capability.

Guan & Ma (2003) analysed several aspects of innovation capabilities of Chinese firms and their export performance in a panel of 213 manufacturing firms. They identified that firm's export growth was related to consistent improvement in several considered innovation dimensions, except for the manufacturing capability. Firm's domestic market share proved to be largely irrelevant while the impact of growth in firm's productivity was robust, significant and positive as expected. Larger firms demonstrated stronger export competitiveness. According to Guan & Ma (2003), firm's core innovation assets (R&D, manufacturing, and marketing) alone cannot lead to sustainable export growth. Supplementary assets are required to gain competitiveness in more demanding international markets. Furthermore, DiPietro & Anoruo (2006) show that coordination of various innovation assets available at a firm level plays the crucial role in the improvement of international competitiveness.

Castellani &Zanfei (2007) revealed that intra-industry heterogeneity in Italy was associated with different internationalisation strategies of companies. Firms with a higher engagement in foreign activities exhibited better economic and innovative performances. Companies with the highest international involvement, performing FDI, were characterised by both the highest productivity premia and the highest R&D efforts and innovative performances.

Generally speaking more productive firms self-select into international markets, but at the same time commitment to foreign markets boosts firms' productivity and propensity to innovate. Higher commitment to foreign markets may be per se associated with a higher efficiency of enterprises, even controlling for innovation inputs and outputs. In particular, an international network of production affiliates may allow access to geographically dispersed sources of knowledge, which could be partially transferred back to the parent company through intra-firm technological collaboration.

Lachenmaier & Wößmann (2006) estimate the impact of innovation on exports in German manufacturing firms treating innovation as an endogenous phenomenon. They consider it as a test of the prediction above of product-cycle models of international trade (Vernon, 1966; Krugman, 1979) stating that innovation is the driving force for industrialized countries'

exports. Taking account of potential reverse causality they identify variation in innovative activity due to specific impulses and obstacles for innovative activity treated as instruments which are exogenous to firms' export performance. The results showed that a share of exports in firms' total turnover that was on average roughly seven percentage points above the mean export share of one-quarter. According to Lachenmaier & Wossmann (2006), this supports the prediction of the product-cycle models that innovation is a driving force for industrialized countries' exports. The effect of innovation is heterogeneous across sectors, lower for traditional and higher for modern, high-technology sectors.

Becker & Egger (2013) studied the effects of product versus process innovations on the export propensity of German firms identifying the superior impact of the former. They found no evidence that process innovation fosters propensity to export beyond product innovation. The extensive margin in the product space or other words, the number of products on offer seems to matter for a company's entry into export markets. Enterprises that perform both processes and product innovation have a higher probability to export than firms that do not innovate at all. However, when carried out on its own, product innovation is a more robust determinant of exports than process innovation. Process innovations increase the likelihood of firm's export only when combined with product innovations, they however marginally raise firm's export-to-sales ratio at the intensive margin.

Caldera (2010) investigated the nexus between innovation and the export behaviour of Spanish firms over 1991-2002. Building a simple theoretical model of a company's decision to export and innovate to guide empirical investigation Caldera found support for the positive impact of innovation on the likelihood to export with various effects of different types of innovations. After controlling for productivity differences across firms, the results indicate that regardless of the innovation activity considered in the model, the innovating Spanish firms have a higher probability of exporting than non-innovating firms. Product innovation through product upgrading appeared to have a larger effect on the likelihood of export than the introduction of cost-saving innovations (process innovations).

In an interesting study Iacovone & Javorcik (2012) find empirical evidence of product quality upgrading preceding entry into foreign markets for a sample of Mexican plants using plant-product level data for the 1994-2004. Future tariff cuts stimulate quality upgrading among

better performing Mexican producers in anticipation of entry into export markets next period. The results are consistent with conscious product upgrading taking place in preparation for exporting and in line with the model by Constantini and Melitz (2007). There was no evidence of upgrading after the entry into export markets (no learning from exporting).

Van Beveren & Vandenbussche (2010) analysed the relationship between firm-level innovation and firms' propensity to commence exporting for Belgian enterprises. The innovation was measured both by innovative input (R&D spending) as well as by innovative output (product and process innovation). The evidence pointed to self-selection mechanisms – firms innovate in anticipation of entry into export markets, product and process innovation do not trigger the entry into the export market. The results suggest that governments could foster firm-level innovation through trade liberalization.

Cassiman & Martinez-Ros (2007) stress that firms' decisions affect their performance and ultimately their survival. For exporting the causality seems to run from good performance to entering export markets. Using the panel of Spanish manufacturing firms for the period 1990-1999 Cassiman & Martinez-Ros (2007) analyse the effect of innovation on the decision to export. The obtained results indicate that product innovation rather than process innovation affects firm productivity, which in turn induces firms to select into the export market.

Cassiman, Golovko & Martínez-Ros (2010) argued that the positive relation between firm productivity and exports is due to the company's innovation decisions. In a panel of Spanish manufacturing companies, they find strong evidence supporting the impact of product innovation and not process innovation, on productivity that induces small non-exporting firms to enter the export market.

Monreal-Perez, Aragon-Sanchez & Sanchez-Marın (2012) performed a longitudinal analysis of 1767 Spanish firms within the manufacturing sector over the period 2001 – 2008, to test the links between export and innovation tackling the problem of endogeneity. The obtained results suggest that the self-selection mechanism does work and that innovation induces firms to increase their export activities. At the same time, companies do not experience any

learning-by-exporting effects on product or process innovations. The results are robust even if one controls for firm productivity.

Ramos, Acedo & Gonzalez (2011) tried to evaluate the effect of a company's technological patterns on its speed of entry into international markets via exports in a panel of Spanish manufacturing firms over a period of 17 years (1990–2006). The authors utilized both input (internal/external R&D spending) and output (innovations in product and processes, patents) measures.

Hobday, Rush & Bessant (2004) distinguish four different groups of companies according to their innovation capability depending on awareness of the need to change and preparedness and ability to change in practice. Hobday, Rush & Bessant (2004) note that as the leading East Asian latecomer firms begin to compete through the development of new products and in-house R&D activities, they appear to confront a difficult strategic dilemma. To compete as an R&D and brand leaders on the international stage or to continue with of low-cost catching-up competitiveness. Most of the major exporters in South Korea offer a mix of products, some of which are technologically advanced and others less advanced. Innovation strategies tend to be executed taking into account the specific needs of diverse products (or product families) than of the firm itself. Firm strategies, therefore, tend to be a mix of leadership, followership, and latecomer positions in line with the needs of a specific product portfolio of a given company.

Accordingly, companies with low awareness and low ability to change are referred to as passive non-innovators. Companies with higher awareness and ability to change are innovators. Innovators can introduce innovations from time to time on an ad hoc basis acting as followers (they introduce innovations but only after the market leaders) with reactive strategies, or they can assume the role of a leader and behave in a strategic manner (potentially gaining first mover advantage). Highly aware firms, introduce innovations permanently and thus are referred to as creative.

The nexus between innovation and internationalization has also been analysed in the case of enterprises from Central and Eastern Europe operating in inferior innovation systems. The studies are however scarce.

De Locker (2007) used matched sampling techniques to analyse whether Slovenian firms in the period 1994–2000 that commenced exporting turn out to be more productive, controlling for the self-selection into export markets. Overall entrants into export market seem to become more productive once they start exporting, and the gap in productivity between exporters domestic firms opens up in time. Using the information on the firm-level destination of exports, De Locker showed that the productivity gains were higher for firms exporting to high-income or more demanding regions.

Damijan, Kostevc & Polanec (2010) explored the causal links between innovation, productivity and export activities of firms in Slovenia in the period 1996–2002 using microdata and innovation and industrial survey data. The authors argued that two causal links be possible. First, from product innovation to productivity and to the decision to export. Second, in the opposite direction, from exporting to process innovation to productivity growth. Applying matching techniques to establish the direction of causality between innovation activity and exporting by testing whether lagged innovations affect the decision to start exporting and whether past exporting has an impact on a firm's decision to start innovating they estimated average treatment effects on probabilities of exporting and innovating. Damjan et al. (2010) found no evidence that either product or process innovations increase the likelihood that a Slovenian firm becomes a first-time exporter. However, past exporting status increased the probability that medium and large enterprises would become process innovators with no similar impact of product innovations.

The authors themselves stress that their our results did not confirm the implications of the model by Constantini & Melitz (2008) and the findings of Aw et al. (2009) - in the case of Slovenian firms, the linkage from product innovation to productivity growth drives the self-selection of more productive firms into exporting. The results favoured the notion of learning-by-exporting of Slovenian companies, which was already indicated by Damijan & Kostevc (2006) occurring through process innovations and rising firms productivity and not through product innovations.

Hegemajer & Kolasa (2011) studied the effects of internationalisation on the economic performance of enterprises in Poland distinguishing between three modes of outward orientation: foreign direct investment, exporting and importing of capital goods.

Internationalised Polish firms were found to be superior regarding their size, productivity, capital intensity and wages. Their productivity growth was found to be higher as well. Hegemajer & Kolasa (2011) found at the same time significant externalities from internationalisation - domestic firms benefited from the presence of companies involved in outward-oriented activities. The results of Cieślik et al. (2014) confirm the significance of firm characteristics for export performance in the CEE countries. According to authors, the financial support to R&D and innovation activities in transition economies should bring an improvement the export performance of firms.

In a recent study Cieślik et al. (2015) analyse the relationship between various types of innovations and export performance of Polish firms over the period of 2008-2010. They control for human and physical capital endowment, firm size (employment size groups), the level of technological sophistication of a sector as well as capital structure - foreign capital participation. They do not control the level of productivity. The probability of exporting is positively related to both product and process innovations, firm size, the share of university graduates in productive employment (a proxy for human capital endowment) and foreign capital participation in the case of exporters.

4. **The survey and financial data utilized and logit modelling**

As the access to micro-level data for Polish enterprises is restricted, we conducted a survey on a sample of exporting and non-exporting enterprises merging it with financial data provided by InfoCredit.

The following selection criteria were applied:

- An enterprise has a complete five year period of data availability,
- total sales per enterprises exceed 2 million PLN (roughly 500k EUR) each year,
- exports exceeds 1 million PLN each year (or approx. 250k EUR).

The use of the criteria outlined above provided us with a database of around 7000 relatively large and matured enterprises, from which randomly selected ones were surveyed. Our sample consists thus of rather large firms (upper tail of distribution by firm size), predominantly from manufacturing industry, that have at least 5-year continuity of financial reports (and thus have been active for at least five years). Out of 709 effectively questioned

enterprises with a direct contact by a pollster, 498 were exporters (X) and the remaining 211 were non-exporters (NX). The questionnaire consisted of 90 questions with some related to innovation capabilities and performance of firms.

In econometric modelling of binary variables the logit approach is the most commonly utilized. The actual response variable in this type of regressions is unobservable. It is commonly called a latent variable. In the present study, the probability of being an exporter is this particular variable. What we observe is a dummy variable y_i receiving 1 if the latent variable is greater than half and 0 in the other cases. In the logit modelling, the dependent variable is the log-odds ratio defined as

$$[1]\ logit(p_i) = \ln \frac{p_i}{1 - p_i}$$

where p_i denotes the probability of success in our case the probability of being an exporter.

In logit modelling instead of directly modelling variable $p_{i\,l}$ in terms of explanatory variables X, a logit is modelled as a function of these variables. Hence, the general form of the logit model can be written as

$$[2]\ logit(p_i) = Z_i = \beta_0 + \beta_1 X_{1i} + \beta_2 X_{2i} + ... + \beta_k X_{ki} + \xi_i$$

The estimates of β coefficients indicate the direction and the strength of impact of each explanatory variable X on the logit, or indirectly on the company's ability to export. The above model is a non-linear model, and its parameters are typically estimated using MLE (maximum likelihood estimator), which in this case is a consistent, asymptotically efficient and asymptotically normal estimator. The significance of the model is tested using LM test. The coefficients of non-linear models do not have a direct interpretation as it is the case of the classical linear model. In the case of the logit modelling, we interpret the results using the odds ratio or by determining the marginal effects. Odds ratio in logit modelling is calculated as the Euler's number raised to the power of the estimated value of β.

In the classical econometric modelling goodness of fit is evaluated using the coefficient of determination R^2. However, the value of this indicator for survey models, or more broadly in micro-econometrics, it is usually very low. The model itself may be fairly correct, but the value of the coefficient of determination will be small (Wooldridge 2003, Murray 2006). For

the logit model, McFadden pseudo-R2 measure is typically calculated (McFadden 1974), which is based on a comparison of estimates of the full model with its reduced form. An alternative way to assess the goodness of fit of the model is to find out what is the accuracy of forecasts. However, in practice, these two measures also are subject to some disadvantages. Hence, we utilize also an AUC measure (Area Under the Curve) - the area under the ROC curve (Receiver Operating Characteristic), which is a measure of a synthetic discriminant power, or the ability to distinguish between firms failing to meet the specified criteria.

5. Innovation activity and export performance of Polish firms

The basic results of the survey in the area of innovation-internationalization nexus were described in an article by Brodzicki (2016). Substantial differences in innovation activity for Polish exporters and non-exporters were identified. Exporters proved to be more focused on innovations, were more aware of the need to implement changes, and were better prepared to introduce them in reality. They were more probable to be creative (continually introduced changes) and more likely to behave in a more strategic manner assuming the position of a market leader. At the same time, exporters outperformed non-exporters in all innovation-related activities. The difference was is particularly evident with entry into new markets (new market innovation), significant organizational changes, significant changes in ownership, modern production methods and the use of technologically improved products or services. Among exporting firms product innovations, process innovations and entry into new markets were the most popular. Product innovators, both exporters, and non-exporters, are on average larger regarding the number of employment size than non-exporters. At the same time, innovating exporters were found to be the largest. Exporters were on average bigger than non-exporters regarding total assets, total sales and value added. Innovators were found to be on average younger than non-innovators. Innovating exporters had the highest total productivity and capital productivity with lower, on average, labour productivity. Innovating exporters have the highest return on assets, however, at the same time, are not far away from non-innovating exporters with having the lowest current liquidity.

Around 18.5 percent of companies declared that they did not introduce change. Innovation passive firms represented 15.5 percent of exporters and 25.6 percent of non-exporters. 37.8 percent of enterprises declared to introduce innovation from time to time (on ad hoc basis). Within the group of ad hoc innovators, non-exporters were more likely to be reactive (followers), and exporters were more liable to behave in a strategic manner thus assuming the role of the leader. A high share of 43.7 percent of firms declared to introduce change constantly (creative). The difference between exporters and non-exporters was statistically significant (chi-square test) and favoured exporters. The verifying question (*Has the company got on offer innovative products or services in the last three years?*) proved, however, that in reality, 60 percent of firms were passive. If the company declared to be creative (permanent innovator) or ad hoc innovator, but did not introduce a new product or service in the preceding three years, it was treated as a non-innovator (passive). The modified results show that passive firms represented 55,8 and 71,6 percent respectively of exporters and non-exporters (please refer to Table 1 beneath). Only 29,1 per cent of exporters and only 15,2 percent of non-exporters were found to be creative. Exporters were more likely to be ad hoc innovators with the leader status in the market. The share of reactive ad hoc innovators post-control was roughly the same in both analysed sub-groups. The difference between exporters and non-exporters was statistically significant in the case of passive, reactive and creative strategies.

Table 1. Market strategies followed by respondents (in percent), post-control

	Exporters	Non-exporters	Overall	X to NX ratio
Passive	55,8	71,6	60,5	**0,78**
Ad hoc - reactive	5,8	5,7	5,8	**1,02**
Ad hoc - strategic	9,2	7,6	8,7	**1,22**
Creative	29,1	15,2	25,0	**1,92**

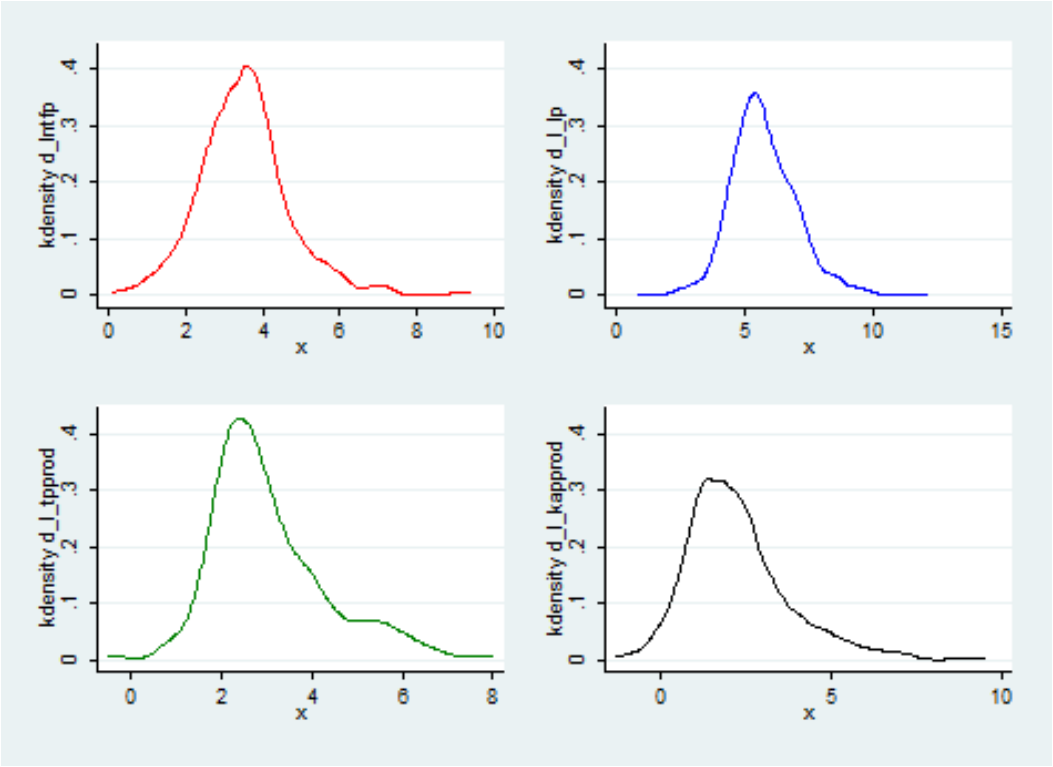
Source: Own elaboration, based on survey results.

In the extension of the previous study, in the present paper, we will try to identify the impact of innovation activity of firms from our database on their likelihood of exporting using standard econometric tools.

To control for productivity differences as postulated by new new trade theory, we calculated a number productivity measures including labour productivity, capital productivity, total productivity (TPROD) and last but not least the TFP. All kernel distribution estimates of productivity in 2012 (see Figure 1) are clearly skewed to the right. Very productive firms are

rare while companies with low productivity clearly dominate. After a careful quantitative analysis, we choose total productivity as a proxy for firms' productivity in the further analysis.

Figure 1 Kernel distribution estimates for four different measures of productivity: TFP, labour productivity, total productivity, and capital productivity



Source: Own elaboration in STATA.

6. Estimation results and discussion

The estimation results are presented in the Tables 2. The base model, not taking innovation-related aspects into account, is estimated in the specification M1. The dependent variable is binary – exporter versus non-exporter status. We treat exports as a success (giving it a value of one). Higher productivity, as expected, has a positive impact on the likelihood of exporting. A 1 percent increase in total productivity boosts the chances of exporting by 0.62 per cent. We also control for other standard features such as firm size (measured by the log of employment) and other aspects of greater internationalization such as importer status, the presence of foreign capital or foreign capital investments by the company. In all cases, the results are statistically significant. Of these, the odds ratio are highest for FDI (48.0), imports (3.12) and size (2.37).

In the remaining specification, we extend the base model by adding one or more innovation-related proxies acquired in our survey. First of all, we test the concepts by Hobday, Rush & Bessant (2004). Greater innovation attitude (M2) has positive however not statistically significant impact on the probability of exporting by Polish firms. The impact of declared innovation ability (M3) is statistically insignificant. In M4 we control for innovation strategy (the declared strategy after the control for actual implementation of innovations in the preceding three years). The variable takes the value of 1 for passive and the value of 4 for creative firms. The impact on the dependent variable is clearly positive and statistically significant. In models M5 to M12 we control for specific strategies independently taking simultaneously into account whether we the introduced innovations were new to the firm (M5 – M8) or the market (M9-M10). It is quite clear that innovatively passive firms have much lower chance of exporting – the odds ratio is equal to 0.587 and 0.610 respectively. It is statistically significant though only for firm-level innovators. The ad hoc strategies have statistically insignificant impact on the likelihood of exporting. Being creative – permanently introducing innovation at the firm or market level, significantly increases chances of exporting. By 62 percent (odds ratio 1.62) if innovations are at firm-level and by 94 percent (odds ratio 1.935) if they are at market level.

We now turn to innovation activity effects and their implications on the likelihood of exporting. If we take the traditional definition of innovations into account, that is a product, process, and organizational innovations together with the introduction of totally new products and include them jointly into regression (M13), only organizational innovations seem to have an impact on the probability of exporting. The odds ratio for them is 1.68. If we include different types of innovations separately them separately (M14 – M17) both product innovations (odds ratio 1.57) and organizational innovations (odds ratio 1.83) impact the probability of exporting at 5 per cent of statistical significance. The magnitude of the impact of product innovations is smaller than of organizational innovations which could be linked to effects of transition. Also changes in the ownership structure of a firm in the last three years (M18) impact the exporting in a statistically significant manner (odds ratio 2.30).

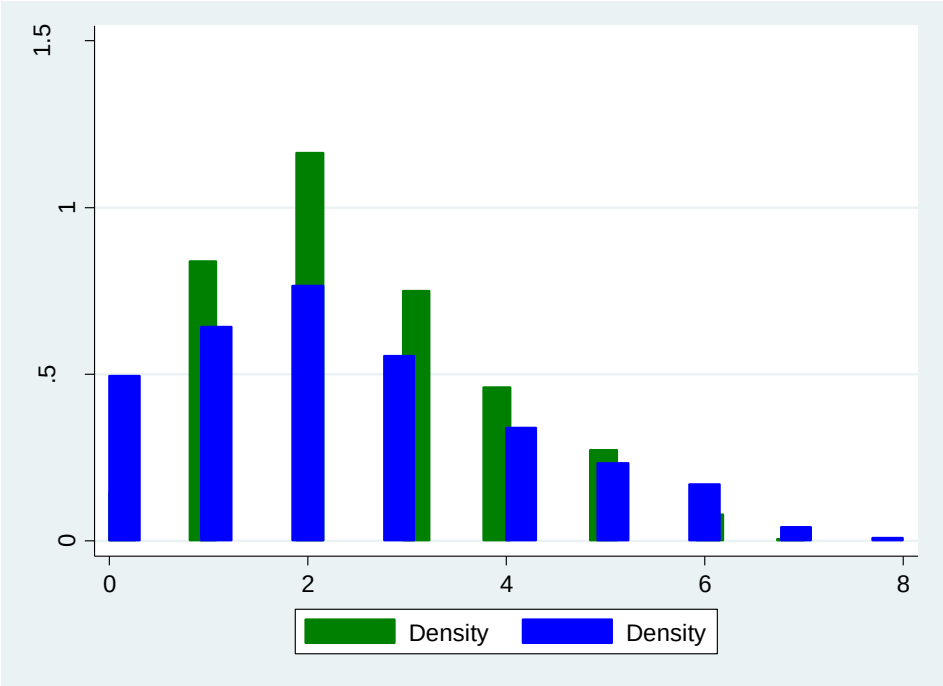
We now turn to input-related measures of innovation and sources of innovation. Several measures of them were taken into account in our survey. Innovation can come from both within the company and from outside of it. R&D can be performed in-the-house and outside-

of-the-house. As to the impact of external and internal sources of innovation only the R&D acquired from outside of the organization. The impact of technology bought from other organizations, or in other words externally acquired (M19) as well as internally developed within an in-house R&D lab (M21) is statistically insignificant. Only the R&D performed externally in specialized bodies (M20) has a positive and strong impact on the probability of exporting (odds ratio of 1.92) but only at 10 percent of statistical significance. The impact of employment in R&D is positive, however, not statistically significant (M22). The likelihood of exporting is however positively boosted by the amount spent on R&D (M23) – Business Expenditures on Research and Development (the odds ratio of 1.15).

The other possibility is to control for innovation outputs. In M24 we simultaneously control for patents, licences, trademark, ISO and other certificates identifying that only obtained patents, and ISO certificates increase the probability of exporting (odds ratio of 1.97 and 1.63).

Following Altomonte, Aquilante, Békés & Ottaviano (2013), we introduce the concept of innovation and internationalization extents. The scope of internationalization takes into account aspects such as imports, the presence of foreign capital, foreign ownership, the status of active foreign direct investor, direct foreign sale offices, the international experience of the CEO. It is measured on the scale from 0 to 8. The extent of innovation takes into account introduction of new or improved products, process, and organization, entry into new markets, patents, licences and trademarks, the introduction of innovation strategy, the presence of R&D unit and amount of BERD as a share of the total sales. It is measured on the scale 0 to 8. The histogram of both is given in the graph beneath. Similarly to the study of Altomonte et al. (2013) companies with low or average values of both extents clearly, dominate.

Figure 2. Histograms of internationalization (blue) and innovation (red) extent - histograms



Source: Own elaboration in STATA.

Innovation extent has a clearly positive impact on the probability of exporting (M26) whether we control for or not the other elements of internationalization included in the base regression (M27). The odds ratios are equal to 1.16 and 1.19 respectively. If we control for the extent of internationalization only (M28) the impact is statistically significant and positive in accordance with our expectations. If, as in M29, we control for both the impact of both innovation extent and externalization extent is positive. However, the magnitude of the further one is much stronger. The odds ratio are respectively 1.17 and 5.05! The result is robust. In addition, we tested for the potential interaction between the two extents, finding no significant interaction between them.

7.Concluding remarks

Innovations play a central role in economic prosperity. They are the drivers of long-term growth and economic progress. Ability to adjust to changing circumstances and to innovate is a fundamental element of company's overall competitiveness in the market. Innovation seems to play a central role in the export behaviour of firms. Internationalization-innovation nexus at least at the firm level is more than evident. The likelihood of exporting seems to be positively related to both product and process innovations controlling for firm size. It is in

line with the findings of Cassiman & Golovko (2011) for Spanish SMEs. Similarly to Cieślik et al. (2015), organizational innovations play a significant role in the case of Polish enterprises as well.

Our results firmly support the postulates of the new new trade theory of Melitz (2003) and others. Higher productivity plays a key role. At the same time, controlling for productivity, and similarly to other country-level studies, substantial differences in innovation activity for Polish exporters and non-exporters were identified. Exporters prove to be more focused on innovations, are more aware of the need to implement changes, and are better prepared to introduce them to reality. They are more probable to be creative (constantly introduce change) and are more likely to behave in a more strategic manner (ad hoc innovators) assuming the position of a market leader. At the same time, exporters outperform non-exporters in all innovation-related activities. The difference is particularly evident with entry into new markets (new market innovation), significant organizational changes, significant changes in ownership, modern production methods and technologically improved products or services.

The major contribution of the paper is the identification of critical linkages between the declared innovation strategy and export states of Polish companies. We have utilized the classification of Hobday, Rush & Bessant (2004) finding its critical linkages with internationalization. Controlling for the significance of innovation (firm or market) level, we show that innovatively passive firms have, ceteris paribus, a significantly lower probability of obtaining exporter status. The introduction of innovations at ad hoc manner, both in reaction to innovation by a leader (follower) or assuming the position of a leader – and thus acting in a strategic manner, has a positive however statistically insignificant effect on the likelihood of exporting. Only companies having creative treats that are permanent innovators enjoy a clear and robust boost in their exporting probability potential. It pays off to be innovative. The entry into more demanding foreign markets proves the higher competitiveness potential of firms. At the same time companies spending more on R&D and able to acquire innovations externally have a higher likelihood of exporting. Ability to obtain a patent proves to be one of the key drivers of exports as well.

At the same time, our results support the postulates by Altomonte, Aquilante, Békés & Ottaviano (2013), on the close connection between innovation and internationalization extents – the nexus is evident.

Despite the results, many different issues remain open. Further research into the link between innovation, innovation strategy and internationalization is necessary. Preferably the analysis should be conducted on a panel of firms observed at regular intervals over their lifetime to fully verify for instance the postulates of industrial organization literature linking the degree of competition within particular markets, market characteristics and behaviour of firms. These and other questions will be the subject for future research.

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Table 2 Estimation results for exporting at the firm level

	M1	M2	M3	M4	M5	M6	M7	M8	M9	M10	M11	M12
l_TPROD	0.484***	0.485***	0.484***	0.480***	0.478***	0.483***	0.482***	0.485***	0.473***	0.485***	0.481***	0.485***
	(0.0991)	(0.0985)	(0.0992)	(0.0986)	(0.0991)	(0.0990)	(0.0987)	(0.0998)	(0.0985)	(0.0991)	(0.0999)	(0.0979)
l_EMPLOY	0.863***	0.859***	0.863***	0.871***	0.866***	0.859***	0.866***	0.863***	0.859***	0.865***	0.863***	0.866***
	(0.123)	(0.123)	(0.123)	(0.123)	(0.124)	(0.123)	(0.124)	(0.121)	(0.123)	(0.123)	(0.123)	(0.123)
IMPORTER	1.140***	1.132***	1.140***	1.149***	1.137***	1.142***	1.141***	1.135***	1.140***	1.142***	1.140***	1.148***
	(0.225)	(0.226)	(0.225)	(0.227)	(0.227)	(0.225)	(0.225)	(0.226)	(0.228)	(0.226)	(0.225)	(0.229)
FOREIGN CAPITAL	0.0197***	0.0197***	0.0197***	0.0199***	0.0198***	0.0194***	0.0196***	0.0203***	0.0200***	0.0197***	0.0197***	0.0201***
	(0.00455)	(0.00452)	(0.00455)	(0.00450)	(0.00449)	(0.00453)	(0.00456)	(0.00459)	(0.00452)	(0.00458)	(0.00455)	(0.00454)
FDI	3.859***	3.884***	3.859***	3.881***	3.866***	3.871***	3.853***	3.867***	3.875***	3.860***	3.860***	3.883***
	(0.947)	(0.946)	(0.946)	(0.939)	(0.928)	(0.947)	(0.946)	(0.934)	(0.942)	(0.947)	(0.946)	(0.942)
IN_ATTITUDE		0.0711										
		(0.0973)										
IN_ABILITY			-0.00290									
			(0.0959)									
IN_STRATEGY				0.169**								
				(0.0847)								
FIRM_STRATEGY_PASSIVE					-0.532**							
					(0.225)							
FIRM_STRATEGY_REACTIVE						0.465						
						(0.506)						
FIRM_STRATEGY_STRATEGIC							0.194					
							(0.391)					
FIRM_STRATEGY_CREATIVE								0.483*				
								(0.261)				
MARKET_STRATEGY_PASSIVE									-0.494			
									(0.310)			
MARKET_STRATEGY_REACTIVE										-0.160		
										(0.570)		
MARKET_STRATEGY_STRATEGIC											0.147	
											(0.663)	
MARKET_STRATEGY_CREATIVE												0.660*
												(0.375)
Constant	-4.762***	-5.034***	-4.751***	-5.217***	-4.424***	-4.766***	-4.783***	-4.882***	-4.302***	-4.772***	-4.760***	-4.855***
	(0.643)	(0.728)	(0.720)	(0.673)	(0.652)	(0.648)	(0.651)	(0.638)	(0.712)	(0.644)	(0.643)	(0.638)
No of observations	623	623	623	623	623	623	623	623	623	623	623	623
Pseudo R2	0.2829	0.2836	0.2829	0.2885	0.2907	0.2841	0.2833	0.2878	0.2867	0.2830	0.2830	0.2879
AIC	559.11	560.57	561.11	556.88	555.23	560.21	560.85	557.39	558.23	561.07	561.05	557.35
AUC	0.8427	0.8425	0.8427	0.8449	0.8427	0.8432	0.8434	0.8445	0.8444	0.8427	0.8429	0.8446

*Source: Own elaboration. Estimated in Stata 12. Logit model. Dependent variable – exporting, binary. Robust standard errors in parentheses *** p<0.01, ** p<0.05, * p<0.1. Odds ratio is equal to e raised to the power of a coefficient on the variable.*

Table 2 continued

	M13	M14	M15	M16	M17	M18	M19	M20	M21	M22	M23
l_TPROD	0.488***	0.487***	0.485***	0.488***	0.486***	0.514***	0.481***	0.481***	0.482***	0.662***	0.506**
	(0.0988)	(0.0986)	(0.0981)	(0.100)	(0.100)	(0.103)	(0.0994)	(0.101)	(0.0988)	(0.249)	(0.204)
l_EMPLOY	0.880***	0.863***	0.865***	0.869***	0.883***	0.902***	0.861***	0.872***	0.869***	0.318	0.458
	(0.127)	(0.123)	(0.125)	(0.123)	(0.126)	(0.126)	(0.123)	(0.126)	(0.123)	(0.247)	(0.382)
IMPORTER	1.168***	1.138***	1.168***	1.150***	1.149***	1.120***	1.137***	1.164***	1.135***	1.887***	2.474***
	(0.227)	(0.227)	(0.226)	(0.225)	(0.226)	(0.226)	(0.225)	(0.226)	(0.225)	(0.650)	(0.826)
FOREIGN CAPITAL	0.0194***	0.0197***	0.0197***	0.0193***	0.0191***	0.0193***	0.0197***	0.0192***	0.0192***	0.0226**	0.0263**
	(0.00443)	(0.00446)	(0.00449)	(0.00451)	(0.00445)	(0.00451)	(0.00456)	(0.00461)	(0.00453)	(0.0101)	(0.0107)
FDI	3.796***	3.832***	3.778***	3.806***	3.867***	3.841***	3.878***	3.904***	3.884***		
	(0.938)	(0.958)	(0.958)	(0.950)	(0.923)	(0.926)	(0.946)	(0.944)	(0.946)		
IN_NEWP	0.142	0.302									
	(0.225)	(0.213)									
IN_PROD	0.345		0.453**								
	(0.242)		(0.220)								
IN_PROC	-0.0373			0.259							
	(0.256)			(0.230)							
IN_ORG	0.517*				0.606**						
	(0.272)				(0.258)						
IN_OWN						0.834**					
						(0.358)					
IN_S_BUYTECH							0.303				
							(0.321)				
IN_S_EXT_RD								0.653*			
								(0.335)			
IN_S_RDUNIT									0.338		
									(0.330)		
IN_S_EMPLYRD										0.0275	
										(0.0342)	
IN_S_BERD											0.140**
											(0.0617)
Constant	-5.170***	-4.937***	-4.963***	-4.882***	-4.986***	-5.071***	-4.783***	-4.872***	-4.821***	-3.423**	-4.750**
	(0.674)	(0.649)	(0.657)	(0.653)	(0.672)	(0.675)	(0.649)	(0.660)	(0.646)	(1.416)	(1.911)
No of observations	623	623	623	623	623	623	623	623	623	79	72
Pseudo R2	0.2947	0.2856	0.2887	0.2846	0.2905	0.2898	0.2841	0.2882	0.2845	0.2737	0.3515
AIC	558.14	559.08	556.75	559.81	555.33	555.86	560.24	557.07	559.89	78.45	63.37
AUC	0.8489	0.8441	0.8458	0.8428	0.8470	0.8465	0.8433	0.8454	0.8437	0.8292	0.8683

*Source: Own elaboration. Estimated in Stata 12. Logit model. Dependent variable – exporting, binary. Robust standard errors in parentheses *** p<0.01, ** p<0.05, * p<0.1. Odds ratio is equal to e raised to the power of a coefficient on the variable.*

Table 2 continued

	M24	M25	M26	M27	M28	M29
l_TPROD	0.500***	0.492***	0.481***	0.552***	0.543***	0.379***
	(0.100)	(0.0982)	(0.0992)	(0.0968)	(0.092)	(0.102)
l_EMPLOY	0.879***	0.852***	0.817***	0.909***	0.853***	0.646***
	(0.128)	(0.123)	(0.123)	(0.114)	(.1103)	(0.129)
IMPORTER	1.156***	1.139***	1.095***			
	(0.230)	(0.228)	(0.226)			
FOREIGN CAPITAL	0.0199***	0.0200***	0.0202***			
	(0.00440)	(0.00453)	(0.00452)			
FDI	3.904***	3.872***	3.786***			
	(0.891)	(0.937)	(0.943)			
IN_R_PATENTS	0.678**	0.634**				
	(0.278)	(0.279)				
IN_R_LICENCES	-0.551*					
	(0.317)					
IN_R_TRADE MARKS	0.335					
	(0.282)					
IN_R_ISO CERTIFICATES	0.488**					
	(0.247)					
IN_R_OTHER CERTIFICATES	0.165					
	(0.269)					
INNOVATION EXTENT			0.147**	0.173***		0.158**
			(0.0641)	(0.0621)		(0.0763)
INTERNATIONALIZATION EXTENT					0.628***	1.621***
					(0.0931)	(0.165)
Constant	-5.224***	-4.853***	-4.896***	-4.694***	-5.426***	-6.906***
	(0.689)	(0.646)	(0.646)	(0.629)	(0.619)	(0.737)
Observations	623	623	623	623	623	623
Pseudo R2	0.3008	0.2829	0.2901	0.1671	0.2281	0.2403
AIC	555.47	556.37	555.68	643.47	596.91	589.67
AUC	0.8531	0.8466	0.8402	0.7781	0.8138	0.8189

*Source: Own elaboration. Estimated in Stata 12. Logit model. Dependent variable – exporting, binary. Robust standard errors in parentheses *** p<0.01, ** p<0.05, * p<0.1. Odds ratio is equal to e raised to the power of a coefficient on the variable.*

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