



# Dipartimento di scienze economiche, aziendali, matematiche e statistiche “Bruno de Finetti”

Research Paper Series, N. 3, 2018

## **Innovation, finance and the probability to export**

STEFANIA P.S. ROSSI

*Department of Economics, Business, Mathematics and Statistics (DEAMS), The  
University of Trieste, Via dell'Università 1, 34123, Trieste, Italy.*

GRAZIELLA BONANNO

*Department of Economics, Business, Mathematics and Statistics (DEAMS), The  
University of Trieste, Via dell'Università 1, 34123, Trieste, Italy.*

MARCO GIAN SOLDATI

*Department of Economics, Business, Mathematics and Statistics (DEAMS), The  
University of Trieste, Via dell'Università 1, 34123, Trieste, Italy.*

TULLIO GREGORI

*Department of Political and Social Sciences, The University of Trieste, Piazzale Europa,  
1, 34127 Trieste, Italy.*



UNIVERSITÀ  
DEGLI STUDI DI TRIESTE

Research Paper Series

Dipartimento di Scienze Economiche, Aziendali, Matematiche e Statistiche “Bruno de Finetti”

Via dell’Università 1

34123, Trieste

Tel.: +390405587927

Fax: +390405587005

<http://www.deams.units.it>

EUT Edizioni Università di Trieste

Via E.Weiss, 21 - 34128 Trieste

Tel. +390405586183

Fax +390405586185

<http://eut.units.it>

[eut@units.it](mailto:eut@units.it)

ISBN: 978-88-8303-951-5



9 788883 039515 >

# **Innovation, finance and the probability to export**

STEFANIA P.S. ROSSI

*Department of Economics, Business, Mathematics and Statistics (DEAMS), The University of Trieste, Via dell'Università 1, 34123, Trieste, Italy.*

GRAZIELLA BONANNO

*Department of Economics, Business, Mathematics and Statistics (DEAMS), The University of Trieste, Via dell'Università 1, 34123, Trieste, Italy.*

MARCO GIAN SOLDATI

*Department of Economics, Business, Mathematics and Statistics (DEAMS), The University of Trieste, Via dell'Università 1, 34123, Trieste, Italy.*

TULLIO GREGORI

*Department of Political and Social Sciences, The University of Trieste, Piazzale Europa, 1, 34127 Trieste, Italy.*

## **ABSTRACT<sup>1</sup>**

This paper examines the effect that innovation and variables able to capture firms' access to finance exert on the probability of European SMEs to become newly exporting companies or exit from foreign markets. To accomplish such a task, we employ firm-level data and statements provided by the ECB SAFE for the years 2014-2016. By exploiting the panel dimension of our dataset, we show that product and process innovations increase the likelihood of a firm to turn from a non-exporter to exporter. Furthermore, firms that have used their obtained financing to develop and launch new products and services enjoy a higher likelihood to make the switch. Similarly, firms, which declared to have embarked in product and organizational innovation benefit from a lower likelihood to stop exporting and becoming exiters. Consistently with previous findings, firms that have used their obtained financing to develop and launch new products and services face a lower likelihood to become an export exiter. These effects hold after controlling for type of ownership, firm performance, as well as for the regulatory environment. Results turn to be robust to different specifications and endogeneity concerns.

**KEYWORDS:** Export, Innovation, Credit access, Bank lending, SMEs

---

<sup>1</sup> **Corresponding author:** Stefania P.S. Rossi, email: stefania.rossi@deams.units.it; tel: +390405582521; fax: +390405587005.

We thank the ECB for the use of data from the Survey on the Access to Finance of Enterprises (SAFE).

## 1. Introduction

Since the seminal contributions of Bernard and Jensen (1999, 2004) and Roberts and Tybout (1997) a growing empirical literature has analyzed the drivers of entry into international markets. Entry means establishing new operations in a foreign industry overtaking entry barriers that protect incumbents. According to Bain (1956) there are two types of entry barriers: structural and strategic. Structural barriers are explained by sunk costs since to break into foreign markets firms must establish marketing channels, learn bureaucratic procedures, and develop new packaging or product varieties. On the other hand, strategic entry barriers are explained by incumbents' actions posed against new entrants, such as undercutting prices or raising costs above the competitive level. Hence, several factors may increase the propensity for exporting enterprises. These range from internal enablers, such as the characteristics of the firm itself (size, labor force composition, management style, product mix, investment in R&D), to external drivers, such as the industry structure, the easiness of doing business, the availability of external funds, being embedded within an innovation system or enjoying from collaborative arrangements between firms (Love and Roper, 2015). Start-up costs are also the focus of the theory that highlights the phenomenon of export hysteresis (Baldwin and Krugman, 1989; Dixit, 1989). The new trade theory emphasizes the role of product differentiation, imperfect competition, and increasing returns to scale technology (Helpman and Krugman; 1985). However, such theoretical framework is not broad enough to accommodate a number of stylized facts observed in the '90s (Bernard et al., 2007). First, in any industry only a modest fraction of firms exports. Second, exporters are better than non-exporters in terms of productivity, profits, and wages (Bernard and Jensen, 1999; 2004). Third, trade liberalization increases the average productivity level in an industry (Pavcnik, 2002). These unexplained facts motivated the later generation of models known as the new new theory, whose key ingredients are firm heterogeneity in productivity and a fixed cost of entering export markets (Melitz, 2003). These elements determine the number and the type of firms that become exporters and the gains from trade. This model works as follows. All firms suffer a loss in the domestic market but exporting firms make up for the loss in domestic sales with foreign ones. These firms increase their production and labor demand which, in turn, drives real wages up. As a result, some of the less-productive firms that were just breaking even, now make losses and are forced to exit the market. This reallocation of market shares from low-productivity firms to high-productivity firms leads to an increase in the average productivity of this economy.

In reality, firms can exit the international arena only and be still active in the domestic marketplace, even if the literature reports a close relationship between exporter exit from foreign markets and firm failure (Aw *et al.*, 2000; Ilmakunnas and Nurmi, 2010). At any rate, this recent trade literature has highlighted the role of firm heterogeneity in determining survival or exit of exporters in international markets (Helpman, *et al.*, 2004; Costantini and Melitz, 2008; Bustos, 2011). It is argued that firm-specific factors such as quality of human resources, price competitiveness, transportation costs, speed of collecting overseas payments and language communication may affect the survival of the exporter (Crick, 2002). It is also natural to argue that innovation is the essence of survival as only those companies that are able to successfully innovate are able to maintain a competitive advantage in foreign markets (Wagner, 2007). Modern trade and growth theories suggest firms' access to export affects innovation because it should increase the size of markets that can be appropriated by successful innovators (Grossman and Helpman, 1991; Acemoglu, 2009; Aghion *et al.*, 2009). Actually, causality may run in both directions and empirical analysis finds a positive relationship between innovative activity and company survival (Buddelmeyer *et al.*, 2009). Stylized facts on firm exit and death stem from two branches of the literature. The first one refers to Industrial Organization (Jovanovic, 1982; Dunne *et al.*, 1988; Caves, 1998, Klepper, 2002), while the second one deals with exporters only (Farinas and Ruano, 2005; Greenaway and Kneller, 2008, Colantone and Sleuwaegen, 2010, Eaton *et al.* 2011; Wagner,

2011, 2016). In the next section we review main findings from both strands in order to identify factors that might increase the probability to enter or exit foreign markets.

Our contribution fits into the abovementioned literature as we assess the likelihood to become an exporter or exiting the international arena using statements by small and medium sized enterprises (SMEs) supplemented by macro variables at the country level. In this paper, we pioneer the use of export data drawn from the ECB Survey on the Access to Finance of Enterprises (SAFE), which, to the best of our knowledge, is the only harmonized and homogeneous dataset providing relevant information for assessing the change in the SME status from non-exporter to exporter in Europe. We focus on the role of finance and innovation (product, process, organizational) on the probability of entry and exit in foreign markets. Since we deal with firms who did not export in the previous period, we can also control for possible reverse causality between innovation and exports by continuous exporters.

There are several reasons that justify the relevance of this research issue. First, understanding which are factors that shape firms' competitiveness in the international arena is of paramount importance in times of global competition and trade slow-down like ours. European small and medium-sized enterprises traditionally had a high dependency on local markets, with minimal trade undertaken in global markets. In 2009, only 25% of SMEs based in the EU27 exported, of which about 50% sell beyond the Internal Market (European Commission, 2010). Second, policies should encourage innovation and internationalization of local firms to foster competitiveness and total factor productivity growth. A change is needed to avoid the "lost decade scenario" especially in Southern countries, where Horizon 2020 projects should actively support European SMEs by providing both direct financial support, and indirect support to increase their innovation capacity (Filos, 2017).

This paper enriches the literature on the interplay between innovation, finance, on one hand, and the extensive margin of exports, on the other. To the best of our knowledge, we are the first to assess, in the same contribution, the effect of both innovation and firms' experiences in access to finance in to the likelihood of entering to and exiting from foreign markets.

Our results can be summarized as follows. We find a strong evidence that firms that declared to have embarked in product and process innovation, face a higher likelihood to start exporting. In addition, the likelihood of switching from non-exporter to exporter is reinforced if firms have obtained finance, regardless its source, that was used to undertake innovation. In a specular way, we observe a similar result for the likelihood of exiting as firms that declared to have embarked in product- and organizational-innovation, enjoy from a lower probability to stop exporting. Such likelihood is also lower if firms have accessed to finance and employed it to develop and launch new products and services. Contrary to the previous findings ownership matters as family and business association are significant. Networking of business association or family ties may favor the probability to continue to export.

The paper is organized as follows. In the next section we review the empirical literature that analyzes the link on the relationship between innovation and exports and financial constraints and the extensive margin of export, and provides research hypotheses. Section 3 describes the SAFE database and the model used to test our hypotheses. Empirical results are presented in section 4, while the last section concludes and indicates directions for future research.

## **2. Literature review and research hypotheses**

Several studies in the field of entrepreneurship have investigated the determinants of firms' inclination to access foreign markets. In this study, we mainly refer to two strands of literature: the first links the SMEs' innovation efforts to the firm's propensity to export, and the second investigates how the firm financial constraints exert an influence of SMEs' export attitude.

### 2.1. The interplay between innovation and export

A large number of contribution addressed the interplay between innovation and export.

One the first articles to analyse the role played by innovation in defining firms' export behavior is supplied by Wakelin (1998) who analyses the UK case. She relies on information for 320 firms over the period 1988-1992, which represented more than half of British manufacturing output at that time. The author takes advantage of data on R&D expenditure for listed firms and on the number of firm innovations. She examines descriptive statistics of innovators and non-innovators, for those that export and those that do not. She notices that small innovative firms are less likely to enter the export market compared to their non-innovative peers, whereas innovative firms that export are larger and show a larger number of innovation compared to their non-exporting peers. Moved by this preliminary evidence, she builds an empirical strategy based on two specifications, i.e. a probit model for the probability of exporting and a tobit model for the propensity to export for the subsample of exporting firms. Results show that the number of innovation recorded at the industry level increases the likelihood of exporting, but reduces the intensive margin of exports for companies that already export. Second, R&D investment at the firm-level decreases the likelihood to start exporting, but it does not exert any significant effect on the intensive margin. Third, the number of innovations recorded at the firm-level enhances the likelihood to start exporting but has no effect on the export intensity.

Another representative example is provided by Roper and Love (2002) who employ plant level information to comparatively analyze the relationship between innovation and exports for the UK and Germany over the years 1991-1994. They observe that innovation, measured through several proxies, exerts an effect on both the extensive and the intensive margins of exports, but these are different in the UK and in Germany. The authors show for the UK that being an innovator and having achieved a commercial success of innovation have a positive impact on the probability to start exporting and to increase export intensity. Similarly, the being an innovator leads to a higher likelihood to enter export markets for German plants, but the scale of innovations activity has a small negative impact on this likelihood.

Aw *et al.* (2008) develop a theoretical model of company investment in R&D, physical capital and the decision to export. They employ firm-level information for Taiwanese companies in narrow electronic industries over the period 1987-2004. They make use of a series of probit models to understand the relationship between firms' export status, R&D and fixed capital investment, where the dependent variable is, in turn, one of the abovementioned regressors. When the specification of interest is based on the observation of the current export status, then the set of covariates includes, amongst others, a dummy to capture if the company was exporting in the preceding time and whether it also undertook R&D investment. Their results show a weak but significant positive association between past investment in R&D and current export status as well as a positive association between past export engagement and current probability to be an exporter.

Caldera (2010) makes use of annual survey level data over the period 1990-2002 and includes information on firms' strategies for a sample of Spanish manufacturing firms. She builds on a theoretical framework that describes the relationship between companies' productivity and export engagement and looks at how R&D expenditure, product and process innovation at the firm-level are able to influence the likelihood of exporting. By making use of a dynamic random effects probit model to account for the sunk costs of exporting, she observes that both product and process innovation exerts a positive effects on the extensive margin of exports in the next period, with the introduction of new products having a larger impact than that of innovation in processes.

Damijan *et al.* (2010) make use of firm-level information provided by the Community Information Survey conducted by the Slovenian Statistical Office over the period 1992-2002. Their descriptive statistics show that innovators are more likely than non-innovators to be exporters, and exporters are almost three more times likely non-exporters to be innovators. The authors argue that

despite they cannot rely on a sound theoretical framework they claim that the evidence points to the presence of an endogenous relationship between innovation, productivity and exporting. Therefore, they wish to supply insights on the abovementioned linkages through a rigorous empirical approach based on a propensity score matching technique. Their results show that neither product nor process innovation increases the likelihood that a company will turn into a first time exporters. Rather, they observe that that past exporting status enhances the probability that medium and large firms will become process innovator, thus stressing the relevance of appropriately tackling the causality issue.

Different results are instead recorded by Becker and Egger (2013). They employ information retrieved from two surveys conducted by the Ifo Institute of Economic Research in Germany, one on product and process innovation as well as exports, and the other one on realized and expected situations with respect to market conditions, business environment, demand, etc. By relying on these sources they build a unique dataset with 1212 firms and 3401 observations and analyse if, and to what extent, the extensive margin of exports is influenced by the type of innovation the firm undertakes. The set of explanatory variables includes covariates able to capture factors that may be an impediment on the firm's probability to innovate, such as lack of own or external capital. By making use of a bivariate probit model, a multinomial logit model and a propensity score matching technique, they show that product innovation is more important than process innovation to increase the likelihood of exporting. Yet, if process innovation by itself has a negligible effect on the extensive margin of export it increases the likelihood of exporting when coupled with product innovation.

More recently Dosi *et al.* (2015) make use of information stemming from the matching of Italian firm-level data on companies' balance sheet, patents and international trade. The authors' aim is to empirically analyse the relationship between firms' fitness and export performance, where the former includes, amongst others, two proxies of product and process innovation, i.e. patents and investment intensity. In their empirical baseline strategy, the lagged technological variable is a covariate within two different models, one describing the extensive margin of exports, and another one describing the intensive margin, making use of a pooled probit and a OLS techniques, respectively. Their result show that both product and process innovation increase the likelihood of exporting, with a larger effect exerted by patents than investment intensity.

## 2.2. Innovation and exports for SMEs

Cassiman et al (2010) rely on information on Spanish small and medium sized firms over the period 1990-1998 and analyse the interplay between export, innovation and productivity. By looking at the transition probabilities they notice that more than 90% of the firms remain in the same state and only 8.8% of non-exporters become exporters. When conditioning the abovementioned transition probability on product or process innovation they observe that 13% of product innovators become exporters whereas 11% of process innovators become exporters. Hence, having undertaken product innovation increases the likelihood to enter the export market by 49%. Moreover, firms that undertook product innovation are less likely to change their status from exporter to non-exporters.

The linkage between firm export and R&D activities is also explicitly addressed by Esteve-Pérez and Rodríguez (2013) who rely on data from a representative sample of SMEs in Spanish manufacturing over the period 1990-2006. By making also use of a bivariate probit model they find that firms that engage in export are more likely to engage in R&D, and *viceversa*.<sup>2</sup> Interestingly,

---

<sup>2</sup> The positive adoption of either growth or innovation on the other is also confirmed by Golovko and Valentini (2011). By relying on information for Spanish SMEs over the period 1990-1999 they document that the positive effect of innovation activity on companies' growth rate is larger for companies that are also engaged in exports and *viceversa*. Although the authors do not look at firms' entry dynamics, their contribution points to the relevance of either product or process innovation, which are grouped together into a one dummy variable, which is, in turn, the dependent or an independent variable.

they also show that previous firms' export and R&D participation improves current engagement in both activities. Their results are confirmed when they employ output measures of innovation activities, i.e. product/process innovation, and observe that product innovation exerts a larger effect than process innovation on the likelihood of both exporting and importing.

In a more recent comprehensive survey, Love and Roper (2015) propose a review of the studies on the SMEs innovation, exporting and growth. They recall how export performance is based on two different approaches. According to the first one, the causal link goes from innovation to exporting as factor endowments or the quality of goods and services are the drivers of internationalization (Wheler *et al.*, 2008). According to the second one, based on endogenous growth models (Grossman and Helpman, 1991), the causality runs the other way round.

Despite not being the main object of their contribution, Di Cintio *et al.* (2017) are worth citing here. By making use of a large sample of Italian manufacturing SMEs they observe the relationship between firms' exports and R&D on one hand, and employment growth and worker flows on the other. Amongst the set of relationships, the authors estimate it is worth recalling here their analysis on the effect of R&D intensity, computed as the ratio between R&D expenditure and turnover on firms' export engagement. Indeed, they address the self-selection issue through a Heckman two step procedure and observe there is the expected positive relationship between R&D intensity and export intensity.<sup>3</sup>

### 2.3. The interplay between financial constraints and export

An increasing number of articles have studied how financial constraints affects export engagement, especially from an empirical perspective (e.g. Greenaway *et al.*, 2007; Minetti and Zhu, 2011; Manova and Yu, 2016).

We recall here the seminal work by Greenaway *et al.* (2007) who concentrate on the UK experience and show that exporters have better financial health than non-exporters. According to their study, a better financial health is not a prerequisite to entry into a foreign market, but is instead the result of companies' trade engagement with foreign partners. An opposite result is obtained by Bellone *et al.* (2010) who show that French export starters are financially stronger than their non-exporting peers, but do not find that being export engaged is a tool to improve firms' financial health.<sup>4,5</sup> This result for the French experience is confirmed by Stiebale (2011) who analyses whether financial constraints matter for foreign market entry. Relying on company-level information he finds no effect of financial constraints on neither the extensive and the intensive margins of exports.

Significant effects of financial frictions on exporting are recorded by Minetti and Zhu (2011) who analyse the consequences of a constrained access to finance on the exports of Italian firms. They show that the presence of credit rationing negatively affects not only the extensive but also the intensive margin of exports. More recent studies confirmed the negative effect of financial constraints on the probability to enter the export markets. This is the case of Aristei and Franco (2014) who observe firm behaviour in seven European countries and Damjjan *et al.* (2015) who focus on the Slovenian experience. but are unable to disentangle the extensive from the intensive margin of exports. Secchi *et al.* (2016) analyse the Italian case and treat the self-selection issue

<sup>3</sup> We decide to insert this reference in our review as the Heckman two step approach allows to explicitly address the issue of sunk costs needed to start exporting. These are clearly lower when the firm has undertaken investment in innovation and can rely on competitive advantages with respect to counterparts, both domestically and abroad.

<sup>4</sup> The diverse outcomes obtained by the two papers could be due to the different covariates employed to measure the presence and intensity of financial constraints. These difference can be also due to the peculiar characteristics of the countries analysed.

<sup>5</sup> A more recent work by Görg and Spaliara (2014) focuses on both the UK and the French experiences and look at how variations in the degree of financial constraints diversely affects the survival of firms at different phases of export engagement, including starters and exiters. Their result show that export starters and exiters are more severely hit by a change in credit conditions than firms which continuously export or have never exporter.

through the approach developed in Semykina and Wooldridge (2010) and find a negative association between financial constraints and firms' foreign sales.

By making use of a large database on Chinese firms over the years 2001 and 2005, Egger and Kesina (2013) record a negative association between financial constraints and both the extensive and the intensive margin of trade. This example is of particular relevance to connect the abovementioned studies to those that focus only on SMEs. These contributions are, in fact, quite limited in numbers and restricted to developing or emerging markets where either the financial or credit markets might be underdeveloped, such as in China.

An earlier example is supplied by Ito and Terada-Hagiwara (2011) who investigate the effect of financial constraints on the exporting behavior of Indian manufacturing companies. They observe that firms with a larger amount of internal cash flow and a lower debt-to-asset ratio prefer to self-finance their export choice without resorting to external finance. This is especially true since the financial liberalization the Indian market does not allow the credit system to meet the finance need of the smallest enterprises.

A more recent study is provided by Ayob *et al.* (2015), who compare exporters from non-exporters in Malaysia and check how perceived costs, internal financial resources and external capital constraints are linked to firms' export status. By making use of a multiple regression model they show exporters rely on larger financial resources and face less constraints in the access to external resources compared to their non-exporting peers.

Using SME-level data drawn from the World Bank's Enterprise Surveys in Chile, Israel, Korea, Mexico, Thailand, and Turkey, Jinjark and Wignaraja (2016) show that the availability of overdraft finance is the most important determinant to underpin the financial constraints-export relationship, especially for those companies that have not obtained a bank loan.

In light of the aforementioned strands of the literature characterizing the background of this study, we further research on the issue by formulating the following hypotheses.

*SMEs face a higher probability to become an exporter, vis à vis peers that have never exported, because:*

H1: *they have undertaken product, process and organizational innovation;*

H2: *they have used the obtained finance to develop and launch new products and services;*

H3: *they have used external financing sources compared to internal funds.*

*SMEs face a lower probability to become an export exiter, vis à vis peers that have always exported, because:*

H4: *they have undertaken product, process and organizational innovation;*

H5: *they have used the obtained finance to develop and launch new products and services;*

H6: *they have used external financing sources compared to internal funds.*

### **3. Data, model and methodology**

#### *3.1 Data*

Our main source of data is SAFE, the Survey on the Access to Finance of Enterprises. SAFE, a survey jointly run by the ECB and the European Commission (EC) every six months since 2009, is a harmonized and homogeneous dataset providing information at the micro level about

SMEs' propensity to use bank credit as a source of funding and about the outcomes of firms' loans applications. More precisely, SAFE provides qualitative information on enterprises' financial needs, their experience in the access to finance, as well as a series of firm-level and financial characteristics provided on the basis of self-assessed perceptions. Each survey round of the SAFE (the so-called *wave*) is addressed to a randomly selected sample of non-financial SMEs included in the Dun & Bradstreet business register, exception made for firms in agriculture, public administration and financial services that are intentionally omitted. Country, sector, and size representativeness are ensured through the use of specific weights.

Starting from April 2014 (the eleventh wave), this survey also supplies information on firms' export status. We thus restrict our analysis to the period during which information on our variables is present over time, namely from the eleventh to the fifteenth wave. Using the same criterion, we select those countries for which the related firms' data are available across the waves.<sup>6</sup>

Finally, we rely on data from Doing business of the World Bank and information on financial depth at the country level from the same source and employ them as controls in our investigation (further discussion is provided in Section 3.2.2).<sup>7</sup>

## 3.2 Model, variables and methodology

### 3.2.1 Dependent variables

To test our hypotheses (H1-H6), we need to exploit the panel structure of our dataset, which enables us to keep track of changes in the firm-level export status. To this end, we first generate the variable  $Exporter_{it}$ , which is equal to one if the firm  $i$  at time (*wave*)  $t$  exports, and zero otherwise. Then, by using the first difference of this variable ( $Exporter_{it} - Exporter_{it-1}$ ), we consider a firm as new exporter if this difference is equal to one, i.e. when the firm  $i$  declares to be exporting at time  $t$  and non-exporting at time  $t-1$ . Moreover, we consider a firm as export exiter if the difference is equal to minus one, i.e. when the firm  $i$  declares to be non-exporting at time  $t$  and exporting at time  $t-1$ .

We employ two sets of regressions. First, we estimate the probability to start exporting, excluding from the sample firms that stop to export, for which the difference is equal to -1, and those that are always exporting. Thus, our dependent variable  $Export Starter_{it}$  is a dummy equal to one if the firm is a new exporter, and equal to zero when the firm declares to have never exported. Second, in order to estimate the probability to stop to export, we create a binary variable, namely  $Export Exiter_{it}$ , equal to one if the firm  $i$  declares to be non-exporting at time  $t$  and exporting at time  $t-1$ , and equal to zero when the firm declares to have always exported. Thus, in this case, we exclude from the sample firms that start to export and those that are never exporting.

### 3.2.2 Model and variables

To study the probability of the  $i$ -th firm to become an exporter *versus* non-exporters, we propose the following model:

---

<sup>6</sup> The countries included in our sample are: Albania, Austria, Belgium, Bulgaria, Croatia, Cyprus, Czech Republic, Denmark, Estonia, France, Finland, Germany, Greece, Italy, Ireland, Hungary, Latvia, Lithuania, Luxemburg, Macedonia, Malta, Montenegro, Poland, Portugal, Romania, Slovenia, Spain, Sweden, the Netherlands, and the UK.

<sup>7</sup> These features help us to properly address the large heterogeneities in terms of macroeconomic and structural features, which we also control for in our investigation (Ferrando *et al.*, 2017).

$$\begin{aligned}
\Pr(\text{Export Starter}_{it}) &= \\
&= F(\alpha \text{Innovation}_{it} + \sum_{l=1}^6 \beta_l \text{Finance}_{lit} + \sum_{m=1}^5 \gamma_m \text{Ownership}_{mit} + \sum_{k=1}^4 \delta_k \text{Performance}_{kit} + \\
&+ \sum_{r=1}^8 \theta_r Z_{rit} + \sum_{s=1}^{35} \mu_s M_{sjt})
\end{aligned} \tag{1}$$

Conversely, to study the probability to become a non-exporter *versus* continuous exporters, we estimate the following model:

$$\begin{aligned}
\Pr(\text{Export Exiter}_{it}) &= \\
&= F(\tilde{\alpha} \text{Innovation}_{it} + \sum_{l=1}^6 \tilde{\beta}_l \text{Finance}_{lit} + \sum_{m=1}^5 \tilde{\gamma}_m \text{Ownership}_{mit} + \sum_{k=1}^4 \tilde{\delta}_k \text{Performance}_{kit} + \\
&+ \sum_{r=1}^8 \tilde{\theta}_r Z_{rit} + \sum_{s=1}^{35} \tilde{\mu}_s M_{sjt})
\end{aligned} \tag{2}$$

where  $i$  indicates the firm,  $j$  the country, and  $t$  the time.

To test our hypotheses, we employ two sets of variables:

i)  $\text{Innovation}_{it}$  is a dummy equal to one if the firm declares to have undertaken product, process and/or organizational innovation, and zero otherwise.<sup>8</sup> Moreover, in order to take into account the different types of innovation, we estimate separate regressions to assess the effect of product, process and organizational, respectively. To this aim we employ following variables:  $\text{Product Innovation}_{it}$  (a dummy variable equal to 1 if the firm declared to have undertaken product innovation, and 0 otherwise),  $\text{Process Innovation}_{it}$  (a dummy equal to 1 if the firm declared to have undertaken process innovation, and 0 otherwise) and  $\text{Organizational Innovation}_{it}$  (a dummy equal to 1 if the firm declared to have undertaken organizational innovation, and 0 otherwise).

A positive parameter  $\alpha$  in model (1) provides support to our research hypothesis H1, as well as a negative parameter  $\tilde{\alpha}$  in model (2) provides support to our research hypothesis H4.

ii)  $\text{Finance}_{lit}$  includes a set of variables able to capture firm's experience in the access to finance. More precisely,  $\text{Financing Innovation}_{it}$  is a dummy equal to one if the firm used obtained finance to develop or launch new products and services, and 0 otherwise. A positive parameter  $\beta_1$  in model (1) provides support to our research hypothesis H2, as well as a negative parameter  $\tilde{\beta}_1$  in model (2) provides support to our research hypothesis H5.

We also include the variable  $\text{Problem of Finance}_{it}$ , which is a dummy equal to one if the firm reported that the access to finance represents a relevant problem, and 0 otherwise.

The last set of variables of the group  $\text{Finance}_{it}$  describes the firm's perceptions of the relevance of different financing channels. These are  $\text{Relevant Bank Loans}_{it}$ ,  $\text{Relevant Credit Lines}_{it}$ ,  $\text{Relevant Grants or Subsidies}_{it}$ ,  $\text{Relevant Trade Credit}_{it}$ ,  $\text{Relevant Family or Friends Loans}_{it}$  and  $\text{Relevant Other Loans}_{it}$ , which are dummies equal to one if the related financing source is perceived as relevant by the reporting firm, and 0 otherwise.<sup>9</sup>

Positive parameters  $\beta_3$ - $\beta_6$  in model (1) provide support to our research hypothesis H3, while negative parameters  $\tilde{\beta}_3$ - $\tilde{\beta}_6$  in model (2) provide support to our research hypothesis H6.

In addition, we use three sets of firm-varying covariates, listed below with a), b) and c).

<sup>8</sup> The information on this variable ( $Q1$  in the survey) is provided by SAFE every second wave, and refers to the previous 12 months, i.e. two waves.

<sup>9</sup>  $\text{Relevant Internal Funds}_{it}$  is the control group.

a)  $Ownership_{mit}$  are dummies that account for the ownership types ( $m$  ranges from 1 to 5), i.e. Family, Business association, Public company, VCBA and Others.<sup>10</sup>

b)  $Performance_{kit}$  describes firm's perceived change in market conditions and efficiency in the last sixth months. To proxy firm's performance, we rely on the following four indicators ( $k$  ranges between 1 and 4).  $Problem\ of\ Competition_{it}$  is a dummy equal to one if the firm reports that the "problem of competition" - either due to external market conditions or an internal loss in firm efficiency - has become more relevant, and zero otherwise.  $Growth\ up_{it}$  is a dummy equal to one if the firm declares that the number of its employees has increased, and zero otherwise.  $Relevant\ Cost\ of\ Production_{it}$  is a dummy equal to one if the company states that the cost of production turned into a major obstacle, and zero otherwise.  $Profit\ up_{it}$  is a dummy equal to one if the firm declares that its profit has increased, and zero otherwise.

c)  $Z_{rit}$  identifies the  $r$ -th standard firm control ( $r$  ranges from 1 to 8), i.e. Size (Micro and Small), Age (Very recent, Recent and Old), and Sector (Industry, Construction and Trade).<sup>11</sup>

Finally,  $M_{sjt}$  includes the  $s$ -th firm-invariant control ( $s$  ranges from 1 to 35), i.e. *country* and *wave* dummies, which account for country and time heterogeneity, as well as  $Distance\ to\ frontier_{jt}$ . The latter is retrieved from the Doing Business of the World Bank and measures the distance of each economy to the frontier, which represents the best performance (i.e. the efficiency in institutions, regulations, and public sector activity) at any point in time.<sup>12</sup> This is now a standard score of the general context for business activity (Besley, 2015), and is used in our framework as a proxy for the effect of the institutional and regulatory context at the country-level. Additionally, we include 'Domestic credit to private sector by banks', which is computed as percentage of GDP and drawn from the World Bank ( $Credit\ to\ GDP_{jt}$ ).

All the controls at the firm- and country-level should limit potential endogeneity problems which may arise from the data.<sup>13</sup>

Summary statistics of our variables are displayed in Table 1. As for the dependent variable  $Export\ Starter_{it}$  (Panel A), we rely on 15,968 firm-level observations throughout the period of our investigation. The new exporters are 1,801 - for which the dummy  $Export\ Starter_{it}$  is equal to 1 - and the non-exporters are 14,167 - for which the dummy is equal to zero. As displayed in Table 1 the new exporters account for about 11% of our sample.

– TABLE 1 HERE –

As for the dependent variable  $Export\ Exiter_{it}$  (Panel B), we count on 14,710 observations, 1,992 of which are export exiters and 12,718 are continuous exporters.

It is worth noticing that there are substantial differences between the two samples, when studying the probability to start exporting and the probability to stop exporting.

In the analysis "export starters vs non-exporters" (Panel A), at least one type of innovation (product, process, and organizational) has been undertaken in about 32% of the cases, while the

<sup>10</sup> The controlling group is Single owner firms.

<sup>11</sup> Micro and Small are dummies equal to one if the firm has less than 9, and between 10 and 49 employees, respectively, and zero otherwise. SAFE provides data also for Medium firms (that have between 50 and 249 employees) and Large enterprises which we do not include in our analysis. Very recent, Recent, and Old are dummies equal to one if the firm is less than 2 years, between 2 and 5 years, and between 5 and 10 years old, respectively, and zero otherwise. As for the sector composition, the SMEs in the sample operate in the four largest economic sectors at 1 digit level of the NACE classification, i.e. Industry (which includes manufacturing, mining and electricity, gas and water supply), Construction, Trade, and Services. The controlling groups for Size, Age, and Sector are Medium, Very old and Services, respectively.

<sup>12</sup>  $Distance\ to\ frontier_{it}$  takes values between 0 and 100, where 0 represents the lowest performance and 100 represents the frontier.

<sup>13</sup> We are aware that omitted variables that affect the decision to export, the type of ownership, and the choice to innovate could lead to spurious correlations. We address this concern later on.

percentage increases to 43% when we analyse export exiters vs exporters (Panel B). By disentangling the types of innovation, one can observe that, on average, the abovementioned gap is still present. Indeed, product innovation has been undertaken in about 17% and 28% of the cases, respectively; process innovation has been undertaken in about 12% and 20% of the cases, respectively; and organizational innovation has been undertaken in about 16% and 21% of the cases in Panel A and Panel B, respectively.

Interestingly enough, by looking at the variable *Financing Innovation<sub>it</sub>*, SMEs employ external funds to develop or launch new product and services in about 11% and 21% of the cases for the two samples, respectively. Moreover, the access to finance represents a relevant problem in about 39% of the cases, for both samples.

Noticeable, when the different sources of financing are concerned, the bank channel (bank loans and credit line) and some innovative financing sources are more relevant than others (the mean values are greater than 0.5).<sup>14</sup>

As far as the types of ownership are concerned, Table 1 shows that, as expected, Family and Single owner firms are the largest groups in our sample, while VCBA represent only a tiny share of SMEs we are looking at. This comes not as a surprise when considering the specific features of our SMEs. For instance, we observe that micro-sized units account for almost half of the sample and most of the companies are classified as Very old.

Turning our attention to the sector composition, we notice that Services (the control group) is the largest sector, followed by Trade, Construction and Industry. As for the performance indicators, competition and costs of production represent the major problems for more than half of the firms. Finally, the mean value of the score *Distance to frontier<sub>it</sub>* (about 75 for both samples) indicates that a large number of countries is not far from the best performer in our sample. Finally, when looking at *Credit to GDP<sub>jt</sub>*, the average values slightly exceed the percentage of 90% for both samples. A detailed description of variables and sources is provided in Table A1 in the Appendix A.

### 3.2.3 Methodology and endogeneity issues

Given the features of the dataset, our empirical strategy unfolds as follows. First, to estimate our model (1) and (2), we use a panel probit model. This method is suitable when the dependent variable is a binary. The use of both qualitative and quantitative regressors is admitted with this technique that employs maximum likelihood to assess the regression's function.

Our empirical setup includes calibrated weights to adjust the sample to be representative of the population from which it is extracted (as in Ferrando *et al.*, 2017). Furthermore, we correct standard errors to address heteroskedasticity and we cluster them at the country level in order to remove potential bias affecting the estimates.

There is a discrete consensus in the literature around the view that the propensity to export and the choice of innovation might not be fully exogenous (see among others Costantini and Melitz, 2007; Van Beveren and Vandebussche, 2010). Thus, any potential correlation between the types of innovation and the two dependent variables may be spurious. Specifically, when analysing the interplay between firm's innovative effort and their choice about export activities, as pointed out by Van Beveren and Vandebussche (2010), three types of endogeneity issues may emerge: a *simultaneity bias*, as firm's choice of innovation and export can be simultaneously; *causality bias*, if previous firm's exporting pattern is not taken under consideration (Aw *et al.* 2008); an *anticipation bias*, which may occurs when the firm anticipate the entrance into foreign market by undertaking innovation. In this case innovation is clearly endogenous to the export choice (see also Costantini and Melitz 2007).

---

<sup>14</sup> Some innovative financing sources, i.e. crowdfunding, belong in the category "Relevant Other Loans", which includes also factoring, leasing and debt securities.

In order to cope with such potential endogeneity issues, we employ the Arellano-Bond system generalized method of moments (SYS-GMM). We are thus able to tackle potential endogeneity stemming from simultaneity, and anticipation bias, as well as unobserved heterogeneity between the change in the status from non-exporter to exporter and all the other independent covariates (Roodman 2009; Wintoki, *et al.*, 2012).

## 4. Empirical Results

### 4.1 Probability to become an exporter: panel probit analysis

We start our empirical analysis by testing the hypotheses H1, H2 and H3 through the use of our panel probit model (1).

As described in the Section 3.2, to study the probability of becoming an *Export Starter* we rely on different types of innovation and different covariates measuring the access and use of finance, after controlling for a large set of variables at firm and country level.

Results are displayed in Table 2 (columns 1-4), where the specifications of model (1), differ for the alternative inclusion of the different types of innovation.

Consistently with our expectations (H1), the coefficients measuring the overall *innovation* and *product* and *process innovation* exhibit a positive and strongly significant sign, while *organizational innovation* is not significant. This evidence indicates that firms which declared to have embarked in product and process innovation, face a higher likelihood to start exporting. Our evidence is consistent with the literature on the linkage between innovation and exports (Becker and Egger 2013) and support the view that for SMEs product and process innovation seem to be more important than organizational innovation (*see* Azar and Ciabuschi, 2017; Hwang *et al.*, 2015).

– TABLE 2 HERE –

As for as our finance key variables are concerned we find the following results. The variable *Financing Innovation* turns to be always positive and significant throughout the 4 specifications. This is relevant as it supports our hypothesis H2 and indicates that firms which have used obtained finance to develop and launch new products and services have a higher likelihood to become an exporter. Results also show that the variable *Problem of Finance* – capturing the perceived difficulties of the firms in accessing to finance - does not play a relevant role on the probability to start exporting.

We test our hypothesis H3 *via* the set of variables labelled *Finance*, which measure SMEs' perceptions of the relevance of different external financing channels. Our findings show that only *Relevant Grants or Subsidies*, and *Relevant Other Loans* are positive and significant, compared to *Relevant Internal Funds* - which is the control group - indicating that only these two channels of financing exert a role on the probability to start exporting.

Turning our attention to other firm level controls, and specifically to the measures of firm performance, our evidence shows that SMEs that experienced growth, measured by an increased number of employees, are more likely to begin to export. Additionally, the dummy *Profit up* is significant with a positive sign, indicating that firms reporting an increase in profit face a higher likelihood to become an exporter. The coefficient of *Relevant Cost of Production* is negative significant, across all specifications, indicating that firms which declare that the cost of production is relevant enjoy from a smaller probability to change the status form non exporter to exporter as they suffer from a problem of production efficiency. Surprisingly, the variable *Problem of Competition* does not turn to be significant.

Overall, the positive effect exerted by innovation and some measures of performance on the *self-selection* hypothesis enriches the picture provided by Cassiman and Golovko (2011), who point to an interplay between innovation, productivity and trade internationalization.

As for the other firm varying controls, none of the types of ownership different from VCBA exerts a significant effect on the probability to become an exporter compared to the omitted group, single owner. This finding supports the notion that a more innovative and dynamic form of ownership might reduce the barriers to entry into foreign markets, but it also provides new evidence on the linkage between trade internationalization and firms' ownership (Zahra, Neubaum and Naldi, 2007; Paul *et al.*, 2017), and between venture capitalism and export engagement (Lockett *et al.* 2008; Smolarski and Kut 2011).

As for the firm-invariant controls, some interesting insights emerge from our analysis. As expected, we observe that companies located in countries where *Distance to frontier* displays a greater score (which means a smaller gap between the economy's performance and the frontier) enjoy a higher likelihood to become newly exporting enterprises. This evidence is consistent with the literature that emphasizes how a friendly business environment enhances production and marketing activities both domestically and abroad (Commander and Svejnar 2011; Besley 2015).

#### 4.2 *Probability to become an export exiter: panel probit analysis*

We now test the hypotheses H4, H5 and H6 to assess the probability for SMEs to change the status from exporter to non-exporter. Similarly, to what done above, also for model (2) we employ a panel probit approach to investigate the probability of stop exporting and thus become an export exiter. We rely on the same covariates employed as in model (1).

Results are displayed in Table 3 (columns 1-4) where the four specifications of model (2), differ for the alternative inclusion of the different types of innovation.

Consistently with our expectations, the coefficients measuring overall innovation, product, and organizational innovation exhibit a negative and significant sign. This evidence indicates that firms which declared to have embarked in product and organizational innovation, face a lower likelihood to stop exporting and becoming an exiter. Our evidence is consistent with the literature on the linkage between innovation and exports (Buddelmeyer *et al.*, 2009) and support the view that for SMEs that are already exporting it important - for reducing their likelihood to become exiter - to undertake any type of innovation.

– TABLE 3 HERE –

If we turn our attention to the finance key variables we find, the following results. The coefficient of *Financing Innovation* is always negative and significant throughout the 4 specifications of Table 3 (columns 1-4). Consistently with our hypothesis H5, our evidence indicates that firms that have used obtained finance to develop and launch new products and services face a lower likelihood to become an export exiter. As far as the set of variables falling under the label Finance (H6), our estimates indicate that *Relevant Credit Lines*, and *Relevant Family and Friends Loans* are negative and significant, compared to the *Relevant Internal Funds* which is the control group. These results are not trivial as they show that those SMEs which relied on trade credit line and to family/friends loans -often the only channel of financing for SMEs - face a lower probability to become an export exiter.

Turning our attention to the measures of firm performance, the evidence shows that SMEs that experienced an increase in profit (*Profit up*) face a lower likelihood to become an export exiter. Interestingly, all the other measures of firm performance do not seem to play a role in the probability to change the status from exporter to non-exporter. This is likely the case as companies

that enjoyed a rise in profits are more prone, *ceteris paribus*, to cope with the competitive pressure of international markets. Larger profits may help companies in undertaking innovation as this activity is cost intensive and associated with large uncertainty, as recalled by Masiak *et al.* (2017), and in line with the findings of Coad and Road (2008).

When looking at firm-varying controls, we observe that none of the types of ownership different from family and business association exerts a significant effect in reducing the probability to become an export exiter compared to the omitted group, single owner. This finding supports the notion that the networking of business association may favour the probability to continue to export.

Differently from the estimates of model (1), none of the firm-invariant controls is significant. This result may indicate that while a friendly business environment plays an important role in affecting the change in the status from non-exporter to exporter, the probability of remaining an export exiter seems to be more influenced by firm level choices and financial constraints than by external factors.

#### 4.3 Addressing endogeneity issues: SYS-GMM estimates

As discussed above in Section 3.2.3, the relation between the change in the export status and the innovation activities might be affected by endogeneity. The concern arises here because the different types of innovation might not be fully exogenous. Indeed, firms that engage in innovation efforts increase their probability to start exporting, but their decision to innovate could be endogenous because firms that intend to start exporting may increase their innovation activities (see, for instance, Costantini and Melitz, 2008; Van Beveren and Vandenbussche, 2010).

To address such a concern, we employ a two-step dynamic SYS-GMM approach (Roodman, 2009). Tables 2 and 3 in columns (5-8) report the results of the SYS-GMM estimates for model 1 and 2, respectively.

The diagnostic tests provided in Table 2 and 3 (columns 5-8) highlight that the model is properly specified, with statistically insignificant statistics for the second-order autocorrelation (i.e., *AR*(2)) test. Admittedly, we pay little attention to the Sargan *J* test since it tends to over-reject the null hypothesis of instrument validity in sample like ours (Benito 2005).

The results of the SYS-GMM estimates for the different specification of model (1) are displayed in columns 5-8 of Table 2. We observe that once controlling for potential endogeneity, i.e. from the probit to the SYS-GMM specification, the coefficient associated with *Product Innovation*, takes a positive and significant (at 10%) sign, indicating that firms that have undertaken product innovation display a higher probability to become an exporter. This result supports our hypothesis H1 and partially corroborates the evidence provided through the panel probit analysis (columns 1-4 of Table 2). Our results, therefore, suggest that firms, firstly, start to embark in product innovation activities and then, as a consequence, are able to change the status from non-exporter to exporting firm.

SYS-GMM estimates also support our hypotheses H2 and H3 and corroborate selected results from panel probit approach. In particular, the positive and significant sign of the variables *Financing Innovation* (H2), across the four specification (5-8) indicates how important is employing obtained finance to launch new product and services in order to increase SMEs' likelihood enter the export markets. Moreover, the significant and positive sign of the coefficient *Relevant Other Loans* indicates that this channel of financing exerts a role on the probability to start exporting, compared to the *Relevant Internal Funds*. Surprisingly, *Relevant Trade Credit* turns significant with negative sign.

Finally, SYS-GMM estimates confirm the importance of a friendly business environment on the probability to start exporting, as stated by the positive and significant coefficient of *Distance to frontier*.

Looking at the SYS-GMM estimates of model (2) whose results are reported in Table 3 columns (5-8) we notice that results corrected for endogeneity largely corroborate the panel probit estimates.

Indeed, all the types of innovation are significant with the expected negative sign, bringing support the hypothesis H4.

With regard to our financial key variables, the SYS-GMM estimates support the results of the panel probit analysis. The coefficient of the variable *Financing Innovation* -which tests the hypothesis H5 - is always negative and significant throughout the 4 specifications of Table 3 (columns 5-8). As claimed by our hypothesis H6, *Relevant Credit Lines*, and *Relevant Family and Friends Loans*, display negative and significant signs, compared to the *Relevant Internal Funds*, which is the control group.

All in all, we can conclude that our findings are not only robust across different specifications (Columns 1-4), but they are also corroborated by the SYS-GMM which address potential endogeneity (Column 5-8, Table 3).

#### 4.4 Additional analysis: The impact of the firm's size

In this Section we exploit the firm's size heterogeneity characterizing our data. Some authors have pointed out (see, amongst others, Hwang *et al.*, 2015) that firm's size matters on the decision to innovate and on the types of innovation undertaken. In this regards, two opposite perspectives are recalled here. According to the Schumpeterian point of view (Schumpeter 1942; Karlsson and Olsson, 1998) large firms have an advantage to innovate, *vis à vis* to smaller companies. Innovation requires effort, long-time investment, know how, resources that often small firms cannot afford. On the opposite, other studies show that SMEs may display a more innovative and efficient efforts than large firms (Cohen and Klepper 1996).

In order to investigate this type of size heterogeneity across the SMEs in our sample, we re-estimate models (1) and (2) on sub-samples of 8,260 and 4,006 observations, respectively, which contain only micro firms (1-9 employees). Results of our investigations are reported in the different Panels of Table 4.

– TABLE 4 HERE –

Panel A of Table 4 reports the four specifications of model (1) - where the dependent variable is export starter - and panel B displays the four specifications of model (2), when the dependent variables is export exiters.

Some interesting findings arise from this analysis.

If we look at panel A we observe that all the types of innovation turn are positive and significant. This result seems to corroborate the view of Cohen and Klepper (1996), highlighting that for micro firms' innovation efforts make a difference in changing the status from non-exporter to exporter.

Additionally, as shown by the positive and significant sign of the coefficient of *Financing Innovation*, micro firms that have used obtained finance to develop and launch new products and services have a higher likelihood to become an exporter. Interestingly, none of the external financing channels, compared to the internal one, exert any influence on the probability of becoming an exporter.

Our evidence also shows that micro firms that experienced growth are more likely to begin to export. In addition, those enterprises located in countries where *Distance to frontier* displays a greater score (which means a smaller gap between the economy's performance and the frontier) benefit from a higher likelihood to become newly exporting enterprises.

As far as model (2) is concerned results are displayed in panel B of Table 4 They can be summarised as follows.

First, only product innovation matters for reducing the probability of becoming an export exiter. This is consistent with the literature that underlines the importance of product innovation for small firms (see *inter alia* Hwang *et al.*, 2015; Azar and Ciabuschi, 2017). Second, *Financing innovation* is relevant in reducing the probability of stop exporting. Third, different external financing channels, such as *Relevant Credit Lines*, and *Relevant Family and Friends Loans* as well as *Relevant Other Loans*, are relevant for the micro firms in reducing the likelihood of become export exiters, when compared to the control group, i.e. *Relevant Internal Funds*.

Interestingly, the problem cost of production is relevant in increasing the probability to stop exporting. Finally, the evidence shows that some types of ownership, namely family firms and business associations, compared to single owner, exert influence in reducing the probability to exit foreign markets.

Overall, the findings of our investigation bring some novelty to the recent literature on the relationship between export activities, innovation efforts and financing sources for European SMEs.

## 5. Conclusions

This paper contributes to the rapidly growing literature that investigates the interplay between becoming an exporter or exiting foreign markets, on one side, innovation and firms' experiences in the access to finance, on the other side. Several theoretical and empirical studies address the determinants of SME export, R&D, product or process innovation. It is well known there is a strong positive relationship between exporting and innovation for SMEs (Golovko and Valentini, 2011) and recent evidence (Love and Roper, 2015) show SMEs which have prior innovation experience are more likely to successfully export. In addition, export oriented European SMEs grow more than twice as fast as domestic oriented ones, and are three times more likely to introduce new products than those that do not export (European Commission, 2010). Yet, these studies do not address the link between exporting and availability of funds, whilst it is widely acknowledged that a limited access to credit may hamper or even prevent exporting since selling abroad involves sunk costs (Wagner, 2016). At the same time, firms also need financial resources to finance innovation, and constraints in the credit market may be binding both to introduce new products and to enter foreign markets. All these issues have been analyzed separately in the literature and, to the best of our knowledge, no previous work did take into account entry/exit in foreign markets, innovation and firms' experiences in access to finance within the same framework.

We fill this gap by providing fresh new tests on the probability to start exporting into or to exit from foreign markets if firms have undertaken product, process and organizational innovation and if they have used external or internal finance to develop and launch new products and services.

To accomplish such a task, we pioneer the use of export data drawn from the ECB Survey on the Access to Finance of Enterprises (SAFE), which, to the best of our knowledge, is the only harmonized and homogeneous dataset providing relevant information for assessing the change in the SME status from non-exporter to exporter and *viceversa* in Europe. Using this dataset we first estimate a panel probit model to assess the probability to start exporting or exit foreign markets. Then we complement this analysis with a two-step dynamic SYS-GMM to address potential endogeneity.

Our findings support the view that firms which declared to have embarked in product and process innovation have a higher likelihood to start exporting. Conversely, organizational innovation does not seem to exert a positive impact, which is instead significant for exiters, i.e. firms which declared to have embarked in product and organizational innovation face a lower likelihood to stop exporting. Moreover, SMEs that have used obtained finance to develop and launch new products and services have a higher likelihood to become an exporter and a lower probability to exit foreign markets. Nonetheless, results also show that the variable Problem of Finance – capturing the perceived difficulties of the firms in accessing finance - does not play a

relevant role on the probability to start exporting. On the contrary, Relevant Grants or Subsidies, and Relevant Other Loans are positive and significant, compared to the Relevant Internal Funds - which is the control group - indicating that only these two channels of financing exert a role on the probability to start exporting. These variables do not matter on exiting as only those SMEs that rely on trade credit line and on family/friends loans -often the only channel of financing for SMEs - face a lower probability to abandon foreign markets.

When other firm varying controls are concerned, we observe that none of the types of ownership different from VCBA exert a significant effect on the probability to become an exporter compared to the omitted group, single owner. This result indicates that business networks, advisory services, training, credit mediation and match-making as partners may provide specific information on foreign markets and reduce sunk costs. This result fits into the recent findings that show how inter-firm networking can ignite virtuous circles (Aghion *et al.*, 2017). Yet VCBA is not significant on the exit side, while family and business association exerts a significant effect in reducing the probability to become an export exiter compared to the omitted group.

As suggested by a sizeable literature, a set of additional key firm's characteristics matter. SMEs that experienced growth, measured by profits and an increased number of employees, are more likely to begin to export, while those with problematic cost of production face a smaller probability to change the status from non-exporter to exporter. On the exit side, profit is the only significant measure of performance. As expected, companies with larger profits face a lower likelihood to leave the international arena.

Finally, we observe that companies located in more efficient countries, according to the Doing Business index developed by the World Bank, enjoy from a higher likelihood to become newly exporting enterprises. This evidence is consistent with the literature that emphasizes how a friendly business environment enhances production and marketing activities both domestically and abroad (Commander and Svejnar 2011; Besley 2015).

Summing up, the evidence discussed in this paper indicates clear interconnections between innovation, availability of funds and exporting and the importance of considering them jointly when we analyze the performance of the external sector or even for policy making.

## REFERENCES

- Acemoglu, D. (2009) *Introduction to modern economic growth*. Princeton Univ. Press.
- Aghion, P., Bloom, N., Blundell, R., Griffith, R., & Howitt, P. (2005). Competition and innovation: An inverted-U relationship. *The Quarterly Journal of Economics*, 120(2), 701-728.
- Aghion, P., Bergeaud, A., Lequien M., & Melitz, M. (2017). The impact of exports on innovation: Theory and evidence, mimeo.
- Aristei, D., & Franco, C. (2014). The role of credit constraints on firms' exporting and importing activities. *Industrial and Corporate Change*, 23(6), 1493-1522.
- Aw, B. Y., Chung, S., & Roberts, M. J. (2000). Productivity and turnover in the export market: micro-level evidence from the Republic of Korea and Taiwan (China). *The World Bank Economic Review*, 14(1), 65-90.
- Aw, B. Y., Roberts, M. J., & Xu, D. Y. (2008). R&D investments, exporting, and the evolution of firm productivity. *American economic review*, 98(2), 451-56.
- Ayob, A. H., Ramlee, S., & Rahman, A. A. (2015). Financial factors and export behavior of small and medium-sized enterprises in an emerging economy. *Journal of International Entrepreneurship*, 13(1), 49-66.
- Azar, G., & Ciabuschi, F. (2017). Organizational innovation, technological innovation, and export performance: The effects of innovation radicalness and extensiveness. *International Business Review*, 26(2), 324-336.
- Bain, J. S. (1956). *Barriers to new competition* (Vol. 3, p. 55). Cambridge, MA: Harvard University Press.
- Baldwin, R., & Krugman, P. (1989). Persistent trade effects of large exchange rate shocks. *The Quarterly Journal of Economics*, 104(4), 635-654.
- Becker, S. O., & Egger, P. H. (2013). Endogenous product versus process innovation and a firm's propensity to export. *Empirical Economics*, 44(1), 329-354.
- Benito, A. (2005). Financial Pressure, Monetary Policy Effects and Inventories: Firm-level Evidence from a Market-based and a Bank-based Financial System. *Economica*, 72(286), 201-224.
- Bernard, A. B., & Bradford, J. J. (2004) Why some firms exports. *The Review of Economics and Statistics*, 86(2): 561-569.
- Bernard, A. B., & Jensen, J. B. (1999). Exceptional exporter performance: cause, effect, or both?. *Journal of international economics*, 47(1), 1-25.
- Besley, T. (2015). Law, regulation, and the business climate: The nature and influence of the World Bank Doing Business project. *Journal of Economic Perspectives*, 29(3), 99-120.
- Buddelmeyer, H., Jensen, P. H., & Webster, E. (2009). Innovation and the determinants of company survival. *Oxford Economic Papers*, 62(2), 261-285.

- Bustos, P. (2011). Trade liberalization, exports, and technology upgrading: Evidence on the impact of MERCOSUR on Argentinian firms. *American Economic Review*, 101(1), 304-40.
- Calabro, A., Torchia, M., Pukall, T., & Mussolino D. (2013). The influence of ownership structure and board strategic involvement on international sales: The moderating effect of family involvement. *International Business Review*, 22(3), 509-523.
- Caldera, A. (2010). Innovation and exporting: evidence from Spanish manufacturing firms. *Review of world Economics*, 146(4), 657-689.
- Cassiman, B., & Golovko, E. (2011). Innovation and internationalization through exports. *Journal of International Business Studies*, 42(1), 56-75.
- Cassiman, B., Golovko, E., & Martínez-Ros, E. (2010). Innovation, exports and productivity. *International Journal of Industrial Organization*, 28(4), 372-376.
- Caves, R. E. (1998). Industrial organization and new findings on the turnover and mobility of firms. *Journal of economic literature*, 36(4), 1947-1982.
- Coad, A. and Rao, R. (2008) Innovation and firm growth in high-tech sectors: A quantile regression approach. *Research Policy*, 37 (4). pp. 633-648
- Cohen, W. M., & Klepper, S. (1996). A reprise of size and R & D. *The Economic Journal*, 925-951.
- Colantone, I., & Sleuwaegen, L. (2010). International trade, exit and entry: A cross-country and industry analysis. *Journal of International Business Studies*, 41(7), 1240-1257.
- Commander, S., & Svejnar, J. (2011). Business environment, exports, ownership, and firm performance. *The Review of Economics and Statistics*, 93(1), 309-337.
- Costantini, J., & Melitz, M. (2008). The dynamics of firm-level adjustment to trade liberalization. *The organization of firms in a global economy*, 4, 107-141.
- Crick, D. (2002). The decision to discontinue exporting: SMEs in two UK trade sectors. *Journal of Small Business Management*, 40(1), 66.
- Damijan, J. P., Kostevc, Č., & Polanec, S. (2015). Access to finance, exporting and a non-monotonic firm expansion. *Empirica*, 42(1), 131-155.
- Dixit, A. (1989). Entry and exit decisions under uncertainty. *Journal of political Economy*, 97(3), 620-638.
- Dosi, G., Grazzi, M., & Moschella, D. (2015). Technology and costs in international competitiveness: from countries and sectors to firms. *Research Policy*, 44(10), 1795-1814.
- Dunne, T., Roberts, M. J., & Samuelson, L. (1988). Patterns of firm entry and exit in US manufacturing industries. *The RAND journal of Economics*, 495-515.
- Eaton, J., Kortum, S., & Kramarz, F. (2011). An anatomy of international trade: Evidence from French firms. *Econometrica*, 79(5), 1453-1498.
- Egger, P., & Kesina, M. (2013). Financial constraints and exports: Evidence from Chinese firms. *CESifo Economic Studies*, 59(4), 676-706.

- Esteve-Pérez, S., & Rodríguez, D. (2013). The dynamics of exports and R&D in SMEs. *Small Business Economics*, 41(1), 219-240.
- European Commission (2010). *Internationalisation of European SMEs*, Final Report, Brussels.
- Farinas, J. C., & Ruano, S. (2005). Firm productivity, heterogeneity, sunk costs and market selection. *International Journal of Industrial Organization*, 23(7-8), 505-534.
- Ferrando, A., Popov, A., & Udell, G. F. (2017). Sovereign stress and SMEs' access to finance: Evidence from the ECB's SAFE survey. *Journal of Banking & Finance*, 81, 65-80.
- Filos, E. (2017). Four years of 'Factories of the Future' in Europe: achievements and outlook. *International Journal of Computer Integrated Manufacturing*, 30(1), 15-22.
- Golovko, E., & Valentini, G. (2011) Exploring the complementarity between innovation and export for SMEs growth. *Journal of International Business Studies*, 42(3): 362–380.
- Görg, H., & Spaliara, M. E. (2014). Financial health, exports and firm survival: Evidence from UK and French firms. *Economica*, 81(323), 419-444.
- Greenaway, D., & Kneller, R. (2008). Exporting, productivity and agglomeration. *European economic review*, 52(5), 919-939.
- Greenaway, D., Guariglia, A., & Kneller, R. (2007). Financial factors and exporting decisions. *Journal of International Economics*, 73(2), 377-395.
- Grossman, G. M., & Helpman, E. (1991). Trade, knowledge spillovers, and growth. *European economic review*, 35(2-3), 517-526.
- Grossman, G. M., & Helpman, E. (1993). *Innovation and growth in the global economy*. MIT press.
- Helpman E., & Krugman P. (1985) *Market structure and foreign trade: increasing returns, imperfect competition, and the international economy*. MA:The MIT Press.
- Helpman, E., Melitz, M. J., & Yeaple, S. R. (2004). Export versus FDI with heterogeneous firms. *American economic review*, 94(1), 300-316.
- Hwang, Y. S., Hwang, M. H., & Dong, X. (2015). The relationships among firm size, innovation type, and export performance with regard to time spans. *Emerging Markets Finance and Trade*, 51(5), 947-962.
- Ilmakunnas, P., & Nurmi, S. (2010). Dynamics of export market entry and exit. *The Scandinavian Journal of Economics*, 112(1), 101-126.
- Ito, H, Terada-Hagiwara, A. (2011), Effects of financial market imperfections on Indian firms' exporting behavior. *ADB Economics Working Paper Series*, 256, 1-50.
- Jinjarak, Y., & Wignaraja, G. (2016). An Empirical Assessment of the Export—Financial Constraint Relationship: How Different are Small and Medium Enterprises?. *World Development*, 79, 152-163.
- Jovanovic, B. (1982). Selection and the Evolution of Industry. *Econometrica: Journal of the Econometric Society*, 649-670.

- Karlsson, C., & Olsson, O. (1998). Product innovation in small and large enterprises. *Small Business Economics*, 10(1), 31-46.
- Klepper, S. (2002). Firm survival and the evolution of oligopoly. *RAND journal of Economics*, 37-61.
- Krugman, Paul R. (1989). *Exchange Rate Instability*. Cambridge, MA: The MIT Press.
- Lockett, A., Wright, M., Burrows, A., Scholes, L., & Paton, D. (2008). The export intensity of venture capital backed companies. *Small Business Economics*, 31(1), 39-58.
- Love, J. H., & Roper, S. (2015). SME innovation, exporting and growth: A review of existing evidence. *International small business journal*, 33(1), 28-48.
- Masiak, C., Moritz, A., & Lang, F. (2017), Financing patterns of European SMEs revisited: an updated empirical taxonomy and determinants of SMEs financing clusters, *European Investment fund, Working paper 2017/40*.
- Melitz, M. J. (2003). The impact of trade on intra-industry reallocations and aggregate industry productivity. *Econometrica*, 71(6), 1695-1725.
- Miller, D., Le Breton-Miller, I., & Scholnick, B. (2008). Stewardship vs. stagnation: An empirical comparison of small family and non-family businesses. *Journal of Management Studies*, 45, 51–78.
- Minetti, R., & Zhu, S. C. (2011). Credit constraints and firm export: Microeconomic evidence from Italy. *Journal of International Economics*, 83(2), 109-125.
- Paul, J., Parthasarathy, S., & Gupta, P. (2017). Exporting challenges of SMEs: A review and future research agenda. *Journal of World Business*, 52(3), 327-342.
- Pavcnik, N. (2002). Trade liberalization, exit, and productivity improvements: Evidence from Chilean plants. *The Review of Economic Studies*, 69(1), 245-276.
- Roberts, M. J., & Tybout, J. R. (1997). The decision to export in Colombia: an empirical model of entry with sunk costs. *The American Economic Review*, 545-564.
- Roodman, D. (2009). How to do xtabond2: An introduction to difference and system GMM in Stata. *Stata Journal* 9, no. 1: 86-136.
- Roper, S., & Love, J. H. (2002). Innovation and export performance: evidence from the UK and German manufacturing plants. *Research policy*, 31(7), 1087-1102.
- Schumpeter, J. A. (1942). *Socialism, capitalism and democracy*. Harper and Brothers.
- Secchi, A., Tamagni, F., & Tomasi, C. (2016). Financial constraints and firm exports: accounting for heterogeneity, self-selection, and endogeneity. *Industrial and Corporate Change*, 25(5), 813-827.
- Semykina, A., & Wooldridge, J. M. (2010). Estimating panel data models in the presence of endogeneity and selection. *Journal of Econometrics*, 157(2), 375-380.
- Stiebale, J. (2011). Do Financial Constraints Matter for Foreign Market Entry? A Firm-level Examination. *The World Economy*, 34(1), 123-153.

Van Beveren, I., & Vandenbussche, H. (2010). Product and process innovation and firms' decision to export. *Journal of Economic Policy Reform*, 13(1), 3-24.

Wagner, J. (2007). Exports and productivity: A survey of the evidence from firm-level data. *The World Economy*, 30(1), 60-82.

Wagner, J. (2012). International trade and firm performance: a survey of empirical studies since 2006. *Review of World Economics*, 148(2), 235-267.

Wagner, J. (2016). A survey of empirical studies using transaction level data on exports and imports. *Review of World Economics*, 152(1), 215-225.

Wakelin, K. (1998). Innovation and export behaviour at the firm level. *Research policy*, 26(7-8), 829-841.

Wheeler, C., Ibeh, K., & Dimitratos, P. (2008). UK export performance research: Review and implications. *International Small Business Journal*, 26(2), 207-239.

Wintoki, M. B., Linck, J. S., & Netter, J. M. (2012). Endogeneity and the dynamics of internal corporate governance. *Journal of Financial Economics*, 105(3), 581-606.

Zahra, S. A., Neubaum, D. O., & Naldi, L. (2007). The effects of ownership and governance on SMEs' international knowledge-based resources. *Small Business Economics*, 29(3), 309-327.

Table 1: Summary statistics

This table displays summary statistics for the variables employed in our analyses.

Variable	Panel A - Export Starters			Panel B - Export Exiters		
	Obs	Mean	Std. Dev.	Obs	Mean	Std. Dev.
<b><i>Dependent variables</i></b>						
Export Starter	15,968	0.113	0.316			
Export Exiter				14,710	0.135	0.342
<b><i>Key regressors</i></b>						
Innovation	15,968	0.319	0.466	14,710	0.430	0.495
Product Innovation	15,968	0.170	0.376	14,710	0.278	0.448
Process Innovation	15,968	0.119	0.324	14,710	0.197	0.398
Organizational Innovation	15,968	0.163	0.369	14,710	0.209	0.407
<b><i>Finance</i></b>						
Financing Innovation	15,968	0.112	0.315	14,710	0.213	0.409
Problem of Finance	15,968	0.385	0.487	14,710	0.391	0.488
Relevant Bank Loans	15,968	0.531	0.499	14,710	0.564	0.496
Relevant Credit Lines	15,968	0.566	0.496	14,710	0.606	0.489
Relevant Grants or Subsidies	15,968	0.323	0.467	14,710	0.385	0.487
Relevant Trade Credit	15,968	0.377	0.485	14,710	0.456	0.498
Relevant Family or Friends Loans	15,968	0.211	0.408	14,710	0.241	0.427
Relevant Other Loans	15,968	0.537	0.499	14,710	0.621	0.485
Relevant Internal Funds	15,968	0.266	0.442	14,710	0.353	0.478
<b><i>Firm-level controls</i></b>						
<b><i>Ownership</i></b>						
Family	15,968	0.457	0.498	14,710	0.494	0.500
Business Association	15,968	0.088	0.283	14,710	0.153	0.360
Public Company	15,968	0.011	0.104	14,710	0.022	0.146
VCBA	15,968	0.004	0.063	14,710	0.011	0.103
Other	15,968	0.030	0.170	14,710	0.027	0.162
Single owner	15,968	0.410	0.492	14,710	0.293	0.455
<b><i>Performance</i></b>						
Problem of Competition	15,968	0.620	0.485	14,710	0.643	0.479
Growth up	15,968	0.212	0.409	14,710	0.294	0.456
Relevant Cost of Production	15,968	0.648	0.478	14,710	0.665	0.472
Profit up	15,968	0.286	0.452	14,710	0.360	0.480
<b><i>Size</i></b>						
Micro	15,968	0.518	0.500	14,710	0.272	0.445
Small	15,968	0.300	0.458	14,710	0.324	0.468
Medium	15,968	0.182	0.386	14,710	0.404	0.491
<b><i>Age</i></b>						
Very recent	15,968	0.010	0.099	14,710	0.006	0.078
Recent	15,968	0.047	0.211	14,710	0.029	0.168
Old	15,968	0.129	0.335	14,710	0.108	0.311
Very old	15,968	0.813	0.390	14,710	0.856	0.351
<b><i>Sector</i></b>						
Industry	15,968	0.118	0.323	14,710	0.428	0.495

Construction	15,968	0.164	0.370	14,710	0.062	0.241
Trade	15,968	0.300	0.458	14,710	0.246	0.431
Service	15,968	0.418	0.493	14,710	0.264	0.441
<b><i>Country-level controls</i></b>						
Distance to Frontier	15,968	75.332	3.838	14,710	75.343	3.914
Credit to GDP	15,968	91.364	25.217	14,710	90.714	25.633

---

Source: ECB SAFE (waves 11-15).

Table 2. Estimations of the probability to become an exporter

VARIABLES	STARTERS							
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
	Probit - coefficients			SYS-GMM				
<i>Innovation<sub>it</sub></i>	0.117563** (0.047416)				0.009636 (0.009158)			
<i>Product Innovation<sub>it</sub></i>		0.139330*** (0.046601)				0.020382* (0.011945)		
<i>Process Innovation<sub>it</sub></i>			0.151598*** (0.053984)				0.000393 (0.013475)	
<i>Organizational Innovation<sub>it</sub></i>				0.049011 (0.048697)				-0.011824 (0.011488)
	<b>Finance<sub>it</sub></b>							
<i>Financing Innovation<sub>it</sub></i>	0.270053*** (0.045723)	0.259182*** (0.046322)	0.270522*** (0.045736)	0.282521*** (0.044692)	0.025898** (0.011946)	0.030670*** (0.011837)	0.025458** (0.011967)	0.027354** (0.012020)
<i>Problem of Finance<sub>it</sub></i>	-0.031071 (0.030840)	-0.030719 (0.030590)	-0.032348 (0.030595)	-0.032062 (0.030985)	0.005979 (0.009338)	0.008054 (0.009340)	0.004993 (0.009356)	0.006277 (0.009330)
<i>Relevant Bank Loans<sub>it</sub></i>	-0.005354 (0.020025)	-0.003398 (0.020039)	-0.004398 (0.019888)	-0.003358 (0.019919)	0.018355* (0.009396)	0.019666** (0.009398)	0.018465** (0.009384)	0.019808** (0.009411)
<i>Relevant Credit Lines<sub>it</sub></i>	-0.002352 (0.038490)	-0.000329 (0.038180)	0.000951 (0.037206)	-0.001154 (0.038144)	-0.000693 (0.010105)	0.001536 (0.010128)	-0.000135 (0.010139)	0.000847 (0.010116)
<i>Relevant Grants and Subsidies<sub>it</sub></i>	0.069625** (0.035007)	0.069055** (0.034701)	0.066841* (0.034443)	0.072012** (0.034953)	0.002261 (0.009592)	0.003080 (0.009593)	0.001562 (0.009614)	0.002722 (0.009611)
<i>Relevant Trade Credit<sub>it</sub></i>	0.023847 (0.027715)	0.022332 (0.027412)	0.025139 (0.027348)	0.023592 (0.027805)	-0.023854** (0.009841)	-0.023194** (0.009836)	-0.023595** (0.009852)	-0.024064** (0.009845)
<i>Relevant Family and Friends Loans<sub>it</sub></i>	0.022762 (0.042137)	0.023127 (0.042122)	0.024786 (0.042142)	0.025649 (0.041810)	0.006429 (0.011020)	0.008868 (0.011044)	0.006281 (0.011047)	0.007965 (0.011012)
<i>Relevant Other Loans<sub>it</sub></i>	0.064583* (0.033294)	0.065094** (0.032551)	0.065674** (0.032899)	0.066807** (0.032294)	0.016222* (0.009725)	0.017308* (0.009728)	0.016579* (0.009723)	0.016310* (0.009731)
	<b>Performance<sub>it</sub></b>							
<i>Problem of Competition<sub>it</sub></i>	-0.029816 (0.040345)	-0.028461 (0.040119)	-0.026915 (0.039709)	-0.028049 (0.039807)	0.004873 (0.009472)	0.006120 (0.009467)	0.006026 (0.009481)	0.005076 (0.009474)
<i>Growth up<sub>it</sub></i>	0.076570** (0.031947)	0.077593** (0.031419)	0.079902*** (0.030852)	0.081085*** (0.031252)	0.015151 (0.010245)	0.018192* (0.010241)	0.015025 (0.010259)	0.016331 (0.010266)
<i>Relevant Cost of Production<sub>it</sub></i>	-0.066116**	-0.064470**	-0.065185**	-0.062692**	-0.008488	-0.008445	-0.009311	-0.008732

<i>Profit up<sub>it</sub></i>	(0.029846)	(0.029553)	(0.029553)	(0.030066)	(0.009135)	(0.009129)	(0.009139)	(0.009142)
	0.043600*	0.044606*	0.042612*	0.047640**	-0.002086	0.000074	-0.002782	-0.001745
	(0.024268)	(0.024377)	(0.024675)	(0.024007)	(0.009536)	(0.009523)	(0.009536)	(0.009561)
	<b>Ownership<sub>it</sub></b>							
<i>Family<sub>it</sub></i>	0.007296	0.008121	0.008559	0.008021	-0.018809	-0.015859	-0.017886	-0.018325
	(0.031584)	(0.031387)	(0.031710)	(0.031649)	(0.018763)	(0.018785)	(0.018752)	(0.018762)
<i>Business association<sub>it</sub></i>	-0.033742	-0.030621	-0.029312	-0.034174	-0.045228*	-0.047857*	-0.041092*	-0.047338*
	(0.049834)	(0.048349)	(0.048382)	(0.049287)	(0.024540)	(0.024506)	(0.024506)	(0.024534)
<i>Public company<sub>it</sub></i>	0.061182	0.051325	0.065857	0.058446	-0.024410	-0.020718	-0.023026	-0.020062
	(0.136346)	(0.135575)	(0.135881)	(0.135808)	(0.054272)	(0.054295)	(0.054383)	(0.054323)
<i>VCBA<sub>it</sub></i>	0.381499**	0.374990**	0.394394**	0.390218**	0.031948	0.033418	0.035749	0.031930
	(0.162407)	(0.162520)	(0.166995)	(0.165245)	(0.064361)	(0.064275)	(0.064373)	(0.064413)
<i>Other<sub>it</sub></i>	-0.104464	-0.103701	-0.103147	-0.107425	-0.004648	-0.012569	-0.004807	-0.009992
	(0.095183)	(0.094098)	(0.094107)	(0.093463)	(0.041233)	(0.041200)	(0.041188)	(0.041303)
<i>Distance to frontier<sub>jt</sub></i>	0.056339***	0.055668***	0.056164***	0.055989***	0.023997***	0.019965**	0.024825***	0.020615**
	(0.010348)	(0.010147)	(0.010306)	(0.010310)	(0.008486)	(0.008279)	(0.008528)	(0.008020)
<i>Credit to GDP<sub>jt</sub></i>	0.001872	0.001876	0.002043	0.002006	0.000551	-0.000102	0.001590	0.000803
	(0.002453)	(0.002453)	(0.002470)	(0.002469)	(0.002637)	(0.002625)	(0.002574)	(0.002632)
	<b>Z<sub>it</sub></b>							
Size dummies	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Age dummies	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Industry dummies	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
	<b>M<sub>jt</sub></b>							
Country dummies	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Wave dummies	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	15,968	15,968	15,968	15,968	15,968	15,968	15,968	15,968
Number of firms	9,855	9,855	9,855	9,855	9,855	9,855	9,855	9,855
Sargan (p-value)					0.000	0.000	0.000	0.000
AR(1) p-value					0.000	0.000	0.000	0.000
AR(2) p-value					0.944	0.968	0.913	0.905

Source: ECB SAFE (waves 11-15).

Table 3. Estimations of the probability to stop exporting

VARIABLES	EXITERS							
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
	Probit - coefficients				SYS-GMM			
<i>Innovation<sub>it</sub></i>	-0.193449*** (0.074975)				-0.013527** (0.005303)			
<i>Product Innovation<sub>it</sub></i>		-0.230444** (0.089504)				-0.027115*** (0.006320)		
<i>Process Innovation<sub>it</sub></i>			-0.120716 (0.090824)				-0.016503** (0.006912)	
<i>Organizational Innovation<sub>it</sub></i>				-0.126605** (0.064222)				-0.024434*** (0.006633)
	<b>Finance<sub>it</sub></b>							
<i>Financing Innovation<sub>it</sub></i>	-0.493643*** (0.085796)	-0.479465*** (0.087018)	-0.506205*** (0.082258)	-0.508816*** (0.084586)	-0.047679*** (0.006621)	-0.049686*** (0.006535)	-0.042013*** (0.006643)	-0.039756*** (0.006694)
<i>Problem of Finance<sub>it</sub></i>	0.021109 (0.074072)	0.019006 (0.073811)	0.018559 (0.074053)	0.019798 (0.072205)	-0.011287* (0.006708)	-0.011595* (0.006714)	-0.007092 (0.006722)	-0.007121 (0.006714)
<i>Relevant Bank Loans<sub>it</sub></i>	0.114721 (0.101625)	0.114631 (0.100676)	0.117611 (0.099745)	0.115641 (0.100242)	-0.002997 (0.006587)	-0.001177 (0.006590)	-0.001716 (0.006577)	-0.002019 (0.006591)
<i>Relevant Credit Line<sub>it</sub></i>	-0.211589*** (0.057682)	-0.213412*** (0.057313)	-0.211766*** (0.057340)	-0.210943*** (0.057774)	-0.016868** (0.007101)	-0.015116** (0.007105)	-0.013502* (0.007108)	-0.014072** (0.007109)
<i>Relevant Grants and Subsidies<sub>it</sub></i>	0.023958 (0.068611)	0.024902 (0.067269)	0.021719 (0.067537)	0.021847 (0.067729)	0.001404 (0.006450)	-0.000330 (0.006445)	0.002458 (0.006437)	0.002858 (0.006456)
<i>Relevant Trade Credit<sub>it</sub></i>	-0.183488** (0.091720)	-0.182435** (0.091559)	-0.185732** (0.090274)	-0.184158** (0.091055)	0.007784 (0.006574)	0.005790 (0.006566)	0.009058 (0.006574)	0.008368 (0.006579)
<i>Relevant Family and Friends Loans<sub>it</sub></i>	-0.290412*** (0.082193)	-0.290422*** (0.082060)	-0.289030*** (0.081973)	-0.286547*** (0.081510)	-0.048412*** (0.007418)	-0.046786*** (0.007424)	-0.045293*** (0.007425)	-0.045660*** (0.007405)
<i>Relevant Other Loans<sub>it</sub></i>	-0.106991 (0.076647)	-0.110648 (0.075361)	-0.109574 (0.076551)	-0.108888 (0.076044)	0.003961 (0.006779)	0.006266 (0.006788)	0.006305 (0.006779)	0.006677 (0.006779)
	<b>Performance<sub>it</sub></b>							
<i>Problem of Competition<sub>it</sub></i>	-0.049094 (0.064507)	-0.048276 (0.063951)	-0.051189 (0.064643)	-0.048878 (0.064847)	-0.038375*** (0.006420)	-0.039036*** (0.006427)	-0.039512*** (0.006414)	-0.040660*** (0.006427)
<i>Growth up<sub>it</sub></i>	-0.067538 (0.055185)	-0.067089 (0.054881)	-0.070517 (0.054236)	-0.068691 (0.055084)	-0.011789* (0.006515)	-0.010496 (0.006522)	-0.009370 (0.006506)	-0.007895 (0.006524)
<i>Relevant Cost of Pproduction<sub>it</sub></i>	0.045431 (0.104775)	0.044130 (0.104804)	0.045758 (0.103026)	0.046055 (0.104475)	-0.012320** (0.006215)	-0.010340* (0.006220)	-0.012032* (0.006202)	-0.011034* (0.006224)

<i>Profit</i> $up_{it}$	-0.157066**	-0.156597**	-0.159553**	-0.160464**	-0.006061	-0.005485	-0.006492	-0.006174
	(0.070527)	(0.069650)	(0.069387)	(0.070012)	(0.005879)	(0.005886)	(0.005876)	(0.005882)
	<b>Ownership<math>_{it}</math></b>							
<i>Family</i> $_{it}$	-0.216697***	-0.218462***	-0.215107***	-0.216772***	-0.007235	-0.011528	-0.016169	-0.012576
	(0.076413)	(0.076638)	(0.076069)	(0.076660)	(0.013984)	(0.014005)	(0.013974)	(0.013926)
<i>Business association</i> $_{it}$	-0.570342***	-0.569371***	-0.562908***	-0.562070***	-0.079244***	-0.079766***	-0.088425***	-0.082321***
	(0.131639)	(0.130564)	(0.130364)	(0.131341)	(0.015866)	(0.015887)	(0.015881)	(0.015846)
<i>Public company</i> $_{it}$	-0.334884	-0.322575	-0.339007	-0.337696	-0.059466	-0.047066	-0.066374*	-0.052181
	(0.286518)	(0.289640)	(0.285429)	(0.288351)	(0.036631)	(0.036646)	(0.036662)	(0.036671)
<i>VCBA</i> $_{it}$	-0.561134	-0.562990	-0.560427	-0.544642	-0.238557***	-0.244160***	-0.222807***	-0.219158***
	(0.346874)	(0.347353)	(0.346886)	(0.347872)	(0.053107)	(0.052997)	(0.053053)	(0.053062)
<i>Other</i> $_{it}$	-0.145155	-0.131106	-0.136627	-0.137466	-0.012788	-0.010931	-0.027853	-0.017470
	(0.242058)	(0.240241)	(0.238561)	(0.239716)	(0.026779)	(0.026797)	(0.026812)	(0.026769)
<i>Distance to frontier</i> $_{jt}$	-0.046949	-0.046029	-0.046067	-0.046506	0.001844	0.003157	0.000955	0.000295
	(0.030940)	(0.030249)	(0.029848)	(0.030335)	(0.004748)	(0.004737)	(0.004765)	(0.004753)
<i>Credit to GDP</i> $_{jt}$	0.002294	0.002347	0.002061	0.002282	0.003289*	0.003469**	0.003413**	0.005153***
					(0.001690)	(0.001699)	(0.001678)	(0.001677)
	<b>Z<math>_{it}</math></b>							
Size dummies	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Age dummies	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Industry dummies	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
	<b>M<math>_{jt}</math></b>							
Country dummies	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Wave dummies	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	14,710	14,710	14,710	14,710	14,710	14,710	14,710	14,710
Number of firms	8,874	8,874	8,874	8,874	8,874	8,874	8,874	8,874
Sargan (p-value)					0.000	0.000	0.000	0.000
AR(1) p-value					0.00378	0.00416	0.00609	0.00609
AR(2) p-value					0.375	0.334	0.449	0.542

Source: ECB SAFE (waves 11-15).

Table 4. Estimations of the probability to start and to stop exporting for micro-sized SMEs

VARIABLES	STARTERS				EXITERS			
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
	Panel A) Probit - coefficients				Panel B) Probit - coefficients			
<i>Innovation<sub>it</sub></i>	0.210108*** (0.060216)				-0.377730 (0.312811)			
<i>Product Innovation<sub>it</sub></i>		0.165643*** (0.056034)				-0.332745* (0.190642)		
<i>Process Innovation<sub>it</sub></i>			0.264966*** (0.067941)				-0.220950 (0.220675)	
<i>Organizational Innovation<sub>it</sub></i>				0.129493* (0.068142)				-0.383519 (0.255165)
	<b>Finance<sub>it</sub></b>							
<i>Financing Innovation<sub>it</sub></i>	0.352586*** (0.062436)	0.348325*** (0.063151)	0.354005*** (0.063562)	0.368044*** (0.061600)	-0.973291*** (0.310411)	-0.942432*** (0.177706)	-0.966706*** (0.173451)	-0.983731*** (0.264932)
<i>Problem of Finance<sub>it</sub></i>	0.008928 (0.056851)	0.011737 (0.056250)	0.009620 (0.056011)	0.008288 (0.056029)	0.072496 (0.135173)	0.069759 (0.130392)	0.067085 (0.129619)	0.082116 (0.134243)
<i>Relevant Bank Loans<sub>it</sub></i>	0.036626 (0.041695)	0.042207 (0.041598)	0.042817 (0.041795)	0.041493 (0.042205)	-0.098514 (0.179479)	-0.093841 (0.153419)	-0.086904 (0.152361)	-0.097619 (0.172136)
<i>Relevant Credit Line<sub>it</sub></i>	0.023108 (0.065192)	0.025492 (0.065045)	0.030716 (0.063276)	0.025081 (0.064507)	-0.196034 (0.167801)	-0.187741 (0.147270)	-0.188634 (0.147780)	-0.206145 (0.164815)
<i>Relevant Grants and Subsidies<sub>it</sub></i>	0.014643 (0.041344)	0.011724 (0.042744)	0.008311 (0.040859)	0.017945 (0.041937)	0.254438 (0.198664)	0.242645 (0.160888)	0.240000 (0.161355)	0.255973 (0.192305)
<i>Relevant Trade Credit<sub>it</sub></i>	0.048070 (0.034988)	0.045004 (0.033647)	0.050172 (0.033515)	0.046817 (0.034987)	-0.432889*** (0.151740)	-0.426728*** (0.126523)	-0.431569*** (0.125405)	-0.438410*** (0.147050)
<i>Relevant Family and Friends Loans<sub>it</sub></i>	-0.045315 (0.060567)	-0.042907 (0.059689)	-0.044655 (0.058159)	-0.043032 (0.058923)	-0.451913* (0.268375)	-0.429436** (0.188791)	-0.423511** (0.187127)	-0.430598* (0.223984)
<i>Relevant Other Loans<sub>it</sub></i>	0.031857 (0.045464)	0.034403 (0.044908)	0.030185 (0.045066)	0.032467 (0.044994)	-0.182840* (0.105692)	-0.189464* (0.105906)	-0.186787* (0.107503)	-0.184523* (0.105854)
	<b>Performance<sub>it</sub></b>							
<i>Problem of Competition<sub>it</sub></i>	-0.083438 (0.066121)	-0.077596 (0.064524)	-0.076752 (0.065161)	-0.078472 (0.064784)	0.014862 (0.154364)	0.006311 (0.135399)	0.009906 (0.134810)	0.009868 (0.149302)
<i>Growth up<sub>it</sub></i>	0.088632** (0.044515)	0.092208** (0.044727)	0.093632** (0.043824)	0.091693** (0.044697)	0.115778 (0.221714)	0.097834 (0.228238)	0.101132 (0.225102)	0.108629 (0.227858)
<i>Relevant Cost of Production<sub>it</sub></i>	-0.047303	-0.043358	-0.047923	-0.044316	0.366689*	0.354884**	0.351473**	0.368729*

<i>Profit</i> $up_{it}$	(0.051301)	(0.051500)	(0.051480)	(0.051638)	(0.211107)	(0.176908)	(0.174937)	(0.201142)
	0.078006	0.080380	0.072116	0.086815	-0.076462	-0.083189	-0.087101	-0.091438
	(0.054645)	(0.054804)	(0.056886)	(0.054200)	(0.142012)	(0.136888)	(0.137835)	(0.142252)
	<b>Ownership<sub>it</sub></b>							
<i>Family</i> $_{it}$	-0.013654	-0.013738	-0.010724	-0.012857	-0.269267*	-0.260319*	-0.256771*	-0.268364*
	(0.047351)	(0.047017)	(0.047492)	(0.047207)	(0.145757)	(0.155766)	(0.154341)	(0.150270)
<i>Business association</i> $_{it}$	0.037161	0.033873	0.041088	0.028288	-1.112899*	-1.059968**	-1.047432**	-1.086189**
	(0.091552)	(0.090253)	(0.090111)	(0.090156)	(0.604067)	(0.448059)	(0.455808)	(0.524934)
<i>Public company</i> $_{it}$	0.075128	0.058353	0.084369	0.062324	-1.019850	-0.929037	-0.960352	-1.003360
	(0.347502)	(0.339282)	(0.328668)	(0.340163)	(1.443934)	(1.360784)	(1.339495)	(1.427843)
<i>VCBA</i> $_{it}$	0.408290	0.400342	0.455151	0.435755	0.768770	0.764538	0.762146	0.764074
	(0.375161)	(0.370012)	(0.385805)	(0.390192)	(1.503271)	(1.365794)	(1.377807)	(1.447192)
<i>Other</i> $_{it}$	0.078127	0.073055	0.072613	0.072995	-0.269260	-0.237000	-0.245633	-0.258924
	(0.215413)	(0.215812)	(0.213545)	(0.216639)	(0.589270)	(0.559801)	(0.557695)	(0.571455)
<i>Distance to frontier</i> $_{jt}$	0.039397***	0.039544***	0.040635***	0.039968***	-0.090770	-0.088389	-0.088155	-0.090726
	(0.012605)	(0.012645)	(0.012311)	(0.012777)	(0.075593)	(0.068058)	(0.066837)	(0.071348)
<i>Credit to GDP</i> $_{jt}$	0.002069	0.002409	0.003045	0.002603	0.025296	0.023942	0.023964	0.024783
	(0.004330)	(0.004215)	(0.004154)	(0.004200)	(0.019340)	(0.016117)	(0.016313)	(0.018449)
	<b>Z<sub>it</sub></b>							
Size dummies	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Age dummies	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Industry dummies	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
	<b>M<sub>jt</sub></b>							
Country dummies	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Wave dummies	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	8,260	8,260	8,260	8,260	4,006	4,006	4,006	4,006
Number of firms	5,297	5,297	5,297	5,297	2,726	2,726	2,726	2,726

Source: ECB SAFE (waves 11-15).

## APPENDIX A

**Table A1: Variable descriptions and sources**

This table shows descriptions and sources of the variables included in our models.

Variables	Description	Source
<b>Dependent variables</b>		
Export Starter	Dummy variable equal to 1 if the firm declares to be exporting at time $t$ and non-exporting at time $t-1$ , and equal to zero when the firm declares to have never exported.	ECB: SAFE
Export Exiter	Dummy variable equal to 1 if the firm declares to be non-exporting at time $t$ and exporting at time $t-1$ , and equal to zero when the firm declares to have always exported.	ECB: SAFE
<b>Key regressors</b>		
Innovation	Dummy variable equal to 1 if the firm declares to have undertaken product, process and/or organizational innovation, and zero otherwise.	ECB: SAFE
Product Innovation	Dummy variable equal to 1 if firms declare to have undertaken product innovation, and 0 otherwise.	ECB: SAFE
Process Innovation	Dummy variable equal to 1 if firms declare to have undertaken process innovation, and 0 otherwise.	ECB: SAFE
Organizational Innovation	Dummy variable equal to 1 if firms declare to have undertaken organizational innovation, and 0 otherwise.	ECB: SAFE
	<i>Finance</i>	
Financing Innovation	Dummy variable equal to 1 if the firm use their obtained financing to develop or launch new products and services, and 0 otherwise.	ECB: SAFE
Problem of Finance	Dummy variable equal to 1 if the access to finance represents a relevant problem for the firm, and 0 otherwise.	ECB: SAFE
Relevant Bank Loans	Dummy variable equal to 1 if bank loans are relevant for the firm, and 0 otherwise.	ECB: SAFE
Relevant Credit Lines	Dummy variable equal to 1 if credit lines are relevant for the firm, and 0 otherwise.	ECB: SAFE
Relevant Grants or Subsidies	Dummy variable equal to 1 if grants or subsidies are relevant for the firm, and 0 otherwise.	ECB: SAFE
Relevant Trade Credit	Dummy variable equal to 1 if trade credit financing is relevant for the firm, and 0 otherwise.	ECB: SAFE
Relevant Family or Friends Loans	Dummy variable equal to 1 if loans from family or friends are relevant for the firm, and 0 otherwise.	ECB: SAFE
Relevant Other Loans	Dummy variable equal to 1 if a residual category of loans not included above is relevant for the firm, and 0 otherwise.	ECB: SAFE
<b>Firm-level controls</b>		
	<i>Ownership</i>	
Family	Dummy variable equal to 1 if the owner is a family or an entrepreneur, and 0 otherwise.	ECB: SAFE
Business Association	Dummy variable equal to 1 if the owner is another enterprise or business associates, and 0 otherwise.	ECB: SAFE
Public Company	Dummy variable equal to 1 if the owner is a public company, and 0 otherwise.	ECB: SAFE
VCBA	Dummy variable equal to 1 if the owner belongs to the categories of venture capitalists or business angels, and 0 otherwise.	ECB: SAFE
Other	Dummy variable equal to 1 if the owner belongs to a residual category not mentioned above, and 0 otherwise.	ECB: SAFE
	<i>Performance</i>	
Problem of Competition	Dummy equal to 1 if the firm reports that the “problem of competition” - either due to external market conditions or an internal loss in firm efficiency - has become more relevant, and 0 otherwise.	ECB: SAFE
Growth up	Dummy equal to 1 if the firm declares that the number of its employees has increased, and 0 otherwise.	ECB: SAFE
Relevant Cost of Production	Dummy equal to 1 if the company states that the cost of production turned into a major obstacle, and 0 otherwise.	ECB: SAFE

Profit up		Dummy variable equal to 1 if a firm experienced an increase of the net income after taxes in the past six months, and 0 otherwise.	ECB: SAFE
	<i>Size</i>		
Micro		Dummy variable equal to 1 if the firm has between 1 and 9 employees, and 0 otherwise.	ECB: SAFE
Small		Dummy variable equal to 1 if the firm has between 10 and 49 employees, and 0 otherwise.	ECB: SAFE
	<i>Age</i>		
Very recent		Dummy variable equal to 1 if the firm is less than 2 years old, and 0 otherwise.	ECB: SAFE
Recent		Dummy variable equal to 1 if the firm is between 2 and 5 years old, and 0 otherwise.	ECB: SAFE
Old		Dummy variable equal to 1 if the firm is between 5 and 10 years old, and 0 otherwise.	ECB: SAFE
	<i>Sector</i>		
Industry		Dummy variable equal to 1 if the firm's main activity in industry (which includes manufacturing, mining and electricity, gas and water supply), and 0 otherwise.	ECB: SAFE
Construction		Dummy variable equal to 1 if the firm's main activity is construction, and 0 otherwise.	ECB: SAFE
Trade		Dummy variable equal to 1 if the firm's main activity is wholesale or retail trade, and 0 otherwise.	ECB: SAFE
<b>Country-level controls</b>			
Distance to Frontier		Score of the general context for business activity as a proxy for the effect of the institutional and regulatory context at the country-level.	Doing Business
Credit to GDP		Ratio between domestic credit to private sector by banks and GDP (%).	World Bank

---