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# Learning by exporting for marketing innovation

Elena Golovko[a], Cindy Lopes-Bento[b,c] and Wolfgang Sofka[d,e]

[a]Department of Management, Tilburg University, Tilburg, The Netherlands; [b]Department of Managerial Economics, Strategy and Innovation (MSI), KULeuven, Leuven, Belgium; [c]Fonds National de la Recherche, Luxembourg; [d]Department of Strategy and Innovation, Copenhagen Business School (CBS), Frederiksberg, Denmark; [e]Strategy, International Business and Entrepreneurship Group, University of Liverpool Management School, Liverpool, England

**ABSTRACT**

Exporting provides important learning opportunities for firms. Learning by exporting literature has primarily focused on general performance outcomes of learning such as productivity or technological innovation outcomes such as patents or product innovation. We use learning mechanisms from this literature and develop arguments for marketing innovation outcomes of learning by exporting. We further theorise how learning outcomes vary across firms depending on firms' levels of marketing and technological capabilities. We test these hypotheses using a panel of Spanish manufacturing firms for 2007–2013 and find that exporting is associated with more marketing innovations. This learning effect is stronger for firms with leading marketing capabilities, and this effect is independent from the technological leadership status of the firm.

**KEYWORDS**

Learning-by-exporting; marketing innovation; treatment effects analysis; technological capabilities; marketing capabilities

**JEL**

O31; O33; F14

## 1. Introduction

> As U.S. exporters remain optimistic on revenue growth through international business, companies also often experience positive impacts on their domestic operation as a result of exporting. A strong majority of SME exporters agree that sellin g to countries outside of the U.S. has led their company to implement changes to the products or services that they offer (83%) and make adjustments (when necessary) to the way they market to domestic customers (84%). *2018 American Express Grow Global Survey*[1]

Potential gains from trade have been studied for decades, primarily at the country or industry level. Increasingly, researchers have examined the effect of exports also at the firm level. Among those effects, learning by exporting, i.e. the positive effect of exporting on firm performance, has attracted substantial interest from both economics and management scholars (Love and Roper 2015; Salomon and Shaver 2005a; Silva, Afonso, and Africano 2012). Exporting firms can access foreign knowledge pools which are not available in their domestic markets and exploit this information to produce more and

**CONTACT** Cindy Lopes-Bento cindy.lopesbento@kuleuven.be Department of Managerial Economics, Strategy and Innovation (MSI), KULeuven, 69, Naamsestraat. 3000, Leuven, Belgium

[1]Accessed 14 December 2018. https://about.americanexpress.com/press-release/business-cards-solutions/us-small-and-middle-market-exporters-expect-international.

higher-quality innovations (Clerides, Lach, and Tybout 1998; Salomon and Shaver 2005a). Knowledge available for exporters comes from a variety of sources. Foreign buyers can informally pass on the information of what constitutes high quality products and how to manufacture them (Atkin, Khandelwal, and Osman 2017; Evenson and Westphal 1995; Love and Ganotakis 2013), or they provide feedback on their needs and expectations (Salomon and Shaver 2005a). Export market environments serve as a source of new information as well, where firms learn about technical standards of the local markets, product requirements, and local competition (D'Angelo, Ganotakis, and Love 2020; Golovko and Valentini 2014; Petersen, Pedersen, and Lyles 2008; Salomon and Shaver 2005a).

While learning realised from export market interaction is largely acknowledged to consist of both technological and market content (e.g. Yeoh 2004; Love and Ganotakis 2013), most of our understanding of such learning by exporting outcomes rests on general innovation (e.g. product innovations) or firm outcomes (especially, productivity) (D'Angelo, Ganotakis, and Love 2020; Golovko and Valentini 2014; Love and Ganotakis 2013; Salomon 2006; Salomon and Jin 2008, 2010; Salomon and Shaver 2005a). Little attention has been paid to other potential gains from exporting, such as marketing innovation. The experience of exporting firms, such as the ones surveyed by the American Express Grow Global Survey, however, shows that these firms tend to significantly improve their *marketing* based on insights gained on export markets.

Our focus in this study is on marketing innovation as an outcome of learning by exporting, i.e. changes to a firm's pricing, design, distribution or packaging (Grimpe et al. 2017) directly related to exports. Recent research has started to extend the narrow focus on technological innovation by considering non-technological or organisational innovation as an important organisational outcome (Hervas-Oliver, Ripoll-Sempere, and Moll 2016; Kang et al. 2021; Villar, Pla-Barber, and Ghauri 2020). Such organisational innovations, or business process innovations (OECD & Eurostat 2018), refer to the implementation of new marketing methods, changes in marketing techniques, new business practices or changes in workplace organisation or external relations (Villar, Pla-Barber, and Ghauri 2020). The non-technological types of innovations can be complementary to technological innovations for firm performance (Hervas-Oliver, Ripoll-Sempere, and Moll 2016), but they may also be the realised outcome of learning from foreign environments by themselves (Kang et al. 2021; Villar, Pla-Barber, and Ghauri 2020).

Within this broader stream of research, we examine how export markets can constitute a source of new information that leads not only to improvements in the technological domain, realised in higher productivity and more product innovations (as prior research argued), but also induces new ideas into the firm's existing marketing mix and enables novel choices resulting in marketing innovations. We develop our reasoning by bringing together the literature on learning by exporting and recent research on marketing innovations, in which innovation outcomes emerge exclusively in the marketing function through novel pricing, packaging, distribution or design choices of firms and *independently* from product innovation or R&D (Grimpe et al. 2017). Furthermore, we outline important firm conditions for such learning effects to occur by incorporating the differences across firms in their marketing and technological capabilities. Internal marketing capabilities are

crucial for the success of exporting firms (Kaleka and Morgan 2019; Morgan 2012; Morgan, Kaleka, and Katsikeas 2004; Murray, Gao, and Kotabe 2011). We theorise that firms possessing strong marketing capabilities are comparatively more likely to turn new information from foreign markets into marketing innovations. We further argue that being a technological leader, i.e. a firm with strong technological capabilities, can weaken this positive effect, as focusing simultaneously on technological and marketing capabilities can be a source of dis-synergies.

We test our hypotheses on a panel of Spanish manufacturing firms between 2007 and 2013 using a matching estimator. Specifically, we compare firms that export during 2007–2013 to similar counterparts that never exported in this period, but had a similar propensity to do so. Based on the comparison of these matched pairs, we estimate the increase in the probability of introducing marketing innovations associated with exports. Our findings confirm that the propensity to innovate in marketing is significantly higher for exporting firms. Moreover, this effect is stronger for firms with leading marketing capabilities. Contrary to our theoretical predictions, technological leadership does not affect the strength of this relationship.

Our findings have important implications for innovation and international business research along two dimensions. First, we add to the rich literature on learning by exporting by demonstrating how exports create a distinct opportunity for firms to innovate in marketing as a result of learning by exporting. In this way, our study complements the existing learning by exporting research by delineating how knowledge from export destinations – which can be market- or technology-based – translates into a distinct form of innovation in the marketing function separately from other innovation outcomes. What is more, we identify firm-level conditions for such effects to materialise based on the marketing capabilities of a firm. Our model of the export-performance relationship allows for more precise understanding of the kind of benefits firms can expect from exporting and where these benefits originate from. Future studies can build on this theoretical platform and theorise about alternative learning opportunities from exporting, e.g. through upgrading or internationalising recruitment strategies.

Second, we add to innovation literature by providing new insights into the mechanism underlying marketing innovation. While existing innovation research has found that the performance potentials from innovative marketing rival those of technological innovation (Griffith and Rubera 2014; Grimpe et al. 2017; Rubera 2015; Rubera and Droge 2013), we know comparatively little about the antecedents of these innovations. We identify export activity as a way to provide knowledge sourcing opportunities for learning and subsequently innovating in marketing. Future studies may build on our approach and explore other channels by which innovative marketing practices emerge, e.g. through the international mobility of marketing managers.

The remainder of the paper is organised as follows. In the next section, we outline theoretical arguments on learning by exporting for marketing innovations. The third section describes the empirical approach, the data and the estimations. The fourth section presents the results of the empirical analysis and in the final section we provide conclusions and discuss contributions and directions for future research.

## 2. Theoretical background

### 2.1. Learning by exporting outcomes and mechanisms

The goal of our theoretical reasoning is to predict the likelihood with which firms introduce marketing innovations as a result of their exporting activities. We start by discussing important constructs and mechanisms from learning by exporting literature and subsequently apply them to marketing innovation.

International economics has emphasised the role of trade as an important source of performance improvements, both at the country and firm level. Among other benefits, research highlights potential learning associated with exports that leads to improved performance, the phenomenon labelled as learning by exporting in the literature. The underlying rationale is that foreign markets enable firms to enhance their knowledge stock through learning from interactions with the local knowledge base and exposure to diverse technological, cultural and social backgrounds (Hitt, Hoskisson, and Kim 1997; Zahra, Ireland, and Hitt 2000) leading to more innovations and better overall performance.

Early literature on learning by exporting has related learning benefits primarily to general performance improvements such as firm productivity (see Silva, Afonso, and Africano (2012) for a review). Recent research has moved from explaining improvements in productivity to specific innovation outcomes such as R&D investments (Aw, Roberts, and Winston 2007), the number of patents and patent applications (Criscuolo, Haskel, and Slaughter 2010; Salomon and Jin 2008, 2010) and product (or process) innovations (D'Angelo, Ganotakis, and Love 2020; Freixanet, Monreal, and Sánchez-Marín 2021; Golovko and Valentini 2014; Love and Ganotakis 2013; Salomon and Shaver 2005a).

Exporting provides opportunities for learning by facilitating access to knowledge that is not available to non-exporters (Love and Ganotakis 2013). New exporters become exposed to a variety of knowledge sources. The new information comes from the foreign trading partners, buyers or suppliers, who voluntarily share knowledge on production technologies or product specifications (Atkin, Khandelwal, and Osman 2017; Evenson and Westphal 1995). Firms also get exposed to competing products and direct customer feedback that foster learning (Salomon and Shaver 2005a). Observed differences in regulatory, competitive and technological requirements between the home and foreign markets become another important source of information for exporting firms to learn and adapt their products and processes (Petersen, Pedersen, and Lyles 2008). New knowledge about competing products and supplier/customer feedback combined with the firm's existing knowledge stock lead to increased innovation output, in particular product innovations (Criscuolo, Haskel, and Slaughter 2010; D'Angelo, Ganotakis, and Love 2020; Golovko and Valentini 2014; Love and Ganotakis 2013; Salomon 2006).

### 2.2. Marketing innovation outcomes of learning by exporting

While learning from export market interaction includes both technological and market content (Love and Ganotakis 2013; Yeoh 2004; Zahra, Ireland, and Hitt 2000), little attention has been paid to innovation outcomes that may occur specifically and independently in the marketing function of exporters. Yet, along with technological knowledge, firms get exposed to a variety of market knowledge sources, providing numerous

inputs for learning and improvements in firms' marketing itself. Below we lay out our arguments for how exporting can result in marketing innovation.

Our theoretical reasoning is grounded in two streams of theory explaining (a) how firms benefit from access to pools of external knowledge (Rosenkopf and Nerkar 2001) - in our case export markets – and (b) how firms explore firm-specific differences in the degree to which they benefit from these pools of external knowledge based on their marketing capabilities (Morgan 2012). Consequently, we rely on the former mechanism for establishing the baseline effect in Hypothesis 1 before exploring moderation effects from a firm's marketing capabilities in Hypotheses 2 and 3.

We start out by exploring the learning opportunities emerging in a firm's marketing function through exposure to export markets. Within our reasoning, exporting provides firms with access to pools of knowledge that are not available to strictly domestic competitors. Models of knowledge recombination identify these opportunities for creating novel combinations of existing firm knowledge with new pools of external knowledge as important sources for innovation (Rosenkopf and Nerkar 2001). If firms are limited to their existing knowledge stocks, they can easily experience the boundaries for knowledge combinations which limits the degree of novelty that they can create with their innovations. Accordingly, firms increase their innovation potential when they overcome this 'local search' phenomenon and draw from new, increasingly distant pools of knowledge (Rosenkopf and Almeida 2003). We reason that these opportunities for innovation exist in a firm's marketing function and are triggered by exporting.

Extant research highlights opportunities of firms for innovating and learning within their marketing functions, indicating that such improvements can happen *separately* from technological improvements (Griffith and Rubera 2014; Grimpe et al. 2017; Hervas-Oliver, Ripoll-Sempere, and Moll 2016; Villar, Pla-Barber, and Ghauri 2020). Performance improvements originate in the context of marketing innovation from changes to the often quoted '4 Ps' of firms' marketing mix, i.e. the way in which products are designed, priced, distributed and/or promoted (Waterschoot and Van Den Bulte 1992). Notable examples of marketing innovations include innovative pricing strategies (e.g. pre-paid, flat-rate pricing), distribution options (e.g. video streaming) or packaging (e.g. 100 calorie packs). Performance effects from marketing innovations have been found to equal those of technological innovations (Grimpe et al. 2017).

Learning and innovating in a marketing function has its specifics. First, the product market is central for marketing innovation. The identification of customer and competitor trends is a major source for new information (Slater and Narver 1998). Firms innovate in their marketing function when they can anticipate new customer trends, e.g. an increasing awareness for sustainable packaging, or follow successful competitors, e.g. by offering flat rate pricing. Verganti (2006) illustrates this distinct process for design innovation in which firms absorb existing offers on the market, interpret their desirability and address an audience, which would subsequently share their excitement about a design innovation. As a result, design innovations can emerge which are distinct for customers based on their form and aesthetics, not functionality or technology (Rubera and Droge 2013). Hence, marketing innovations are often times supported by new technologies and especially the internet but the technological components, e.g. social media analysis software, are rarely distinct for the marketing innovation (Grimpe et al. 2017). Moreover, while many technological innovations can be patented (Arundel and

Kabla 1998), hardly any marketing innovations lend themselves to patent protection, but merely trademarks which can protect a logo or slogan (Sandner and Block 2011). Therefore, imitating successful marketing innovations is easier compared to patented technologies, which facilitates the diffusion of novel pricing, design, packaging or distribution practices. We connect these two characteristics of marketing innovations to learning by exporting.

Marketing innovations associated with exports emerge because firms encounter new customers and competitors abroad which have products, processes, and procedures that are tailored to export markets and often times substantially different from the approaches of foreign firms (Zaheer 1995). In other words, export markets constitute a distant pool of marketing knowledge that exporting firms may combine with their existing marketing knowledge for innovative solutions. This type of distance between domestic and export markets is often times described as a challenge for exporting firms. Foreign customers need to be familiarised with products and brands (Bilkey and Nes 1982; Schmidt and Sofka 2009), the export market business environment follows unfamiliar processes (Petersen, Pedersen, and Lyles 2008) and competitors offer products and services which are comparatively better aligned with export market demands (Anderson 1960). While these differences between home and export markets challenge exporters, they can also provide attractive learning opportunities based on combinations between firms' existing marketing knowledge and the new experiences they encounter.

By starting exporting, firms may be exposed to market feedback directly, as information about successful marketing mixes, e.g. promotion, pricing, distribution or design choices of competitors, is typically easily observable on export markets. To illustrate, exporting firms might experience unfamiliar products (Calantone et al. 2004) and promotion strategies, i.e. positioning, packaging/labelling, or advertising approaches (Cavusgil, Zou, and Naidu 1993) on export markets which provide opportunities to rethink their existing marketing approaches and consider alternatives. As a result, the marketing function of exporting firms is likely exposed to foreign market information, which can be substantially different from existing practices and therefore provides opportunities for learning and marketing innovation.

In such a way, as in the case of productivity or product innovation, exports offer the opportunities for firms to learn from foreign customers and competitors. As in a more general case of resource-augmenting internationalisation strategy achieved through FDI, firms get exposed to different institutional and cultural environments, which allow for development and exploitation of specific market knowledge, resulting in adaptation of management and commercialisation systems in the first place (Villar, Pla-Barber, and Ghauri 2020). The learnt insights can be even transferred to other markets. In this regard, certain geographical markets can serve as lead markets with anticipatory demand conditions for other international markets (for a review see Beise and Cleff (2004)). Consequently, exporting increases the opportunities in marketing departments to question existing marketing practices and envision innovative ones resulting in marketing innovation.

In sum, we argue that learning by exporting is likely to lead to marketing innovations independently and separately from technological innovation in firms. While all learning by exporting mechanisms rely on the increased access to foreign knowledge that is not available to non-exporters (Love and Ganotakis 2013), this knowledge exposure is

particularly strong in the marketing function because export markets provide opportunities to observe unfamiliar marketing practices, which can be combined in innovative ways with a firm's existing marketing knowledge. We acknowledge that this reasoning rests on the assumption that firms interact meaningfully with export markets, i.e. not merely through export intermediaries, and we should not find significant empirical results if the assumption is violated for the average firm. We formulate the following hypothesis:

**Hypothesis 1:** Exporting is associated with an increase in the likelihood of marketing innovation.

### 2.3. Marketing and technological capabilities

Hypothesis 1 details the effect of learning by exporting on marketing innovation in the average firm. However, some firms might be particularly well positioned to turn learning by exporting into marketing innovations. We reason that firms with advanced marketing capabilities are more likely to transform newly acquired market knowledge into marketing innovations, while lagging capabilities will limit the learning opportunities.

International marketing literature identifies a firm's market orientation as crucial for success of export ventures. The critical function of firms' market orientation lies in capturing information about export customers' needs, competition, and foreign environment changes including regulatory policies and changes in technology (Calantone et al. 2004; Murray, Gao, and Kotabe 2011). Yet, it is not the knowledge about foreign environment per se generated by market orientation that leads to performance improvements, but rather the capability to build on that knowledge by assimilating, coordinating and integrating it in the firms' organisational processes, i.e. marketing capabilities (Morgan 2012; Murray, Gao, and Kotabe 2011). Marketing capabilities are defined as complex coordinated patterns of skills, activities and knowledge, which firms utilise to transform resources into market-related value outputs (Kaleka and Morgan 2019). Firms can develop a wide range of marketing capabilities around the classical 'marketing mix' which consists of product, pricing, communications and distribution of firm's products or services. The common characteristic of various marketing capabilities is in their ability to acquire, combine and transform relevant knowledge into value offerings for target markets (Morgan 2012), be it knowledge about customer needs, pricing strategies, distribution channels, marketing communication or market research.

While exporting increases the availability of new information, it does not guarantee the learning outcomes. The presence of marketing capabilities is essential for learning by exporting to result in enhanced innovation performance. Exporters with more advanced marketing capabilities are better able to gather relevant market knowledge, assimilate and further use it for product innovation or improvement/adaptation of existing products (Kaleka and Morgan 2019). While new market knowledge is ultimately aimed at updating the product development processes with the intent to create more relevant and better products, they are also a source of relevant marketing knowledge. By facilitating a better understanding of what overseas customers want and what foreign competitors can offer

in that respect, marketing capabilities allow for more innovative or differentiated marketing activities (Kaleka and Morgan 2019; Murray, Gao, and Kotabe 2011).

Accordingly, exporting firms that possess highly developed marketing capabilities are well positioned to learn, integrate and utilise knowledge of foreign customers and competitors for innovative choices in marketing activities. By contrast, firms with lagging marketing capabilities are constrained in their ability to effectively absorb and use the available information. Hence, they are comparatively less likely to fully benefit from learning by exporting opportunities for creating marketing innovations. We therefore expect the effect of export activity on marketing innovations to be higher for firms with leading marketing capabilities.

**Hypothesis 2:** The positive effect of exporting on marketing innovation is stronger for firms with leading marketing capabilities.

Further, we argue that the effect of exporting on marketing innovation is not just affected by how advanced a firm's marketing capabilities are but also by whether the firm has technological capabilities for innovation. We reason that the learning by exporting effect on marketing innovation reaches its maximum when the focal firm is specialised in its marketing capabilities and the marketing function does not have to compete for resources or management attention with R&D departments providing technological capabilities. The relationship between marketing and technological capabilities falls into a broader, non-export-specific stream of research which has found mixed results for complementary or dis-synergistic relationships. We synthesise both streams briefly.

On the one hand, innovation literature highlights the potential benefits of combining the technological and non-technological innovations (including marketing innovations) for innovation performance. The complementarity between different forms of innovation is rooted in the ability of firms with valuable and rare complementary assets to appropriate the returns from technological innovation (Teece 1986). Based on Community Innovation survey data, several studies find general support for the complementarity (Azar and Ciabuschi 2017; Ballot et al. 2015; Battisti and Stoneman 2010; Hervas-Oliver, Ripoll-Sempere, and Moll 2016). The presence of the complementary relationship suggests that firms tend to be more likely to adopt both innovation types as the combination is associated with additional performance increases. Several studies, however, highlight the importance of the context for such synergy to exist. As Ballot et al. (2015) indicate, the costs of the simultaneous adoption of different forms of innovations also have to be considered.

On the other hand, recent innovation literature provides evidence consistent with the dis-synergistic relationship between marketing and technological innovation in firms (Ballot et al. 2015; Grimpe et al. 2017; Lee, Lee, and Garrett 2019). The underlying rationale for the dys-synergistic effect can be related to frictions in the resource allocation and managerial attention between marketing and R&D capacities that underlie each innovation type. There exist fundamental differences in technological and marketing capabilities to screen, absorb and assimilate particular type of information that firms develop. Firms build trust and a shared language with particular knowledge sources (Laursen and Salter 2006). The specific contextual relationship, e.g. with customers or

suppliers, allows them to transfer knowledge comprehensively (Jensen and Szulanski 2004). Moreover, firms need screening capacities for evaluating which parts of externally available knowledge are valuable and assign priorities to them (Koput 1997). Such screening capabilities are costly to utilise, since they require experts in particular fields. Finally, most external knowledge requires transformation before it can be assimilated with the firms' existing knowledge stock, e.g. in the way it follows existing standards, processes or interfaces (Todorova and Durisin 2007). All of these mechanisms result in a specialisation of firm's relevant capabilities. In other words, the capability for screening and transferring technological knowledge about novel materials or processes will rarely be useful for screening and assessing market knowledge about e.g. changing customer tastes.

Based on this general stream of research examining the relationship between marketing and technological capabilities for innovation in firms, we propose that dys-synergistic mechanisms outweigh the complementary ones in the specific context of learning-by-exporting for marketing innovation. Interpreting knowledge obtained from export markets is challenging for exporting firms because customer tastes and competitor behaviour are typically unfamiliar. Hence, firms benefit from marketing capabilities rooted in the skills and knowledge of specialised marketing professionals (Kaleka and Morgan 2019). A firm can specialise in these marketing capabilities when it does not simultaneously invest in technological capabilities. Consistent with the dys-synergistic relationship between marketing and technological innovation, international marketing literature argues that high technological orientation of firms has a negative impact on using marketing adaptation strategy in international markets. This is due to the need to allocate firm's financial and human resources to be committed to specific strategic actions, such as staying close to customers and markets or committing substantial R&D investments to product development (Renko, Carsrud, and Brännback 2009; Theodosiou and Leonidou 2003). Accordingly, technology intensive firms are often found reluctant to adapt their marketing strategies in international markets (Cavusgil, Zou, and Naidu 1993; O'Donnell and Jeong 2000). Based on these arguments we expect lower effects of exporting on marketing innovation when firms combine marketing and technological capabilities. However, we acknowledge that some firms might operate in resource-rich contexts or have invested in technologically new products prior to exporting (Cassiman, Golovko, and Martínez-Ros 2010; Ganotakis and Love 2011; Golovko and Valentini 2014) and those may not experience dys-synergetic relationships between marketing and technological capabilities.

Overall, we put forward a testable prediction for the average firm and suggest that while firms with leading marketing capabilities are more likely to turn learning by exporting opportunities into marketing innovation, such effects can be lower for firms with an increasingly important technological orientation. The tension between two innovation types is likely to put limits on the resources available for turning export market learning into marketing innovation. Conversely, firms which are specialised in leading marketing capabilities are likely to experience the maximum effects of learning by exporting on marketing innovation since they can prioritise this innovation outcome. We thus propose:

**Hypothesis 3:** The presence of leading technological capabilities weakens the positive effect of leading marketing capabilities on the export – marketing innovation link.

## 3. Empirical approach

### 3.1. Data

We use data from a survey of Spanish manufacturing firms 'Encuesta sobre Estrategias Empresariales (ESEE)' or 'Survey on Business Strategies' for the years 2007–2013. The survey is conducted by the Fundación Empresa Pública with financial support of the Spanish Ministry of Science and Technology. It is administered to the population of Spanish manufacturing firms with 200 or more employees and to a stratified sample of small and medium sized firms, representative of the population of manufacturing firms with more than 10 but less than 200 employees. The sample aims to maintain the representativeness of the manufacturing sector over time. Additional firms are included in the sample from the population of newly founded firms every year. Firms that exited the original sample during the sampling period are replaced by firms with similar characteristics drawn from the population. The initial sample is an unbalanced panel that covers the whole manufacturing sector of the Spanish economy and includes 20 industries defined at the 2-digit level. The industry breakdown with the number of firms in each sector is provided in Appendix T1. The ESEE dataset has been used by prior research on learning by exporting (e.g. Golovko and Valentini 2014; Salomon and Jin 2010; Salomon and Shaver 2005a), which allows for comparison of the results. After data cleaning, our final sample includes 11,799 firm-year observations (corresponding to 2,711 different firms), out of which approximately 70% (or 1,897 firms) are exporters and 30% (or 814 firms) never engaged into export activities.

### 3.2. Methodological approach

To test our hypotheses empirically, we need to establish whether exporting has an impact on introducing marketing innovations and whether this effect varies depending on differences in firms' marketing and technological capabilities. The empirical assessment of the effect of exporting on performance, marketing innovation in our case, can be subject to endogenous selection biases, as firm-specific characteristics might simultaneously drive the decision to start exporting and performance outcomes (Verbeke and Forootan 2012). Chang and Chung (2017) suggest two methodological approaches to deal with the endogenous nature of the relationship between internationalisation and performance in the context of learning-by-exporting, namely propensity score matching and difference-in-difference estimations. We adopt a non-parametric propensity score matching estimation that addresses the endogeneity concern by matching on observables, to evaluate the effect of exports on marketing innovation (Chang and Chung 2017). Furthermore, we estimate a Heckman selection model, which provides an alternative econometric technique by taking the selection on unobservables into account (Chang and Chung 2017; Czarnitzki and Lopes-Bento 2013). Finally, we use a difference-in-difference approach as a robustness test of our empirical estimations.

As our main empirical approach, we start by estimating the effect of exports on marketing innovation through a combination of a treatment effects analysis in a first step, followed by a regression analysis in a second step. First, we estimate the effect of export status on the likelihood of introducing marketing innovations using a non-parametric matching procedure. Second, we estimate whether this effect is heterogeneous across firms with a regression analysis. Using a matching procedure allows us to address the selection into exporting, without imposing any functional form assumptions on our estimation. It further allows us to estimate the effect of exporting on marketing innovation at the firm level, compared to a mere average as would be the case with regression analysis.

### 3.2.1. The impact of exporting on marketing innovation

We start by estimating the impact of exporting on marketing innovations. In other words, we estimate whether firms that export have a higher likelihood of introducing marketing innovations than they would have if they had chosen to serve only domestic markets. To do so, we use a treatment effects analysis which allows us to assess such a counterfactual situation by estimating the average marketing innovations by exporting firms as follows:

$$E(\alpha_{TT}) = E\left(Y^T|S=1\right) - E\left(Y^C|S=1\right), \tag{1}$$

where $Y^T$ is the outcome variable (marketing innovation), the status $S$ refers to the export status of a firm ($S = 1$represents exporting firms, i.e. the 'treated' group and $S = 0$ the non-exporting firms, i.e. the counterfactual group), and $Y^C$ is the potential outcome measured by marketing innovation realised if the exporting firm ($S$=1) had not been exporting.

While $E(Y^T|S = 1)$ is directly observable, its counterpart ($E(Y^C|S = 1)$ is not observable and therefore needs to be estimated. Because of a potential selection bias driven by the fact that the decision to export is not a random decision but a carefully planned strategic choice by the exporting firm, $E(Y^C|S = 1) \neq E(Y^C|S = 0)$ and the counterfactual situation cannot be based on the average outcome of marketing innovations by non-exporting firms. Indeed, a firm that decides to start exporting may differ in important characteristics from a firm that decides to stay local. Rubin (1977) introduced the conditional independence assumption (CIA) to overcome such selection problems. In practice, the CIA means that as long as participation (exporting in our case) and potential outcome (marketing innovations in our case) are statistically independent for firms with the same set of exogenous characteristics $X$, this potential 'untreated outcome' of treated firms can be constructed from a control group of firms that did not export. Conditional on the CIA, the remaining differences in the outcome variable between both groups can then attributed to the treatment. It follows that the average treatment effect on the treated can be written as:

$$E(\alpha_{TT}) = E\left(Y^T|S=1, X=x\right) - E\left(Y^C|S=0, X=x\right) \tag{2}$$

We account for selection into exporting by using a non-parametric econometric matching estimator. Recent research demonstrates the usefulness of the propensity score matching approach with an application to learning by exporting phenomenon (see Chang and Chung 2017). To ensure that we find the closest possible neighbour for

each of our exporting firms, we combine nearest neighbour propensity score matching with coarsened exact matching (see Iacus, King and Porro 2011, 2012). More precisely, we pair each exporting firm with the single closest non-exporting firm based on the similarity in the estimated probability of engaging into export activities. On top of this estimated probability – coming from a probit estimation on a dummy indicating the export status *S* - we require observations of firms in the selected control group to belong to the same year, sector and region as the exporting firms. We further require non-exporting and exporting firms to be similar in labour productivity, R&D and capital intensity, financial constraints and foreign ownership as those are essential criteria to build comparable pairs. Finally, to avoid 'bad matches' we impose a threshold (a 'caliper') to the maximum distance allowed between the treated and the control unit (see e.g. Hottenrott and Lopes-Bento 2014).[2] If the distance is above this pre-defined threshold, the treated observation is dropped from the sample to avoid bias in the estimation (see also Smith and Todd 2005).

From this matching algorithm it follows that the marketing innovation of the matched non-exporting twin serves as a reliable counterfactual for the focal firm. Remaining differences in marketing innovation can therefore be interpreted as associated with exporting and the subsequent equation can be used to test our *H1*:

$$\alpha^{MktgTT} = \frac{1}{N^T}\sum\nolimits_{i=1}^{N^T}\left(Marketing\ innovation_i^T - Marketing\ innovation_i^C\right) \tag{3}$$

where $Marketinginnovation_i^T$ indicates marketing innovation of exporting firms and $Marketinginnovation_i^C$is the counterfactual situation, i.e. the potential outcome which an exporting firm ($S = 1$) would have realised if it had not exported. If $\alpha^{MktgTT}$ is positive and significant, we can conclude that *H1* is supported, i.e. exporting is associated with an increase in the likelihood of marketing innovation.

### 3.2.2. The moderating impact of marketing and technological capabilities leadership on the export – marketing innovation link

Provided that we find a positive and significant effect of exports on marketing innovation in the first part of our analysis, we test whether this estimated impact varies depending on marketing and technological capabilities of the focal firm, as predicted by *H2* and *H3*. Methodologically, we follow Beck, Lopes-Bento, and Schenker-Wicki (2016). The sample for the regression analysis includes only firms that export. We use the predicted value of the marketing innovation from the matching estimation, the treatment effect, $\alpha_i^{MktgTT}$, as a new outcome variable. By doing so, we disentangle 'ordinary' marketing innovation, that would have taken place irrespective of the export decision, with the export-induced part. This export-induced part of the marketing innovation is regressed on the *Marketing capabilities leader* variable and its interaction with *Technological capabilities leader* variable. In other words, we test whether the effect of exporting on marketing innovation changes for marketing capabilities leaders, while taking into account firm's technological leadership. This way of testing the moderation allows us to use the precise measure of

[2]Caliper matching aims at reducing the bias by avoiding to match treated firms with control firms above a certain 'distance', i.e. those firms for which the value of the matching argument $Z_j$ is far from $Z_i$. It does so by imposing a predefined threshold $\varepsilon$, above which an observation is deleted from the potential control group. More precisely, $||Z_j - Z_i|| < \varepsilon$ for a match to be chosen.

marketing innovation that is induced by export activity and delineate how this export-induced part is associated with different levels of marketing and technological capabilities.

To obtain the individual firm level effects $\alpha_i^{MktgTT}$ we calculate the difference between overall marketing innovation and the counterfactual marketing innovation as follows:

$$\alpha_i^{MktgTT} = Marketing\ innovation_i - Marketing\ innovation_i^C \quad (4)$$

For firms that remained domestic, $Marketinginnovation_i^C$ is equal to their marketing innovation, as export-induced marketing innovation $\alpha_i^{MktgTT}$ equals 0. Since we measure marketing innovation as a dummy equal to 1 if a firm introduced marketing novelties, the individual treatment effect of exporting firms can take values −1, 0 and 1.[3] Compared to the *average* treatment effect that comes from the matching, such calculation allows us to have this likelihood at the firm level.

## 3.3. Variables

### 3.3.1. Dependent variable

For the first part of our analysis – *the treatment model* - the dependent variable is *Marketing innovation*. The ESEE questionnaire asks whether a firm introduced innovations in marketing in a given year. These innovations include the implementation of a new marketing method involving significant changes in product design or packaging, changes in sales channels, product placement, product promotion or pricing strategies. We measure marketing innovation as a dummy variable equal to 1 if a firm has introduced any of these changes. We use the contemporaneous values for dependent and independent variables measured at time *t* in the matching approach, to avoid confounding export effects from experience effects (i.e. timing effects).[4] For the second part of the analysis – *the regression analysis* - the dependent variable is the export-induced part of marketing innovation $\alpha^{MktgTT}$ measured as explained in the methodology section (Equation (4)).

### 3.3.2. Independent and control variables

*3.3.2.1. Treatment model.* To estimate the propensity of firms to start exporting in the treatment model, we use a number of relevant covariates typically employed in the literature to model a firm's likelihood to export. Labour productivity (*Labour productivity)*, measured by the value added per 1000 employees, stands as an important control for the firms' selection into export markets. Future exporters are found to have significantly higher productivity levels, including higher labour productivity before they enter the export market (Bernard and Jensen 2004; Clerides, Lach, and Tybout 1998; Delgado,

[3]The individual treatment effect $\alpha_i^{MktgTT}$ of exporting firms (i.e. treated firms) takes the value '−1' if an exporting firm did not have a marketing innovation while the matched non-exporting firm did. It equals 0 in case both exporting and non-exporting firms had/did not have marketing innovations, and 1 if only exporting firm introduced marketing innovation. As the regressions on the moderating effect of marketing capabilities and technological focus are done only for exporting firms, the sample for the second part of our analysis (regression) is limited to exporting firms only. In this way, in the regression a '0' in the individual treatment effect is not confounded with the matching outcome for a non-exporting firm.

[4]In subsequent robustness checks (dif-i-dif and Heckman selection models), we allow for time lags between DV and IVs and our results remain unaffected.

Fariñas, and Ruano 2002; Hansson and Lundin 2004). Firms with initially higher productivity levels may have comparative advantage and be more likely to overcome the difficulties in starting to trade internationally, such as sunk entry costs, compared to less efficient firms in the home market. Furthermore, we include capital intensity (*Capital intensity)* as a control variable to explain the decision to export based on economies of scale. Prior research suggests that firms with higher capital intensity are more likely to enter the export markets since they are often times technologically superior when compared to labour intensive firms, and thus more likely to have to compete on an international level (Bernard, Jensen, and Lawrence 1995; Bernard et al. 2007; Hansson and Lundin 2004; Kimura and Kiyota 2006). Firm size (*Size*) is calculated as the logarithm of the number of employees, and accounts for the fact that larger firms are more likely to become exporters (Bernard and Jensen 1999). We include the percentage of foreign ownership (*Foreign ownership*) as firms with a high foreign-owned equity capital might be more likely to export to the countries that hold their shares (Basile 2001; Campa 2004; Castellani 2002; Cirera, Marin, and Markwald 2015). Foreign ownership can facilitate additional information about the export markets and provide better access to financial resources needed for export entry. The ratio of debt to value added (*Financial constraints)* controls for the possible financial constraints that firms may experience, which can affect the decision to become exporter (Shaver 2011). We further control for firms' R&D intensity *(R&D)* measured as the ratio of R&D investment to sales, since the literature has shown that R&D intensive firms may be more inclined to export than non-R&D intensive firms (Basile 2001; Kimura and Kiyota 2006). We control for firm's overall innovation experience by using a binary variable, which equals 1 if a firm performs either product, process, or organisational innovation, and 0 otherwise (*Innovation*), following the suggestions provided by the Community Innovation Survey.[5] This variable captures the propensity of a firm to engage in innovation activity, as firms with innovation experience may have a higher likelihood to learn from export activities. At the same time, innovation active firms are on average more likely to engage in exporting (Cassiman and Golovko 2011). A separate dimension of the propensity of a firm to export is the spatial distance and related transportation costs. We therefore include a control variable for the geographical location of firm headquarters within the provinces of Spain (*Region)*, as firms that are in proximity of a harbour or a border might have more options to export than firms that are located in more remote areas. Finally, twenty industry dummies control for unobserved heterogeneity and technological opportunity across sectors and time dummies, one for each year, capture macroeconomic shocks.

***3.3.2.2. Regression model.*** To test whether the effect of exporting on marketing innovation changes for marketing capabilities leaders (i.e. firms with highly developed marketing capabilities) we use a binary variable, *Marketing capabilities leader*, defined as having above industry average marketing investments of firms composing our sample.

[5]As recent advances of the Community Innovation Survey indicate, it might be more appropriate to control for innovation activity rather than a particular innovation type, because it allows approximating a certain firm behaviour. *'Not every innovation activity relates to innovative products [. . .]. Innovation activities can also relate to innovative processes or other issues (such as new methods for production, information processing, marketing, distribution, enlarged assortment of the firm, still ongoing or abandoned innovation projects).'* https://ec.europa.eu/eurostat/web/products-eurostat-news/-/ddn-20210115-2.

Marketing investments are calculated as the ratio of marketing expenditures to total sales using the information on expenditures on advertising, publicity and public relations from the balance sheet of the firm (account 627 'Plan General Contable'), reported in the ESEE questionnaire. For *Hypothesis 3* we interact this variable with the indicator of firm's technological capabilities, which we measure by a dummy variable (*Technological capabilities leader)* defined as having above industry average R&D investment intensity. The ESEE questionnaire asks whether a firm invested in R&D activities in a given year and if so, how much it invested. We use the answer to this question to measure R&D expenditure related to technological activities of firms scaling it by total sales. We calculate the industry averages of marketing and R&D investments across the pooled sample, i.e. across all seven years. The rationale behind using the full sample period rather than yearly averages is that we can identify persistent leaders in marketing and R&D instead of classifying firms as leaders which had merely high investments in a single year.

### 3.4. Descriptive statistics

Before turning to the empirical results, we present the descriptive statistics of the sample in Table 1. The European Union classifies Spain as a member state with moderate innovation performance in its annual innovation scoreboard (European Commission 2017) and this is also reflected in our sample. On average, a firm in the sample has an R&D intensity of 0.86%, 214 employees (58 at the median) and a share of foreign equity ownership of 15%. It further produces 48,023 EUR in added-value per 1000 employees and faces a debt to value added ratio of 1.8, on average. Furthermore, we observe that about 47% of firms in the sample can be classified as innovation active, i.e. reporting either product or process or organisational innovation, while approximately 20% of firms have introduced marketing innovations. About 20% of the firms in the sample can be classified as technological capabilities leaders, i.e. having above average R&D intensity in

**Table 1.** Descriptive statistics. N = 11,799.

| | Overall sample | | | | By group of interest | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | | | | | Non-exporting firms N=3,616 | | Exporting firms, N=8,183 | | t-test on mean difference |
| Variable | Mean | Std. Dev. | Min | Max | Mean | Std. Dev. | Mean | Std. Dev. | |
| *Marketing innovation* | 0.210 | 0.404 | 0 | 1 | 0.128 | 0.334 | 0.241 | 0.428 | p = 0.000 |
| *Marketing capabilities leader* | 0.290 | 0.004 | 0 | 1 | 0.213 | 0.006 | 0.324 | 0.005 | p = 0.000 |
| *Technological capabilities leader* | 0.200 | 0.003 | 0 | 1 | 0.056 | 0.003 | 0.263 | 0.004 | p = 0.000 |
| *RD* | 0.856 | 2.666 | 0 | 97.460 | 0.237 | 1.670 | 1.130 | 3.990 | p = 0.000 |
| *Innovation (product/ process/organisational)* | 0.466 | 0.498 | 0 | 1 | 0.295 | 0.456 | 0.541 | 0.498 | p = 0.000 |
| *Ln(Size)* | 4.285 | 1.296 | 2.485 | 9.575 | 3.456 | 0.910 | 4.651 | 1.271 | p = 0.000 |
| *Foreign capital* | 14.730 | 34.620 | 0 | 100 | 1.583 | 11.757 | 20.540 | 39.458 | p = 0.000 |
| *Labour productivity* | 48.023 | 26.336 | 0.461 | 149.801 | 37.584 | 21.970 | 52.635 | 26.787 | p = 0.000 |
| *Financial constraints* | 1.804 | 4.620 | 0 | 148.196 | 1.672 | 5.489 | 1.864 | 4.178 | p = 0.060 |
| *Capital intensity* | 5.570 | 11.103 | 0 | 149.514 | 3.845 | 10.253 | 6.328 | 11.375 | p = 0.000 |
| *Exporters* | 0.693 | 0.461 | 0 | 1 | | | | | |

their respective industry. Marketing capabilities leaders constitute about 29% of the sample. The cross-correlations between these variables can be found in Appendix T2.

When considering the descriptive statistics by group, i.e. differentiating between exporters (roughly 70% of the firms) and non-exporters, we see that exporters differ significantly from non-exporters on all dimensions, including the frequency of introducing marketing innovations. However, based on descriptive comparisons we cannot determine how much of this difference in marketing innovation can be attributed to the fact that they export and how much is due to other firm characteristics.

## 4. Results

### 4.1. Matching results

We begin by estimating a propensity to start exporting, i.e. the export decision. Table 2 displays the results of the estimation on the likelihood of entering the export market. In line with previous research, we find that with the exception of financial constraints and capital intensity, all of our observed characteristics are highly significant, thereby driving the selection into exporting.

The probit estimation allows us to predict the propensity score for each firm in our sample on the likelihood to export which we utilise in the subsequent matching estimation. We use the contemporaneous variables measured at time t in the matching approach. Table 3 shows the results of the matching estimation. As can be seen from the t-test on mean differences between the treated (exporting) firms and the control group (non-exporting) firms, all the pre-matching differences between the covariates disappear and are well balanced. Thus, we can conclude that our matching was successful and that we found a close neighbour for all of our treated firms. The only remaining difference is in the outcome variable *Marketing innovation*, which is positive and significant, providing support for our *Hypothesis 1*. While non-exporting firms have a likelihood of 14.5% of introducing a marketing novelty, this likelihood increases to 40.3% for exporting firms, on average. We have performed additional analyses, introducing 1- and 2-year lags between dependent and independent variables in the matching

**Table 2.** Probit estimation on the likelihood to export. N = 11,799.

| Variables | Coeff. | Std. err. P>\|t\| |
|---|---|---|
| *RD* | 0.049 | (0.007) [0.000] |
| *Innovation (product/process/organisational)* | 0.216 | (0.007) [0.000] |
| *Ln(Size)* | 1.360 | (0.076) [0.000] |
| *Ln(Size$^2$)* | −0.103 | (0.008) [0.000] |
| *Foreign capital* | 0.007 | (0.001) [0.000] |
| *Labour productivity* | 0.006 | (0.001) [0.000] |
| *Financial constraints* | 0.005 | (0.003) [0.115] |
| *Capital intensity* | −0.001 | (0.001) [0.430] |
| *Constant* | −2.241 | (0.221) [0.000] |
| Log-likelihood | | −5064.665 |
| Overall model significance | | LR chi2(49) = 4462.14 [0.000] |
| Joint significance of sector dummies | | $\chi^2$ (19) = 563.06*** [0.000] |
| Joint significance of region dummies | | $\chi^2$ (16) = 363.62 [0.000] |
| Joint significance of time dummies | | $\chi^2$ (6) = 87.63 [0.000] |

Standard errors are reported in parentheses (), p-values are provided in brackets []. The model contains industry, region, and year dummies (not presented).

**Table 3.** Matching results.

| Variables | Selected control group $N = 1243$ Mean | Std. Dev. | Treated group $N = 1243$ Mean | Std. Dev. | Mean difference | t-test on diff. in means |
|---|---|---|---|---|---|---|
| **Control variables** | | | | | | |
| *RD* | 0.276 | 1.274 | 0.388 | 1.816 | 0.112 | $p = 0.118$ |
| *Innovation (product/process/ organisational)* | 0.337 | 0.473 | 0.366 | 0.482 | 0.028 | $p = 0.211$ |
| *Ln (Size)* | 3.561 | 0.954 | 3.623 | 0.980 | 0.061 | $p = 0.187$ |
| *Ln (Size$^2$)* | 13.596 | 8.078 | 14.09 | 8.572 | 0.494 | $p = 0.217$ |
| *Foreign capital* | 0.722 | 8.462 | 0.715 | 8.381 | 0.007 | $p = 0.986$ |
| *Labour productivity* | 39.475 | 23.302 | 40.014 | 22.512 | 0.539 | $p = 0.630$ |
| *Financial constraints* | 1.423 | 3.037 | 1.498 | 2.613 | 0.075 | $p = 0.594$ |
| *Capital intensity* | 4.421 | 11.09 | 3.861 | 9.93 | 0.559 | $p = 0.282$ |
| *Propensity score* | 0.556 | 0.227 | 0.573 | 0.224 | 0.016 | $p = 0.135$ |
| **Outcome variable** | | | | | | |
| *Marketing innovation* | 0.145 | 0.352 | 0.205 | 0.403 | 0.059 | $p = 0.001$ |

T-statistics are based on Lechner's (2001) asymptotic approximation of the standard errors that accounts for sampling with replacement in the selected control group. The number of treated firms in the matching reduces to 1243 because no nearest neighbour could be found for each exporting firm. This is due to a control group that is less than half the size of the treated group. Rather than introducing bias, we have limited the sample to the observations for which we have a perfectly balanced matched twin

estimation. The results suggest that the difference in the outcome variable *Marketing innovation* continues to be positive and significant for marketing outcomes in (t + 1) and (t + 2), confirming the main results.

### 4.2. Regression results

We proceed by using this significant and positive difference in the likelihood of introducing marketing innovations as a dependent variable to analyse whether the effect varies depending on the firms' marketing capabilities, and whether the technology focus changes this effect. The sample includes only exporting firms. Similar approach has been used in Beck, Lopes-Bento, and Schenker-Wicki (2016). Table 4 reports the results of the regressions.

The results show that being a marketing capabilities leader is positively related to introducing a marketing novelty $\alpha^{MktgTT}$. Thus, having strong marketing capabilities positively impacts the likelihood of introducing a marketing innovation in exporting firms, providing support for hypothesis *H2*.

With respect to the interaction of marketing and technological capabilities, we observe that while firms with advanced marketing capabilities are more likely to introduce marketing innovations, the effect diminishes with the increased focus on technology. The coefficient of the interaction term is only statistically significant at the 87% level. Thus, we find no support for hypothesis *H3*, although the direction of the effect is consistent with the hypothesised trade-off. Interestingly, we find that the likelihood of export-related marketing innovations is also higher for firms that are exclusively technologically oriented. The coefficient of *Technological capabilities leader* is positive and significantly different from zero. This explorative finding might suggest that technologically advanced firms are increasingly likely to innovate in their marketing approaches

**Table 4.** OLS regression estimating the effect of marketing capabilities and technology focus on learning by exporting.

| | Dependent variable: $\alpha^{MktgTT}$ |
|---|---|
| *Marketing capabilities leader* | 0.104 (0.035) [0.004] |
| *Technological capabilities leader* | 0.219 (0.106) [0.039] |
| *Marketing capabilities leader*technological capabilities leader* | −0.302 (0.196) [0.124] |
| *Intercept* | 0.013 (0.023) [0.549] |
| Number of observations | 1,243 |
| Overall significance | F(3, 562) = 4.03 [0.007] |

Standard errors are in parentheses, p-values are in brackets. Standard errors are clustered at the firm level, as a few firms appear more than once in the database.

based on export impulses. It provides some early indications that exporting can affect the innovation trajectories of firms from being merely technologically focused towards considering potentials for marketing innovation.

### 4.3. Additional analyses

We proceed by conducting several additional analyses to further enhance our understanding of the suggested relationships. We repeat the main analysis for different types of marketing innovations to provide additional evidence on what kind of learning in marketing is more likely to occur with exports. We make the distinction between four different types of marketing innovations using the respective questions in the ESEE questionnaire: (1) innovation in product design or packaging, *Design*; (2) innovation in sales channels, *Channel*; (3) innovation in product placement and promotion, *Promotion*; (4) innovation in pricing strategy, *Pricing*. In Table 5 we conduct the same matching as in the main analysis dividing marketing innovations into the above mentioned four categories. The results suggest that learning by exporting for marketing realises in new product promotions, new designs, and new channels, while pricing strategies are not significantly affected. A possible explanation for our findings is that foreign pricing strategies may be more difficult to adopt as these may interfere with local laws or licencing, e.g. for providing credit, or require local partners, such as credit card firms. Further, the room for experimenting with innovative pricing strategies is constrained by the pricing strategies of local competitors. These competitive considerations are likely to be mostly locally determined which makes the transfer of innovative pricing strategies only feasible when competitors on foreign and domestic markets overlap. This conditions is unlikely to hold for the average firm.

**Table 5.** Matching results for the additional analyses (outcome variables only).

| | Selected control group N = 1243 | | Treated group N = 1243 | | | |
|---|---|---|---|---|---|---|
| Variables | Mean | Std. Dev. | Mean | Std. Dev. | Mean difference | t-test on diff. in means |
| **Outcome variables** | | | | | | |
| *Promotion* | 0.061 | 0.239 | 0.111 | 0.314 | 0.049 | p = 0.000 |
| *Pricing* | 0.041 | 0.198 | 0.054 | 0.227 | 0.013 | p = 0.178 |
| *Design* | 0.075 | 0.264 | 0.115 | 0.320 | 0.040 | p = 0.004 |
| *Channel* | 0.059 | 0.236 | 0.090 | 0.287 | 0.031 | p = 0.011 |

T-statistics are based on Lechner's (2001) asymptotic approximation of the standard errors that accounts for sampling with replacement in the selected control group.

**Table 6.** OLS regression estimating the effect of marketing capabilities and technology focus on learning by exporting for various types of marketing innovation.

| | Dependent variable: $\alpha^{MktgpromotionTT}$ |
|---|---|
| *Marketing capabilities leader* | 0.114 (0.027) [0.000] |
| *Technological capabilities leader* | 0.325 (0.095) [0.001] |
| *Marketing capabilities leader*technological capabilities leader* | −0.327 (0.145) [0.024] |
| *Intercept* | −0.008 (0.015) [0.593] |
| Number of observations | 1,243 |
| Overall significance | F(3, 562) = 9.19 [0.000] |
| | Dependent variable: $\alpha^{MktgdesignTT}$ |
| *Marketing capabilities leader* | 0.032 (0.025) [0.198] |
| *Technological capabilities leader* | 0.14 (0.094) [0.137] |
| *Marketing capabilities leader*technological capabilities leader* | −0.250 (0.177) [0.158] |
| *Intercept* | 0.026 (0.016) [0.115] |
| Number of observations | 1,243 |
| Overall significance | F(3, 562) = 21.51 [0.211] |
| | Dependent variable: $\alpha^{MktgchannelTT}$ |
| *Marketing capabilities leader* | 0.062 (0.024) [0.012] |
| *Technological capabilities leader* | 0.205 (0.085) [0.016] |
| *Marketing capabilities leader*technological capabilities leader* | −0.124 (0.122) [0.309] |
| *Intercept* | −0.005 (0.016) [0.741] |
| Number of observations | 1,243 |
| Overall significance | F(3, 562) = 4.24 [0.005] |

Standard errors are in parentheses, p-values are in brackets. Standard errors are clustered at the firm level, as a few firms appear more than once in the database.

We then proceed, in the same way as for the overall marketing innovation, by calculating the average treatment effect of exporting firms at the firm level. We do so for the three marketing innovations, for which exporters have a higher likelihood of introducing them. Using these firm-level treatment effects as our dependent variables, we regress them against the marketing capabilities leader and technological capabilities leader positions. The results of the estimation are presented in Table 6. We find that being a marketing leader is positive and significant for all three marketing innovation types. In other words, being a marketing leader is positively related to introducing a variety of marketing innovations. When considering whether there is a trade-off in being simultaneously a marketing leader with high technological capabilities for the effect of export on introducing a marketing innovation, we find a negative interaction term for all types, however, the effect is only statistically significant for innovation in promotion. Overall, our results suggest that learning for marketing innovation is mainly realised for promotion and product placement features, new product design and new sales channels. Moreover, while firms with strong marketing capabilities are more likely to introduce novelties in promotion, design, and new sales channels, we find no general support for the trade-off between marketing and technological focus (Hypothesis 3).

### 4.4. Robustness test

Finally, we test the robustness of our findings against critical features of our econometric specifications. The reliability of our results hinges upon the correct specification of the matching estimation, which forms the core of our analysis. Therefore, we contrast the finding of our non-parametric matching approach to an alternative econometric

technique that takes the selection on unobservables into account. In this way, we check whether it provides the same conclusion as the one obtained from the matching which only controls for observables (see e.g. Czarnitzki and Lopes-Bento (2013)). To do so, we estimate our main regression with a 2-step-Heckman approach based on two equations. In the first step we estimate a selection equation that describes the link between a binary participation decision – exporting – and a vector of covariates *Z*i; the second step estimates an outcome equation on the link between the marketing innovation and a vector of covariates *X*i. We employ a 1-year lag between dependent and independent variables. This approach allows us to take the error term correlation into account that may result from the selection into exporting (see Heckman, 1976, 1979).[6] For identification purposes we include an exclusion restriction, namely the exchange rate.[7] The international trade literature shows that exchange rate fluctuation can significantly affect the export behaviour of firms (Basile 2001; Campa 2004), while it has no impact on the firms' likelihood of introducing marketing innovations. Home currency devaluation is expected to result in more firms entering the export market. Yet, different sectors might export to different export destinations, and thus be differently affected by the exchange rate changes. This variable has been used as an instrument for similar purposes in previous literature (Campa 2004; Golovko and Valentini 2014; Salomon and Shaver 2005b). As can be seen in Table 7, on top of fulfilling the theoretical rationale, our exclusion restriction satisfies the statistical requirement.[8] In the first stage, the exclusion restriction is highly significant, meaning that it accounts for the selection into exporting. In the second stage, export remains positive and highly significant, showing that controlling for unobservables, it is significantly associated with introducing marketing novelties.

To further improve the robustness of our empirical estimations, we test whether our results hold when running a Dif-in-Dif estimation to compare pre- to post-exporting innovative behaviour of the firm, with marketing innovation being the dependent variable and export being the treatment. The results of the Dif-in-Dif regression are

[6]Indeed, if rho ≠ 0, standard regression techniques would yield biased results; downward biased in case of a negative error term correlation and upwards biased in case of a positive error term correlation. The proposed Heckman model accounts for such error term correlation by restoring the zero conditional mean through including an estimate of the selection bias, the inverse mills ratio (see e.g. Hottenrott and Lopes-Bento 2016).

[7]Following Campa (2004), we calculate the exchange rate variable as an index that measures the weighted average of the behaviour of the bilateral exchange rates between the euro and the foreign currency of each potential export destination. The exchange rate index reflects the changes in the euro with respect to relevant foreign currencies during 2007–2013. Higher index values correspond to euro depreciation periods. The ESEE survey data distinguishes between three broad export destinations – EU (European Union) countries, other OECD countries, and the rest of the world. For other OECD countries, we use the behaviour of the euro relative to the US dollar, and for the rest of the world, we use the nominal effective exchange rate of the euro relative to a trade weighted basket of currencies for Spain.

For exporting firms, the information on the export shares to these destinations is provided in the survey. The survey reports the information on the export destinations only once in four years, i.e. we have these data for 2006 and 2010. We calculate the industry average export shares for each of these destinations in 2006 and 2010. Subsequently, we use these percentages as weights for the respective yearly bilateral exchange rates. For years 2007–2009, we use the export shares in 2006, and for 2011–2013 we use the export shares calculated in 2010. Thus the exchange rate index is industry specific, i.e. it accounts for the fact that different industries may export to different markets and thus be differently affected by the relative exchange rate changes. Prior research has shown that home currency depreciation is associated with higher export participation (e.g. Campa (2004)). We therefore expect the positive association between the exchange rate variable and the export decision of firms.

[8]Since the Heckman model is a parametric model with function form assumptions, the magnitude between this model and the matching cannot be compared. This additional model merely serves to test the robustness of the significance and the sign of the main independent variable (see e.g. Hottenrott, Lopes-Bento, and Veugelers (2017), who do the same with an IV estimator).

**Table 7.** Heckman selection model (two-step estimation; 8462 obs.).

| | 1st stage | | | 2nd stage | | |
|---|---|---|---|---|---|---|
| | *Pr(Export = 1)* | | | *Marketing innovation* | | |
| Variable | Coef. | Std.Err. | P>\|z\| | Coef. | Std.Err. | P>\|z\| |
| *Export (t-1)* | | | | 0.113 | 0.045 | 0.014 |
| *RD (t-1)* | 0.056 | 0.009 | 0.000 | 0.001 | 0.001 | 0.419 |
| *Innovation (product/process/organisational) (t-1)* | 0.190 | 0.036 | 0.000 | 0.227 | 0.009 | 0.000 |
| *Ln(Size) (t-1)* | 1.445 | 0.091 | 0.000 | −0.115 | 0.028 | 0.000 |
| *Ln(Size$^2$) (t-1)* | −0.110 | 0.009 | 0.000 | 0.014 | 0.002 | 0.000 |
| *Foreign capital (t-1)* | 0.006 | 0.000 | 0.000 | −0.0006 | 0.000 | 0.000 |
| *Labour productivity (t-1)* | 0.007 | 0.000 | 0.000 | −0.0003 | 0.000 | 0.117 |
| *Financial constraints (t-1)* | 0.007 | 0.004 | 0.089 | −0.001 | 0.001 | 0.303 |
| *Capital intensity (t-1)* | −0.002 | 0.001 | 0.069 | 0.0001 | 0.000 | 0.816 |
| *Constant* | −5.12 | 0.385 | 0.000 | 0.213 | 0.062 | 0.001 |
| *Exclusion restriction: exchange rate* | 0.018 | 0.001 | 0.000 | | | |
| *Industry, year and regions effects* | included | | | | | |
| *Wald Chi$^2$(97)* | 3568.09 [0.000] | | | | | |
| *Mills ratio (lambda)* | −0.038 (0.027) [0.154] | | | | | |
| *$R^2$* | 0.144 | | | | | |
| *Adjusted $R^2$* | 0.139 | | | | | |

consistent with our main findings, indicating that even if we compare the same firm before and after the treatment (export), we find a positive and significant effect of exporting on marketing innovation. For reasons of preserving space, we do not show the regression in the main text but make the results available upon request. Overall, we can conclude that the results found by the matching approach are robust.

## 5. Discussion and conclusions

We conduct this study in search of novel insights into the learning by exporting phenomenon by integrating the marketing innovation perspective. More specifically, we theorise that the learning by exporting mechanisms are likely to result in marketing innovation outcomes separately from technological ones. Our theoretical reasoning integrates mechanisms from learning by exporting to the emerging stream of literature on marketing innovation (Griffith and Rubera 2014; Grimpe et al. 2017; Rubera 2015). We hypothesise that exporting is likely to provide marketing functions with relevant information from export markets that is not available to non-exporters and constitutes a unique learning opportunity. As a result, learning by exporting is likely to occur which increases the odds of marketing innovation. Our findings support this positive effect of exporting on marketing innovation. Further, we find that firms benefit more from learning by exporting when they have leading marketing capabilities. We do not find empirical support for the hypothesised trade-off between marketing and technological capabilities.

These findings have important implications for academic research. Our primary contribution is to the learning by exporting literature. Our theoretical framework explicitly explains learning by exporting for marketing innovation as a distinct learning outcome from export activity. Extant literature has already moved from investigating general firm performance outcomes of learning by exporting towards focusing on specific innovation outcomes such as patenting or product innovation (D'Angelo,

Ganotakis, and Love 2020; Golovko and Valentini 2014; Love and Ganotakis 2013). We shift the theoretical conversation further by highlighting how learning by exporting can affect innovation outcomes which are not technological in nature and instead occur independently in the marketing function. Future studies can build on this conceptualisation and explore alternative, non-technological innovation outcomes from learning by exporting, e.g. innovations in organisational structures or human resource management based on best practices on export markets.

Moreover, we contribute to the marketing innovation literature which has documented the important performance effects from innovative pricing, promotion, design and packaging, separately from technological innovation (Griffith and Rubera 2014; Grimpe et al. 2017; Rubera and Droge 2013). However, this literature focuses mostly on the performance potentials of marketing innovation but gives little guidance on its antecedents. Our study provides a precise theoretical mechanism by which marketing innovation is triggered, i.e. learning by exporting. We reason that the exposure to new customer demands and competitor practices on export markets enables firms to create novel marketing approaches. Future studies exploring the antecedents of marketing innovation can use our theoretical reasoning and extend it to other activities that expose firms to unfamiliar marketing practices such as novel pricing or promotion strategies of startups in an industry.

In terms of relevance for practice, we provide impulses for both management and policy-making. Entering foreign markets is a risky decision for firms, in particular since they face new customers and competitors. Our findings provide managers with a more precise understanding of the kind of beneficial outcomes they can expect from an export activity and where these benefits originate from. Marketing innovation is a new concept for many managers which they may not even consider as innovative since it does not materialise as patent applications or new products. Hence, it may be easily overlooked when firms have to weigh the long-term advantages of starting to export. Following our logic, exporting firms are likely to experience learning effects resulting in novel marketing approaches, e.g. through pricing or design innovations. These outcomes should be part of any export plan, review and controlling. What is more, effects are particularly strong in firms with leading marketing capabilities. Accordingly, firms can maximise the innovation opportunities from exporting by strengthening their marketing function, e.g. by hiring additional personnel for screening and integrating successful marketing practices of competitors on export markets.

From a policy perspective, many governments, such as in the United States, have started high profile policy initiatives to encourage domestic firms to become exporters (e.g. export.gov). Our study provides new insights into the changes that similar export policy initiatives will bring to firms' innovation outcomes. Based on our findings, policy reviews ignoring marketing innovation outcomes are likely to systematically underestimate the learning by exporting effects.

## 6. Limitations and future research

While conducting our study we have learned about potential venues for future research. First, we focus on the changes in marketing associated with exports. Future studies may be able to disentangle what part of the marketing mix or function (especially market

research) is especially likely to benefit from export experience. Second, while we explicitly account for industry heterogeneity, by matching within industries only (i.e. comparing firms in exact same industry), we do not theorise on the heterogeneous industry-level effects for learning. The nature of the sector (high-tech, low-tech manufactures) is an important differentiating factor to determine learning by exporting outcomes. We would expect, for example, that firms in marketing intensive industries will possess more developed marketing capabilities and consequently benefit more from learning by exporting in terms of marketing innovation outcome, as this is directly related to their strategic orientation towards marketing. Future research can look into industry dimension to explore its effect on learning from exporting in marketing.

Third, the focus of our study is specifically on the exporting as a mode of internationalisation. Recent research highlights the role of foreign learning for different dimensions of innovation (including marketing innovation) for broader set of international entry modes conceptualising learning within an exploration-exploitation paradigm (Kang et al. 2021; Villar, Pla-Barber, and Ghauri 2020). Within learning by exporting, future research may focus on the export mode used by a firm, as different modes of exporting (own channel, consortia, export agents) may encourage or restrict the learning opportunities from exporting as they determine the extent of market feedback to which the firm is exposed.

Fourth, our model implies information flows throughout the exporting company, i.e. from export sales to marketing departments. Dedicated studies may be able to disentangle how these information flows are organised and whether different organisational designs are particularly akin to result in marketing innovation. Fifth, we focus on marketing and technological capabilities as factors that may enhance or limit firm's ability to benefit from learning by exporting in marketing. We would urge future research to investigate other systematic patterns of differences in the impact of exports related e.g. to firm size, export channel or export market characteristics. Next, although we did our best to account for possible selection into exports, we acknowledge that we still cannot claim causality in our findings, as we did not exploit any exogenous shock.

Sixth, our results indicate the potential dys-synergetic relationship between marketing and technology capabilities when exporting firms create marketing innovations. We use a matching approach to eliminate potential biases from factors such as firm size which could affect these trade-offs. Dedicated studies might use research designs to isolate the specific nature of these trade-offs and the context in which they occur.

Finally, given our empirical approach and the structure of our data we were not able to explore the temporal issues in the relationship between exports and marketing innovation. Some marketing innovation effects will be persistent while others are temporary. Moreover, the mechanisms underlying the heterogeneity in marketing outcomes through learning by exporting for marketing outcomes are rooted in the notion of firm marketing capabilities. Firms may accumulate these capabilities over time and consequently learn more (Albornoz and Ercolani 2007; Salomon and Jin 2010). Given the temporal structure of our empirical approach, we were not able to measure accumulation over time. Addressing the dynamics and the temporality in the learning by exporting in marketing can constitute a promising avenue for future research.

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No potential conflict of interest was reported by the authors.

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# APPENDICES

## Appendix T1: Industry distribution

| Industry | Number of firms |
|---|---|
| Meat products | 459 |
| Food and tobacco | 1,297 |
| Beverages | 209 |
| Textiles | 710 |
| Leather and footwear | 331 |
| Wood and wood products | 400 |
| Paper | 481 |
| Publishing and printing | 495 |
| Chemical products | 845 |
| Plastic and rubber products | 656 |
| Non-metal mineral products | 810 |
| Metallurgy | 394 |
| Metallic products | 1,509 |
| Machinery and equipment | 726 |
| Office machinery and computing | 220 |
| Electronics and electronic equipment | 488 |
| Autos and motor vehicles industry | 644 |
| Other transport equipment | 252 |
| Furniture | 591 |
| Miscellaneous manufacturing | 282 |
| Total | 11,799 |

## Appendix T2: Cross-correlations (N=11,799)

| | | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | *Marketing innovation* | 1.000 | | | | | | | | | | |
| 2 | *Labour productivity* | 0.064* | 1.000 | | | | | | | | | |
| 3 | *RD* | 0.109* | 0.071* | 1.000 | | | | | | | | |
| 4 | *Ln(size)* | 0.152* | 0.385* | 0.155* | 1.000 | | | | | | | |
| 5 | *Innovation* | 0.510* | 0.173* | 0.200* | 0.284* | 1.000 | | | | | | |
| 6 | *Financial constraints* | −0.000 | −0.123* | 0.053* | 0.060* | −0.001 | 1.000 | | | | | |
| 7 | *Foreign capital* | 0.014 | 0.271 × 0 | 0.029* | 0.433* | 0.119* | 0.017 | 1.000 | | | | |
| 8 | *Capital intensity* | 0.066* | 0.284* | 0.044* | 0.210* | 0.154* | 0.062* | 0.103* | 1.000 | | | |
| 9 | *Technological capabilities leader* | 0.175* | 0.139* | 0.542* | 0.252* | 0.296* | −0.002 | 0.047* | 0.069* | 1.000 | | |
| 10 | *Marketing capabilities leader* | 0.153* | 0.036* | 0.089* | 0.008 | 0.079* | −0.019 | −0.042* | −0.008 | 0.128* | 1.000 | |
| 11 | *Export* | 0.129* | 0.264* | 0.154* | 0.425* | 0.226* | 0.019 | 0.252* | 0.103* | 0.238* | 0.112* | 1.000 |