

Management, productivity and firm heterogeneity in international trade

Firm
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in international
trade

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Abstract

Purpose – This paper aims to analyse the relevance of management and productivity in the behaviour of firms in international trade.

Design/methodology/approach – Using a survey of Spanish manufacturing firms, the authors use a management quality index to serve as a proxy for the good management practice of the firm.

Findings – The results demonstrate that exporter and multinationals firms are more productive and better managed than domestic firms. Furthermore, in the periods in which switcher firms decide to export or to invest abroad, they are better managed but are not more productive than in the rest of the periods. Finally, results indicate that regardless of its positive relationship with productivity, management also has a direct impact on the firm's probability of exporting and involving in foreign direct investment.

Originality/value – This paper aims to reconcile the recent international trade literature, which focusses on the role of productivity heterogeneity in international trade, with the international business literature, concentrated on depicting the key management practices that impact internationalization.

Keywords Foreign direct investment, International trade, Exports, Management, Productivity, Firm heterogeneity

Paper type Research paper

1. Introduction

In the mid-1990s, the increasing availability of data at firm level showed that the classical models of international trade (Ricardo, 1817; Heckscher, 1919; Ohlin, 1933) and the new trade theory (Krugman, 1980; Helpman, 1984; Helpman and Krugman, 1985) had serious limitations in explaining the behaviour of individual firms in international markets. Even though these trade models incorporated appropriate elements to describe some stylized facts of international trade (comparative advantages, specialization, imperfect competition and



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economies of scale), “they proved inadequate to explain a range of empirical findings that emerged in the 1990s from new firm level data sets” (Helpman, 2011).

Therefore, recent international trade literature has primarily focussed on the role of firm heterogeneity in international markets. The idea behind this research is that differences in the behaviour of firms in international markets are explained by differences in the firm characteristics. Studies have revealed the existence of substantial differences between exporters and non-exporters. According to Bernard *et al.* (1995), exporting firms are larger, more innovative and more productive than non-exporting firms. Among these differences, productivity has been placed at the core of the firm’s export decision. In his seminal work, Melitz (2003) established that only the most productive firms could obtain positive profits from exports because of the existence of certain sunk costs on entry into international markets. Consequently, only the most productive firms will enter export markets while less productive firms will tend to remain in domestic ones.

Nevertheless, when the international trade literature started to focus on firm heterogeneity in international markets, there was already a huge field that was investigating the behaviour of firms in exporting and foreign direct investment (FDI): the international business literature. As that moment, both branches of literature have tried to answer a common question:

Q1. Why some firms export and perform FDI activities while others do not?

In addition, both have pursued the same goal: try to shed more light on the behaviour of firms in international markets. Nevertheless, they have focussed on different variables and through different methodologies.

Hence, in the past 20 years, international trade and international business literature have travelled through parallel ways, but unconnected. Despite the two branches of literature have focussed on the same topic, few are the papers that include both approaches together (Beugelsdijk *et al.*, 2013), and this is precisely the main motivation and contribution of this research. In other words, we want to reconcile the international trade literature and the international business literature into one empirical work, to deepen into the determinants of exporting and FDI. Using a rich data set for a sample of Spanish manufacturing firms, the survey on firms’ strategies (EESE), we have used an index of management quality, which will serve us as a proxy for the good management practices in the firm. Then, we will include this variable in the international trade analysis with firm heterogeneity, to compare the relevance of management and productivity in the behaviour of firms in international markets. We are conscious of the fact that measuring management quality is undeniably a difficult task. We are not the first to do it, however (Bloom and Van Reenen, 2007), and our indicator of management quality is based on a comprehensive and unique set of information, which has never been exploited before in this context.

For our purposes, we will proceed in two steps. In Step 1, we will analyse the heterogeneity in terms of management practices across firms regarding their internationalization status. In other words, we will compare the management level of the domestic, exporter and multinational firms. Then, we will repeat this analysis for the productivity heterogeneity across firms, to check if firms differ more in terms of management or in terms of productivity. In Step 2, we will see how management and productivity correlate to the joint probability of exporting and performing FDI. We want to see if management has a direct impact on the firm’s internationalization decisions beyond its impact on productivity.

Literature has proved that management and productivity are strongly correlated, at the firm level and research has offered many evidences of this link. In general, management can foster productivity through the use of human capital and innovation

activities (Andrews and Westmore, 2014; Bloom and Van Reenen, 2010a, 2010b). Good management quality has a direct translation on productivity through the incorporation of more efficient, profitable and competitive labour and capital. However, management and productivity do not reflect the same firm virtues. While total factor productivity (TFP), the measure used in this research, measures the level of firm efficiency, profitability and capacity to be competitive, management abilities reflect the attributes of top managers together with the organizational structure of the firm. Therefore, while productivity and management are connected, they reflect different aspects of the firm nature, and hence, may have a different role in the behaviour of firms in international markets, which is precisely the main interest of this paper.

To anticipate our main findings, our results show that there exists a considerable degree of heterogeneity across firms in terms of management. More precisely, multinationals are the better-managed firms, exporter firms have an intermediate management level and domestic firms are the worst managed firms. Differences in terms of productivity across firms respond to this same hierarchy. Moreover, among switcher firms, results show that in the periods in which they decide to export or to invest abroad, these firms are better managed but are not more productive than in the rest of the periods. Furthermore, results indicate that our management index is positive and significantly correlated to the firm's productivity level. Finally, we show that regardless of its positive relationship with productivity, management also has a direct impact on the firm's probability of exporting and involving in FDI.

The conclusion to be drawn from this is that there is considerable room for management quality in the firm's export decision and in the activities of firms. This is our main hypothesis in the paper that can be formulated as follows: firms performing optimal management practices may either absorb some of the sunk costs on entry into international markets or deal more easily with the risks associated with exporting, and in the end, may accomplish a successful internationalization strategy despite their limitations in terms of productivity. In this sense, management quality should be seen as an instrument in the firm's internationalization decisions, in which better-managed firms will find the least costly and most efficient internationalization pattern.

According to Melitz's (2003) model, firms wishing to export must overcome certain costs associated with the entry into foreign markets. These costs may be variable in nature, such as transport costs or tariffs, but can also be fixed, independent of the export volume. Thus, only the most productive firms can afford the sunk costs associated with entry into export markets and obtain positive profits from exports. In other words, the only way to overcome these sunk costs is through productivity. So, facing similar sunk costs, only the firms with productivity levels above a certain threshold will be able to export.

However, our results show that management plays an important role. Better-managed firms may overcome costs associated with the setup of new distribution channels through cooperative strategies, such as alliances, partnerships or joint ventures with suppliers or customers or even because of an experienced legal department within the firm, thus improving the firm's access to new export markets. They may also surmount other sunk costs such as those associated with learning about a foreign market or informing foreign buyers, at a very low marginal cost, through information technology resources. Moreover, sunk costs are never very predictable and firms must, therefore, always assume some risks in their export decisions. Recent research has revealed the importance of the risks that firms face when starting an international project, especially in developing economies, related to fraud, corruption or competition and regulation uncertainty. Therefore, we would expect

better-managed firms to be more able to evaluate these risks and to face them in a more efficient way.

Furthermore, some tendencies towards the reduction of sunk costs increase the relative importance of management quality against productivity. The European framework undoubtedly helps Spanish manufacturing firms to overcome the sunk costs associated with exporting. Firstly, 67 per cent of Spanish exports go to the EU and the European Common Market ensures the free circulation of products within the EU, so tariff costs or costs associated with the rules of foreign customs agencies disappear. Besides, the majority of sectors (e.g. electronic and electrical equipment, machinery and medical devices) are harmonized and subject to common rules across the EU. They provide a clear and predictable legal framework for businesses. If manufacturers follow these rules, their products can be sold freely in the market. In this sense, the costs associated with product modifications to conform to foreign standards are relatively small inside the EU.

The rest of the paper is organized as follows: Section 2 analyses the theoretical framework, which supports this research, reconciling both recent international trade literature, which focusses on explaining the firm's behaviour in international markets, as well as the international business literature, which focusses on evaluating the impact of management practices on the firm's economic performance. Section 3 describes the data set and the methodology used in this research, as well as the econometric strategy used to demonstrate our objectives. Section 4 presents the main results obtained from the econometric analysis, with the corresponding robustness checks. Finally, Section 5 highlights the main conclusions of this research.

2. Theoretical framework

The recent international trade literature has been focussed on depicting the role of firm heterogeneity in exporting and FDI. The first people to undertake an empirical study about exporting across firms and between industries were [Bernard *et al.* \(1995\)](#). Because of panel data of US manufacturing firms between 1976 and 1987, they found remarkable differences between the exporter and domestic firms. Specifically, they discovered that exporters were larger, more capital intensive, paid higher wages, received higher benefits, invested more per employee and showed higher labour productivity than non-exporter firms. However, the theoretical model that recognized differences between individual producers within an industry did not arrive until [Bernard *et al.* \(2003\)](#) and [Melitz \(2003\)](#) broke with the classical assumption of a representative firm to incorporate firm heterogeneity in markets. In his model, [Melitz \(2003\)](#) made an extension of the [Krugman \(1980\)](#) model with monopolistic competition and increasing returns to scale but incorporating firm level productivity differences. In the Melitz model, the key element used to explain why some firms export, while others do not, is productivity. According to him, there are some sunk costs associated with entry into export markets and only the most productive firms are able to overcome these. In this sense, the least productive firms serve only the domestic market while the most productive firms can export to international markets.

[Helpman *et al.* \(2004\)](#) extended [Melitz's \(2003\)](#) model to include firms that invest abroad. Their results showed that multinational firms, those firms that own foreign subsidiaries or license foreign firms to produce their products, are more productive than others (exporters and domestic firms). In other words, only the most productive firms are able to become involved in FDI. The hierarchy of firms in terms of productivity presented by [Melitz \(2003\)](#) is extended in the [Helpman *et al.*](#) model: the least productive firms serve only the domestic market, firms with an intermediate productivity export and only the most productive firms are able to become involved in FDI activities. Regarding the empirical literature on FDI at

firm level, [Yeaple \(2009\)](#) with a sample of US multinational firms, found that the most productive multinational firms invest in a larger number of foreign countries. He also found that multinational activity was correlated to other factors such as distance between the parent company and the subsidiary, a common language or the GDP per capita of the country in which the subsidiary will operate.

However, the international business literature has offered, as well as many explanations about the behaviour of firms in international markets. [Johanson and Wiedersheim-Paul \(1975\)](#) and [Johanson and Vahlne \(1977\)](#) proposed a model that described the behaviour of multinational and exporting firms, later called the Uppsala model. Through the study of the cases of four Swedish multinational firms, they concluded that firms experienced a process of gradual internationalization in their conquest of international markets, a process they called “the establishment chain”. Firstly, because of the lack of knowledge about foreign countries and the propensity to avoid uncertainty, firms develop in the domestic market, selling only in the home country. Secondly, firms start to export to neighbouring countries, which are comparatively well-known and they share similar business practices. Finally, they start producing or manufacturing abroad, getting involved in FDI activities. Hence, the Uppsala model suggests that the process of internationalization of firms depends on a gradual acquisition, integration and use of knowledge about foreign markets and operations.

John [Dunning \(1980a, 1980b\)](#) proposed a model to explain the activity of multinational firms called the eclectic paradigm or the OLI model ([Dunning, 2001](#)). Hence, according to this author, at any given moment of time, three forces will determine the activity of multinational firms. Firstly, the ownership advantage (O) that a multinational firm from one nationality possesses relative to their competitors of another nationality. These ownership advantages may be related to the firm’s productivity or to any kind of ability that allows it to supply any particular market better than its competitors. Secondly, a location advantage (L) that encourages a multinational firm to locate its activity outside its national boundaries. Thirdly, an internalization advantage (I) that enables a multinational firm to benefit from internalize their activities rather than go to the market.

Recent international business literature has found that leadership abilities or the idiosyncratic attributes of the owner-manager ([Lamb et al., 2011](#); [Ellis, 2011](#)), the commercial and managerial experience of the founding team ([Ganotakis and Love, 2012](#)) or the managerial networking and social capital ([Laursen et al., 2012](#)) are also correlated to the performance of firms in international activities. Furthermore, market orientation capabilities such as information about customers, competitors and the external environment ([He et al., 2013](#)) or the use of cooperative strategies through alliances, partnerships or joint ventures with other firms ([Haahti et al., 2005](#)) improve their access to new export markets. [Shamsuddoha et al. \(2009\)](#) suggested that managers who perceive the international context more positively bring more value to the company because they are more likely to become involved in international activities.

Therefore, until now we have shown that, on the one hand, the economic analysis of international trade has highlighted the role of productivity in exporting and FDI. Then, on the other hand, the international business literature has highlighted the role of management practices in the behaviour of firms in international markets. The main goal of our work is to reconcile both the recent international trade and the international business findings to analyse the role of management and productivity in the behaviour of firms in international markets.

3. Data and methodology

3.1 Data

The data source used in this research is the EESE drawn up by the Spanish Ministry of Industry and the *Fundación Empresa Pública*. This data set is an annual survey, which refers to

a representative sample of Spanish manufacturing firms, according to industry and size. The survey applies random sampling for firms with 10-200 workers and exhaustive sampling for firms with 200 or more workers. The period analysed in this research is 2009-2013 (five years).

Some firms answer every year while others do not, which makes the data set an unbalanced panel. For our purposes, the sample used is composed of three kinds of the firm:

- (1) those that neither export nor carry out FDI (*domestic*);
- (2) those that export but are not involved in FDI activities (*exporter*); and
- (3) those that export and are involved in FDI activities (*multinational*).

The activity of firms is classified into 20 different industries, according to the three-digit aggregation CNAE-09 of manufacturing industries. The complete list of variables used in the model is presented in [Table I](#).

[Table II](#) presents a summary of the sample according to the firm's internationalization status. The average firm answers the survey for 4.4 years. Multinational firms are more

Variable	Definition
<i>MQI</i>	Value of the management quality index
<i>Leadership</i>	Value of the <i>leadership</i> indicator
<i>Innovation</i>	Value of the <i>innovation</i> indicator
<i>Collaboration</i>	Value of the <i>collaboration</i> indicator
<i>Training</i>	Value of the <i>employees</i> indicator
<i>Digitization</i>	Value of the <i>digitization</i> indicator
<i>Results</i>	Value of the <i>results</i> indicator
<i>TFP</i>	Total factor productivity ^a
<i>Domestic</i>	1-if firm <i>i</i> neither exports nor carries out FDI in period <i>t</i> , 0-otherwise
<i>Exporter</i>	1-if firm <i>i</i> exports but is not involved in FDI in period <i>t</i> , 0-otherwise
<i>Multinational</i>	1-if firm <i>i</i> is involved in FDI in period <i>t</i> , 0-otherwise
<i>Export</i>	1-if firm <i>i</i> exports in year <i>t</i> , 0-otherwise
<i>FDI</i>	1-if firm <i>i</i> invests abroad in year <i>t</i> , 0-otherwise
<i>Small</i>	1-if firm <i>i</i> in year <i>t</i> has less than 51 employees, 0- otherwise
<i>Medium</i>	1-if firm <i>i</i> in year <i>t</i> has between 51 and 200 employees, 0-otherwise
<i>Large</i>	1-if firm <i>i</i> in year <i>t</i> has more than 201 employees, 0-otherwise
<i>Industry</i>	1-if firm <i>i</i> belongs to industry X, 0-otherwise
<i>Foreign ownership</i>	1-if the foreign capital of firm <i>i</i> represents more than 50% of the social capital in year <i>t</i> , 0-otherwise

Table I. Variable description **Note:** ^aTFP has been calculated following the method proposed by [Olley and Pakes \(1996\)](#), which is available in STATA trough the module prodest

Variable	Domestic		Exporter		Multinational		Total	
	Firms	(%)	Firms	(%)	Firms	(%)	Firms	(%)
Small	685	81	547	42	22	7	1,254	51
Medium	129	15	484	37	123	39	736	30
Large	31	4	274	21	173	54	478	19
Total	845	100	1,305	100	318	100	2,468	100
Average number of years in the sample	4.3 years		4.4 years		4.6 years		4.4 years	

Table II. Sample description according to firm's size

Source: Own elaboration using EESE database. Period 2009-2013

likely to remain in the survey for more years (4, 6), compared to exporter (4.4) and domestic firms (4.3). Furthermore, Table II shows that multinational firms are as well larger in terms of employees compared to exporter and domestic firms.

3.2 Management quality index

The management quality index (MQI) has been elaborated following Campo and Yagüe (2018)[1]. Using the EESE, we construct the MQI, selecting 40 variables in the survey (the complete list of variables is presented in Table III), dividing them into 6 indicators:

- (1) *Leadership* (7 variables): related to leadership and management abilities.
- (2) *Innovation* (10 variables): related to management operation of products, processes or services.
- (3) *Collaboration* (5 variables): related to the management of partnerships and resources.
- (4) *Training* (6 variables): related to the management of staff.
- (5) *Digitization* (7 variables): related to digital and technological strategy.
- (6) *Results* (5 variables): related to the measurement of the results.

All the indicators are binaries, in other words, when asked about the use of these indicators, the firm's only possible answers are yes or no. All the indicators are constructed as follows, where X is the value of the indicator, i is the firm and t is the year:

$X_{it} = 1$, if firm i in year t performs the indicator X (it has answered "yes"); $X_{it} = 0$, if firm i in year t does not perform the indicator X (it has answered "no").

To construct each indicator, we add the value of each variable, and then, to build up the MQI, we add the values of each indicator. The MQI thus reflects the number of good management practices the firm is performing. In other words, the higher the value of the MQI, the better the firm's management practices. Table IV presents a summary of the descriptive statistics and correlations of the MQI and its components. Figure 1 presents the distribution of MQI across firms.

In general, the level of good management practice of Spanish manufacturing firms is notably low, as firms perform, on average, only 25 per cent (9.8/40) of total possible management practices. The MQI takes the value 0 in 29 observations, which represents 0.32 per cent of the observations[2]. Regarding the components of the MQI, the *leadership* indicator shows the best results: on average, firms perform 2.2/7 *leadership* practices. The worst scores appear in the *collaboration* indicator, in which firms only implement 0.6/5 *collaboration* practices. Notably, the maximum number of management practices performed by one firm in one year is 35, which means that none of the 2.468 firms performed all possible management practices (40) in any one of the five years analysed. Correlation coefficients show that *leadership* where X is the value of the indicator, i is the firm and t is the year strongly correlates with the majority of indicators, especially with *collaboration* (0.645) and *innovation* (0.559), which may suggest that strategic decisions at the core of the firm depend on the leadership level of managers.

We must emphasize the fact that we are not the first to elaborate an index of management practices. Bloom and Van Reenen (2007) created an index of management practices when conducting a survey of 732 medium size US and European manufacturing firms. Managers were asked about 18 questions grouped under the following three headings: *monitoring* (tracking and reviewing worker performance), *targets* (type, realism

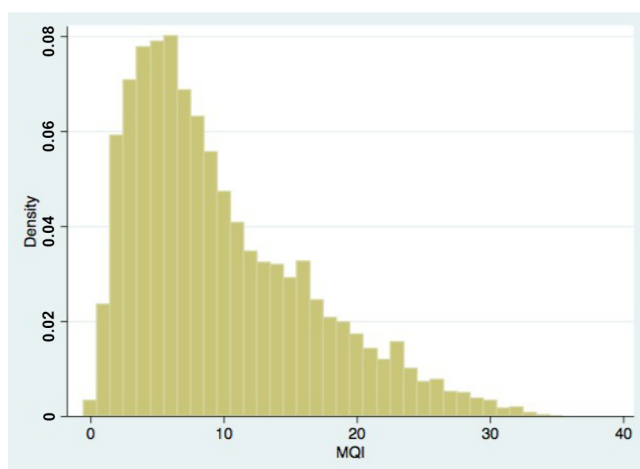
Table III.
Variables included in
the ESEE and used
in the creation of
the MQI

<i>Leadership</i> Variables linked to leadership and management abilities	<i>Technological guidance or committee</i> Innovation activity plan Owners and family support in leadership and management Use of consultants for technology Information expenditure on environmental Protection investment on environmental Protection degree of diversification
<i>Innovation</i> Variables linked to the operations management (processes, products and services)	Product standardization Normalization and quality control Scientific and technique information systems Product innovations Equipment goods acquisition for product Improvement innovations in external relations Management merchandising innovations Process innovations of new Equipment process innovations of Software process innovations of new techniques
<i>Collaboration</i> Variables linked to the management of partnerships and resources	Technological collaboration with customers Technological collaboration with competitors Technological collaboration with suppliers Collaboration with universities or technological Centres EU research programme
<i>Training</i> Variables linked to the management of the staff	External expenditure on language training External expenditure on engineering and technical training External expenditure on sales and marketing training External expenditure on computer and technologies Training external formation on training in other themes Hiring employees with experience in R&D
<i>Digitization</i> Variables linked to the digital and technological policy and strategy	Own internet domain Web page on the firm server Online purchases from Supplier online sales to final Customers online sales to firms Evaluation of alternative technologies Evaluation of technological change prospects
<i>Results</i> Variables linked to the measurement of results	Market surveys Innovation performance indicators Online sales impact indicator Identification of the competitive position in the main market Positive evolution of the market share

and transparency of targets) and *incentives* (promotion criteria, pay and bonuses). Following this work, the authors created the world management survey (WMS) project, and because of the collaboration of many researchers and interviewers, they have managed to measure management in over 15,000 firms in 35 countries.

Table IV.
Descriptive statistics
and correlations of
the MQI and its
components

Variable	Mean	SD	Maximum	Minimum		
MQI	9.9/40	6.737	35/40	0/40		
Leadership	2.2/7	1.612	7/7	0/7		
Innovation	2.4/10	2.197	10/10	0/10		
Collaboration	0.6/5	1.065	5/5	0/5		
Training	1.2/6	1.588	6/6	0/6		
Digitization	2.1/7	1.571	7/7	0/7		
Results	1.2/5	0.977	5/5	0/5		
	Leadership	Innovation	Collaboration	Training	Digitization	Results
Leadership	1.000					
Innovation	0.559	1.000				
Collaboration	0.645	0.526	1.000			
Training	0.502	0.455	0.492	1.000		
Digitization	0.511	0.467	0.443	0.379	1.000	
Results	0.344	0.346	0.292	0.261	0.375	1.000

**Figure 1.**
Distribution of the
MQI across firms

Compared to the WMS elaborated by [Bloom and Van Reenen \(2007\)](#), our MQI covers more aspects of management quality; six categories (*leadership, innovation, collaboration, employees, digitization and results*) compared to their three aspects of firm management (*monitoring, targets and incentives*). Moreover, our survey asks firms a larger number of questions (40 compared to their 18).

The WMS is strongly focussed on human resource management within the firm, while our MQI is especially interested in the firm technological strategy. We believe that, in the next years, technological change will reshape the production structure and the distribution channel of the manufacturing industry. Hence, we consider that better-managed firms are those firms who are anticipating these changes, and therefore, are those who invest in adapting the structure of the firm and the skills of workers towards this technological disruption. Better-managed firms are consequently performing a continuous innovation

strategy, are collaborating technologically with customers, competitors and suppliers, and are developing the online activity of the firm.

It is important to recall that our index is elaborated from self-reported questions, which may contain a degree of error due to questions not being completely understood. Nevertheless, questions in the EESE drawn up by the Spanish Ministry of Industry are clear enough in our opinion for a satisfactory understanding, and in this sense, we will consider the measurement error due to this factor as minimal. Another aspect in which our index presents some limitations compared to the WMS is that we use closed questions. The use of closed questions, in which the only possible answers are yes or no, may provoke the loss of some nuances and details in managers' answers that could be useful in determining the firm's management quality (Bloom and Van Reenen, 2010b). However, we find that the closed questions bring enough information for our purposes to the extent that we are investigating the number of good management practices firms perform.

3.3 Methodology

3.3.1 Firm heterogeneity. For our purposes, we will proceed in two stages. Stage 1, we will focus on firm heterogeneity in terms of management and productivity. More precisely, we will estimate the average difference, in terms of MQI (1) and TFP (2) between *Domestic*, *Exporter* and *Multinational* firms:

$$\ln(MQI_{it}) = c + \beta_1 \text{Exporter}_{it} + \beta_2 \text{Multinational}_{it} + \beta_3 \text{Foreign Ownership}_{it} + \beta_j \text{Size Dummies}_{it} + \beta_k \text{Industry Dummies}_{it} + \varepsilon_{it} \quad (1)$$

$$\ln(TFP_{it}) = c + \beta_1 \text{Exporter}_{it} + \beta_2 \text{Multinational}_{it} + \beta_3 \text{Foreign Ownership}_{it} + \beta_j \text{Size Dummies}_{it} + \beta_k \text{Industry Dummies}_{it} + \varepsilon_{it} \quad (2)$$

To test the robustness of the results regarding the MQI, we will decompose the index into the six indicators (*leadership*, *innovation*, *collaboration*, *training*, *digitization* and *results*) to see which of the components of the MQI is more important in explaining differences between firms:

$$\ln(\text{Indicator}_{it}) = c + \beta_1 \text{Exporter}_{it} + \beta_2 \text{Multinational}_{it} + \beta_3 \text{Foreign Ownership}_{it} + \beta_j \text{Size Dummies}_{it} + \beta_k \text{Industry Dummies}_{it} + \varepsilon_{it} \quad (3)$$

3.3.2 Export and foreign direct investment decisions. Then, we will study the link between management and productivity during the firm's decision to exporting and investing abroad. We will first analyse the relationship between management and productivity, to test if good management practices within the firm affect the productivity level:

$$\ln(TFP_{it}) = c + \beta_1 \ln(MQI_{it}) + \beta_2 \text{Foreign Ownership}_{it} + \beta_k \text{Size Dummies}_{it} + \varepsilon_{it} \quad (4)$$

We will estimate a bivariate equation (5) to analyse the joint decision of exporting and investing abroad, to study the complementarity of these variables in the behaviour of firms in international markets. As one would expect the firm's export and FDI decisions to be

correlated (i.e. they are not independent), the estimation strategy should recognize this interdependence:

$$\begin{aligned} \text{Export}_{it} \text{ FDI}_{it} = & c + \beta_1 \ln(\text{MQI}_i) + \beta_2 \ln(\text{PTF}_i) + \beta_3 \text{Export}_{it-1} \\ & + \beta_4 \text{IED}_{it-1} + \beta_5 \text{Foreign Ownership}_{it} + \beta_j \text{Size Dummies}_{it} \\ & + \beta_k \text{Industry Dummies}_{it} + \varepsilon_{it} \end{aligned} \quad (5)$$

In the Export_{it} variable (dummy), the 1 correspond to firms i that export in period t , and the 0 correspond to firms i that do not export in t . In the FDI it variable (dummy), the 1 correspond to firms i that perform FDI in period t , and the 0 correspond to firms i that do not perform FDI in period t .

4. Results

4.1 Management and productivity premium

Table V presents the main results of the regressions performed to estimate the management and productivity premium. Equations (1) and (2) have been estimated through a random effects model. The results of equation (1) prove the existence of a management premium on more internationalized firms. Controlling for size and industry differences, *Exporter* firms have, on average, 35 per cent (0.300 MQI points measured in logs) more management quality than *Domestic* firms[3]. Moreover, equation (1) also indicates the existence of a management premium for firms involved in FDI. *Multinational* firms have, on average, 54.3 per cent (0.434 MQI points measured in logs) and 14.3 per cent (0.134 MQI points measured in logs) more management quality than *Domestic* and *Exporter* firms, respectively. This result is consistent with Bloom *et al.* (2009) who found that multinationals were generally well managed in all countries. Therefore, these results confirm the existence of a hierarchy of firms in terms of management quality.

Equation (2) exhibits a well-known stylized fact (Melitz, 2003): the existence of a TFP premium in the case of internationalized firms. Controlling for size and industry differences, *Exporter* firms show a TFP level that is on average 12.7 per cent (0.120 TFP points measured in logs) larger than *Domestic* firms. Similarly, equation (2) highlights the existence of a TFP premium for Spanish multinationals, which fits with the results obtained by Helpman *et al.* (2004) for US multinationals. *Multinational* firms are 19 per cent (0.174 TFP

Variable	MQI (logs) (1)	TFP (logs) (2)	MQI (logs) (3)	TFP (logs) (4)
Exporter	0.300*** (0.022)	0.120*** (0.022)	0.109*** (0.028)	0.042 (0.033)
Multinational	0.434*** (0.030)	0.174*** (0.034)	0.094*** (0.036)	0.093* (0.055)
Medium	0.312*** (0.025)	0.057** (0.028)	0.155** (0.076)	0.303*** (0.113)
Large	0.550*** (0.030)	0.084*** (0.032)	0.203* (0.109)	0.265* (0.149)
Foreign ownership	0.049** (0.025)	0.044 (0.032)	-0.087* (0.053)	0.027 (0.119)
Industry dummies	Yes	Yes	No	No
Firm fixed effects	No	No	Yes	Yes
No. of firms	2.468	2.155	348	348
F-test exporter = multinational	0.000	0.043	0.581	0.251

Notes: In equations (1) and (2), we have controlled manufacturing industry to two digits. Robust standard errors (clustered by firm) are given in parentheses; *, ** and *** denote significance at the 10, 5 and 1 per cent levels, respectively. In the last row, we include the p -value obtained from the F -equality test

Table V.
Firm heterogeneity
estimation results

points measured in logs) and 5.5 per cent (0.054 TFP points measured in logs) more productive than *Domestic* and *Exporter* firms, respectively.

The purpose of equations (3) and (4) is to analyse the correlation between a change in the firm's status and its management quality and productivity, estimating a fixed effects model. To do that we include only firms that change status during the period analysed (2009-2013). Notice that the number of firms present in these estimations falls to 348, indicating the high degree of persistence in the internationalization behaviour across Spanish manufacturing firms. Hence, among these group of *Switcher* firms, results show that to start exporting or to start investing abroad is correlated to a better management quality equation (3), but not to a larger productivity level equation (4). These results prove that, in the periods in which switcher firms decide to export or to invest abroad, they are better managed but are not more productive than in the rest of periods. In other words, it seems that the positive link between the internationalization process of firms and productivity appears only once the firm has reached a certain degree of persistence in its behaviour in international markets. On the contrary, managerial abilities seem to be more useful for firms in the early steps of their internationalization path.

To test the robustness of our results, we will focus on the components of the MQI to clarify where exactly the management heterogeneity between firms comes from. Regressions on Table VI confirm that behind the hierarchy of firms in terms of management quality there exists a hierarchy of firms in each of the six indicators that contribute to the MQI. In other words, *Exporter* firms possess more leadership and more management abilities, perform more innovation activities, collaborate more with partners and distributors, invest more in the training of their employees, have a more accurate digitization strategy and have better results measurement than *Domestic* firms. This situation is reproduced when we check the differences between *Multinational* and *Exporter* firms.

4.2 Export and foreign direct investment decisions

In the previous section, we have shown that more internationalized firms are more productive and better managed than domestic firms. Now, this section will investigate how management and productivity interact in the firm's export and FDI decisions. It has been described, recent research has revealed that management and productivity are correlated, and that management positively affects the firm productivity level.

Table VII presents the results of a fixed effects model, in which we have regressed the firm productivity level on the MQI and a set of controls. Results show that both variables are tightly correlated. Precisely, a 1 per cent increase in the MQI is correlated to a 0.05 per cent increase in TFP equation (1) while equation (2) suggests that this connection between management and productivity is contemporaneous rather than lagged. Equation (3) shows that the impact of management on productivity is rather linear.

Once we have shown that management practices foster productivity within Spanish manufacturing firms, the purpose of this section is to investigate how these two variables interact in the behaviour of firms in international markets. However, if management and productivity are correlated, exporting and FDI are correlated as well. To control for this interdependence, we have performed a biprobit estimation of the joint decision of exporting and investing abroad.

Table VIII presents the main results of the biprobit estimation where the dependent variables are the firm's export and FDI status (whether the firm exports and invest abroad or not). Results of equation (1) show that TFP is positive and significantly correlated to the firm's export and FDI decision (at the 10 per cent significance level). Moreover, past export and FDI experience positively affect the probability of both exporting and getting involved

Variable	Leadership (logs) (1)	Innovation (logs) (2)	Collaboration (logs) (3)	Training (logs) (4)	Digitization (logs) (5)	Results (logs) (6)
Exporter	0.250*** (0.017)	0.150*** (0.022)	0.044*** (0.009)	0.091*** (0.013)	0.131*** (0.018)	0.120*** (0.013)
Multinational	0.383*** (0.030)	0.302*** (0.036)	0.182*** (0.024)	0.199*** (0.031)	0.236*** (0.031)	0.185*** (0.025)
Medium	0.210*** (0.022)	0.224*** (0.025)	0.106*** (0.013)	0.249*** (0.019)	0.147*** (0.021)	0.063*** (0.015)
Large	0.400*** (0.029)	0.469*** (0.034)	0.242*** (0.022)	0.505*** (0.029)	0.311*** (0.027)	0.101*** (0.021)
Foreign ownership	-0.025 (0.027)	0.028 (0.035)	-0.023 (0.021)	0.159*** (0.030)	0.015 (0.027)	-0.053** (0.021)
<i>F</i> -test exporter = multinational	0.000	0.000	0.000	0.000	0.000	0.006

Notes: In all the regressions we have controlled manufacturing industry to three digits. All the firms in the sample (2,468) are included in the estimations. Robust standard errors (clustered by firm) are given in parentheses; *, ** and *** denote significance at the 10, 5 and 1 per cent levels, respectively. In the last row, we include the *p*-value obtained from the *F*-equality test

Table VI.
Random effects
estimation results

Table VII.
Connection between
management and
productivity

Variable	TFP (logs) (1)	TFP (logs) (2)	TFP (logs) (3)
MQI (logs)	0.055*** (0.020)		
MQI _{t-1} (logs)		0.023 (0.020)	
MQI			0.004 (0.006)
MQI ²			0.001 (0.001)
Medium	0.112* (0.060)	0.103 (0.065)	0.113* (0.060)
Large	0.154* (0.081)	0.129 (0.094)	0.153* (0.080)
Foreign ownership	-0.021 (0.059)	-0.057 (0.062)	-0.022 (0.058)
Industry dummies	No	No	No
Firm fixed effects	Yes	Yes	Yes
No. of firms	2.155	1.983	2.155

Notes: Robust standard errors (clustered by firm) are given in parentheses; * and *** denote significance at the 10 and 1 per cent levels, respectively

in FDI. Interestingly, foreign-owned firms have a lower probability to get involved in FDI. This circumstance maybe because of the fact that this type of subsidiaries are themselves the result of a FDI made by the parent company.

Results of [equation \(2\)](#) show that better managed firms have a higher probability of exporting and being involved in FDI, regardless of their productivity level. This result suggests that management quality has a role in internationalization decisions of firms beyond its impact on productivity. Moreover, once we include management in the estimation, the firm's TFP level and the past export experience lost their significance in explaining the FDI probability.

Finally, in [equation \(3\)](#), we include only firms that change status during the period analysed. Results show that, among these *Switcher* firms, improvements in managerial abilities increase the likelihood of exporting and performing FDI, as well as increases in the TFP.

5. Conclusions

In recent years, the literature on international trade has focussed on learning more about the firm's behaviour in international markets. A number of theoretical models and empirical works have revealed the importance of productivity in the behaviour of firms in international markets process of firms, where only most productive firms could be involved in exporting and FDI. Parallel, the international business literature has highlighted that the firm's organizational structure together with the attributes of the top managers has a very relevant role in the behaviour of firms in international markets. Despite both branches of literature have focussed on the same topic and pursue the same goal, few are the papers that include both approaches together, and this is precisely the main motivation and contribution of this research, in other words, to reconcile the international trade literature and the international business literature into one empirical work, to deepen into the determinants of exporting and FDI.

The goal of the paper has been to analyse the role of management quality in the behaviour of firms in international markets, comparing its importance with the one of productivity. Firstly, using a sample of Spanish manufacturing firms, we have elaborated on a unique and comprehensive MQI, including the more relevant aspects of the managerial practices within the firm. Furthermore, we have included our management index into the international trade models with firm heterogeneity, and we have proceeded in two steps. Step 1, we have focussed on the existence of a management quality premium on exporter

Variable	Export (1)	FDI (1)	Export (2)	FDI (2)	Export (3)	FDI (3)
MQI (logs)			0.401*** (0.047)	0.205*** (0.073)	0.360*** (0.073)	0.302*** (0.107)
TFP (logs)	0.200*** (0.048)	0.132* (0.073)	0.152*** (0.050)	0.116 (0.075)	0.180** (0.071)	0.346*** (0.115)
Export _{t-1}	3.049*** (0.061)	0.331** (0.154)	2.966*** (0.072)	0.247 (0.157)	0.985*** (0.075)	0.403 (0.140)
IED _{t-1}	0.439*** (0.136)	3.526*** (0.090)	0.357** (0.141)	3.500*** (0.104)	0.534*** (0.147)	1.503*** (0.124)
Medium	0.534*** (0.067)	0.609*** (0.105)	0.409*** (0.069)	0.538*** (0.108)	0.366*** (0.105)	0.563*** (0.152)
Large	0.520*** (0.093)	0.807*** (0.117)	0.248** (0.099)	0.673*** (0.130)	0.149** (0.172)	0.824*** (0.202)
Foreign ownership	0.381*** (0.145)	-0.268*** (0.098)	0.337** (0.140)	-0.252*** (0.098)	0.441* (0.245)	-0.128*** (0.178)
Sample	All	All	All	All	Switchers	Switchers
No. of firms	1,983	1,983	1,983	1,983	330	330

Notes: In all the regressions we have controlled for three digits manufacturing industry and for firm size. Robust standard errors (clustered by firm) are given in parentheses; *, ** and *** denote significance at the 10, 5 and 1 per cent levels, respectively

Table VIII.
Biprobit estimation
for the joint
probability of
exporting and
performing FDI

and multinational firms compared to domestic firms, and we have compared this premium to the productivity premium already presented in the literature. Step 2, we have analysed how management affects productivity and how these two variables interact in the firm's exporting decision and in the firm's decision to invest abroad.

Our results show that there exists a considerable degree of heterogeneity across firms in terms of management. More precisely, multinationals are the better-managed firms, exporter firms have an intermediate management level and domestic firms are the worst managed firms. Differences in terms of productivity across firms respond to this same hierarchy. Moreover, among switcher firms, results show that in the periods in which they decide to export or to invest abroad, these firms are better managed but are not more productive than in the rest of the periods. Furthermore, results indicate that our management index is positive and significantly correlated to the firm's productivity level. Finally, we show that regardless of its positive relationship with productivity, management also has a direct impact on the firm's probability of exporting and involving in FDI.

These findings have wide implications regarding international trade literature. Until now, research has shown that the firm's internationalization behaviour is closely tied to its size, innovation and productivity level. Nevertheless, all these elements are the result of management decisions within the firm. Therefore, our results suggest that management has a key role in the behaviour of firms in international markets, comparable to the role of productivity. The fact that it is not easy to measure the management level in a firm should not act as a barrier to admit that managerial capabilities are crucial in exporting and FDI. Sunk costs at the entry of export markets are not all well-known, making exporting and FDI risky processes, more easily afforded by better managed firms. We have proposed that management is an instrument for firms and that better-managed firms will find the most efficient and least costly internationalization pattern.

Notes

1. The MQI was designed by María Jesús Yagüe Guillén, and first published in Campo, S., Yagüe, M. J. (2018) "El Capital Directivo" in Myro, R. (dir.): Una nueva política industrial para España. Consejo Económico y Social, cap. 7. We would like to thank her for her useful comments and for let us use the index.
2. When we use the logarithm of the MQI, these 28 observations are coded as 0.
3. To transform differences in logs into differences in percentage, we have followed the process suggested by Halvorsen and Palmquist (1980): "take the antilogarithm (base e) of the estimated coefficient of the dummy variable, subtract 1, and multiply the difference by 100".

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