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RESEARCH ARTICLE

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Internationalization and performance in agri-food firms

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Abstract

This paper studies the relationship between internationalization and performance in agri-food firms. In line with the recent literature, it analyses the effects of the degree of internationalization using a uniform sample, a long-term focus and a measure that combines export intensity and regional diversification. The study empirically confirms the hypothesis of a horizontal S-curve relationship between geographical diversification and performance and identifies three phases. Export firms are found in the first phase; their profits are low due the initial costs incurred in exporting. Companies with a more advanced internationalization process are in the second phase; they benefit from the positive outcomes of operating on a larger scale. Lastly, the third phase contains highly international, geographically diversified companies; their performance decreases as a result of the costs of entering extra-regional markets, which are especially steep in this sector; they also face higher transition costs and organisational complexity. The results presented could be interesting for policymakers designing and implementing export programmes for agri-food firms. Policies should include assistance at the start of the internationalization process and an attempt to prolong the strategy until the volume of business is sufficient to start showing an increase in performance. The policies could possibly promote networking between Spanish and foreign companies to reduce the costs of more global internationalization strategies.

Additional keywords: agribusiness; international trade; company performance; degree of internationalization.

Abbreviations used: DOI (Degree of Internationalization); ESEE (*Encuesta sobre Estrategias Empresariales*, Survey on Business Strategies); EU (European Union); HHI (Herfindahl-Hirschman Index); OLS (Ordinary Least Square); ROA (Return on Assets); ROS (Return on Sales).

Authors' contributions: The three co-authors participated in all stages of the work, including the conception and design of the research, the revision of the intellectual content and the drafting of the paper.

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Introduction

The intense globalization of economic activity has turned internationalization into an essential condition for the survival and success of some agri-food firms. The commonly-accepted idea of international expansion being good for the company is a recurrent argument used by politicians and the press, and promoted by business associations and organisations. However, entering international markets is still a challenge for a number of companies in the industry. Crossing the border involves the initial costs of internationalization and then competing and organising activities in a more uncertain and complex environment. Furthermore, entering new markets can imply a reduction in margins due to operating in more competitive environments. Therefore, understanding the relationship between a company's internationalization and performance is a crucial area of research not only for academics, but also for professionals and politicians (Hsu *et al.*, 2013; Powell, 2014).

Schumacher & Boland (2005) made one of the first studies that analyses performance in the food industry in the United States. The authors used a large sectorial sample (1980–2001). However, they did not identify and estimate the effects of specific strategic factors (such as internationalization) on company profitability. Subsequently, Schiefer & Hartmann (2008) went a

step further by making one of the few attempts to analyse the relationship between internationalization and performance, using micro-level data from the agri-food sector. They identified the factors that explain why a specific firm is more (or less) successful than its competitors. In this respect, some studies suggest that these company-level effects explain, to a large extent, the variation in performance between enterprises (McGahan & Porter, 1997). Schiefer & Hartmann (2008) found a positive relationship between export status and performance (ROS-Return on Sales and ROA-Return on Assets). However, due the limitations of their database, their conclusions cannot be generalized for the whole of the food industry, although this study paved the way for new contributions that shed more light on the issue. Nevertheless, there have been very few subsequent contributions. Bryla (2012) confirmed the success of internationalization strategies among Polish food processing companies. However, Furtan & Sauer (2008) did not find this positive relationship in Denmark. Recently, Zouaghi & Sánchez (2016) have found that, in the case of Spanish agri-food companies, the export variable is positively related to company performance and innovation.

In this context, this paper studies the relationship between internationalization and performance in agri-food firms, particularly focusing on exporting as the mode of entry. Since the results of previous papers have varied, the academic debate is still open (Chen & Tan, 2012; Hsu *et al.*, 2013; Beleska-Spasova, 2014). Since there is no single accepted definition and measure of internationalization, in this paper, as in others (*e.g.*, Grant, 1987; Sullivan, 1994; Pangarkar, 2008; Fernández-Olmos, 2011), the concept of internationalization refers to geographical diversification but not to product diversification. This paper presents an analysis of a uniform sample of companies with a long-term outlook, which is quite unusual. Some previous studies have considered a set of companies belonging to sectors with very disparate performance, which could have skewed the results obtained.

The database used for empirical confirmation is a Survey on Business Strategies (ESEE or *Encuesta sobre Estrategias Empresariales*) (Fundación SEPI, 2014), a longitudinal panel from 1994 to 2012 comprising 342 companies in the Spanish food industry.

The paper empirically confirms a horizontal S-curve relationship between internationalization and performance and identifies three phases in the process. New export companies are found in the first phase; their profits are low due to the initial costs of exporting incurred. Mature export companies with a more advanced level of internationalization are in the second phase; they benefit from the positive outcomes of operating on a larger scale. Lastly, the third phase contains internationally over-diversified export companies whose performance decreases as a result of the costs of entering extra-regional markets, which are especially steep in this sector, and dealing with greater organisational complexity.

We believe that this paper makes a relevant contribution to the existing literature, as it offers new empirical evidence of the relationship between internationalization and business performance using a uniform sample of companies and a very broad time horizon. Previous literature analysing the sector generally contains descriptive and cross-sectional studies (Fernández-Olmos, 2011; Fernández-Olmos & Díez-Vial, 2015). As Chiao *et al.* (2006) highlight, longitudinal studies are more appropriate for capturing the dynamic nature of businesses becoming international. Therefore, we also contribute to the literature by studying the business results from internationalization over a very broad period, 1994–2012, by also studying other pertinent factors, such as the company's size, and innovation and marketing strategies.

In accordance with Dunning's (1976) resource theory and eclectic paradigm, firms with unique intangible resources can exploit their advantage in foreign markets (Lu & Beamish, 2004). Consequently, the model includes the Innovate Product and Innovate Process variables by means of two fictitious variables, which take a value of 1 if the firm has introduced a new or significantly improved product or process, and zero if not. The model also includes the intensity of the firm's marketing activities. This is approximate based on the quotient resulting from the firm's communication costs divided by total sales (see an example in Qian *et al.*, 2010).

Furthermore, from a sector perspective, it represents a significant advance in our knowledge of the performance of the agri-food industry in international markets. As international activities take place in the dimensions of geographical scale and scope of foreign operations, we studied the degree of internationalization with a measure that combines export intensity and geographical export diversification. Despite the importance of the agri-food sector, there has been scant research on it in comparison with studies covering other sectors (Kirca *et al.*, 2012). We know that the food industry faces major obstacles in entering international markets; a large number of these are technical, concern for food safety or customs barriers, and they all narrow export companies' margins (de Frahan & Vancauteren, 2006). Given that the characteristics of the agri-food business clearly differ from those of other sectors, it is of interest to ascertain the impact on company performance of a higher degree of internationalization, or the influence of other

relevant company characteristics, for example product and process innovations, from the specific perspective of this industry.

This study aims to validate this three-phase model empirically for a uniform sample of companies in the food industry. Some studies have already shown that regionally-focused companies are better represented by a horizontal S-shaped relationship. We believe that Spanish exporting food companies match this model due to the above features. As will be seen, the majority of the companies in the industry show very limited degrees of diversification, as they concentrate their exports in nearby markets. Access to liberalised European markets, as opposed to the still very high barriers imposed in more distant markets, means that the destination for the Spanish agri-industry export is mainly intra-regional.

Material and methods

Contextualisation

The food industry is the main manufacturing industry in Europe, representing 15.6% of total sales and over one third of world trade in agricultural products and food (Serrano & Pinilla, 2014). In Spain, the sector making the largest contribution to gross domestic product after metal is the agro-industrial complex representing over 22% of sales in the manufacturing sector and employing around 13% of the workforce (21% in manufacturing sector) (Industrial Survey, Spanish Statistical Office, INE). According to data from the economic report by the the Spanish Federation of Food and Drink Industries (FIAB, *Federación Española de Industrias de Alimentación y Bebidas*) it was consolidated as the top export sector in 2015. Food industry exports reached 25.4 billion euros in 2015, representing 10.2% of total exports in Spain.

The development of exports in the Spanish food and drink industry indicates a major shift towards internationalization. Advances in expanding the industry to other countries are reflected in both the growing intensity of sales abroad (between 1970 and 2012, the mean annual rate of increase in exports was around 4%) and the rising number of destination countries for the exports (over 175 geographical locations in 2016).

This process of internationalization can be explained by the existence of a home market effect in the food and drink industries in Spain (Serrano *et al.*, 2015) and the intensification of intra-regional trade. This type of trade refers to that taking place between countries that have signed preferential agreements, a phenomenon dubbed the "spaghetti bowl" by Bhagwati *et al.* (1999) and Baldwin (2006). There is some consensus that regional trade agreements (RTAs) have boosted trade between the signatory countries, sparking intense regionalization. Thus, in the last few decades a significant part of the trade in agricultural and food products has occurred within regional blocs (Sarker & Jayasinghe, 2007; Grant & Lambert, 2008; Jayasinghe & Sarker, 2008; Serrano & Pinilla, 2012, 2016). Some authors suggest that RTAs have increased partners' bilateral agricultural and food exports by 30-40% on average. As can be seen in Table 1, the European Union (EU) in particular was especially successful in liberalising the exchange of agri-food products among its members. Intra-EEC trade between the member states accounted for just 17% of total world agricultural and food trade when the community was founded. By the end of the twentieth century, this figure was close to 30% (Pinilla & Serrano, 2009). After Spain joined the EU, the percentage of exports to this destination climbed to over 80% of the total. Since the end of the integration and transition period in 1992, the restructuring of Spanish exports has consolidated the community market as the natural destination for its products, while the rest of the world has decreased in importance (Contreras & Bacaria, 2000; Clar *et al.*, 2015).

According to the normalised Herfindahl-Hirschman Index (HHI)[1] of geographical diversification of exports in terms of volume (taking 175 destinations into account, right axis of Fig. 1), the growth in concentration during most of the last few decades is considerable, as the greater importance of flows with European partners shows. Finally, some geographical diversification has been seen in the past decade comprising both increasing exports to new EU partners from Eastern Europe and more importance placed recently on non-European exports.

The Spanish food and drink industry has focused its exports on large-scale regional markets in developed and geographically close countries (Clar *et al.*, 2015). Breaking down Spanish agricultural exports by destination region highlights the fact that removal of barriers to entering the EU intensified the degree of internationalization and the importance of this region; however, it did not change the main destination markets for Spanish exports (France, Italy, Germany and the UK have always been very important countries for Spanish trade). The only significant exception is Portugal, which has purchased more since it joined the EU,

[1]Normalised Herfindahl-Hirschman Index: $HHI = \frac{\left(H-\frac{1}{n}\right)}{\left(1-\frac{1}{n}\right)} (0 \leq H \leq 1)$, where: H is the Herfindahl-Hirschman index of geographical diversification, n = number of export countries.

Table 1. Distribution of Spanish food, drink and tobacco industry exports by destination regions, 1980–2016 (in percentages).

Year	EU	%	OECD	%	Rest of the World	%
1980		**46.50**		**21.75**		**31.76**
	United Kingdom	13.38	USA	11.20	Lybia	5.57
	The Netherlands	8.25	Switzerland	3.34	Algeria	2.81
	Germany	8.09	Canada	1.74	Venezuela	2.51
	France	5.17	Mexico	1.43	Morocco	2.45
	Italy	4.09	Turkey	1.43	Andorra	2.34
1990		**64.10**		**22.04**		**13.86**
	Italy	17.81	USA	11.26	Andorra	2.81
	France	11.90	Switzerland	2.72	Algeria	1.99
	Germany	9.10	Turkey	2.02	Brazil	0.99
	United Kingdom	8.20	Mexico	1.51	Saudi Arabia	0.70
	The Netherlands	5.55	Canada	1.28	Tunisia	0.62
2000		**69.26**		**16.51**		**14.24**
	France	16.53	USA	8.54	Russia	1.40
	Italy	12.55	Switzerland	1.50	Andorra	1.13
	Portugal	11.46	Japan	1.42	Saudi Arabia	0.73
	Germany	8.60	Mexico	1.00	Morocco	0.69
	United Kingdom	7.85	Japan	1.00	Lybia	0.67
2010		**71.12**		**14.00**		**14.88**
	France	17.02	USA	6.17	Russia	1.93
	Italy	13.55	Switzerland	1.57	Emirates A.	1.21
	Portugal	12.81	Mexico	1.35	Andorra	0.99
	Germany	7.96	Japan	1.21	China	0.93
	United Kingdom	7.80	Japan	0.89	Saudi Arabia	0.87
2016		**66.79**		**14.79**		**18.40**
	France	16.93	USA	5.75	Emirates A.	1.63
	Portugal	11.80	Switzerland	1.91	Saudi Arabia	1.50
	Germany	9.08	Mexico	1.76	Andorra	1.09
	United Kingdom	8.42	Japan	1.34	China	0.94
	Italy	6.38	Canada	1.18	Russia	0.91

Source: UN-COMTRADE (2018).

to take second place in around 2016. The process of redirecting flows towards the region especially affected other countries in the OECD, which have gradually decreased in importance, especially the USA in the last decade. Also noticeable is the recent rising trend in exports to other countries outside the EU, namely Russia, China and the Middle East, although their share is still relatively small. This integration process and its effects on the foreign trade of agri-food products have been addressed in some studies. Research has been focused on the impact of liberalising trade barriers (Contreras & Bacaria, 2000; Sanz & Gil, 2001; Gil Pareja *et al.*, 2005; Selva & Álvarez-Coque, 2011). More recent studies have shown the presence of the home market effect to be a key factor in the upsurge of Spanish agri-food exports (Clar *et al.*, 2015; Serrano *et al.*, 2015).

To sum up, the internationalization of Spanish agri-food companies has increased, especially in exports to traditional European markets, due to a significant decrease in transaction costs in these markets from the removal of trade barriers and the uniformity of food safety standards in the region. Although Spanish companies are increasingly exporting to more countries, it is only recently that the geographical diversification of Spain's exports can be considered of any significance. The recession in Europe has led Spanish firms to try to increase their sales in markets that differ greatly from their traditional ones, *e.g.* the Middle East, China and Russia. However, companies operating outside the

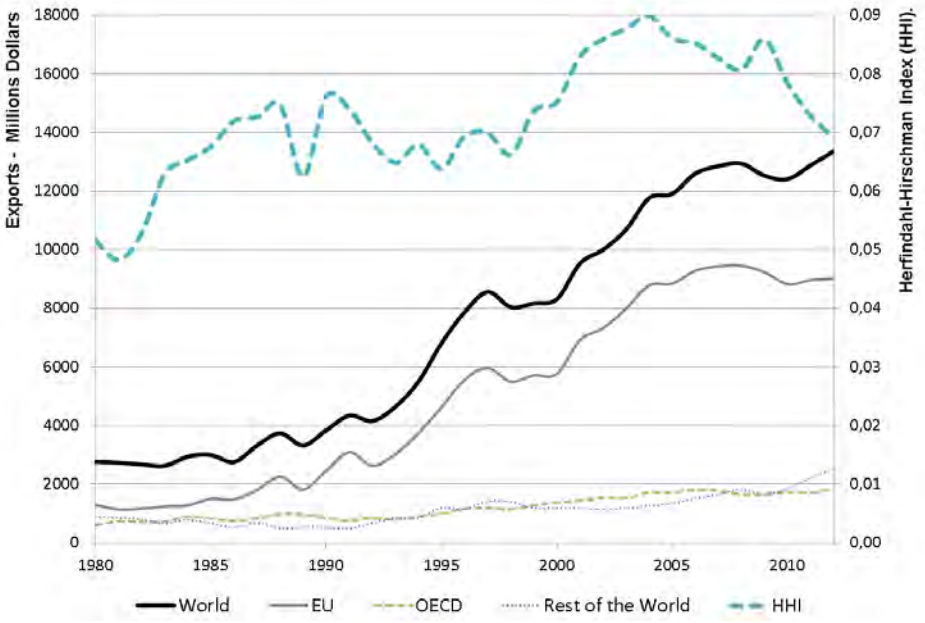

Figure 1. The development of exports in the Spanish food, drink and tobacco industries between 1970 and 2012 (millions of 2005 US dollars) and normalised Herfindahl-Hirschman Index (HHI). Source: UN-COMTRADE (2018).

European region are confronted with highly protected markets commercially and the steep costs of adapting products to local regulations (Serrano & Pinilla, 2011).

Theoretical framework

This section covers the process of company internationalization from a dynamic perspective. According to the Uppsala Model (Johanson & Vahlne, 1977), the internationalization of companies follows a sequential process that depends on the gradual accumulation of knowledge of external markets. Johanson & Vahlne (1977) acknowledge the costs of acquiring foreign market knowledge. Early internationalizations have large learning costs because of unfamiliarity with foreign markets, cultures and environments (Johanson & Vahlne, 1990). To explain the expansion of operations into new markets, the Scandinavian school used the concept of 'psychological distance', comprising a set of barriers that hinder a company's internationalization.

This model, together with the learning by exporting theory, presents the benefits of internationalization: the appearance of new business opportunities as new commercial relationships are established, while the existing ones are exploited (Johanson & Vahlne, 1990). Furthermore, following the theory of transaction costs, exporting companies face the costs of entering new markets and increased coordination costs arising from international expansion. The Uppsala school used the concept of 'psychological distance', comprising a set of barriers that hinder a company's internationalization (Johanson & Wiedersheim-Paul, 1975). According to the Uppsala model, firms first choose to enter nearby markets in terms of psychological distance with low market commitment, followed by subsequent entries into markets with greater psychological distance. In other words, internationalization is an evolutionary process linked to better knowledge and stronger commitment to foreign markets.

The negative effect in the initial stages and the high coordination costs of some over-internationalized firms form the basis of the three-stage theory of international expansion that some authors have proposed for other sectors (Contractor *et al.*, 2003; Lu & Beamish, 2004).

A variety of benefits stem from the geographical expansion of company operations. An incremental focus and obtaining economies of scale, scope and experience are probably the most common reasons in the literature to explain why companies internationalize. Investment in the company's property, plant and equipment and costs sunk into overseas expansion require companies to have a minimum volume of operations to reach the profitability threshold. Increasing the intensity of international operations and entering new markets sequentially form the usual procedure to achieve economies of scale. In some cases, the increase in results arose from the opportunity to use several assets across product families (economies of scope). Lastly, as mentioned above, as companies increase their foreign operations, they acquire more market knowledge, which translates into taking advantage of economies of experience. From an incremental point of view, an

increase in the volume of operations abroad results in a decrease in the mean cost.

A second group of arguments that are well documented in the literature can explain the international expansion of companies. These include: diversification of risks (Annavarjula & Beldona, 2000) by operating in markets with a changing cycle, for example; improving performance by leveraging specific assets abroad, for example exploiting the competitive edge of innovations in various markets (Buckley, 1988; Caves, 1996; Delios & Beamish, 1999); and obtaining benefits from exploiting market imperfections (Caves, 1971).

Following the theory of transaction costs, companies immersed in an internationalization process face the costs of entering new markets and an increase in coordination costs arising from international expansion.

On the one hand, related to the 'psychological distance' concept, companies tackle markets they do not know. In the initial stages especially, companies incur 'research and information costs' since they have to spend time and effort on researching the target market and adapting their products to local consumer tastes and very diverse regulations. On the other, they also incur an increase in 'negotiation and decision costs' as they have to contact intermediaries, compile information on offers, travel to establish trade networks, decide, negotiate, draft contracts and take out risk cover.

Lastly, as the company increases the volume of its foreign operations and diversifies, it incurs more 'supervision and control costs' to comply with agreed conditions. Transaction costs rise, especially in very distant markets, and transport costs are also steep, since the environments differ greatly and the barriers to market entry, associated with trade protection policies or a wide variety of regulatory and technical reasons, are difficult to overcome. For some authors, the key to decreasing coordination costs is the stability of the regulatory framework, or compliance with the guarantees of property rights.

Internationalization, therefore, is the consequence of a process of incremental adjustments to the changing conditions of the company and its environment (Johanson & Vahlne, 1977). The issue of whether there is a positive relationship between internationalization and performance, or whether there is an optimal degree of internationalization are very controversial subjects (Hsu *et al.*, 2013; Powell, 2014). Ruigrok & Wagner (2005) and Wagner (2012) reviewed papers covering this aspect with very disparate results. Some have a positive linear relationship, others a negative effect, and yet others curvilinear U-shaped or inverted U-shaped relationships with a positive or negative effect based on the company's degree of internationalization.

In an attempt to synthesise previous research, some authors have proposed a horizontal S-shaped relationship between performance (y-axis) and internationalization (x-axis) (Contractor *et al.*, 2003; Lu & Beamish, 2004; Li, 2005). Contractor *et al.* (2007) classified companies into various stages depending on their degree of internationalization: new exporters (Phase 1) are firms that have just started expanding abroad and are facing the initial costs of crossing the border; mature exporters (Phase 2) are companies intensifying the internationalization process and reaping positive benefits from an increased volume of business; and lastly, highly internationalized firms (Phase 3) are companies whose export and geographical diversification have grown to the extent that they face additional costs arising from greater management complexity. Consequently, firms in the third phase revert to a negative effect on their performance.

The three phases of the internationalization process of the agri-food exporter

First phase (negative slope)

As is well known, international markets represent an important source of new opportunities for improving firm performance. Most of these opportunities are derived from the resource-based view of the firm, since international expansion gives the firm the chance to explore the interdependencies between business units, developing new capabilities and creating a competitive advantage.

Despite these benefits, operating across countries usually creates several new costs for the firm. In the early stages these costs are associated with the liability of foreignness. The most important relate to distance (transportation, coordination at a distance and over time zones, etc.), and the company's lack of familiarity with the destination's markets and legal systems (Zaheer, 1995). The importance of these liabilities of foreignness depends of the different cultural values, levels of development, quality of institutions, and the skills and experience of the firm in foreign markets (Hitt *et al.*, 2006). The international expansion of firms involves entering unknown markets and incurring an increase in transaction costs. Firms face costs in seeking information, researching markets (Hofstede, 1980), visiting sales representatives and intermediaries, negotiating contracts and supervising compliance. The cost of this learning goes together with an increase in coordination and communication costs (Rosenzweig & Singh, 1991).

From the sector's point of view, the food exporter also needs to adapt the product to technical safety and quality standards, to the requirements of a new label, a

new language in some cases, and the logistics needed to preserve products, since some are perishable. Firms face steep initial costs in this first stage, which narrow their margins. Implicit behind this argument is the incremental internationalization theory proposed by Johanson & Vahlne (1977). Obviously, many costs will occur at any stage in international expansion. However, in terms of impact on performance, the negative influence in this first phase is greater, since the initial high costs are distributed over a volume of business that is still very small. Consequently, the negative effect on performance caused by reduced margins in the first phase, comes from a combination of the steep initial costs of crossing the frontier and an insufficient scale.

Second phase (positive slope)

In the second phase, the company benefits from the different opportunities arising from international operations. The firm advantages to the firm are the economies of scale, scope and experience linked to more foreign activity (Buckley & Casson, 1976; Caves, 1996). Furthermore, as in the other stages, it is well documented in the literature that internationalized companies perform better due to the diversification of risks (Annavarjula & Beldona, 2000), leveraging of specific assets abroad (for example innovations), which are the source of competitive advantage (Buckley, 1988; Caves, 1996; Delios & Beamish, 1999).

Economies of scale occur when activity leads to an increase in profits through greater production factor specialization (technological know-how, organizational know-how, brand names). Following Ghoshal (1987), scale can foster dynamic benefits such as experience and the learning effect because higher volumes allow for progressive cost reduction.

Expanding international volumes can also lead to the appearance of economies of scope as a result of the common use of production factors (assets, know-how and brand names) above and beyond the potential offered through product diversification (Grant *et al.*, 1988; Kim *et al.*, 1993; Caves, 1996).

Hamel & Prahalad (1985) and Kim *et al.* (1993) have also shown that market diversification provides a firm with multiple national market bases from which it can retaliate against any aggressive moves by its competitors, therefore reducing its risk.

Another advantage of international expansion is the learning effect of operating in different markets and the ability to develop more diverse capabilities. Thus, international diversity fosters innovation and prepares firms for achieving good results in dynamic environments (Kogut, 1983; Ghoshal, 1987; Kim *et al.*, 1993).

The agri-food firm in these phases has already overcome initial product adaptation costs, has established more stable distribution networks and can diversify geographically by taking advantage of economies of scale and scope. The positive effects of international expansion occur once the firm has crossed the threshold of necessary business, after the export volume that reduces the mean cost of the operations has been reached, and it has also accumulated experience to exploit opportunities in other nearby markets, in this case, slow but steady expansion throughout the European region.

Third phase (return to a negative slope)

Despite the fact that the costs of exporting to new markets tend to reduce as international activity increases, some new costs appear which are associated with the greater geographical dispersion of operations. Following the theory of transaction costs, geographical dispersion increases managerial information and processing demands. Coordination between units, essential in the exploitation of economies of scope and scale, becomes much more difficult, and firms must develop a strong ability to manage their global needs.

Highly geographically diversified companies again leading to a negative performance slope due to a new reduction in margins. There are several reasons for this. Some authors highlight the increase in coordination costs associated with geographical dispersion as they have to deal with several different regulations (Sundaram & Black, 1992). Others emphasise that directors face more complexity (Grant, 1987), information overload (Hitt *et al.*, 1997), loss of information or distortion in governance (Hoskisson & Turk, 1990). Lastly, the institutional and cultural diversity of entering more diverse environments has a negative influence on costs (Bartlett & Ghoshal, 1989). Following Contractor *et al.* (2003) and the Uppsala school's 'internationalization theory' hypothesis, over-expanding (over-diversified) firms face incremental costs of further expansion into peripheral nations (smaller and less profitable markets) and the growth of coordination and governance costs may exceed the benefits of further expansion, because of the complexity of global operations.

The food trade is also subject to a series of special characteristics that can help us understand the negative slope faced by companies in this last phase. As mentioned above, it is a highly protected sector and regulated outside the frontiers of regional blocks (Serrano & Pinilla, 2014). Therefore, companies that decide to export on a more global scale face higher costs due to an increase in trade barriers. If we add in the higher cost of operations resulting from a longer physical and psychological distance, and that

in some cases geographical diversification occurs in very small markets, the outcome is lower margins in foreign operations. The recent literature analysing the determining factors in international trade flows, generally using gravity models, has highlighted the importance that distance, as a proxy for transport costs and other associated costs, continues to have in the current second wave of globalization (Jacks *et al.*, 2011). Also in the case of agri-food products, there is clear evidence in the same direction (Serrano & Pinilla, 2012, 2014). Finally, also for Spanish agri-food exports, a recent study using gravity models has shown that for the existing 13 agri-food subsectors, between 1970 and 2012 and with a destination of 175 markets, distance is significant and has a negative coefficient (Serrano *et al.*, 2015). In other words, trading to distant destinations entails additional costs. This is not surprising, as there is empirical evidence that for agri-food products, transport costs have remained fairly stable over the long term in the second globalizing wave (Serrano & Pinilla, 2010).

In this context, this paper proposes to test the following hypothesis:

Hypothesis 1: The relationship between internationalization and performance in food companies results in a horizontal S-shaped curve graph representation (performance y-axis - internationalisation x-axis) **with three phases:**

−In the **first phase**, the degree of internationalization has a negative impact on company performance.

−In the **second phase**, the degree of internationalization has a positive impact on company performance.

−In the **third phase**, the degree of internationalization has a negative impact on company performance.

Database

The data we used came from the ESEE (Fundación SEPI, 2014), a panel survey on business strategies conducted by the SEPI Foundation backed by the Spanish Ministry of Industry. This survey provides information on the strategies of Spanish manufacturing companies for the 1990–2012 period. The ESEE has already been used in several other papers. These have highlighted its representativeness as a sample and its unique information on business strategy. In our case, it contains relevant information on the internationalization of companies.

The empirical work uses a longitudinal panel between 1994 and 2012 comprising companies in the following business sectors: (1) meat industry; (2) food and tobacco products; and (3) beverages. The three groups selected from the ESEE correspond to the groups in the food, beverages and tobacco industry contained in NACE-2009.

Econometric model

—Dependent variable: in the majority of studies, company performance is based on ROA, which is also the dependent variable used in this study. It is an indicator of how profitable a company is relative to its total assets. ROA gives an idea of how efficient a company's management is at using its assets to generate earnings: ROA=Net Income/Total Assets. In order to ensure the robustness of our results, we estimated an additional model using Return on Sales (ROS) as an alternative dependent variable. ROS is a ratio used to evaluate a company's operational efficiency, also known as the operating profit margin: ROS= Operating Profit / Net Sales. This is the profitability indicator presented by ESEE, which is earnings before interest, taxes and depreciation of sales. Some previous studies have already used this indicator successfully (Almodóvar, 2012; Almodóvar & Rugman, 2014; Fernández-Olmos & Díez-Vial, 2015).

—Independent variables: defining and measuring the degree of internationalization has become a controversial and unresolved issue among international business researchers (Fernández-Olmos and & Díez-Vial, 2015). Since the degree of internationalization refers to the performance of a firm in foreign markets several authors have argued that a proxy must be found to measure the dimensions of the geographical scale and scope of foreign operations (Grant, 1987; Sullivan, 1994).

In order to reflect the internationalization process of the firms selected for our study, we designed an operational measure combining both the geographical scale and scope of their foreign operations (Degree of Internationalization or DOI). In particular, we focused on exports instead of foreign direct investment, since exporting is their primary vehicle of internationalization.

The foreign sales ratio, defined as the ratio of a firm´s foreign sales to its total sales, is the most commonly used variable for capturing the geographical scale of foreign operations (see for instance Grant *et al.*, 1988). In order to capture the geographical scale of foreign operations, some researchers have used the number of export countries as a proxy for internationalization (Delios & Beamish, 1999). However, this measure is significantly limited, as it does not distinguish between the markets, either in terms of intensity of the market or distance of the market from the home country (Pangarkar, 2008). Therefore, this measure makes it difficult to accurately assess the extent of a firm´s international activities (Kim *et al.*, 1989). To correct this deficiency, other measures of internationalization have also been used, such as the number of dissimilar geographical regions in which the firm operates. For example, Kim *et al.* (1989) and Hitt

et al. (1997) used an entropy index weighted by foreign sales which includes not only the multiplicity of foreign markets, but also the extent to which a company's activities are spread across similar foreign countries within regions (Qian *et al.*, 2010).

Based on the previous reasoning, this paper uses a measure that considers both the traditional proportion of the foreign sales variable and the dispersion of foreign sales across geographical regions, as shown in the equation below. Other authors that have used similar indexes are Grant *et al.* (1988), Pangarkar (2008), Fernández-Olmos (2011) and Fernández-Olmos & Díez-Vial (2015).

$$DOI = \frac{Proportion\ of\ foreign\ sales}{\sum_{i=1}^{n}\left(Proportion\ of\ sales\ in\ region_i^2\right)\ (0 \le H \le 1)}\ x\ 100$$

The denominator in this measure is calculated by the sum of the squared percentage of foreign market shares in each region (*i.e.*, proportions are based on foreign sales and not total sales, which adds up to 1.0). It is similar to the HHI, a commonly accepted measure of market concentration. We applied the criteria used by the ESEE, which groups the world environment into three different regions: EU, OECD and Rest of the World. To study the effects of the degree of internationalization in its various phases, DOI is entered into the model to analyse the effects in the first phase. **DOI^2** for the second phase and **DOI^3** for the third and last phase. A summary of the variables, measures and expected direction of influence on the business results is shown in Table 2.

—Control variables: obtaining a robust result from the relationship between the degree of internationalization and performance requires a control mechanism using variables that can also affect the firm's results. Thus the empirical model includes the approximate size of the company **(Size)**, using the logarithm of the number of employees at the firm; a positive influence on the result is expected (Acedo & Jones, 2007; Richter, 2007).

We also used the **Age** of the firm as a control method. The effect of the age of a firm during internationalization is ambiguous. On one hand, older companies are usually more stable than younger companies in their provision of resources; therefore, they have more capacity (Zahra & George, 2002). Young firms, on the other hand, are not as rigid, and they have the advantages of the learning effect (Autio *et al.*, 2000; Sapienza *et al.*, 2006). Age is calculated by the number of years (plus one) from the year the firm was established up to the year in which the survey is carried out (Anderson & Reeb, 2003).

In accordance with Dunning's resource theory and eclectic paradigm, firms with unique intangible resources can exploit their advantage in foreign markets (Lu & Beamish, 2004). Consequently, the model includes the **Innova Product** and **Innova Process** variables by means of two fictitious variables, which take the value 1 if the firm has introduced a new or significantly improved product or process respectively, and zero if not. The model also includes the intensity of the firm's marketing activities (**Int_ADV**). This is approximate based on the quotient resulting from the firm's communication costs divided by total sales (one example in Qian *et al.*, 2010).

Finally, we control for the regional operations of the firm with a dummy variable for each region (EU, OECD and Rest of the World), so (**Region**) is a dummy

Table 2. Model, variables, measures and expected effect on performance

$$Performance_{it} = \beta_1 + \beta_2\, DOI_{it} + \beta_3\, DOI^{\wedge 2}{}_{it} + \beta_4\, DOI^{\wedge 3}{}_{it} + \beta_5\, ln\_Size_{it} + \beta_6\, ln\_Age_{it} + \\ + \beta_6\, Int\_ADV_{it} + \beta_7\, Innovate\ product_{it} + \beta_7\, Innovate\ process_{it} + U_{it} \quad (1)$$

Variables	Measures	Expected effect
Dependent variables		
ROS	Return on Sales	
ROA	Return on Assets	
Independent variables		
DOI	1ª Phase. Degree of Internationalization	Negative
DOI^2	2ª Phase. Squared Degree of Internationalization	Positive
DOI^3	3ª Phase. Cubed Degree of Internationalization	Negative
Control variables		
l_Size	Logarithm of the number of employees	Positive
Age	Age of the firm	Ambiguous
Int_ADV	Advertising costs / Total sales	Positive
Innova product	(Dummy, Yes=1) Innovate Product	Positive
Innova process	(Dummy, Yes=1) Innovate Process	Positive

Source: ESEE (Fundación SEPI, 2014).

variable taking the value of one if firm i exported to region j in year t and zero otherwise.

Main features of the food exporters in the sample

The sample only includes exporting companies and, therefore, these were included in the empirical model. The turnover of these companies was considerably higher than non-exporting firms[2].

Table 3 contains the values of certain variables related to internationalization between 1994 and 2012. Looking at the variables in detail, it is observed that food exporters can be classified as large companies. In 2012, they employed a mean of 227 workers. Although size is a determining business characteristic in internationalization, innovation or marketing capacity are factors that influence a firm's growth strategies and the success of its international expansion (Altomonte & Nicolini, 2012). As seen in Table 3, food companies tend to invest in innovation. According to 2012 data, on average, around 20% of the surveyed exporters introduced product innovations during the year, and 41% process innovations. In 1998, for example, 4.6% of their sales was invested in advertising investment. These companies with an average age of around 36 years. Lastly, exporting companies allocate a higher volume of resources to marketing. Despite the recent drop, the percentage is always higher than the industry average.

Results

The estimation technique used is panel data, since it enables both variations between companies and time variations in the explanatory variables to be taken into account. Besides technical reasons, there are also theoretical ones for preferring estimations using panel data, as previous papers have outlined (Almodóvar, 2012). From this perspective, three types of panel data estimations are proposed; the first is ordinary least square (OLS) with the grouped panel; the second and third address the time variation by including random effects (REM) and fixed effects (FEM), respectively.

To determine which of the three models is the most suitable, we firstly proposed the Breusch-Pagan LM test for random effects. This test makes it possible to select between the OLS estimation of the grouped panel and the estimation with random effects. After testing, we concluded that the random effects are relevant, and, therefore, the estimation including these was preferable to the grouped panel estimation. To demonstrate that the estimation of fixed effects is a better method than OLS, we conducted the F significance test for fixed effects (FEM) (Greene, 2000). This test demonstrates that the FEM is more suitable than the OLS estimation of the grouped panel. Furthermore, the Hausman test reveals that the random-effect and fixed-effect estimators differ substantially and that the fixed-effect model better explains the sources of variation and, therefore, is more appropriate[3].

It is important to note here that, even after modelling heterogeneity in time and space, our aim was to overcome the limitations of previous research, which has only taken into account the variations between the units of observation (cross-section analysis). This study also examines the time variations within the observation units, using the panel data methodology. Panel data increases the efficiency of estimators and significantly reduces the potential problems caused by omitting variables. According to the Wald test (Greene, 2000), our model raises problems of heteroscedasticity. Furthermore, according to the Wooldridge test (Wooldridge, 2001), the estimation does not presents

Table 3. Spanish food company indicators.

	1994	1998	2002	2006	2012
ROS	0.11	0.94	0.86	0.10	0.81
ROA	0.21	0.09	0.99	0.94	0.06
DOI	29.6	34.8	32.2	30.2	35.9
Size	513.9	363.3	409.4	324.2	227.4
Age	33.9	35.6	36.2	36.2	36.7
Int_ADV (percentage)	4.7	4.6	4.9	3.5	2.7
Innova product (percentage)	33.6	30.9	31.1	31.1	20.1
Innova process (percentage)	42.6	44.7	35.6	42.2	41.0

Source: ESEE (Fundación SEPI, 2014).

[2]In 2010, average sales per exporting company amounted to 91.99 million euros, as opposed to 24.15 in for non-exporting firms (ESEE).
[3]Table S1 [suppl] shows an example of the econometric process and the test results, for the three-phase model with the dependent variable ROS.

Table 4. Results of the FEM regression with PCSE. Prais-Winsten estimation with PCSE and fixed effects. Errors are presented in brackets.

	First-Phase		Second-Phase		Third-Phase		Fourth-Phase	
Variable	**(1) ROS**	**(2) ROA**	**(3) ROS**	**(4) ROA**	**(5) ROS**	**(6) ROA**	**(7) ROS**	**(8) ROA**
DOI_t	0.0149 (0.0164)	-0.0002 (0.0001)	0.0043 (0.0250)	-0.0006 (0.0004)	-0.0985* (0.0482)	-0.0022* (0.0009)	-0.1507* (0.0671)	-0.0042* (0.0016)
$DO\hat{}2_t$	…	…	-0.0000 (0.0001)	2.23e-06 (1.89e-06)	0.0013* (0.0006)	0.0001* (9.42e-06)	0.0025* (0.0013)	0.0001* (0.0000)
$DOI\hat{}3_t$	…	…	…	…	-3.43e-06* (1.80e-06)	-6.05e-08* (2.45e-08)	-0.0000 (9.55e-06)	-3.87e-07* (1.68e-07)
$DOI\hat{}4_t$	…	…	…	…	…	…	1.84e-08 (2.04e-08)	6.94e-10 (3.28e-10)
l_Size_t	1.5944** (0.9272)	0.0201 (0.0177)	1.582** (0.9241)	0.0195 (0.0176)	1.5258* (0.9113)	0.0192* (0.0175)	1.4978* (0.9148)	0.0183* (0.0174)
l_Age_t	-2.1748* (1.0948)	-0.0709** (0.0169)	-2.1446* (1.094)	-0.0695** (0.0170)	-1.9287* (1.0731)	-0.0665** (0.0170)	-1.8950* (1.0756)	-0.0656** (0.0174)
Int_ADV_t	-0.0080 (0.0158)	-0.0001 (0.0003)	-0.0079 (0.0158)	-0.0001 (0.0003)	-0.0070 (0.0157)	-0.0001 (0.0003)	-0.0072 (0.0157)	-0.0001 (0.0003)
Innova product$_t$	1.5674** (0.6148)	0.0433** (0.0141)	1.5562** (0.6158)	0.0430** (0.0141)	1.4869** (0.6164)	0.0419** (0.0141)	1.4880* (0.6165)	0.0419** (0.0140)
Innova process$_t$	-0.3589 (0.5389)	-0.0048 (0.0107)	-0.3551 (0.5377)	-0.0046 (0.0107)	-0.3590 (0.5364)	-0.0045 (0.0106)	-0.3478 (0.5377)	-0.0040 (0.0106)
Constant	14.9610* (6.4865)	0.0425 (0.1235)	15.0081* (6.4671)	0.0540 (0.1231)	15.4669** (6.3334)	0.0592 (0.1224)	15.8216** (6.3323)	0.0733 (0.1214)
Regional dummy	+	+*	+	+*	+	+*	+	+*
Nº of Firms	342	327	342	327	342	327	342	327
Nº of Observations	2644	2565	2644	2565	2644	2565	2644	2565
R^2	0.478	0.323	0.478	0.323	0.480	0.325	0.480	0.326
Prob>χ^2	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000

ROS: return on sales. ROA: return on assets. ** and * denote 1% and 5% of the level of statistical significance, respectively.

autocorrelation problems. Problems were solved using the Prais-Winsten estimation with panel-corrected standard errors (PCSE) and fixed effects.

Once the specification problems of the estimators were solved, the models worked well, explaining 45.4% of variations in performance. Columns 1-8 of Table 4 contain the coefficient, standard errors between brackets and the statistical significance of the variables (at *** 1%, ** 5% and * 10%) by means of the FEM Prais-Winsten estimation with PCSE.

Columns 1 and 2 propose a model for only one phase in the internationalization process for companies. Columns 3 and 4 propose a model for two phases, which includes DOI and squared DOI. Columns 5 and 6 present the model with three phases which includes cubed DOI as well as DOI and squared DOI. Lastly, columns 7 and 8 present the option of a four-phase model, which includes DOI raised to four as well as DOI, squared DOI and cubed DOI.

As shown in columns 5 and 6, the variables **DOI_t**, **$DOI\hat{}2_t$**, and **$DOI\hat{}3_t$** are statistically significant with the expected sign with both performance measures (ROS and ROA). No significance was found in **DOI_t** in models 1 and 2 (one-phase models) and in **DOI_t $DOI\hat{}2_t$** in models 3 and 4 (two-phase models). Columns 7 and 8 show that the four-phase models cannot be accepted, as the variables **$DOI\hat{}3_t$** and **$DOI\hat{}4_t$** are not significant for the model with ROS as dependent variable and **$DOI\hat{}4_t$** for the model with ROA as dependent variable. This validates the hypothesis of the internationalization model in three phases and the horizontal S-shaped relationship, since **DOI_t** presents a coefficient with a negative sign, **$DOI\hat{}2_t$** a positive coefficient and **$DOI\hat{}3_t$** again presents a coefficient with a negative sign. We must be somewhat cautious with these results, due to the limitations posed by the sample of companies used, and the fairly weak explanatory power of the models.

Figure 2 presents a horizontal S-shaped (or sigmoid curve) relationship between the degree of internationalization and performance in a Spanish food exporter. We found companies in the first phase tackling the initial costs of internationalization, resulting in

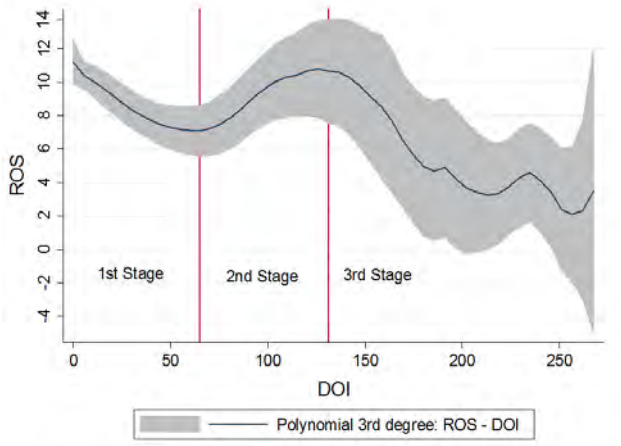

Figure 2. The three phases of the Agri-food exporter.

a decrease in their margins and performance. The second phase contains mature companies with a more advanced internationalization process that reap the benefits of operating on a larger scale. Lastly, the third phase contains highly geographically diverse agro-exporters whose performance is falling because of reduced margins. This is related with the idea that exporting firms enter markets with successively greater psychological distance. This concept refers to the cultural, linguistic, institutional, developmental level and other dimensions differentiating a firm´s country of origin and other countries to which it exports. In particular, these differences can give rise to costs associated with a need to adapt to local contexts, where the perceived uncertainty is high. For this reason, firms start exporting by going to those countries they can most easily understand. From the results in Table 4, we were able to obtain our critical points. Using the same equation system, we calculated that the optimal levels for the ratio of DOI were between 73.19 and 113.57, which illustrates a relationship that is initially negative until the intensity of internationalization reaches 73.19, then positive as internationalization increases to 113.57. Beyond this threshold of 113.57 a greater level of internationalization is associated with weaker performance.

All the models provided the same results for the control variables. As predicted, the size of the company is the determining variable in better performance. The coefficient of the size variable, which is an approximation based on the number of employees, has a positive sign and statistical significance. Furthermore, exporting companies with product innovation return better business results (Table 4, see row 7, column 3) statistical significance and coefficient of the **Innova product** variable). However, the **Age** variable includes a negative effect on company performance. As already mentioned, previous papers also have already demonstrated this effect. The other variables, **Int_ADV** and **Process innovation** contain neither a positive effect nor statistical significance. The results of the marketing intensity variable are in line with Caves's (1981) argument that marketing does not play a determining role outside national borders. The lack of significance of the process innovation variable corroborates the new trade theories that emphasise product innovations above process innovations.

Discussion

This study researched into the relationship between the degree of internationalization and company performance for a uniform sample of agro-industry firms. The debate continues to be open, since the results from previous papers vary. With the sample of companies used, we have conclusively confirmed the existence of a horizontal S-shaped relationship between internationalization and performance for Spanish food exporters. Secondly, in line with the recent literature, we studied the influence of the degree of internationalization with a measure that combines export intensity and regional diversification. Lastly, this paper specifically studies the food industry, and the number of prior studies on this sector is very low. Taking into account the type of transaction costs agri-food companies face, our results show a horizontal S-shaped relationship between internationalisation and performance. Our work shows that internationalization by a Spanish food firm is more regional than global. The results specifically show how international geographical over-diversification reduces company margins for food exporters. As described above, operations on a more global scale outside the regional sphere increase transaction and coordination costs.

The study also highlights certain limitations that open up interesting areas for possible lines of research. The first limitation refers to the dependent variables that were used. The study uses the ROS margin and, alternatively, ROA. Although these financial measures capture the company's general performance, other measures could be used in the future, such as survival or economic profitability (ROE).

Although our work, in line with the most recent literature, included three regions to study the degree of geographical diversification, there is obviously a large variety of countries worldwide, each with their own particular characteristics. Future studies could also include data per country to generalise the results. Future studies could also examine de-

internationalization stages. Some scholars suggest viewing cross-border activity as a process between internationalization and de-internationalization (Welch & Luostarinen; 1988; Calof & Beamish, 1995; Benito & Welch, 1997; Turcan, 2003). As markets become less attractive, the company may decide to leave these and focus efforts on more profitable markets where the volume of exports is higher.

Identifying the effects of the internationalization of agri-food firms on their performance also entails several theoretical and managerial implications. It is crucial for the directors of the companies in the industry to understand the three phases of the process we have presented here, and for them to pay special attention to the two phases in which performance is low. The first is related to the initial costs of exporting and the lack of dimension to cover the profitability threshold. The second concerns the costs associated with adapting to very different cultural and institutional environments and to the major barriers companies in the sector are confronted with when they enter new markets.

Furthermore, the results presented here could be interesting for policymakers designing and implementing export programmes for agri-food firms. Policies should include assistance at the start of the internationalization process and an attempt to prolong the strategy until the volume of business is sufficient to start showing an increase in performance. They should also prepare companies for the low performance in the third phase. The policies could possibly promote networking between Spanish and foreign companies to reduce the costs of more global internationalization strategies.

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