

**THE INTERNATIONALISATION OF THE SPANISH FOOD INDUSTRY, 1970-2012:
THE HOME MARKET EFFECT AND EUROPEAN MARKET INTEGRATION**

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**LA INTERNACIONALIZACIÓN DE LA INDUSTRIA ALIMENTARIA ESPAÑOLA, 1970-2012:
CRECIMIENTO DEL MERCADO DOMESTICO E INTEGRACIÓN EN EL MERCADO EUROPEO**
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RESUMEN

El objetivo de este trabajo es analizar los factores determinantes del proceso de internacionalización de la industria agroalimentaria española desde una perspectiva de largo plazo. El trabajo se ha centrado en verificar empíricamente la existencia de home market effect en las industrias de la alimentación y bebidas en España y en los efectos en los flujos comerciales de la integración en la Unión Europea. Para ello se ha estimado una ecuación de gravedad para una muestra de flujos de exportación de 13 subsectores agro-alimentarios entre 1970 y 2012. Destaca como factor determinante del creciente proceso de internacionalización en la mayoría de los subsectores de la industria alimentaria, la existencia de home market effect. La presencia de este efecto fue más importante en las industrias, donde el proceso de reestructuración propiciado por el desarrollo del mercado interno fue más intenso. Además, la influencia del proceso de integración europeo se ha mostrado como un factor muy importante. Nuestros resultados matizan los de trabajos previos, ya que el efecto positivo fue más tardío de lo que cabría pensar. Los efectos positivos no aparecieron hasta no haberse completado el proceso de transición en el desmantelamiento de las barreras arancelarias fijado en el tratado de adhesión.

Palabras clave: Comercio agrario, industria agroalimentaria, modelo de gravedad, efecto mercado domestico, heterogeneidad empresarial, acuerdos regionales de comercio.

ABSTRACT

The objective of this study is to analyse the factors determining the process of internationalisation of the Spanish agrifood industry from a long-term perspective. The paper concentrates on the empirical verification of the existence of a home market effect and on the effects on trade flows of integration into the European Union. With this aim in mind, we estimate a gravity equation for a sample of export flows from 13 agrifood subsectors between 1970 and 2012, with a destination of 175 markets. The existence of the “home market effect” stands out as the determining factor of the increasing process of internationalisation in the majority of the subsectors of the food industry. The presence of this effect is remarkable in the most dynamic industries, where the process of restructuring caused by the development of the internal market was more intense. Furthermore, the influence of the process of European integration has been shown to be a very important factor. Our results qualify in part the results of previous studies, since the positive effect appeared later than expected. The positive effects did not appear until the completion of the process of transition in the dismantling of the barriers established in the accession treaty.

Keywords: Agrifood trade, agrifood industry, gravity model, home market effect, firm heterogeneity, regional trade agreements.

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The internationalisation of the Spanish food industry, 1970-2012: the home market effect and European market integration*

Introduction

Intra-industrial trade has undergone a considerable increase in recent decades. The models proposed by Krugman (1980) and Helpman and Krugman (1985) permit the causes of this expansion to be understood; they describe a market with a great number of companies, each of them producing a differentiated product without barriers to entry. The key prediction of this model is that trade liberalisation among countries leads to a higher degree of competition, provoking the exit from the market of some companies, while those remaining expand their production by taking advantage of economies of scale.

Thus, in accordance with Krugman (1980), a large domestic market means an increase in the supply of differentiated products, which will subsequently be exported, permitting companies to undertake greater economies of scale. This phenomenon, termed the home market effect (HME), generates a reorganization of resources towards the more efficient companies and encourages the localisation of multinationals in those markets which offer a greater potential for growth. Given this context, the processes of trade liberalisation are exploited by companies with higher levels of productivity, thereby becoming exporters, while those whose productivity is lower either exit from the market or limit themselves to merely serving the domestic market (Roland-Holst, et al., 1995). The existence of fixed costs to entry into the export markets (such as the acquisition of information regarding consumer tastes, diverse regulations, the establishment of trade networks, etc.) means that only those firms with expectations of profits are those which become exporters (Melitz, 2003). This would explain why only a small percentage of companies become exporters (Bernard *et al.*, 2007). Here, Melitz&Ottaviano (2008) construct a model which, allowing for business heterogeneity, predicts how the liberalisation of trade, associated to a greater size of the domestic market, induces a sectorial process of the self-selection of firms.

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From the mid-1990s on, it has been observable that companies, even within the same industry, are very different; this heterogeneity could play a very important role in the explanation of overall results. Yeaple (2005) and Melitz&Ottaviano (2008) have shown, through these new models of heterogenous companies, the links between market liberalisation and the growth of the competitiveness of industries.

The Spanish economy, since its incorporation into the European Union, has participated in the principal characteristics described above: strong growth of the domestic market, a profound liberalisation of exchanges and, above all, increasingly elaborated products destined to high-income markets. Some studies have shown the presence of the HME to be a key factor in the upsurge of Spanish manufacturing exports (Claver *et al.*, 2011). However, few studies have analysed the long-term effects of the growth of the domestic market as a determinant of exports in the agrifood industry. For the European case, Olper *et al.* (2013), Chevassus-Lozza and Latouche (2011) have shown that the abovementioned effect of selection in the food industry has been driven by the growth of the domestic market.

For the Spanish agrifood sector, however, academic debate has focused on the effect of the liberalisation of the barriers to trade with Spanish incorporation into the EU, paying little attention to other factors which also favour the expansion of such trade (Sanz., 2000; Gil-Pareja *et al.*, 2005, Contreras and Bacaria, 2000; Sanz and Gil, 2001; Selva and Álvarez-Coque, 2011).

Given this context, and using as a base the theoretical proposals of the New Theory of International Trade, we are interested in explaining the causes behind the process of the internationalisation of the Spanish agrifood industry. Specifically, this study will attempt to measure the impact of the growth of the domestic market on this process of internationalisation. As explained above, market liberalisation also plays an important role in the process of company reorganisation. Consequently, we shall link the HME to the possibilities for international expansion offered by Spanish accession to the European Union (EU).

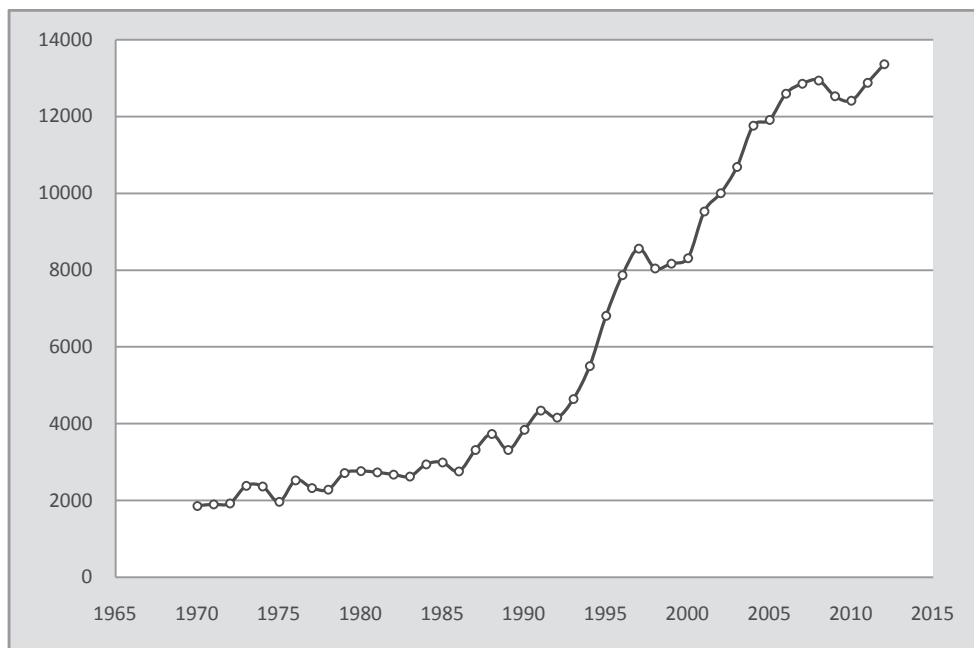
To this end we shall use the exports of the Spanish agrifood industry, estimating gravity equations for 13 agrifood sectors with exports destined to 175 countries, in the period 1970-2012. The gravity model for trade is probably one of the most successful empirical

applications in international economics and has been used profusely, since the pioneering article by Tinbergen (1962), to analyse aspects of great importance such as: the impact on trade of the GATT/WTO system (Rose, 2004); regional trade agreements (Baier and Bergstrand, 2007); non-reciprocal trade agreements (Gil-Pareja *et al.*, 2014); exchange rate systems (Klein and Shambaugh, 2006); or monetary unions (Rose, 2000). The present study makes an additional contribution to the literature on the HME, applying a gravity specification for the disaggregated flows of trade in the food and drink industry, from a long-term perspective, and in a period in which an intensive process of liberalisation and growth occurred in the domestic market. Furthermore, we have taken into account the latest technical advances in gravity equation estimation, such that it has been controlled by factors such as “multilateral resistance”, “unobservable heterogeneity”, the heteroscedasticity of residuals and the existence of null values in the dependent variable, which various studies have shown to be very important (Haq *et al.*, 2012).

The internationalisation and concentration of the Spanish agrifood industry

The increase in the internationalisation of the food and drink industry in Spain has been spectacular, if it is analysed for the period 1970-2012; its exports have multiplied, by volume, more than seven-fold.

Graph 1. The evolution of exports from the Spanish food and drink industry, 1970-2012 (millions of 2005 US dollars)



Source: Authors' elaboration, on the basis of UN-Comtrade (2013)

The rhythms of growth of these exports, furthermore, have tended to accelerate. From 1970 until 1986 they increased smoothly. In 1986, the year of Spanish accession to the EU, their growth accelerated, and from 1992, the year which marked the end of the transitional period following this incorporation, the increase was notably faster. These data show that, apparently, integration into the European market notably benefited Spanish agrifood exports, following a general tendency among EU members, whose intracommunity trade had increased significantly from the beginning of the 1960s (Pinilla and Serrano, 2009; Serrano and Pinilla, 2011). This also meant a considerable increase in the quota represented by EU destinations within Spanish agrifood exports (Claret *al.*, 2015).

Such rapid growth was distributed unequally, however, among the distinct subsectors of the Spanish food industry. Perhaps it is most interesting to emphasise that the industries which initially had lesser weight in exports, such as meat products, dairy goods, the bread and pasta industries, confectionery and chocolate, non-alcoholic drinks and animal feed, were those which experienced the strongest growth, which in some cases doubled and almost tripled the average of the food industry. These were sectors which traditionally exported little and which elaborated products with a certain degree of sophistication, thereby having relatively high added value and also a strong income elasticity, despite being food products.

The opposite is true of those sectors which from well before the Civil War constituted the principal export base of the Spanish food industry: wine, oil and processed fruit and vegetable products (Medina, 2010; Pinilla and Ayuda, 2002, 2009; Ramon, 2010). In this fashion, a strong specialisation in food and drink products, linked to Mediterranean products, tended to be complemented by others with a greater degree of transformation and differentiation, among which stand out those linked to industrial livestock production and cattle feed production. Not by chance, it is above all following adhesion to the EU when this increasing diversification in exported products took place. It is also important to underline that the sectors with more explosive growth had until the 1960s very slow development in Spain, and the consumption of their products was at very low levels. The case of dairy products is paradigmatic, their consumption in Spain doubling between 1961 and 1980 (Collantes, 2014).

The case of meat is also similar. The increase in its consumption was also very important from the 1960s on. This was linked to the appearance from the sixties of intensive animal farming, following a pattern of specialisation more typical of Central and Northern Europe, which also confirms the protagonism in Spain of the diversification and increasing specialisation in differentiated products in recent years. Thus, from the 1960s on an important intensive and industrial cattle structure has been consolidated in Spain, based above all on pork (Domínguez, 2000; Clar, 2008). Traditionally, in meat and processed meat, the rate of coverage was low; in 1961-70 for meats and processed meat, the ratio of exports over imports was only 6.9%. Today, however (in the years 2001-2011), these products not only fully supply the domestic market but have generated important surpluses destined to export, the value of their coverage rate being 209% (Claret *al.*, 2015).

Figure 1. Composition and rate of growth of exports of the Spanish food industry

	1971- 1976	1980- 1985	1989- 1994	1998- 2003	2007- 2012	Growth 1970 2012
Processed meat products	0.2	0.4	1.2	3.7	5.3	15.4
Processed fish products	7.1	5.4	3.4	4.5	4.5	3.4
Dairy industry	0.4	1.6	3.9	7.3	7.3	13.2
Processed fruit and vegetable products	26.1	23.4	22.8	18.0	16.8	3.7
Grain mill products	0.4	1.0	2.1	1.1	0.5	1.6
Bakery and farinaceous products	0.4	0.9	2.4	5.4	6.0	14.6
Confectionery and chocolate industry	1.0	2.0	3.7	6.0	4.7	8.9
Non-alcoholic drinks industry	0.1	0.4	1.2	3.5	1.7	12.8
Alcoholic drinks industry	49.9	41.5	31.9	22.3	21.5	3.0
Animal feed industry	1.4	6.6	2.0	3.6	5.0	8.9
Other food products	0.5	1.1	1.9	3.6	7.3	11.7
Oil industry	11.9	15.2	22.8	20.1	17.9	4.7
Tobacco industry	0.7	0.5	0.5	0.9	1.4	7.8
Total	100.0	100.0	100.0	100.0	100.0	4.8

Source: Authors' elaboration, from UN-Comtrade (2013) industries, following the National Classification of Economic Industries (CNAE), homologous to the European NACE.

Important in this process of internationalisation has been the intensification of the trade exchanges of an intraindustrial nature produced in the food and drink sector; their advance has been especially significant in the framework of the EU (Reiget *et al.*, 1999, Fernández-Núñez, 2000).

In this context of increasing internationalisation the Spanish agrifood industry has undergone a notable process of restructuring in recent decades. The development of the domestic market has produced since the decade of the 1970s an incipient process of concentration in the industry (Peinado-Gracia, 1985). However, there is no doubt that adherence to the EU in 1986 has been key to its stimulation, since the change proved to be essential to gain size and to be able to compete in the European and national markets. While in 1981 the 40 leading companies by turnover accumulated 23% of the total revenue of the industry, in 1998 and 2011 a similar number of companies accounted for over 33% of total sales. Furthermore, as Figure 2 shows, the number of industrial establishments in Spain in the food sector, fell from the 46,349 existing in 1981 until slightly over 20,000 in 2011. When the 347 principal companies in the agrifood sector are taken, for example, a strong concentration in the stage of the accession of Spain to the European common market can be observed, as these grew from 52.3% of sales in the sector in 1981 to 67.3 % in 1998 and to 71.6% in 2011^{*}.

Figure 2. Concentration Indexes (CR) in the food and drink industry, 1981-2011

	No. of establishments	No. of employees	CR40	CR167	CR347
1981	46.349	313.000	23.7	46.4	52.3
1998	26.286	373.341	30.2	54.0	67.3
2011	20.208	361.143	34.0	56.8	71.6

Source: Authors' elaboration, from Alimarmet, Industrial Survey of the Spanish Statistical Office and Peinado Gracia (1985)

In the six-year period immediately subsequent to the integration of Spain into the EU numerous processes of concentration were undertaken. Specifically, the mergers and acquisitions of leading European companies were responsible for the process, with the objective of rapidly penetrating new markets or taking advantage of economies of scale,

^{*} See on this same point the studies by Delgado-Gómez *et al.* (2004); Fariñas & Martín-Marcos (2007) for manufactures or Ameur and Gil (2003) for agroindustry.

exploiting the geographical position of Spain as a platform to attend to European consumers (Albisu&Gracia, 2002) and attempting to obtain absolute or majority control (Sanchís&Martínez, 1992). Direct foreign investment (DFI) played, therefore, a key role in the process of reorganisation of the agrifood industry, as underlined by the strong increase in the investment flows received by Spain, which rose from 1% of Spanish GDP in 1985 to 4.2% six years later (Guillén, 2004).

Nevertheless, the buying and selling of companies which characterised the late 1980s was braked in the 1990s, and investments, until then predominantly in the hands of foreign capital, made way for national capital, more orientated to the acquisition of small firms (Fernández-Núñez, 2000).

The process of concentration of the industry has been highly heterogeneous. From a disaggregated analysis of the different food industries, while the indexes of concentration of the sales of the four principal companies in 1997 in the three most traditional sectors, processed and conserved fruit and vegetables, the fabrication of vegetable and animal oils and fats or the fabrication of alcoholic drinks did not exceed in any case more than 25% of the total sales of the sector. In other sectors, which gradually became more important in the internationalisation of Spanish industry, the process of restructuring was greater. In that same year, 1997, for the fabrication of non-alcoholic drinks, the four principal companies accounted for 50% of sales. In the case of processed sugar, cacao and chocolate the CR4 index reflects an accumulation of 40%, while this same index represented 30% of the sales of the following subsectors: the fabrication of dairy products, the fabrication of grain mill products, bakery products and farinaceous products.

The process does not appear to have finished yet. In 2006 the Study of the Perception of the Dimension of the Spanish Agrifood Industry concluded that half of the businesspeople and directors of the agrifood industry continued to show their interest in understanding how to gain and the reason for gaining size. Acquisitions, mergers and associationism proved to be the preferred formulas by the directors of the agrifood industry. The study showed, furthermore, that 75% of the entrepreneurs perceived the problem of size as a challenge for the survival of the company itself, due to internationalisation, the processes of concentration undertaken and the increase of the power of negotiation of distribution channels. By contrast, those who did not see dimension as a key factor for the future of

their companies placed greater importance on differentiation, especially on aspects of the quality of service in the local market (Fernández-Núñez, 2000).

An influential article by Melitz (2003) shows how liberalisation with a presence of business heterogeneity, that is to say with significant differences in size, like those which have been underlined, causes a process of restructuring in the sector via the survival of the fittest. On this point, Melitz&Ottaviano (2008), permitting company heterogeneity in productivity, construct a model which predicts that the liberalisation of trade associated with a greater market size induces a sectorial process of the self-selection of those firms which are capable of confronting internationalization.

According to figures for 2011 from the Industrial Survey undertaken by the Spanish Statistical Office, the companies of greatest size, with over 200 employees, and which constituted approximately 18% of companies in the food industry, concentrated more than 70% of the exports of the sector. Fernández-Núñez (2000), in an analysis of manufacturing companies as a whole, states that size continues to be a key variable in the decision to export of Spanish companies.

Figure 3. Indicators of Spanish food companies, 1994-2011

	Size		Labour force productivity		% Exporters	% Exports/Sales	% FDI Participation	% Top 10 Exporters
	All	Exporters	All	Exporters				
1994	295.82	513.86	20.32	25.92	48.79	6.56	23.83	8.73
2002	267.15	409.43	25.93	30.97	59.47	12.58	25.12	33.42
2011	182.44	227.37	21.39	36.56	64.59	17.13	8.99	59.85

Source: Authors' elaboration, from the Company Strategies Survey (ESEE)

In addition, the Company Strategies Survey (ESEE), undertaken by the SEPI Foundation for the period 1990-2011, with the support of the Spanish Ministry of Industry, emphasises some of these changes in the industry. Firstly, the sample shows how Spanish food firms which export are of greater size than those of the industry as a whole. These companies, furthermore, have a strong participation of foreign capital, of approximately 25%, although they have lost weight recently. Secondly, as the following table shows, in the third and fourth columns, such firms are additionally more productive than those which do not export. We underline how since the 1990s there has been an accelerated

increase in the apparent productivity of labour. In this same direction, Wagner (2007) concludes, following a review of the literature, that exporting companies are generally more productive than their non-exporting counterparts, due to the effect of self-selection; that is to say, the fact that only the most productive can export, among other reasons, due to the presence of irrecoverable costs. Very notable is the high concentration of exports accumulated by the 10 companies with the largest foreign sales figures (Table 3, final column); these accounted in 2011 for almost 60% of the exports in the sample. This would support the thesis that not all companies are prepared to tackle the challenge of exports and that we can also speak of the concentration of exports in a relatively small number of firms.

We can therefore conclude that the strong growth of the domestic market, accompanied by the process of liberalisation produced by accession to the EU, has caused a process of self-selection in the food industry, that is to say a far-reaching restructuring of the sector with the emergence of more heterogeneous companies, increasing the size of companies and establishing the position of a set of leading companies which, exploiting economies of scale, exported products with a greater degree of differentiation. This is the central thesis of the present study, the validation of the home market effect for the different industries comprising the sector. In fact, as we know, the reduction of the barriers to imports associated with entry into the EU has produced an increase in the level of productivity, necessary in turn to be able to remain in the domestic market (Blanes and Milgram, 2009). The foregoing arguments should help us to understand what forces determine the international expansion of the Spanish agrifood industry. Among these are the changes provoked by a strong growth of the domestic market, with an increase in the size of the companies associated with the productivity gains caused by economies of scale. In this process of transformation the increasing presence of foreign multinationals in the sector played a key role at the beginning of the process (Rodríguez-Zúñiga & Soria, 1989). The Spanish agrifood system, following adhesion to the EU, notably increased its advantages for the acceptance of foreign investors, especially after the subsequent implementation of the single market and the free movement of capital (Rama and Calatrava, 2002).

Thus, the hypothesis to be verified in this study is:

Hypothesis 1: There is a positive effect of the development of the domestic market (the home market effect) as a key factor for the success of the process of the internationalisation of the Spanish agrifood industry.

Material and methods

Gravity equation

The gravity model has been the standard econometric technique to analyse the determinants of international trade. Analogous to Newtonian physics (from which it takes its name), this model assumes that bilateral trade flows depend positively on the economic size of countries (normally measured by their income) and negatively on the distance between them. Although the first empirical applications were based on this idea and it could be said that it was merely an econometric model which explained international trade well, from the 1970s on analytical developments began to appear (Anderson, 1979; Anderson and van Wincoop, 2003; Bergstrand, 1985 and 1989; Deardoff, 1998; Eaton and Kortum, 2002; and Evenett and Keller, 2002); these support it from almost any theoretical approach dealing with the motivations for trade between countries.

In addition to the basic variables (income and distance), the gravity model incorporates other variables which affect, in one direction or another, the trade barriers among countries: this is termed the “expanded gravity model”. In particular, for each of the agrifood subsectors considered, the specification used in this study is the following:

$$\begin{aligned} \ln X_{ijt} = & \beta_1 + \beta_2 \ln(Y_{it}) + \beta_3 \ln(Y_{jt}) + \beta_4 \ln Dist_{ij} + + \\ & + \beta_5 PTA_{ijt} + \beta_6 GATT_{ijt} + \beta_7 UE_{ij86-92} + \beta_8 UE_{ij86-11} + U_{it} \end{aligned} \quad (1)$$

where i and j represent the trade partners; t is time and the variables are defined as follows:

The endogenous variable X_{ijt} is the flow of exports from country i (in this case Spain) to country j in year t ;

The independent variables are: Y_{it} and Y_{jt} are the real GDP of both the exporting country and the importing country, in year t , in 2005 US dollars; $Dist_{ij}$ is the distance between i and j ; $GATT_{ijt}$ is a dummy variable which takes the value of 1 for the signatory countries of the Uruguay Round of GATT, which represents an important advance in the process of liberalisation of the agricultural sector on an international scale; PTA_{ijt} is a dummy variable which takes the value of 1 if i and j belong to the same preferential agreement in t , taking into account the recent proliferation of this type of trade agreement; UE is a binary variable which takes the value of 1 if the two countries belong to the EU at moment t . Distinction has been made between the period 1986-1992 and the period 1992-2011, as 1992 was the end of the transitory period for the dismantling of tariff barriers, and U_{it} is the standard error term.

It must be underlined that it is necessary to take account of the theoretical foundations of the gravity equation which have been formulated since the well-known article by Anderson (1979), in order to avoid erroneous specifications. Specifically, Anderson and van Wincoop (2003) signal the bias generated on omitting relevant variables such as the terms measuring the so-called “multilateral resistance”, which assume that trade decisions are made taking into account relative and not absolute prices. As these authors state, it is necessary to take into account not only resistance to trade between the two countries considered, but also the resistance with which each of them is faced with regard to the remaining members. From the econometric point of view, “multilateral resistance” is controlled for through the inclusion of dummy variables by countries. Given that in this concrete case a single origin is available, the inclusion of solely fixed destination effects would control for the abovementioned bias.

Similarly, when we work with panel data, control must be made for “unobservable bilateral heterogeneity”, that is to say, those factors constant over time which affect trade between pairs of countries and which have not been explicitly controlled for by the researcher. On this point, the inclusion of fixed effects by pairs of countries would take into account this econometric problem (Mátyás, 1997, 1998; or Egger, 2002). It is necessary to make it clear that the inclusion of these fixed pair effects, on the one hand, already controls in turn for multilateral resistance and, on the other, makes unnecessary

the inclusion in the extended gravity model of those specific variables of pairs of countries which do not alter over time and which are usually included when estimation is made by OLS, such as a common language, a land border, etc. As occurred in the previous case, having a single origin means that the number of pairs coincides with the number of destinations. In this way, in our specific case, the inclusion of a variable with a different value for each pair and constant over time would control for both “multilateral resistance” and “unobservable heterogeneity”. The ideal candidate is the distance variable (*Dist*).

Lastly, Santos Silva and Tenreyro (2006, 2010) explain the appearance of serious econometric problems as the result of the existence of heteroscedastic residuals and the high percentage of zero values in the dependent variable. Both these aspects are very common when we deal with international trade data, and even more so if we concentrate on sectorial data. These authors argue that in these cases estimation by OLS is biased. Consequently, they propose a non-linear Poisson estimator to estimate the gravity equation which, on the other hand, takes into account the presence of the zeros. This is known as the PPML (Poisson Pseudo Maximum-Likelihood) estimator.

In short, this study, with the explicit inclusion of a variable (distance) which controls for the fixed pair effects, such that consideration is taken from the econometric point of view of the latest developments formulated by the literature on this point, avoids, as far as possible, the diverse biases which may occur. Following the work of Feenstra *et al.* (1998, 2001), if the estimations reveal a greater sensitivity of domestic income to changes in the income of the importing country, the home market effect will be produced. That is to say, we shall conclude that the presence exists of the effect for the subsector “z”, if $\beta_2 > \beta_3$.

Data collection

The data for the dependent variable (Spanish exports from the agrifood sector to 175 countries) have been extracted from the UN-COMTRADE database (2013), published by the United Nations Statistics Division. These values have been deflated by price indexes, elaborated on the basis of the unitary value of the exports of the industry according to UN-Comtrade figures, to thereby obtain the series in volume in constant 2005 dollars.

The sectors chosen follow the national classification of economic activities (CNAE) for 2009: processing and preservation of meat and elaboration of meat products; processing and preservation of fish, crustaceans and molluscs; fabrication of dairy products; processing and preservation of fruit and vegetables; fabrication of grain mill products; fabrication of starches and food starch products; fabrication of bakery and farinaceous products; fabrication of sugar, confectionery and chocolate products; fabrication of alcoholic drinks; fabrication of non-alcoholic drinks; fabrication of mineral waters and other bottled waters; fabrication of products for animal feed; fabrication of other food products; fabrication of vegetable and animal oils and fats; tobacco industry.

The values of GDP in 2005 dollars for the 175 countries which comprise the sample come from the WDI (World Development Indicators) of the World Bank. The variable which measures the geographical distance between pairs of countries, and similarly the variables which measure membership of GATT, Preferential Trade Agreements (PTA) and the EU are the authors' elaboration, on the basis of the CEPII database.

Estimation and results

Figure 3 presents the results of the estimation of 13 gravity equations (one for each sector), using PPML. From a general perspective, it can be concluded that the exports of the Spanish food and drink industry have been strengthened by the growth of the domestic market, by the increase in demand in the destination markets and by the effect of the creation of trade promoted by adherence to the EU. However, as numerous studies have shown, the physical distance between markets continued to constitute an important barrier to trade. All the variables have the expected sign.

Firstly, the results of the coefficients (Y_{it}) and (Y_{jt}), which refer to market size, both in Spain and in the countries of destination of exports, display a positive and statistically significant effect in the majority of cases. It can also be observed that there exists empirical evidence which supports the existence of the HME in 9 of the 13 industries studied: processed meat products; dairy industry; grain mill products; bakery and farinaceous products; confectionery and chocolate; non-alcoholic drinks; animal feed; other food products; tobacco industry. In these nine subsectors $\beta_2 > \beta_3$, which demonstrates the existence of an HME. As columns 1 and 2 show, the coefficients (Y_{ijt}) are statistically

significant and superior to the coefficient of the income of the importing country (Y_{ijt}). The most notable exceptions to the positive effect in the exports of the industry of the growth of the domestic market, that is to say the absence of the HME, are those of the subsector of the processing and preservation of fish, the processing and preservation of fruit and vegetables, the oil industry and the elaboration of alcoholic drinks. As stated earlier, these were precisely the most traditional sectors of Spanish agrifood exports, those which experienced lower growth in their sales abroad in the period and also those which displayed less intensity in the processes of industrial reorganisation. This result is consistent with previous studies, such as Feenstra *et al.* (2001) or Serrano & Pinilla (2014), which underline that the most traditional sectors, with a predominance of homogeneous products, are those which do not take advantage of the existence of the HME.

Figure 4. Results of the gravity equation, by PPML.

	(1) $\ln(Y_{it})$	(2) $\ln(Y_{jt})$	(3) $\ln \text{Dist}_{ij}$	(4) GATT_{ijt}	(5) PTA_{ijt}	(6) $\text{UE}_{ij86-92}$	(7) $\text{UE}_{ij93-12}$	(8) R^2
Processed meat products	5.087 (0.715)***	0.617 (0.025)***	-1.581 (0.067)***	-0.684 (0.176)***	-0.702 (0.184)***	-0.861 (0.331)***	0.449 (0.112)***	0.81
Processed fish products	-0.402 (0.373)	0.693 (0.026)***	-0.995 (0.057)***	-0.069 (0.106)	0.440 (0.097)***	-0.265 (0.209)	1.472 (0.120)***	0.50
Dairy industry	4.030 (0.443)***	0.650 (0.037)***	-2.395 (0.066)***	0.311 (0.181)*	-1.115 (0.202)***	-0.106 (0.294)	-0.044 (0.171)	0.80
Processed fruits and vegetables	0.567 (0.292)**	0.973 (0.015)***	-0.849 (0.049)***	-0.400 (0.097)***	-0.420 (0.082)***	-0.305 (0.114)**	0.300 (0.088)***	0.82
Grain mill products	1.937 (0.990)**	0.314 (0.031)***	-2.163 (0.170)***	-0.747 (0.260)***	-3.308 (0.315)***	-4.492 (0.389)***	-1.402 (0.323)***	0.41
Bakery and farinaceous products	4.612 (0.515)***	0.562 (0.016)***	-1.868 (0.063)***	0.443 (0.138)***	-0.843 (0.121)***	-0.503 (0.208)**	0.002 (0.098)	0.89
Confectionery and chocolate	2.406 (0.480)***	0.701 (0.012)***	-0.912 (0.057)***	-0.182 (0.152)	-0.269 (0.100)***	-0.417 (0.125)***	0.276 (0.072)***	0.81
Alcoholic drinks	3.426 (0.727)***	0.271 (0.034)***	-2.455 (0.062)***	0.087 (0.165)	-0.257 (0.178)	-0.142 (0.354)	1.048 (0.173)***	0.72
Non-alcoholic drinks	-0.381 (0.311)	0.736 (0.012)***	-0.769 (0.041)***	0.356 (0.126)***	0.399 (0.086)***	0.326 (0.141)**	0.657 (0.080)***	0.84
Animal feed	1.621 (0.529)***	0.446 (0.021)***	-1.658 (0.069)***	1.381 (0.163)***	-1.047 (0.239)***	0.855 (0.178)***	-0.087 (0.198)	0.65
Other products	3.408 (0.424)***	0.464 (0.017)***	-1.591 (0.057)***	0.542 (0.113)***	-0.969 (0.115)***	-0.121 (0.163)	-0.303 (0.087)***	0.83
Oil industry	0.752 (0.538)	0.666 (0.019)***	-1.092 (0.056)***	0.175 (0.119)	-0.450 (0.121)***	0.077 (0.286)	0.236 (0.122)*	0.39
Tobacco industry	2.992 (0.877)***	0.620 (0.051)***	-1.537 (0.121)***	-0.549 (0.311)*	-0.232 (0.299)	-3.199 (0.436)***	-0.368 (0.297)	0.33

Note: The number of observations are 6.239 for each industry group. Standard errors in parentheses. *** Significant at the 1%, ** at the 5%, * at the 10% level.

Secondly, as shown by many studies, we have found empirical evidence of the creation of trade by the insertion of Spanish agro-industry into the EU. In our case, we can offer this new empirical evidence of the positive effect, from a long term perspective and also in a disaggregated form, for the distinct subsectors comprising the food and drink industry. Furthermore, our results underline that this boost to trade only took place following completion of the process of transition of Spanish integration into the EU, as it was then that tariff barriers for Spanish products were completely eliminated.

As shown in the results in column 6 for the dummy variable $UE_{ij86-92}$, which attempts to capture positive effects in trade in an initial period of liberation, neither positive signs nor statistical significance are found in the majority of subsectors in this period. There even exist negative and statistically significant signs in some sectors, which would imply a certain effect of trade deviation. The exceptions to this general result are produced in the alcoholic drinks industry and the animal feed industry, where there was already an effect of trade creation from 1986 onwards.

After 1992, as shown in the sign and significance of the coefficients of the variable $UE_{ij93-12}$, which draws us close to the effect of EU integration, following finalisation of the transition period, in 7 of the 13 industries considered there is evidence of a positive effect of such integration for Spanish food exports, once completed the transition process in the dismantling of tariff barriers. Specifically, this positive effect is to be found in processed meat products, fish and fruit and vegetables, the confectionery and chocolate industries, alcoholic drinks and the oil industry.

Lastly, we have attempted to explore the effect of the reduction of trade barriers at an international scale, following the Uruguay Round of GATT, and its positive influence upon the exports of the Spanish agroindustrial complex. On the basis of our results, it is only possible to talk of a certain boost to trade for four industries: dairy products, bakery and farinaceous products, alcoholic drinks and animal feed. Similarly, no positive effect is perceived for the exports of the Spanish food industry from the proliferation of the Preferential Trade Agreements (PTA_{ijt}) signed from the 1990s onwards with economies outside the EU.

Discussion

This article has attempted to study more deeply the determinants of the exports of the Spanish food and drink industry from a very long-term perspective. Given this context, the paper has explored with special emphasis the effects of the growth of the domestic market and the process of European integration in the Spanish agrifood complex. That is to say, it has attempted to describe the presence and importance of these two effects in the intensive restructuring in the majority of branches comprising the sector.

We have taken into account the latest theoretical advances in the estimation of the gravity equation, such that we have controlled for factors such as “multilateral resistance”, “unobservable heterogeneity”, the heteroscedasticity of residuals and the existence of zeros in the dependent variable. Finally, we have estimated an equation for each of the industries comprising the Spanish agribusiness complex for the period 1970-2012, taking into account a broad sample of destination markets, including data for 175 countries.

The results of the empirical work permit the validation of the hypothesis of the positive effect of the development of the domestic market as a key factor in the success of the process of internationalisation of the Spanish agrifood industry. The test has been performed for 13 industries, there existing evidence of its presence in nine of them. Specifically, the HME has appeared in those which we had previously observed a greater dynamism and a process of restructuring of its more intensive business fabric: processed meat products; dairy industry; grain mill products; bakery and farinaceous products; confectionery and chocolate; non-alcoholic drinks; animal feed; other food products; and the tobacco industry.

Furthermore, the estimation of the gravity equation performed reinforces the idea, already proposed in previous studies, that the Spanish agrifood trade has progressively concentrated in those EU countries with greater market potential. In our case, new empirical evidence is gathered of the positive effect of integration into the EU, from a very long-term perspective and in a disaggregated fashion for the distinct subsectors which comprise the food and drink industry. In addition, we can partially qualify the results of some previous studies, since the positive effect upon the exports of the Spanish agrifood industry as a consequence of the liberalisation of the EU markets occurred later than the actual date of adherence. For a large number of industries, these positive effects

did not appear until the completion of the process of transition by the dismantling of the tariff barriers established by the treaty of adhesion.

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