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Juan de Lucio ^a, Raúl Mínguez-Fuentes ^b, Asier Minondo ^c & Francisco Requena-Silvente ^d

^a Juan de Lucio, High Council of Spanish Chambers of Commerce, Madrid, Spain

^b High Council of Spanish Chambers of Commerce, Madrid, Spain

^c Deusto Business School, San Sebastian, Spain

^d Universitat de València, Facultad de Economía, Department of Estructura Económica, Avda Tarongers s/n, 46105, Valencia, Spain
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The extensive and intensive margins of Spanish trade

Juan de Lucio^a, Raúl Mínguez-Fuentes^b, Asier Minondo^c and Francisco Requena-Silvente^{d,*}

^aJuan de Lucio, High Council of Spanish Chambers of Commerce, Madrid, Spain; ^bHigh Council of Spanish Chambers of Commerce, Madrid, Spain; ^cDeusto Business School, San Sebastian, Spain; ^dUniversitat de València, Facultat de Economia, Departament of Estructura Económica, Avda Tarongers s/n, 46105 Valencia, Spain

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Recent empirical research highlights that differences in trade flows across countries, products and years are governed by two margins: the intensive margin and the extensive margin. The analysis of the relative contribution of each margin is very important to determine which policies can be more efficient to foster trade at the aggregate, geographic, product or firm level. We use the whole universe of firm level transaction data to analyse the relative contribution of these margins to changes in Spanish trade flows during the 1997–2007 period. We first apply the methodology proposed by Bernard et al. (2009) to decompose trade variation over time into three components: net entry of firms, product-country switching and value growth by regular trading firms. The first two components correspond to the extensive margin and the last one refers to the intensive margin. We find that short-run changes in exports and imports are governed by firms' intensive margin; however, in the long-run, both the extensive and the intensive margins are equally important to foster trade. We also examine the importance of the trade margins at the cross-sectional level for the year 2007. We find that large differences in the Spanish trade flows across countries and products, especially in the case of exports, are explained by the number of firms that participate in trade, which is consistent with the fact that the number of trading partners decline significantly with distance.

Keywords: firm exports; firm imports; extensive margin; intensive margin; Spain

JEL Classification: F1

1. Introduction

In this paper we use the whole universe of export and import firm transactions to study the contribution of the intensive and extensive margin to changes in Spanish exports and imports in the period 1997–2007. The extensive margin tracks changes in the number of firms that participate in international trade or changes in the number of products or trading partners of existing firms. The intensive margin captures changes in the trade that take place within surviving trade relationships, e.g. the same firm trading more or less of the same product to the same country.

*Corresponding author. Email: francisco.requena@uv.es

The analysis of the trade margins improves our understanding of the trade patterns and the relative efficiency with which economies allocate resources. A fluid entry and exit may reflect reallocations of resources towards the most efficient use as business conditions change. On the other hand, high levels of entry and exit may imply greater diversion of resources away from production if engaging in international trade requires firms to develop relationship-specific human capital or incur non-recoverable expenses. The importance of entry and exit of firms, products and trading partners to changes in trade flows also plays a crucial role in the design of policy instruments that are more efficient to promote trade at the aggregate, geographic, sectoral or firm level.

Our paper applies the methodology proposed by Bernard et al. (2009) to decompose trade variation over time into three components: net entry of firms, product-country switching and value growth by regular trading firms. The extensive margin is captured by the first two terms and the intensive margin by the last term. We then compare our results with those obtained by other authors that use the entire universe of trading relationships to decompose the variation of trade flows into the extensive and intensive margins (Bernard et al. 2009, for the US; Amador and Opromolla 2008, for Portugal; Eaton et al. 2008, for Colombia). Next, in addition to the time dimension, we also analyse the contribution of the intensive and extensive margins at the cross-section level. In particular, we study whether differences in trade flows across trading partners (or products) are explained by differences in the number of firms that participate in foreign markets, the number of traded products (or trading partners) or by the average value traded by each firm.

Our results show that year-to-year variation in trade flows are largely explained by the variation in the average value of trade flows of existing trade relationships. However, when we analyse longer time horizons, both trade margins are important. Conditional on survival, new trading firms play a key role in the evolution of aggregate trade flows in the long run. Moreover, among existing trading firms, the expansion of the new product-country relationships emerges as another source of trade growth in the long run.¹

On the cross-sectional analysis, variation in trade across countries and across products is due mostly to the extensive margin, being more important for exports than for imports. This can be explained by the fact that the number of trading partners decline significantly with distance.

The rest of the paper is organised as follows. Section 2 describes the database. Section 3.1 analyses of the contribution of the extensive and the intensive margin to variation in trade flows over time; Section 3.2 does the same in a cross-section dimension. Section 4 concludes.

2. Data

We use data coming from the Customs and Excise Department of the Spanish Revenue Agency. It includes all Spanish firms that carried out foreign trade transactions between 1997 and 2007. For each firm we have information on the value of its exports and imports for any possible intersection of product (tariff chapter) and country.² This register is subject to European Union regulation and, in 1999 and 2002, thresholds for which there was no obligation to declare certain operations of minor value were modified. These regulation changes resulted in an increase in the number of firms and transactions in 1999 and 2002 but not significant changes in the total value of imports and exports in these years.

Table 1 displays information on the number of trading firms, number of transactions and value (in million euros) in the 1997–2007 period. The number of firms involved in exporting and importing activities in 1997 was 62,725 and 81,665, respectively; ten years later the number was 97,418 for exports and 192,037 for imports; that is, 55% more exporters and 135% more importers.³ Table 1 also shows the evolution in the number of transactions in exports and imports. In this paper we define ‘transaction’ as a combination (product–trading partner–firm), where product is measured at the HS 2-digit level and trading partner is defined at country level.⁴ The number of transactions has multiplied by 1.5 in export activities and by 1.8 in import activities over the period analysed, suggesting an important expansion in the product and country portfolios of trading firms. Finally, Table 1 shows the total value of Spanish exports and imports. During the period 1997–2007, in nominal terms, exports have almost doubled and imports have almost tripled, leading to a larger deficit in Spanish merchandise trade. The average value exported by a firm in 2007 (€1.9 million) is larger than the average value imported by a firm (€1.5 million). However, the average value of an export transaction (€315,498) is lower than the average value of an import transaction (€354,025).

3. Empirical model and results

In this section we analyse first the contribution of the trade margins to the variation in exports and imports over time. Next, we investigate the importance of the number of firms, average number of products and average value of each product–firm transaction on the total value of exports and imports across countries. Finally, we repeat the same exercise but we analyse the impact of the trade margins on total trade across products.

3.1. Time dimension: exports and imports growth

If we take exports as reference, the change in aggregate Spanish exports between year $t-1$ and year t can be expressed as:

$$\Delta x_t = \sum_{f \in N} x_{f,t} - \sum_{f \in E} x_{f,t-1} + \sum_{f \in C} \Delta x_{f,t} \quad (1)$$

Change in exports may arise from three different sources, each of them corresponding to a different type of firm (f): new exporting firms (N), firms that exit the foreign market (E) and firms that continue to export (C). Change in trade in continuing firms can be further decomposed into the following components:

$$\Delta x_{f,t} = \sum_{f \in A_f} x_{f,j,t} - \sum_{f \in D_f} x_{f,j,t-1} + \sum_{j \in V_f} \Delta x_{f,j,t} \quad (2)$$

where A_f is the set of product–country export relationships that are added by a firm, D_f is the set of product–country export relationships dropped by a firm, and V_f is the set of firms’ existing product–country export relationships, whose value may grow or decline between year $t-1$ and t . In this decomposition the extensive margin is captured by new exporting firms and the continuing firms’ diversification strategies (the first two components of equation (2)), and the intensive margin is captured by the variation of the value of exports of continuing firms in the existing product–country relationships (the last component of equation (2)).

Table 1. Number of firms, transactions and value in Spanish external trade, 1997–2007.

	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007
Exports											
Number of firms	62,725	59,674	60,790	66,278	69,307	90,082	93,279	96,401	98,232	100,177	97,418
Number of transactions	397,352	355,747	363,281	396,499	411,456	531,855	540,488	553,513	563,469	580,159	586,449
Value (million €)	93,419	99,850	104,789	124,177	129,771	133,268	138,119	146,925	155,005	170,439	185,023
Imports											
Number of firms	81,665	76,985	78,345	80,592	81,234	128,627	144,904	162,340	169,828	169,812	192,037
Number of transactions	440,437	407,994	418,960	438,848	444,957	506,454	646,503	701,099	740,904	763,517	805,137
Value (million €)	109,469	122,856	139,094	169,468	173,210	175,268	185,114	208,411	232,955	262,687	285,038

Note: The term ‘firm’ refers to any individual operator that makes a transaction in a year.

Source: Own elaboration using Customs database.

The change that stems from adding a new country–product relationship can be further decompose into four sources: (1) when the firm exports a new product to an existing trading partner; (2) when a firm exports an existing product to a new trading partner; (3) when the firm exports a new product to a new trading partner and (4) when the firm exports an existing product to a partner that imports other products from the firm (new combinations of old products and old partners).

This decomposition is interesting to evaluate whether diversification comes from either the introduction of new products, or the introduction of new partners, or the combination of both new partners and new products, or new combinations of old products and old partners. A similar decomposition is done to decompose the dropping of country–trade relationships. It is important to notice that by using a broadly defined product (HS 2-digit level), a certain proportion of product switching by firm will be overlooked as it occurs at the intra-chapter level. Our high product-aggregation level will result in an overestimation of the role played by the intensive margin and underestimate the role played by the extensive margin in exports growth. Hence, the contribution of the intensive margin should be considered as an upper-bound and the contribution of the extensive margin as a lower-bound.

Table 2 presents the decomposition of Spanish nominal exports change (expressed in billion euros) year by year from 1997 to 2007, for 5-year intervals (1997–2002 and 2002–2007) and for the whole time period (1997–2007). The elements that contribute to the change in exports appear in rows and are grouped in three components: exporter entry and exit, product-country switching (diversification), and the intensive margin. In each component we present the elements that contribute positively to exports growth, the elements that contribute negatively to exports growth and the net effect. The adding of the three net effects yields the total change in exports. At the end of the table we also present the relative contribution of each margin to the total change in exports.

The year-to-year variation in total exports change is largely explained by the intensive margin: it is the change in the value of exports of firms in existing product–country relationships that drives the overall evolution of exports. If we exclude those periods that are subject to methodological changes (1998–1999 and 2001–2002), the average contribution of the intensive margin is 77%, ranging from a maximum of 96% in the 1997–1998 period to a minimum of 62% in the 2003–2004 period. On the extensive margin, the average contribution of net entry and exit to the annual change in total exports is similar to the average contribution of diversification (12% and 11%, respectively). When we further decompose diversification, we can observe that it is the adding and dropping of partners that drives most of the total exports variation in the extensive margin. The annual contribution of the components of the extensive margin is quite disperse: for the net entry and exit the annual contribution ranges between –2% and 35% and for diversification it ranges between –15% and 33%.

A different picture emerges when we examine longer time intervals. The contribution of the extensive margin to exports growth is 50% over the 1997–2002 period, 38% over the period 2002–2007 and 57% for the 10 years period.⁵ The significant role played by the extensive margin in the longer run (here, 10 years) points out that, subject to surviving, exports value grow faster among new firms and new product–country relationships, compared with the value of the existing product–country relationships. Moreover, the important role played by the extensive margin in the long run is driven firstly by the contribution of new exporting firms and secondly by the contribution of firms' diversification strategies.

Table 2. Decomposition of changes in Spanish exports, 1997–2007 (billions of euros).

	1997– 1998	1998– 1999	1999– 2000	2000– 2001	2001– 2002	2002– 2003	2003– 2004	2004– 2005	2005– 2006	2006– 2007	1997– 2002	2002– 2007	1997– 2007
Exporters entry and exit	2.9	4.8	4.3	3.8	4.6	3.0	3.3	5.1	4.4	3.8	25.6	26.8	54.0
Exporter births	1.6	1.5	2.0	3.7	2.4	3.1	2.0	2.2	3.5	2.9	12.9	15.2	21.0
Exporter deaths	1.2	3.2	2.3	0.1	2.2	-0.1	1.3	2.8	0.9	1.0	12.7	11.6	33.0
Net entry	5.8	8.0	7.3	7.4	7.9	7.7	9.0	8.4	8.6	9.4	20.6	26.5	35.4
Diversification	0.5	0.8	0.9	0.6	0.8	0.6	0.9	0.6	0.7	0.8	1.4	1.8	1.7
– New product country	3.3	5.8	4.7	5.3	5.0	5.1	5.7	5.8	5.3	5.9	14.8	18.6	26.1
– New product	0.7	0.5	0.7	0.4	0.6	0.6	0.5	0.6	0.5	0.8	1.4	1.7	2.8
– New product and partner	1.2	1.0	1.0	1.1	1.5	1.4	1.9	1.3	2.1	1.9	3.0	4.4	4.7
– New combinations of old products and partners	6.8	6.6	5.7	6.0	6.3	6.1	7.0	8.6	6.6	8.5	13.3	18.4	16.0
Retired product-country	0.6	0.5	0.7	0.7	0.8	0.7	0.7	0.5	0.8	0.8	0.9	1.3	1.4
– Product retired	4.4	4.7	3.7	3.7	4.1	3.5	4.3	5.6	3.6	5.1	8.7	12.7	10.7
– Partner retired	0.4	0.6	0.5	0.5	0.3	0.4	0.5	0.4	0.9	1.2	1.6	1.2	1.9
– Product and partner retired	1.3	0.9	0.8	1.2	1.1	1.6	1.5	2.1	1.3	1.4	2.1	3.2	2.0
– Product retired from some markets products and partners	-1.0	1.4	1.5	1.4	1.6	1.6	2.1	-0.2	2.0	0.9	7.3	8.1	19.4
Net diversification	0.2	4.6	3.8	1.6	3.8	1.5	3.4	2.6	2.9	1.9	20.0	19.7	52.4
Net extensive margin	22.0	20.1	30.9	27.3	26.0	27.6	31.9	31.2	37.5	43.9	40.3	65.4	59.6
Product-country increases	15.8	19.7	15.3	23.2	26.3	24.2	26.5	25.8	25.0	31.2	20.4	33.3	20.4
Product-country decreases	6.2	0.4	15.5	4.0	-0.3	3.4	5.4	5.5	12.5	12.7	19.9	32.1	39.2
Net intensive margin													

(Continued)

Table 2. (Continued).

	1997-1998	1998-1999	1999-2000	2000-2001	2001-2002	2002-2003	2003-2004	2004-2005	2005-2006	2006-2007	1997-2002	1997-2007	
Total change in exports	6.4	4.9	19.4	5.6	3.5	4.9	8.8	8.1	15.4	14.6	39.8	51.8	91.6
% annual growth due to													
Net entry and exit	19	65	12	3	63	-2	15	35	6	7	32	22	36
Net diversification	-15	27	8	25	46	33	23	-3	13	6	18	16	21
Net extensive	4	92	20	28	109	31	38	32	19	13	50	38	57
Net intensive	96	8	80	72	-9	69	62	68	81	87	50	62	43

Note: Bold highlights the net flows (no-bold figures are gross flows), figures may not add-up due to rounding.

How do our results compare with those of previous studies? Bernard et al. (2009) analyse the changes in US exports over the period 1993–2003. Like the Spanish case, the contribution of the extensive margin is small in the short run but becomes almost as important as the intensive margin in the long run. Amador and Opromolla (2008) decompose Portugal's exports growth over the period 1997–2005. The average year-to-year growth figures confirm that continuing firms in existing products and markets made the main contribution to exports growth. These authors also find that, conditional on surviving, new exporting firms have a larger exports growth than incumbent firms. Although we find similar results, we should point out that studies are not fully comparable due to differences in the time horizon as well as in the level of product disaggregation. Bernard et al. (2009) use a 10-digit HS classification and Amador and Opromolla a 4-digit HS disaggregation, whereas in our study we use a 2-digit HS classification. Owing to the lower product disaggregation, in comparison to Bernard et al. (2009), the role of the extensive margin will be attenuated both in Amador and Opromolla (2008) and in our study.⁶ Finally, Eaton et al. (2008) decompose the change in Colombian manufacturing exports over the period 1996–2005. They find that continuing firms explain most of the changes in exports in the short run and that the contribution of new exporting firms is larger when longer time periods are considered. Unfortunately they do not analyse the contribution of diversification to exports growth.⁷

When we examine the gross contribution of each component, we also find that they are much larger than the net contributions. For example, whereas the average contribution of net entry and exit to exports growth is 12%, the average contribution of new exporting firms is 44% and the average contribution of exiting firms is –32%. With respect to diversification, whereas the average net contribution lies at 11%, the average contribution of adding new country–product relationships rises to 93% and the dropping of country–product relationships to –82%. Finally, whereas the average net contribution of the intensive margin is 77%, the average contribution of firms that increase the value of their existing country–product exports rises to an astonishing 356%, and the average contribution of firms that reduce the value of their existing country–product exports is –279%. These figures highlight the large degree of heterogeneity we find across firms, a characteristic that has become the bedrock of the new-new trade theory models (Bernard et al. 2003; Melitz 2003).

In order to illustrate the importance of firm heterogeneity in trade, Table 3 presents the number of firms, as a percentage of all exporting firms in the final year of each period, that are classified in each exports growth category. Note that a single firm may be classified simultaneously in different categories. As explained before, when we measure the gross contribution in terms of value there are large differences across components and the largest gross contributions are found in the intensive margin, followed by diversification and entry and exit. Hence, it is striking to find that the gross contribution in terms of firms is almost the same across different growth elements. For the three components, the gross contribution is about 40%. This result points out that stochastic shocks on productivity seem to be symmetric for all categories of exporting firms, and on the number of firms that benefit and get damaged by the shock within each category.

Table 4 presents the decomposition of changes in Spanish imports in the period 1997–2007. Again we observe that the average year-to-year contribution of the intensive and extensive margins to imports growth is similar to the one found in the case of exports: 77% and 23%, respectively. Within the extensive margin, product–country

Table 3. Firms in each growth category (as percentage of the number of firms in the final year). Exports.

	1997-1998	1998-1999	1999-2000	2000-2001	2001-2002	2002-2003	2003-2004	2004-2005	2005-2006	2006-2007	Average
Exporter births	33	35	37	37	48	43	43	44	44	41	40
Exporter deaths	38	33	29	33	25	39	40	42	43	44	36
New product-country	45	45	43	42	38	39	38	38	39	41	41
Retired product-country	49	45	41	43	34	40	39	38	38	41	41
Existing product-country, growth value	45	42	42	41	33	36	35	35	35	37	38
Existing product-country, decline value	44	43	41	42	35	38	37	36	36	37	39
Existing product-country, maintain value	0	0	0	0	0	1	1	1	1	1	1

Note: The sum of the rows does not have to sum a 100%, as a single company might simultaneously increase the number of products-countries relationships or retire a product-country pair, and increase, reduce or maintain the value of different trade pairs present in both years.

Table 4. Decomposition of changes in Spanish imports, 1997–2007 (billions of euros).

	1997–1998	1998–1999	1999–2000	2000–2001	2001–2002	2002–2003	2003–2004	2004–2005	2005–2006	2006–2007	1997–2002	2002–2007	1997–2007
Importer entry and exit													
Importer births	3.3	5.1	6.9	5.2	6.3	4.5	5.1	7.8	5.0	6.5	32.5	36.4	85.1
Importer deaths	2.0	2.2	2.6	4.8	3.3	3.7	2.5	2.9	4.3	4.5	16.1	18.1	25.5
Net entry	1.3	2.9	4.3	0.5	3.0	0.7	2.6	4.9	1.3	2.0	16.4	18.3	59.7
Diversification													
New product-country	6.5	7.4	8.9	9.5	9.4	9.2	10.6	11.4	12.8	14.5	24.8	40.4	49.5
– New product	0.7	1.0	1.4	1.0	0.9	1.1	1.1	1.2	1.2	1.4	2.9	3.9	5.0
– New partner	3.6	4.0	4.5	5.4	5.4	5.0	6.3	6.7	7.5	8.2	13.2	24.4	28.3
– New product and partner	0.7	0.8	1.1	0.9	1.0	0.8	0.8	1.1	0.9	1.2	3.0	3.8	6.0
– New combinations of old products and partners	1.5	1.6	1.9	2.2	2.1	2.3	2.4	2.3	3.2	3.6	5.7	8.4	10.3
Retired product-country	5.9	6.8	6.7	7.9	8.2	8.6	7.4	8.3	9.6	14.9	13.3	20.9	17.4
– Product retired	0.7	0.7	0.7	0.8	1.1	0.8	0.9	0.8	1.1	1.4	1.5	2.3	2.2
– Partner retired	2.7	3.7	3.4	4.7	4.3	5.0	4.2	4.3	5.3	8.3	6.4	11.2	8.1
– Product and partner retired	1.1	1.1	0.8	0.7	0.8	0.9	0.7	0.8	0.9	1.9	1.6	2.4	2.2
– Product retired from some partners	1.3	1.3	1.8	1.8	2.1	1.9	1.6	2.3	2.2	3.3	3.9	5.0	4.8
Net diversification	0.6	0.6	2.2	1.6	1.2	0.6	3.2	3.1	4.0	–0.4	11.5	19.5	32.1
Intensive margin													
Net extensive margin	1.9	3.5	6.5	2.0	4.2	2.0	5.8	8.0	5.3	1.6	27.9	37.8	91.8
Product-country increases	28.9	32.2	45.4	35.0	34.3	38.3	47.0	51.6	62.1	62.2	58.8	108.6	104.3
Product-country decreases	17.3	19.5	21.5	32.7	36.5	29.8	30.0	35.0	36.8	42.0	20.9	36.7	20.5
Net intensive margin	11.0	12.0	23.9	2.0	–2.2	–8.0	17.0	16.5	25.2	20.0	37.9	72.0	83.8

(Continued)

Table 4. (Continued).

	1997–1998	1998–1999	1999–2000	2000–2001	2001–2002	2002–2003	2003–2004	2004–2005	2005–2006	2006–2007	1997–2002	2002–2007	1997–2007
Total change in imports	13.4	16.2	30.4	3.7	2.1	9.9	23.3	24.5	29.7	22.4	65.8	109.8	175.6
% annual growth due to													
Net entry and exit	10	18	14	12	145	8	11	20	4	9	25	16	34
Net diversification	4	4	7	42	60	6	14	13	11	-2	17	18	18
Net extensive	14	22	21	54	205	14	25	33	15	7	42	34	52
Net intensive	86	78	79	46	-105	86	75	67	85	93	58	66	48

Note: Bold highlights the net flows (no-bold figures are gross flows), figures may not add-up due to rounding.

adding and dropping have a slightly larger contribution than the net entry and exit of firms (12% and 11%, respectively). When we further decompose diversification, we can observe that the adding and dropping of countries plays a primary role in this growth category. As in the case for exports, we also observe an increasing role for the extensive margin when we enlarge the time period. Specifically, the extensive margin accounts for half of the total change in imports value over the 10-year period.

Bernard et al. (2009) also find a similarity between the exports and imports change decomposition. These authors argue that this similarity stems from the fact that a substantial amount of US exports and imports activities are performed by the same firms. However, the Spanish data do not seem to support this hypothesis: the correlation between changes in exports and imports for new exporting firms is 0.199; the correlation between exports and imports for companies with new products is 0.177; and finally, the correlation between changes in exports and imports for those companies in the intensive margin lies at 0.003. Our data suggest that, in Spain, exporting firms are different from importing firms. However, the underlying causes that govern the relative contribution of the extensive and intensive margins, both at the short and at the long-run, seem to be similar for exports and imports variations.

Finally, Table 5 presents the number of firms, as a percentage of all importing firms in the final year of each period, that are classified in each imports growth category. It is worth noting the large activity that occurs in the entry and exit of firms from the imports market, especially after 2001. We also observe that the activity in the diversification category is similar to the activity in the intensive category.

3.2. *Cross-sectoral dimension: partners and products*

In this section, we analyse the role of the extensive and intensive margins in explaining the differences in Spanish exports and imports across partners and products. We want to know whether it is the number of firms that participate in international trade (extensive margin) or the amount traded by each firm (intensive margin) which drives the large differences of Spanish trade at the cross-sectoral level.

We start with the decomposition of Spanish exports across countries. Spanish total exports to country c can be expressed as:

$$x_c = f_c \bar{x}_c \quad (3)$$

where f_c is the number of firms that export to country c and \bar{x}_c is the average amount of exports per firm.

If we run a regression of the logarithm of each margin on the logarithm of aggregate exports we get the average contribution of each margin to the differences in exports growth across countries.⁸ We use 2007 year data to perform this exercise.⁹ As shown in Table 6, in the case of exports, the extensive margin is the main driver of differences across countries: almost two-thirds of the differences are explained by the number of firms and one-third by the amount exported by each firm. In the case of imports, the extensive and the intensive margins have a similar contribution to differences across partners. Bernard et al. (2009) suggest that the larger role of the intensive margin may reflect the larger concentration of trade among importers. However, in the Spanish case this does not seem to be the case. For example, the first 100 Spanish firms export 39% of total exports, whereas the first 100 importing firms import 40% of total imports. Part of the explanation lies in the fact that the

Table 5. Firms in each growth category (as percentage of the number of firms in the final year). Imports.

	1997– 1998	1998– 1999	1999– 2000	2000– 2001	2001– 2002	2002– 2003	2003– 2004	2004– 2005	2005– 2006	2006– 2007	Average
Importer births	33	36	36	35	56	53	54	53	51	55	46
Importer deaths	39	35	33	34	19	41	43	49	51	43	39
New product-country	44	42	43	43	32	33	32	33	35	32	37
Retired product-country	46	42	43	44	28	33	32	33	34	32	37
Existing product-country, growth value	48	44	45	45	29	30	30	30	31	28	36
Existing product-country, decline value	45	44	44	46	31	32	30	30	31	28	36
Existing product-country, maintain value	0	0	0	0	0	0	0	0	0	0	0

Note: The sum of the rows does not have to sum a 100%, as a single company might simultaneously increase the number of products-countries relationships or retire a product-country pair, and increase or maintain the value of different trade pairs present in both years.

Table 6. Decomposition of Spanish exports and imports across countries, 2007 (OLS regression).

	Exports	Imports
Equation (3)		
Firms	0.625 (0.0146)	0.517 (0.019)
Average value per firm	0.375 (0.0146)	0.483 (0.019)
Equation (4)		
Firms	0.625 (0.0146)	0.517 (0.019)
Products	0.279 (0.0093)	0.263 (0.009)
Density	-0.253 (0.0089)	-0.234 (0.009)
Average value per firm-product	0.349 (0.0151)	0.454 (0.020)
Countries	226	226

Note: standard errors in parentheses.

share of some primary products, such as petroleum, is much larger in Spanish imports than in Spanish exports. The number of importers in these commodity categories tends to be lower and the value of imports per transaction tends to be much larger than the average.¹⁰

If we compare with previous studies, our coefficient on the elasticity of firms to exports is slightly lower than the one obtained by Bernard et al. (2009) for the US (0.69), and larger than the one obtained by Eaton et al. (2008) for Colombia (0.54). With respect to imports we find a lower estimate (0.52) than the one obtained by Bernard et al. (2009) for the US (0.58).

We further decompose equation (3) in order to analyse the role of the number of products traded by firms in explaining the differences in exports and imports across trading partners:

$$x_c = f_c p_c d_c \bar{x}_{pc} \quad (4)$$

where p_c denotes the number of products exported to country c and \bar{x}_{pc} the average firm-product exports; d_c denotes the density of products exported by a firm and is defined as the number of firm-product observations for which trade with country c is above zero. Now the extensive margin is captured by the combined effect of the number of firms, the number of products and the density of exported products; the intensive margin is captured by the average value of firm-product exports. As shown in Table 6, the introduction of products' extensive margin only reduces marginally the contribution of the intensive margin, especially in the case of exports. Although there is a positive correlation between the amount of exports and the number of exported products, this positive effect is counterbalanced by a negative correlation between the amount of exports that a country receives and the number of products that Spanish firms export to that country.

We also analyse the contribution of the extensive and intensive margins to explain the differences in trade flows across products. Spanish exports of product p can be decomposed as:

$$x_p = f_p \bar{x}_p \quad (5)$$

where f_p is the number of firms that export product p and \bar{x}_p the average amount of p -product exports per firm. In order to measure the relative contribution of each margin we apply the same methodology used in the previous analysis. As can be seen in Table 7, the extensive and intensive margins have the same weight in explaining why Spain trades more in some goods than in others; nevertheless, the role of the extensive margin is lower than in the country analysis and is larger for exports than for imports.

Following the previous procedure, we further decompose equation (5) in order to incorporate the role of partner countries in explaining the differences in trade across products:

$$x_p = f_p c_p d_p \bar{x}_{cp} \quad (6)$$

where c_p denotes the number of countries to which product p is exported and \bar{x}_{cp} the average firm-country exports of product p ; d_p denotes the density of partners and is defined as the fraction of all possible firm-country combinations for product p for which trade is positive. We also observe a negative relationship between the number of countries where product p is sold and the density of partners: products with a large volume of exports are sold to a large number of countries; however, since firms usually operate in few markets, country-density is negatively correlated with the number of trading firms and partner countries. Hence, we do not observe a notable reduction in the role of the intensive margin in explaining the differences in trade across products when we incorporate the partner dimension.

4. Conclusions

This paper analyses the contribution of the extensive and intensive margins to explain the differences in Spanish trade across years, trading partners and products. For that purpose we use the whole universe of firm level trade transactions over the 1997–2007 period. With respect to the time dimension, our results point out that year-to-year changes are largely explained by the intensive margin, i.e. changes in value of existing product–country relationships. However, when we analyse longer time horizons, the extensive margin becomes as important as the intensive margin. These results point out that, conditional on survival, new trading firms play a key role in the evolution of

Table 7. Decomposition of Spanish exports and imports across products, 2007 (OLS regression).

	Exports	Imports
Equation (5)		
Firms	0.562 (0.050)	0.466 (0.077)
Average value per firm	0.438 (0.050)	0.534 (0.077)
Equation (5)		
Firms	0.562 (0.050)	0.466 (0.077)
Countries	0.180 (0.020)	0.168 (0.021)
Density	-0.122 (0.018)	-0.114 (0.029)
Average value per firm-country	0.380 (0.054)	0.480 (0.070)
Products	98	98

Note: standard errors in parentheses.

aggregate trade flows in the long run. We also find that expansion of the country portfolio is another source of growth of exports and imports in the long run. On the cross-sectoral level, the number of firms is the key driver of the differences in trade across countries and across products, likely to be explained by the fact that the number of trading partners declines significantly with distance. The importance of the extensive margin is more pronounced in the case of exports than in the case of imports.

As exports and imports growth, in the medium and long run, heavily depends both on the entry of new firms and the diversification of existing firms, policies aimed to maximise the benefits that external trade can bring to the Spanish economy should focus on these two lines and be tailored to the firms' specific status (new or incumbent). First, to capitalise on the entry of new firms, especially in the case of exports, policy practitioners should improve the identification of firms that have a larger probability to survive in foreign markets and concentrate resources in those firms. Second, for incumbent firms that are concentrated in few foreign markets, policies should identify and target the obstacles that preclude firms from entering new markets.

Finally, the collapse in trade in 2008–2009 stresses the relevance of the analysis of trade margins in trade variation. In particular, the decomposition of trade variation in the extensive and intensive margins helps us to understand the impact that the crisis may have on the Spanish trade in the future. If the collapse in trade is concentrated in the extensive margin, new exporters and new export relationships will not be able to grow, limiting a very important route for the expansion of Spanish trade; on the contrary, if the collapse in trade is concentrated in the intensive margin, firms will be able to recover previous exports levels when demand conditions improve.

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Notes

1. De Lucio and Mínguez (2008) perform a similar analysis to ours and conclude that new firms account for most of the variation in trade volume over the period 2000–2005 while product-country switching plays a minor role. Madrid (2009) finds that, among firms that export annually more than 200,000, both existing firms and new firms contribute the same to the variation in aggregate exports value over the period 2000–2007. However, she does not analyse the importance of product-country switching as an additional extensive margin. Martín and Rodríguez (2009) also investigate the importance of new exporting firms in Spanish trade using a different database (Central de Balances elaborated by Bank of Spain). Since large firms are overrepresented in their sample, their results are similar to those reported by Madrid (2009).
2. Bernard et al. (2009) use match data since they do not have access to firm identifiers. They claim to be able to match 76% and 82% of the exports value and imports value, respectively, over the period 1993–2003. Our original files have a firm identification for each transaction so it is easy to follow all the transactions of the same firm every year.
3. Since methodological changes in 1999 and in 2002 did not significantly change the total value of imports and exports in these years, they do not affect significantly our calculations of the contributions of the trade margins (expressed in percentage contribution to the variation in aggregate trade value).

4. For example, 'exports of edible fruits and nuts by a Spanish firm to Germany in a year' is defined as a transaction.
5. Unlike the 2002–2007 period, the 1997–2002 and 1997–2007 periods are subject to methodological changes in 1999 and 2001 so the interpretation of the results in these periods should be interpreted cautiously.
6. In another piece of research, the authors have compared the role played by country-switching and product-switching in explaining the composition of portfolio diversification for the years 2008–2009 using different levels of product aggregation. The results reveal that the importance of product-switching as a determinant of diversification increases significantly when we use a high level of product classification (CN 8-digits) compared with the one (CN 2-digit) used in the current paper, because some relationships previously classified as intensive margin change to extensive margin, and because of changes in the composition of extensive margin.
7. The findings using the entire universe of firms are in contrast with previous studies that used a selection of firms. Wagner (2004) finds that the entry of new exporting firms contributed marginally to the export growth boom in the German Low Saxony states in the 1995–2002 period while Gleeson and Ruane (2007), in their analysis of the evolution of exports for Irish manufacturing plants between 1985 and 2003, find that continuing firms explain the majority of changes in both exports booms and slumps.
8. As the OLS is a linear estimator, and errors have an expected value of zero, the sum of the relative contribution of each margin adds to 1.
9. Results are not altered significantly if we use other years.
10. The coefficient for number of firms in imports rises to 0.551 when we exclude primary products from the regression. In the case of exports the rise in the coefficient is almost negligible (0.627).

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