

The Portrait of Success: Firms in International Trade

Very Preliminary and Incomplete

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Abstract

This work presents a picture of Uruguayan manufacturing firms. To this aim we combine data on firms' characteristics from the Annual Economic Surveys (Encuesta de Actividad Economica) with data on exports and imports from the Customs Direction for the period 1999-2006. We analyze trade concentration as well as performance premium associated to international activity for firms that export and import (two-ways traders), only exporters and only importing firms.

We find that, in line with previous works, trade is more concentrated than employment and sales and that two-ways traders are the best performing firms, followed by exporting firms.

Finally, we analyze product and country extensive margins of imports and exports and we find that the product extensive margin of imports and the country extensive margin of exports have a positive effect on two key variables: total factor productivity-estimated with Akerberg et al. 2006 methodology), and employment.

Keyword: trade, labour markets, productivity, exports

JEL: F14, F16, J23, O33

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Introduction

From the mid of 90s, the analysis of the microeconomic evidence indicates that the exporting firms are more productive, more capital intensive and pay higher wages than non-exporters, indicating a high heterogeneity in the performance between firms even within the same industry. These empirical findings hold for developed countries (Bernard and Jensen for the United States, 1995, 1999) and for developing ones (Aw et al. 2000 for Taiwan; De Loecker 2007, for Slovenia; Clerides et al. 1998, for Morocco, Mexico and Colombia; Álvarez and López, 2005, for Chile).

The high association between exports and productivity within the same narrowly defined industry could not be explained assuming representative firms as in the previous trade models, leading to the so called 'new – new' trade models that incorporate heterogeneity in productivity between firms (Melitz, 2003; Bernard et al., 2003; Yeaple, 2005; Bernard, Redding and Schott, 2007; Melitz and Ottaviano, 2008). These models predict that a movement to the free trade would drive to an increase in the productivity and the size of the firms, reducing the margins of profit (Melitz and Ottaviano, 2008) and the number of firms. Melitz (2003) was the first to develop a theoretical model introducing explicitly firm heterogeneity which helps explaining the empirical findings. This author shows that in the presence of firm heterogeneity trade opening leads to important distributive effects within industries, with shrinkage or exit of the least productive firms towards the most productive ones which expand, leading to increases in average productivity and the average size of firms while it reduces its number. Thus, in these new models, trade opening can generate not only the traditional reallocation of resources from industries without comparative advantages towards those with comparative advantages, but also from less productive firms towards more productive within the same industry. In these models free trade allows the expansion of the most productive firms that will demand more work and this greater demand pushes the price of wages up and the least productive firms shrink or exit the market. Since in order to export firms must incur in sunk costs, only firms with high productivity levels can make positive profits in international markets. Moreover, by assuming that sunk costs are specific to individual products and destination markets, would explain why most exporters would sell only few products to few countries (Chaney, 2008, Helpman et al., 2008). Following the pioneer work by Melitz, new theoretical models introducing extensions in several dimensions, were developed. For instance: Yeaple (2005) allows that firms use two different types of technologies with different fixed costs, Melitz and Ottaviano (2008) introduce asymmetries between trading countries, Kasahara and Lapham (2008, 2012) and Amiti and Davis (2012) introduce imports of intermediate inputs, and Costantini and Melitz (2008) activities of the R&D making productivity endogenous. In summary, most of the recent

developments aim at endogenizing heterogeneity between the firms, incorporating the decisions of vertical integration (outsourcing), investments in new technologies, adjustments in the productive mix and of the qualification of the workforce. Another interesting aspect is the multi-product and multi-destination character and/or multi-origin of the exporting and importer firms respectively that has been explored theoretically by Bernard et al.(2011, 2006).

As we mention above, recently it has pointed out that the exports are only one part of the story. Some authors have pointed out that import activities also must be analyzed to understand the nature of the heterogeneity between different firms (for example: Halpern et al., (2006);¹ Bernard et al. (2009); Kasahara and Lapham, (2008); Vogel and Wagner, (2010). Thus, with the availability of detailed transaction data, researchers started to analyze the role of imports, combining information on both the import and export sides (Bernard et al. 2009; Muûls and Pisu, 2009 , Andersson et al., 2008, Tucci, 2005). These studies find a positive association between imports and firms' productivity. The better performance of importing firms may be due to the higher quality of imported inputs or to the transfer of knowledge embodied in imported inputs and capital goods. As in the case of exporters, prior to importing, firms may need to incur in sunk costs related to the search of foreign markets and learning of the custom procedures. This search and learning process requires the accumulation of technological capabilities, hence the association between imports and productivity could be the result of a self-selection mechanism. In this regard in this work we propose to analyze exports, imports and the combination of both (two-way-traders), and its effects on firms' performance and labor market outcomes. On the other hand there is some empirical evidence on the concentration of the exports and the imports, as well as on the productive and geographical concentration/diversification (Eaton et al. 2004, 2007; Bernard et al., 2007 Firms in international trade; Mayer and Ottaviano, 2007; Muuls and Pisú, 2007). These works show that export volumes are accounted by a handful of firms which export many products in many countries, while the large majority of firms sell only few products in a limited number of foreign countries. Furthermore, these studies suggest that to understand the heterogeneity between firms and the impact on the levels of productivity it would be necessary to explore the characteristics of the exporting/importer firms ('traders') and different combinations of their status in relation to their geographical and sectoral concentration/diversification.

This work contributes to the flourishing literature by giving a detailed picture of international trade activities of Uruguayan firms over the period 1999-2006. Firstly, we describe the pattern

¹ Halpern et al. (2006) developed an empirical model that suggests that importers have to face fixed costs to establish business relationship with foreign suppliers. In this model firms would buy foreign inputs into the extent that these goods would determine productivity gains to cover the fixed costs of importing.

of concentration of imports and exports across firms and compare it with the concentration of employment and sales, and with some international works. Then we analyze the country and sector extensive margin of trade, the intensity of their activities and their diversification in terms of products and geographical markets. Finally, we present the performance premia in particular in terms of productivity, employment. This gives us a flavor/picture of firm heterogeneity and its association with international trade activities. To this goal we consider the various trade status of the firms (importers and exporters, only exporters, only importers) and the diversification of their activities in terms of number of products and countries, and e geographical markets in which they trade.

Thus in this work we analyze the impact of firms performance –in particular total factor productivity (TFP) and its link with imports and exports of the firms. Furthermore, we analyze the impact of trade on labor demand, particularly the demand for qualified work² for importers only, exporters only and two-way traders. We also take into account if trade flows are with developed countries or at the regional level –where the region is Latin America-.

Eaton et al. (2004, 2007) show that firm heterogeneity translates into substantial differences in exporting participation and the number of markets to which the firm sells. In this work we present some statistics showing the number of main origin/destination countries, and the share of trade flows to the region and to developed countries.

Thus, we explore the characteristics of the firms according to their international status: exporting / importer ('traders') and different combinations of their status (two-ways traders). This is complemented with information on the level of development (developed and Latin American countries) of origin and destination countries and product concentration/diversification, analyzing these variables on firms' performance and labor demand.

This work will give us a picture of firm heterogeneity associated with international activities, showing how they differ from firms oriented exclusively towards the domestic market and the impact of trade flows with different partners/developed countries. These first descriptive approaches are complemented with regressions by ordinary least squares and fixed effects (controlling for industrial sector, year, foreign ownership, and firm size), allowing the comparison of the results obtained with the findings for other countries for which there are similar works (Altamonte and Bekes, 2009 for Hungary; Muuls and Pisú, 2008 for Belgium;

² We should note that causality may run in both ways.

and, Vogel and Wagner 2008, for Germany, Castellani et al. 2010, for Italy, between others). Finally in order to analyze causality we will rely on instrumental variable techniques –such as IV-GMM- to control for endogeneity present in this type of analysis.

Data at the firm level comes from the Encuesta de Actividad Economica from the Instituto Nacional de Estadistica. Furthermore, we combine this data with trade data from the Direccion Nacional de Aduanas.

Uruguayan export and import data were obtained from the Direccion Nacional de Aduanas which covers the entire population of trade flows by firm.

Export and import data are recorded at the year-firm –product-country level, i.e. they provide information of trade flows at the 10 digits of the NCM (equivalent to HS) product –which we classify in 8 and 6 digits in order to make international comparison- and destination country. Thus, we have a panel for the period 1997-2008 with information of firms' characteristics, exports and imports by country, product and value.

Finally, our results can be compared to previous studies for developed and developing countries.

Our results are in line with evidence on for developed countries showing that exports and imports are more concentrated than employment and sales, and that most international firms trade only a few products with a small number of countries, but a small number of diversified firms account that firms engaged in international activities are more productive, larger in terms of employment and sales, and more capital intense than firms oriented exclusively towards the domestic market (non-traders). While the results for pooled OLS controlling for sector, time and size) gives larger estimates, when we introduce firm-specific time-invariant effects (fixed effect model) the magnitude of our estimates reduce considerably but are still significant for productivity and employment.

Our preliminary results (OLS) seems to indicate that two ways traders are bigger in terms of employment, exhibit higher productivity, higher export propensity and served a higher number of countries. When we compare firms serving mostly developed countries we find that these employ more people and present higher productivity, but we do not find evidence that the demand more skilled labor.

Additionally, we observe a hierarchy among traders: firms engaged in both imports and export activities (two-ways traders) are the best performing firms. They outperform both exporters and importers only. However, firms engaged in only exporting outperform those engage in importing. Thus, unlike the results reported by Castellani et al. (2010) for Italy, sunk costs, i.e. the selection mechanism seems to be higher for exporting firms than for importing ones for

Uruguayan trade. This could be associated to the concentration of imports from Mercosur's partners and the region in general, while exports, though more concentrated in few firms, are more diversified in terms of destination markets.

This work structure as follows: after this introduction, in Section 2 we present the data. In Section 3 we provide evidence of the degree of concentration along country and product extensive margin of imports and exports. In Section 4 we report the results on the association of firms' internationalization status and along the country and sector extensive margins and their productivity, employment, sales and capital intensity.

2 Data description

This work relies upon a dataset which combines two different sources of data: on one side we have data for a panel of firms over the period 1999-2006.

The empirical analysis is based on the Annual Industrial Survey carried out by the National Institute of Statistics of Uruguay (INE) for the years 1999 to 2006.³ The surveys cover manufacturing plants with more than 5 workers at the firm level. Each firm has a unique identification number which allows following the firms over time. For each firm, the INE collects data on production, value added, sales, employment, wages, exports, investments, capital, depreciation, energy usage, foreign ownership of capital among other variables. Further, each firm is classified according to its main activity at the 4 digit ISIC level.

On the other side we use data from the National Direction of Customs which records exports by the firm in value and country of destination, and we merge these data to the INE database. All variables were deflated by specific price indexes with base year 1997.⁴

The countries of destination of exports and origin of imports were classified according to the level of development and the geo-economic region according to the World Bank classification⁵ for each year.

We have an unbalanced panel for the period 1999-2006 with 6,767 total observations and 1,014 manufacturing firms,⁶ of which 726 had export activity in the period according to data from the Customs Direction.⁷

³ Our purpose is to undertake this analysis for the period 1997-2008. Nevertheless up to the date we do not count with Customs microdata for the years 1997 and 1998.

⁴ The specific Price indexes were estimated and provided by Susana Picardo, Department of Economics, University of the Republic, Uruguay.

⁵ Over the period Uruguay belongs to the medium-high income countries.

⁶ The number is lower in 2006 since only those firms with more than 50 workers and/or sales greater than 120 millions of pesos per year were surveyed (compulsory stratum).

⁷ There is a difference of 7.3 % lower if we take data from the INE.

As showed in Table 1, 57 % of the firms in our sample are exporting firms and 85 % are importers in the year 1999. Thus, like Italy and Sweden, Uruguayan firms seem to be much more internationalized than U.S. ones, and they tend to import more. The small share of trading firms in the U.S. may be explained by its large internal market and to the sampling method since in the case of the US all firms are considered while as can be observed in Table1 for Italy the sample includes firms with more than 20 workers. For Sweden the sample includes firms with more than 10 workers and for Uruguay with more than 5 workers. Thus, the inclusion of smaller firms may reduce the share of firms with international activity due to the sunk costs related to international trade activities. The country most similar to Uruguay in terms of higher openness seems to be Sweden.

Furthermore, our results regarding concentration are similar to the empirical works for developed countries: trade is more concentrated than employment and sales. Nevertheless, while there seems not to be important differences in the concentration of exports and imports for the US and Belgium, but a higher concentration of imports in the case of Italy, for Uruguay exports are slightly more concentrated than imports, which reinforces the idea that fixed exports costs are higher for exports than for imports. Finally, we note that Uruguay exhibits the lower concentration indices in relation to previous studies.

In Table 2 we break down the sample into four categories: 1) non-trading firms, 2) firms that import and export (two-ways traders), 3) firms that export but do not import (only exporters) and firms that import but do not export (only importers).

In 1999 we find that 57 % of firms are exporters, 85 % importers, 55 % are two-way traders, only 30 % of importers do not export, and 2.35 % of exporters do not import, i.e. the vast majority of exporters also undertake imports.

Table 1: Participation in international trade and concentration

	Uruguay	Italy	United States	Sweden	Belgium
% Exporters	57.5	71	27	71	41.2
% Importers	85	69	14	60	43.2
Gini Exports	0.819	0.825	0.972	---	0.959
Gini Imports	0.769	0.899	0.965	---	0.956
Gini Sales	0.709	0.807	0.916	---	0.873 (value added)
Source	this paper	Castellani et al. (2008)	Bernard et al. (2007) Plant-level, 2002	Andersson et al. (2007) Firm-level, 2004 10 workers or more manufacturing	Muuls and Pisu (2007) Firm-level, 1996 all firms manufacturing
Gini Added Value	0.721				
Gini Employment	0.535				

Source: own elaboration based on data of the INE and Dirección Nacional de Aduanas.

In Table 2 we present the share of firms according to their internationalization status. Since the Annual Survey of Economic Activities records the amount of imported inputs used by the firms we define a dummy for importers of intermediate inputs. As expected we find that this figure is lower than for importers, which can be importers of intermediates, capital or final goods. We observe that the vast majority of firms are engaged in both export and import activities (more than 50 % over the period). Furthermore, while one third of the firms that undertake imports do not exports (30 and 27 % in 1999 and 2005 respectively), most exporters also are importers: only 2 % and 4 % of exporters do not undertake imports in 1999 and 2005 respectively. This could be indicating that export fixed costs are higher than import fixed costs.

Table 2: Share of the number of firms per year, no of exporting firms, no of importing firms, two-ways traders

	1999	2005
Exporters	57,48	55,1
Importers intermediates	56,7	50,28
Two-ways1	40,92	34,57
Two_ways2	55,13	50,99
Importers	85,19	78,01
Exp_noimp2	2,35	4,11
Imp_noexp2	30,06	27,02
Domestic	12,46	17,88
No. Of observations	682	755

Source: Own elaboration based on data from the National Customs Direction [Dirección Nacional de Aduanas]

Finally, regarding to the evolution of traders over the period we find a slight reduction in only importing and two-ways traders. Nevertheless, since in 2005 we were just starting the path of growth after the 2002 crisis so a longer period would be needed to capture accurately the evolution of the internationalization of firms.

Table 3: Share of firms according to their internationalization status for the period 1999-2006

Year	Export	Import	Two_ways	Two_ways2	Imp_custom	Exp_noimp2	Imp_noexp2	Domestic
1997	0.5270	0.5512	0.3722	0.0000	0.0000	0.5270	0.0000	0.4730
1998	0.6092	0.5790	0.4239	0.0000	0.0000	0.6092	0.0000	0.3908
1999	0.5748	0.5670	0.4092	0.5513	0.8519	0.0235	0.3006	0.1246
2000	0.5872	0.5607	0.4019	0.5639	0.8458	0.0234	0.2819	0.1308
2001	0.5437	0.5527	0.3765	0.5126	0.8089	0.0311	0.2963	0.1600
2002	0.5089	.	.	0.4717	0.7708	0.0372	0.2991	0.1920
2003	0.5397	0.0946	0.0844	0.5000	0.7932	0.0397	0.2932	0.1671
2004	0.5290	0.5223	0.3482	0.5000	0.7942	0.0290	0.2942	0.1768
2005	0.5510	0.5028	0.3595	0.5099	0.7801	0.0411	0.2702	0.1788
2006	0.6934	0.5619	0.4335	0.6682	0.8856	0.0252	0.2174	0.0892
Total	0.5608	0.4966	0.3531	0.4127	0.6353	0.1481	0.2226	0.2166

Source: Own elaboration based on data from the National Customs Direction [Dirección Nacional de Aduanas]

Notes: Export: exporters; Import: importers of intermediates; Two-ways: exporters and importers of intermediates only; Two-ways2: exporters and importers of intermediates, capital and other final goods; Imp_customs: importers of intermediates, capital and other final goods; Exp_noimp2: only exporters; Imp_noexp2: only importers; Domestic: non-traders firms.

Regarding to the distribution of traders between sectors varies between sectors. In Table 4.1 and 4.2 we present the share of firms according to their trade status by industry at the two-digit ISIC code.

Table 4.1: Trade status by sector, 1999

Sectors	ISIC rev. 3	Two_way traders	Only Exporter	Only Importer	Exporters	Importers	Domestic
Food, Beverages	15	49.0	3.6	27.8	52.6	76.8	19.6
Tobacco	16	66.7	0.0	33.3	66.7	100.0	0.0
Textiles	17	71.7	3.3	20.0	75.0	91.7	5.0
Wearing, Apparel	18	69.0	0.0	25.9	69.0	94.8	5.2
Leather, Allied Products	19	71.4	7.1	14.3	78.6	85.7	7.1
Wood Manufacturing	20	31.3	0.0	43.8	31.3	75.0	25.0
Paper, Allied Products	21	60.0	10.0	30.0	70.0	90.0	0.0
Printing, Publishing	22	41.0	0.0	41.0	41.0	82.1	17.9
Chemical Products	24	68.9	0.0	27.8	68.9	96.7	3.3
Rubber, Plastics	25	62.9	0.0	25.7	62.9	88.6	11.4
Non-Metallic Mineral Products	26	32.1	10.7	32.1	42.9	64.3	25.0
Basic Metals	27	55.6	0.0	33.3	55.6	88.9	11.1
Metal Products	28	25.0	0.0	59.4	25.0	84.4	15.6
Industrial Machinery	29	66.7	0.0	22.2	66.7	88.9	11.1
Office Machinery	30	100.0	0.0	0.0	100.0	100.0	0.0
Electrical Machinery	31	64.7	0.0	35.3	64.7	100.0	0.0
Radio, TV, etc.	32	75.0	0.0	25.0	75.0	100.0	0.0
Medical, Prec., Optical Instruments	33	50.0	0.0	33.3	50.0	83.3	16.7
Motor Vehicles	34	76.9	7.7	15.4	84.6	92.3	0.0
Other Transport Equipment	35	37.5	12.5	37.5	50.0	75.0	12.5
Furniture Manufacturing	36	33.3	0.0	47.6	33.3	81.0	19.0
Total		55.1	2.3	30.1	57.5	85.2	12.5

Source: own elaboration based on data of the INE and Dirección Nacional de Aduanas.

Table 4.2: Trade status by sector, 2005

Sectors	ISIC rev. 3	Two_way traders	Only Exporter	Only Importer	Exporters	Importers	Domestic
Food, Beverages	15	38.30	14.33	19.18	52.64	57.48	52.64
Tobacco	16	67.86	14.29	17.86	82.14	85.71	82.14
Textiles	17	53.13	20.77	16.54	73.90	69.67	73.90
Wearing, Apparel	18	41.62	17.98	23.84	59.60	65.45	59.60
Leather, Allied Products	19	58.85	19.27	11.98	78.13	70.83	78.13
Wood Manufacturing	20	27.96	11.29	23.66	39.25	51.61	39.25
Paper, Allied Products	21	38.26	19.13	31.30	57.39	69.57	57.39
Printing, Publishing	22	32.08	7.80	27.17	39.88	59.25	39.88
Chemical Products	24	51.46	14.19	21.28	65.65	72.75	65.65
Rubber, Plastics	25	46.31	15.06	21.88	61.36	68.18	61.36
Non-Metallic Mineral Products	26	24.03	13.95	30.62	37.98	54.65	37.98
Basic Metals	27	51.76	16.47	18.82	68.24	70.59	68.24
Metal Products	28	25.85	10.77	34.46	36.62	60.31	36.62
Industrial Machinery	29	38.67	16.00	25.33	54.67	64.00	54.67
Office Machinery	30	44.44	11.11	33.33	55.56	77.78	55.56
Electrical Machinery	31	36.84	13.82	35.53	50.66	72.37	50.66
Radio, TV, etc.	32	50.00	19.23	23.08	69.23	73.08	69.23
Medical, Prec., Optical Instruments	33	44.44	9.40	23.93	53.85	68.38	53.85
Motor Vehicles	34	52.41	19.31	20.69	71.72	73.10	71.72
Other Transport Equipment	35	41.18	16.18	14.71	57.35	55.88	57.35
Furniture Manufacturing	36	29.32	12.57	28.27	41.88	57.59	41.88
Recycling	37	87.50	12.50	0.00	100.00	87.50	100.00
Total		44.65	14.79	22.88	59.44	67.53	59.44

Source: own elaboration based on data of the INE and Dirección Nacional de Aduanas.

3. Concentration of international trade activities

The empirical evidence on firms in international trade document that a few firms account for a large volume of aggregate trade (Bernard et al. 2007 for US, Mayer and Ottaviano 2007 for six European countries⁸

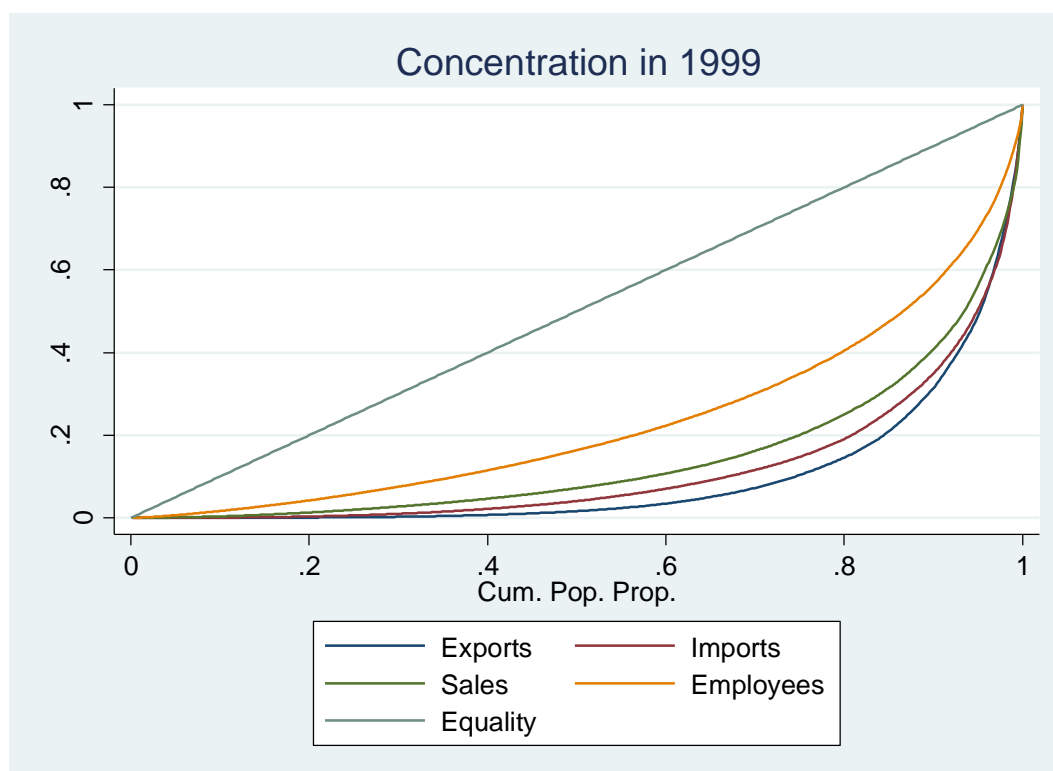
In Table 1 we have reported concentration of exports, imports, employment and sales for Uruguay in 1999 and for some previous studies, using the Gini index.

We find that Uruguay exhibit the lowest concentration index, though trade is slightly more concentrated than sales, and employment (value added shows a high concentration).

In Figure 1 and 2 we present the Lorenz curve for 1999 and 2005. The Lorenz curve plots the shares in the cumulated value of a given quantity (which in this case is employment, sales, imports, and exports) accounted for the cumulated proportion of firms. The closer the Lorenz curve is to the equidistribution line, the lower the degree of concentration.

For both years trade is more concentrated than sales and employment, while exports are more concentrated than imports. For instance, if we take Figure 2, we find that 80 % of firms account for 40 % of employment and less than 20 % of exports.

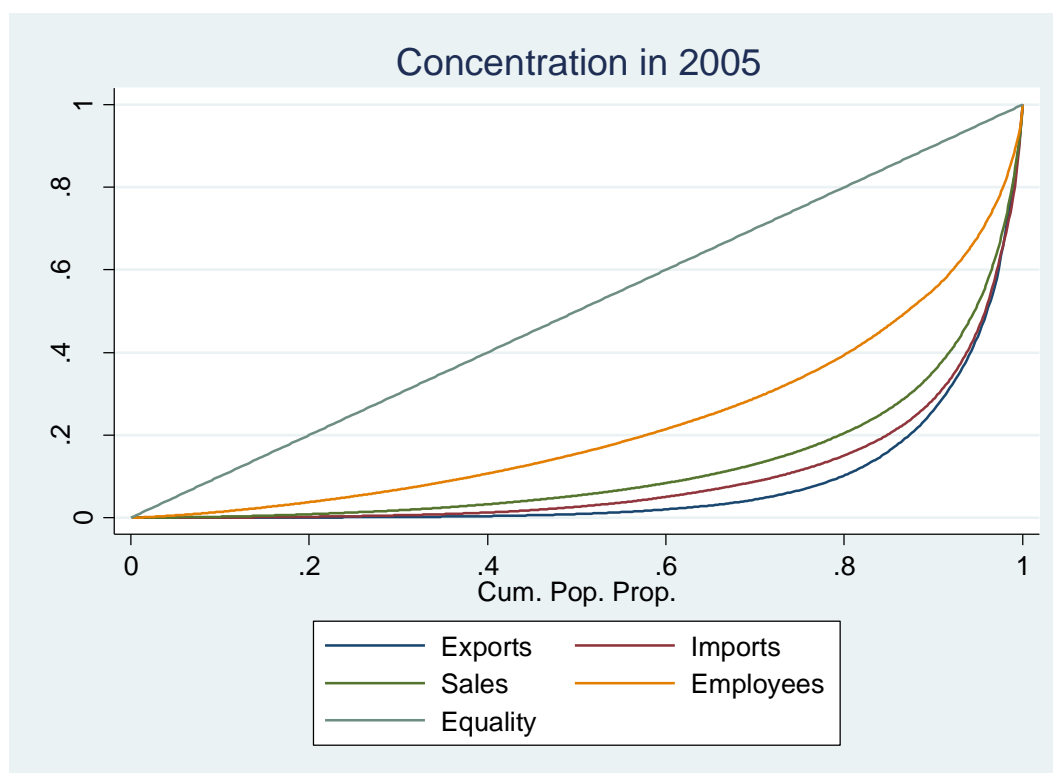
Figure 1: Lorenz curve for exports, imports, total trade, employment and sales, 1999



Source: own elaboration based on data of the INE and Dirección Nacional de Aduanas.

⁸ Mayer and Ottaviano (2007) report that the top five percent of exporters account for more than 70 percent of exports in five out of six countries analyzed).

Figure 2: Lorenz curve for exports, imports, total trade, employment and sales, 2005



Source: own elaboration based on data of the INE and Dirección Nacional de Aduanas.

3.1. Concentration within and between industries

Trade concentration may reflect both a between industry effect (export and import are concentrated in few sectors) or a within industry effect (some firms within a sector account for the bulk of trade. The first effect reflects the traditional comparative advantage theory while the second reflects Melitz's model of trade in presence of firm heterogeneity.

In Table 5 we present the Gini and Theil coefficients of exports, imports and total trade, and total sales and employment for Uruguayan manufacturing firms in 1999 and 2005 and for the whole period. We observe an increasing concentration for the four variables analyzed, though exports and imports are much more concentrated than sales, and employment exhibits the lower concentration.

Table 5: Concentration of Uruguayan trade, employment and sales

Variable	1999		2005		Whole period	
	Gini	Theil	Gini	Theil	Gini	Theil
Exports	0.8092	1.4197	0.8189	1.4572	0.8253	1.4927
Imports	0.7687	1.2919	0.8068	1.4686	0.7943	1.3983
Employment	0.5351	0.5715	0.5512	0.6171	0.5483	0.5989
Sales	0.7082	1.0989	0.7501	1.2157	0.7308	1.1493

Source: own elaboration based on data of the INE and Dirección Nacional de Aduanas.

In order to answer the question whether concentration of trade is due to sectoral trade specialization or it is a feature that holds for each sector, we first compute concentration for each sector and then exploit a property of the Theil index, which can be decomposed in its between sectors and within sectors components⁹.

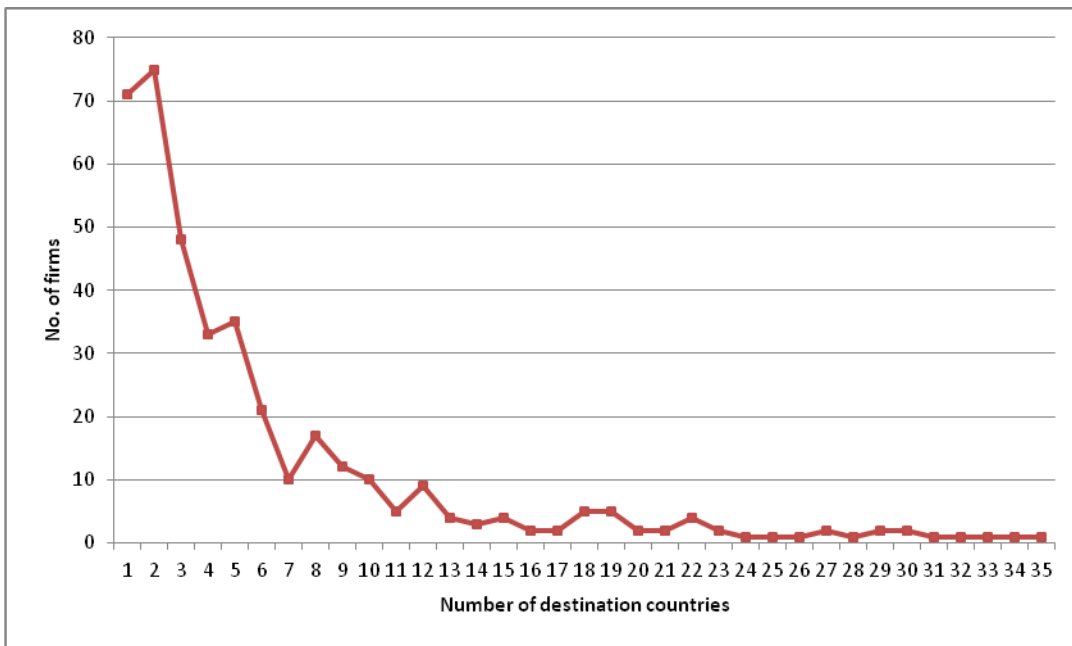
3.2. Concentration along the extensive margin

It has been observed that international trade is not only concentrated across firms (i.e. small number of firms accounting for most exports and imports) but also along the product and country extensive margins.⁹ Similar results were obtained for Slovenia (Damijan et al. 1998), Belgium (Muuls and Pisu, 2007), Sweden (Anderson et al. 2007) and the US (Bernard et al. 2007). The last three studies also analyze imports and find a negative relationship between the number of countries from which firms import (country extensive margin of imports) and the number of firms that imports from those markets. Similar results have been found along the product extensive margin: many firms export (import) few products, and a small number of firms trade in several different products. These stylized facts are also found in the case of Uruguayan manufacturing trading firms.

In Figure 3 we depict the number of export destinations by firm by firm in 1999, while in Figure 4 we present the number of origin countries, and in Figure 5 we present the share of firms and both number of destinations and origin countries. In other words these figures depict the country extensive margins of exports and imports. As can be observed from these figures the number of countries declines with both exports and imports, but it is lower in the case of exports. In 1999, nearly 18 % of exporting firms serve only one country, while approximately 10 % of exporting firms imported from only one country. These figures are 26 % for exporters to only one country and 10 % of importers from only one country in 2005.

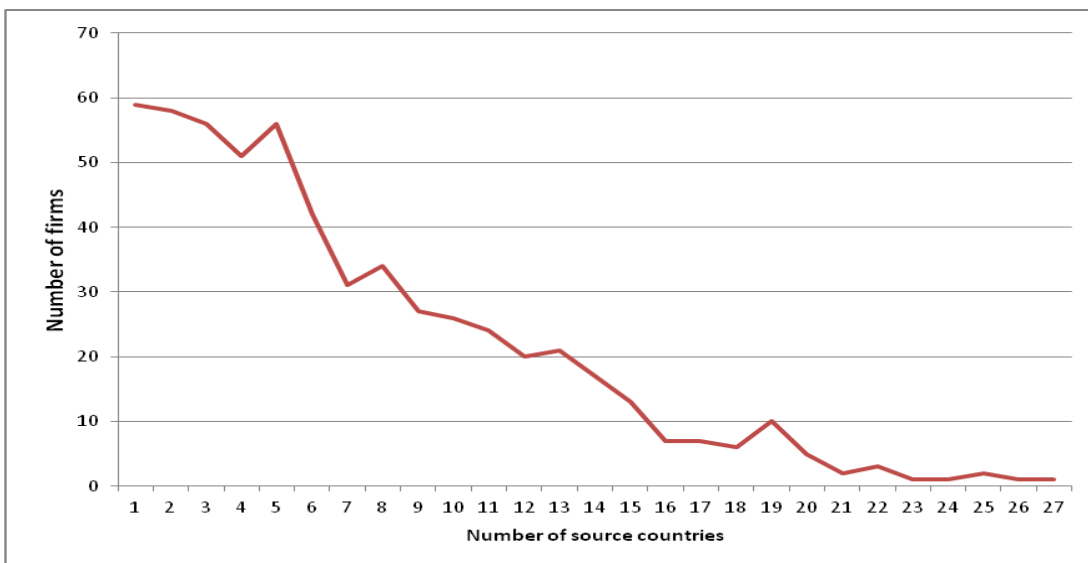
⁹ The extensive margin of export(import) refers to the number of firms involved in exporting (importing) activities, while the product and country extensive margins refer to the number of products and countries in/with which a firm trades goods, and can be thought as a measure of geographical and product diversification. Mayer and Ottaviano (2007) discuss this definition.

Figure 3: Number of export destinations (average by firm, 1999)



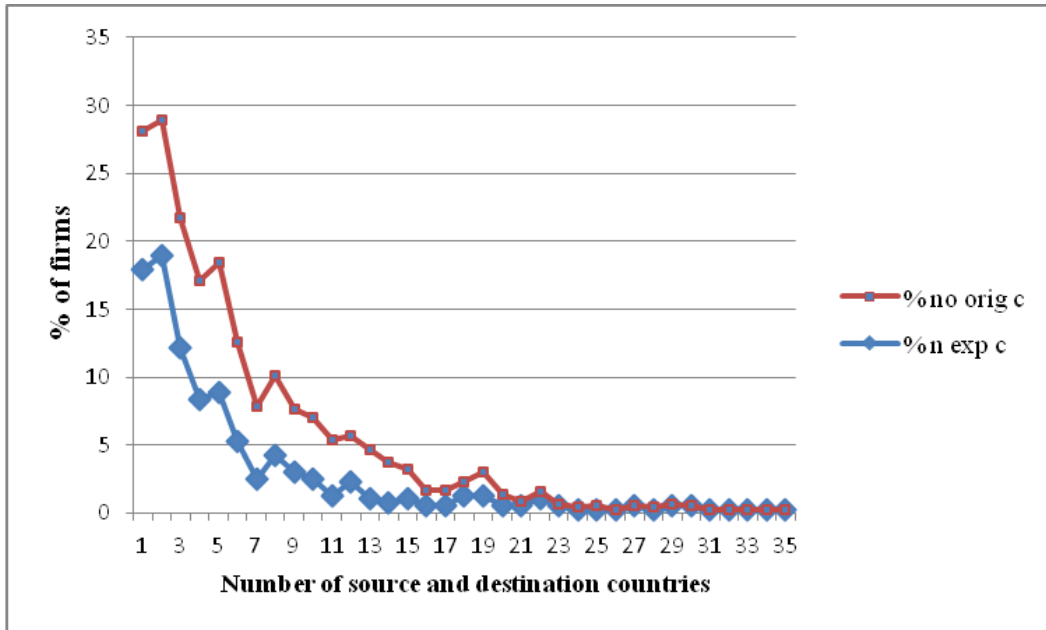
Source: own elaboration based on data of the INE and Dirección Nacional de Aduanas.

Figure 4: Number of origin/source countries (average by firm, 1999, hs 7 digits)



Source: own elaboration based on data of the INE and Dirección Nacional de Aduanas.

Figure 5: Number of origin/source countries (average by firm, 2005)

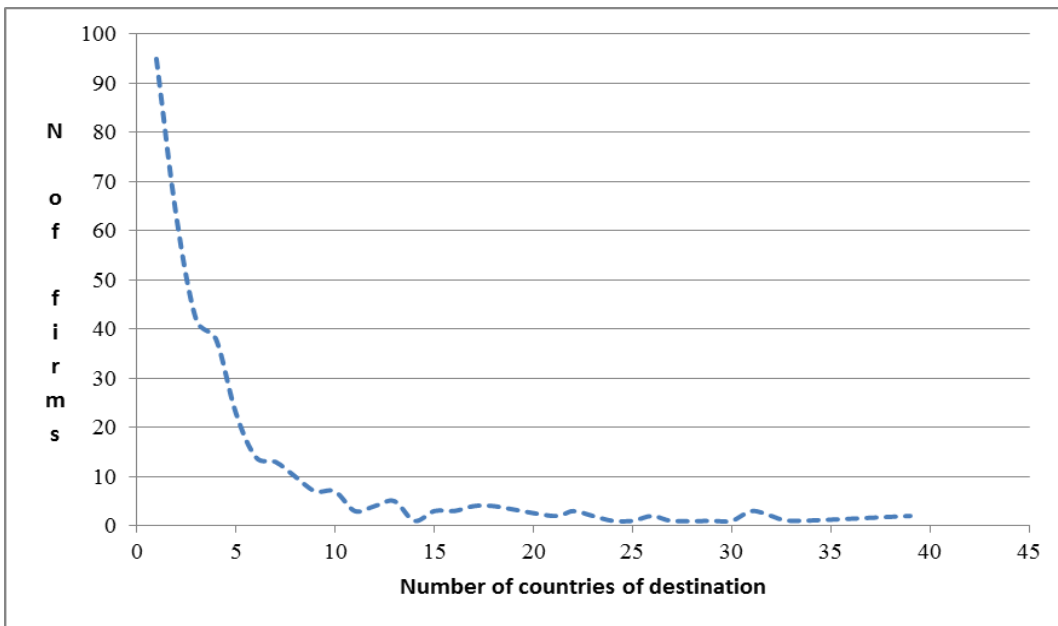


Source: own elaboration based on data of the INE and Dirección Nacional de Aduanas.

In Figures 6 and 7 we present the chart of the number of firms according to the country extensive margins for exporters and importers, while Figure 8 shows the share of firms and the extensive margins.

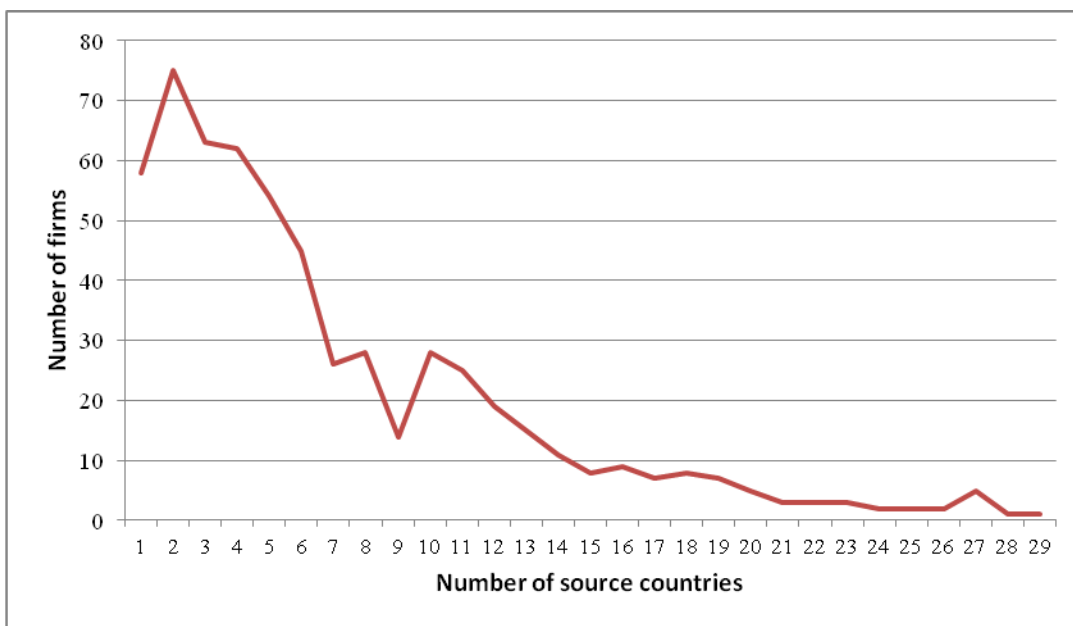
We also note that the percentage of importing firms is higher than the percentage of exporting firms. When we consider eleven countries we find that for both years there are approximately 1 % of exporting firms and 4 % of importing ones. The average number of exporting countries in 1999 is 5, with a median of 3, and the average number of importing countries is 7, with a median of 6.

Figure 6: Number of export destinations (average by firm, 2005)



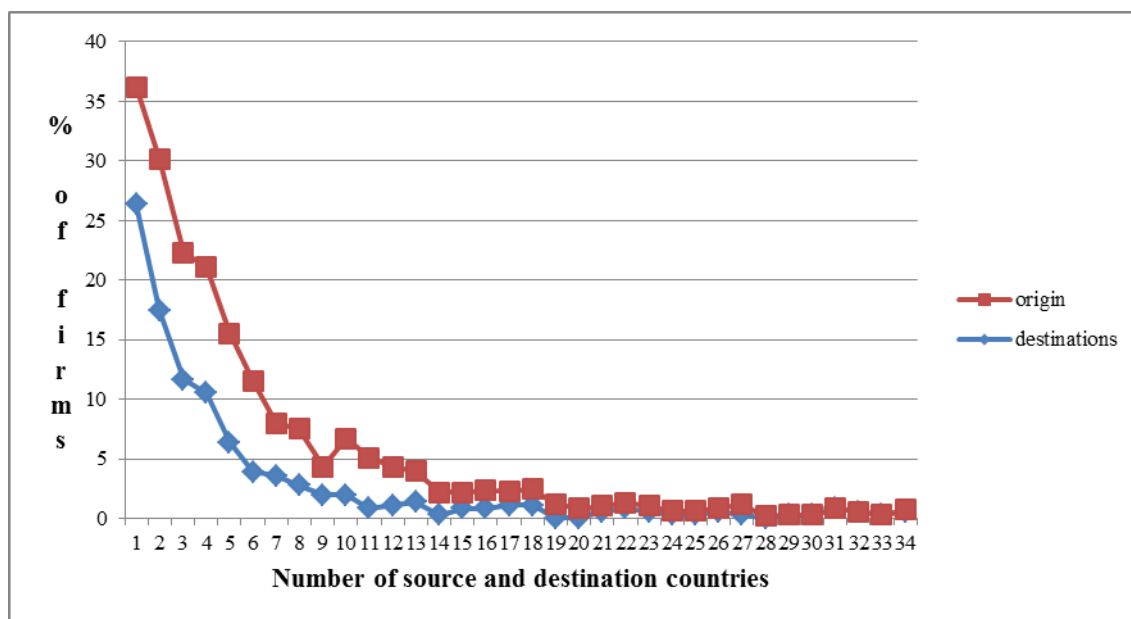
Source: own elaboration based on data of the INE and Dirección Nacional de Aduanas.

Figure 7: Number of origin/source countries (average by firm, 2005)



Source: own elaboration based on data of the INE and Dirección Nacional de Aduanas.

Figure 8: No of source and destination countries (avg by firm, 2005)



Source: own elaboration based on data of the INE and Dirección Nacional de Aduanas.

Finally, the support for country extensive margin of exports is [0,33], while for the country extensive margin of imports is [0,39] in 1999.

Now we consider the product extensive margins, defined at the Nomenclatura Comun del Mercosur¹⁰ (NCM) at the ten, eight and seven digits. For brevity reasons in this draft we present the results for at seven digits. The picture that emerges is that exports are much less diversified than imports.

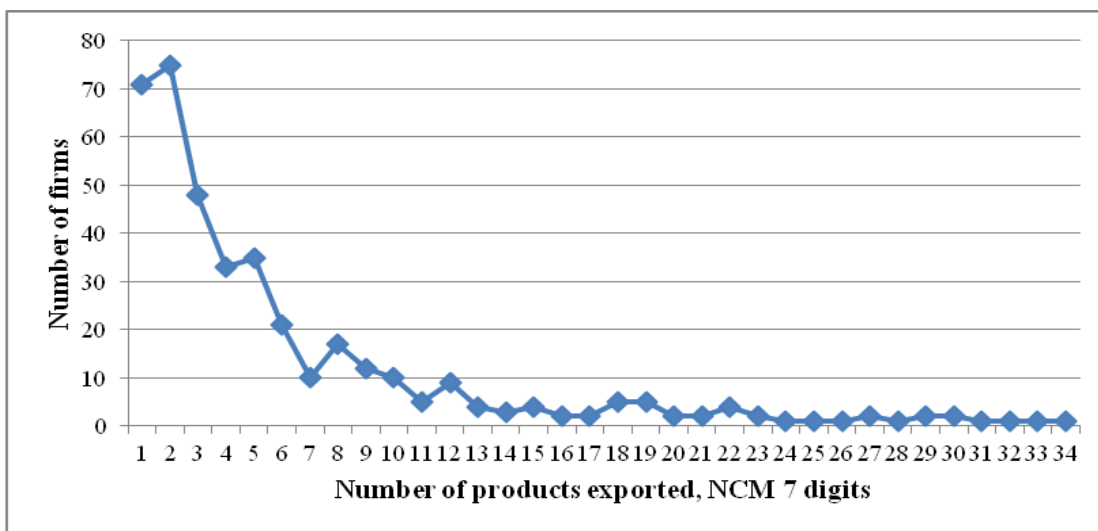
We find that the average number of products exported in 1999 is 6 with a median of 4 products, while the percentage of firms that exported only one product is 18 %. On the importing side we find that the average number of imported products is 19 with a median of 36, and only 5 % of the firms imported only one product. Hence, imports are more diversified than exports.

Comparing with the international literature for Belgium the average number of products exported by firm was 12, and imported 34 products (Muuls and Pisu,2008), while for US Bernard et al. (2006) report an average of 8.9 products exported and 10 imported products. The maximum number of products exported by a firm is 67, while the maximum number of products imported is 281 in 1999.

Thus, the product extensive margin of exports is lower than for Belgium and US and higher than for France (Eaton et al. 2006). Regarding the product extensive margin of imports results are lower than for Belgium and higher than for the US.

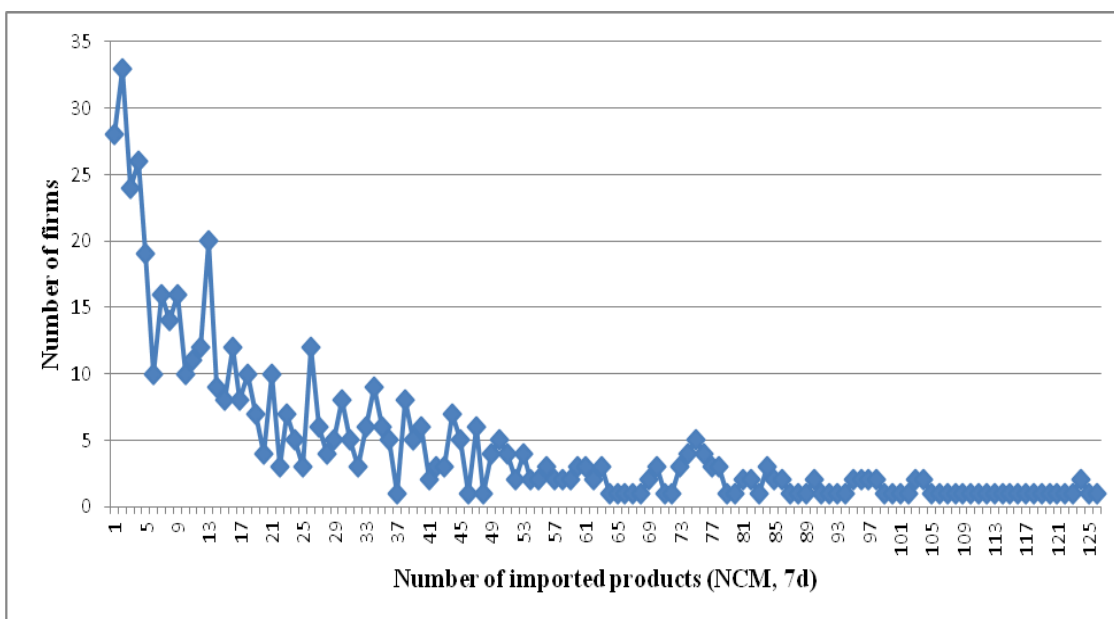
¹⁰The NCM is equivalent to the Harmonised System to classify traded products.

Figure 9: Number of products exported, 1999, NCM 7 digits



Source: own elaboration based on data of the INE and Dirección Nacional de Aduanas.

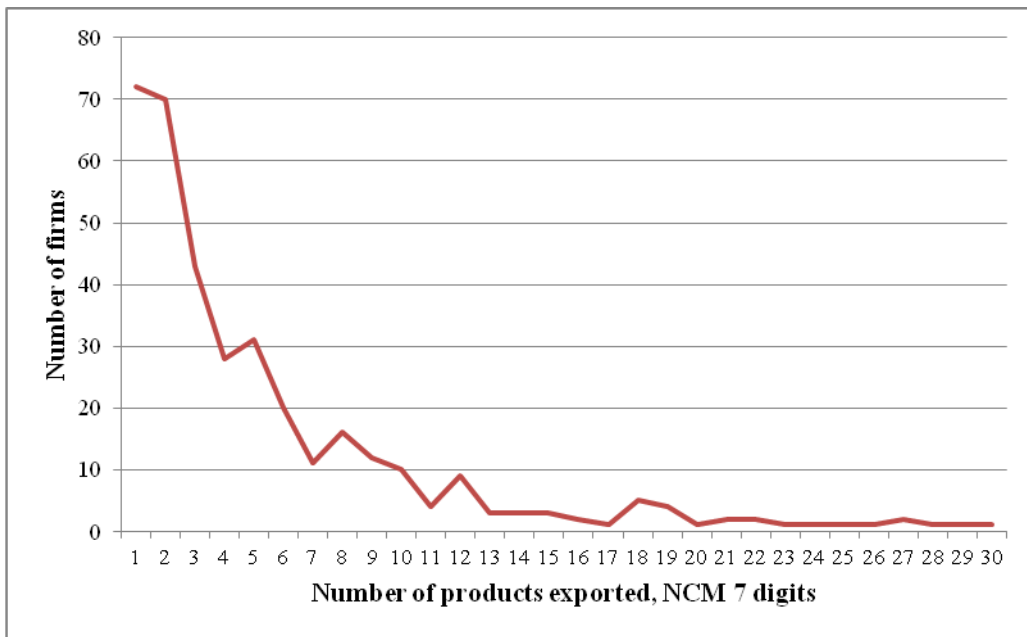
Figure 10: Product extensive margin of imports, 1999, NCM 7 digits



Source: own elaboration based on data of the INE and Dirección Nacional de Aduanas.

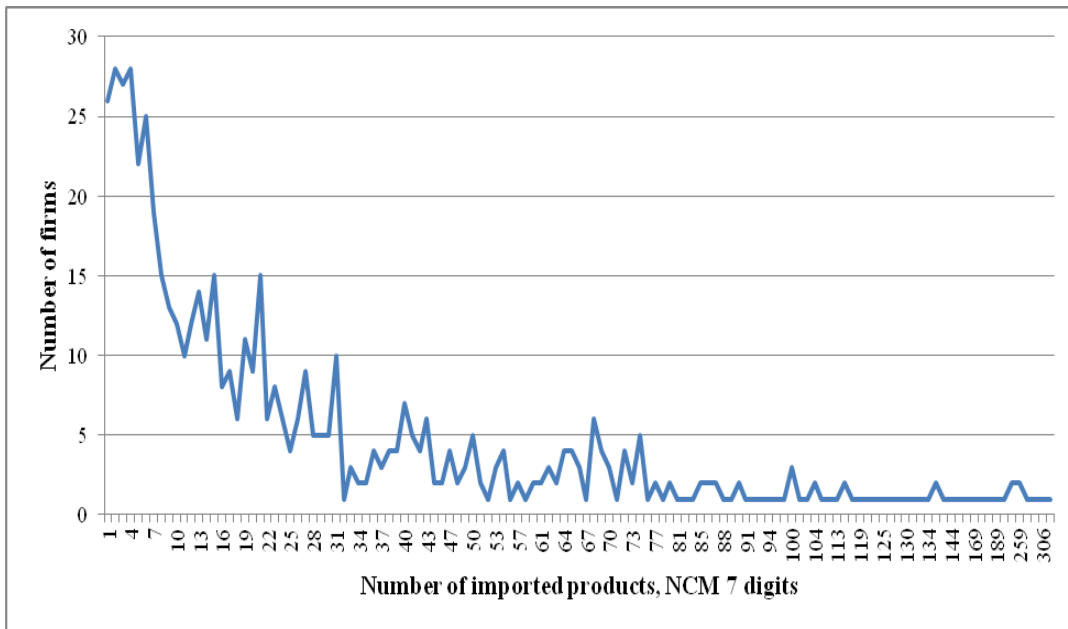
In 2005 the average number of exported products is 6 with a median of 4, and the average number of imported products is 34 with a median of 18. The maximum number of products exported per firm is 54, and the maximum number of products imported is of 313. Thus, the figures are similar in 1999 and 2005 for exports and imports.

Figure 11: Number of products exported, 2005, NCM 7 digits



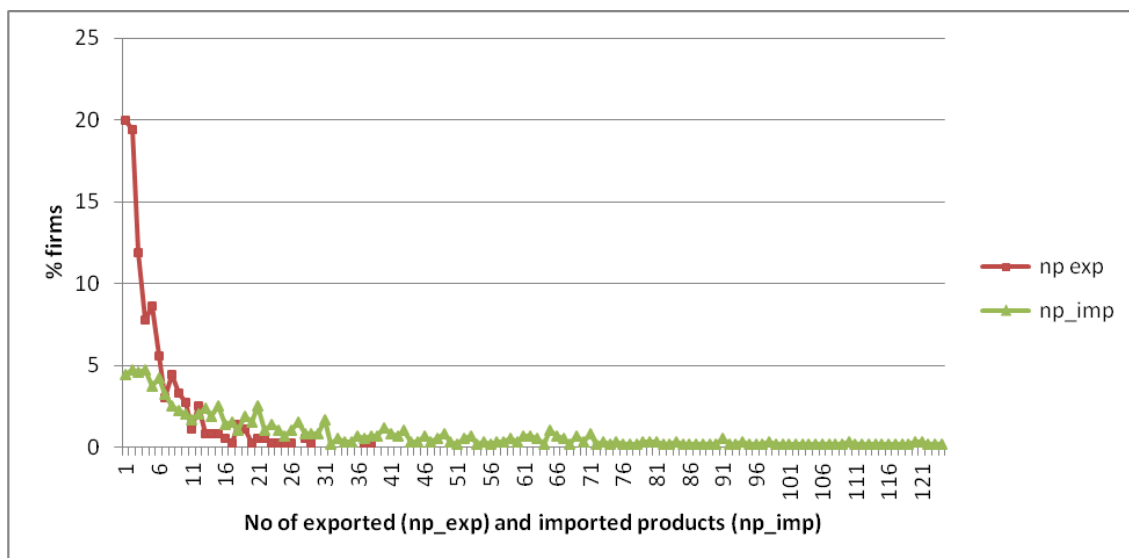
Source: own elaboration based on data of the INE and Dirección Nacional de Aduanas.

Figure 12: Product extensive margin of imports, 2005, NCM 7 digits



Source: own elaboration based on data of the INE and Dirección Nacional de Aduanas.

Figure 13: Product extensive margins of exports and imports, 2005, NCM 7 digits



Source: own elaboration based on data of the INE and Dirección Nacional de Aduanas.

4. Firm heterogeneity and international trade activities

4.1. Firms' characteristics and internationalization status

As commented before, most of empirical analysis on the characteristics of internationalized firms focus on exporting firms, and it has been shown that they outperform non-exporters. The empirical evidence shows that in most cases this could be the result of a self-selection effect, which allows the best performing firms to bear the sunk costs associated to exporting. Moreover, some studies show evidence of learning by exporting (Van Biesebroeck, 2006; Isgut and Fernandes, 2007, Lileeva and Trefler, 2007).

Less explored has been import behavior and firms' characteristics. Some authors (Castellani et al. 2010; Muuls and Pisu, 2008 Bernard et al. 2011) have shown that importers exhibit similar characteristics as those observed for exporters. The positive association between importing activities and firms' performance lead to consider the existence of fixed costs to enter into the import market. As in the case of exports, this could be a self-selection process according to which only the most efficient firms can afford entering the import market.

As we have commented previously, Halpern et al. (2007) has developed an empirical model through which imports are associated with productivity improvements through two main channels: the higher quality of imported goods and imperfect substitution among foreign and domestic inputs. In this model importers have to pay a fixed cost every time they buy a new foreign variety of intermediates, so they would buy those varieties into the extent that the gains in productivity out-weights the fixed cost of importing.

Table 6 provides some descriptive statistics according to the internationalization status of the firms. In line with other studies we find that domestic oriented firms are smaller in terms of employment and sales, are less capital intensive and exhibit lower productivity than internationalized firms. Among the group of traders, two-way traders outperform firms engaged only in exporting and importing activities. Thus, increasing global involvement is associated with better performance. Furthermore, we observe that only exporters are more productive, bigger and more capital intense than importers only. Only importers are in between only exporters and domestic oriented firms: there are bigger in terms of employment and sales, and present higher capital intensity, and total factor productivity, but do not seem to exhibit higher labor productivity than domestic firms. This may be explained by the fact that only importers are firms that sell domestically and import mostly from the region, and to a lower number of markets as we will show in what follows.

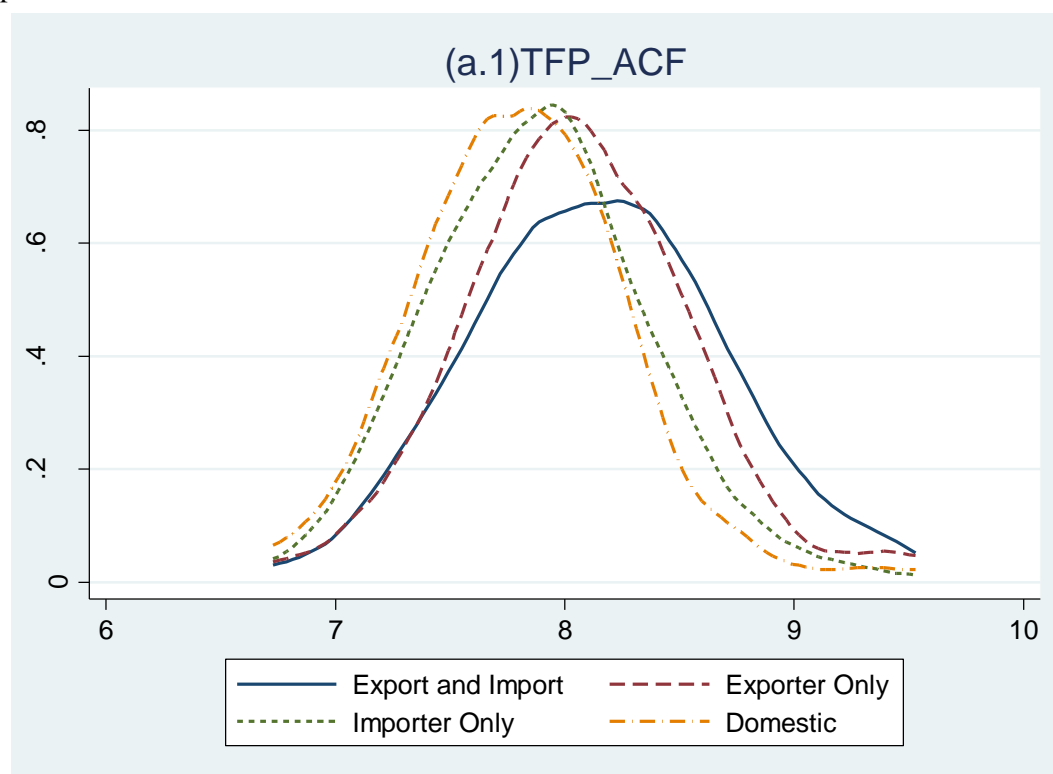
Table 6: Descriptive statistics according to the internalization status of the firms, period 1999-2006

	Two-ways	Only Exporter	Only Importer	Domestic
Employment	135.97	130.26	54.56	51.11
Sales	1.51E+08	1.09E+08	27376787	23143765
TFP LP	10.81	10.84	10.52	10.46
TFP ACF	8.15	8.05	7.88	7.83
Capital Intensity Labor	345061.57	220356.6	172065.47	111008.48
Productivity	276632.48	267655.04	176954.15	188743.63

Source: own elaboration based on data of the INE and Dirección Nacional de Aduanas.

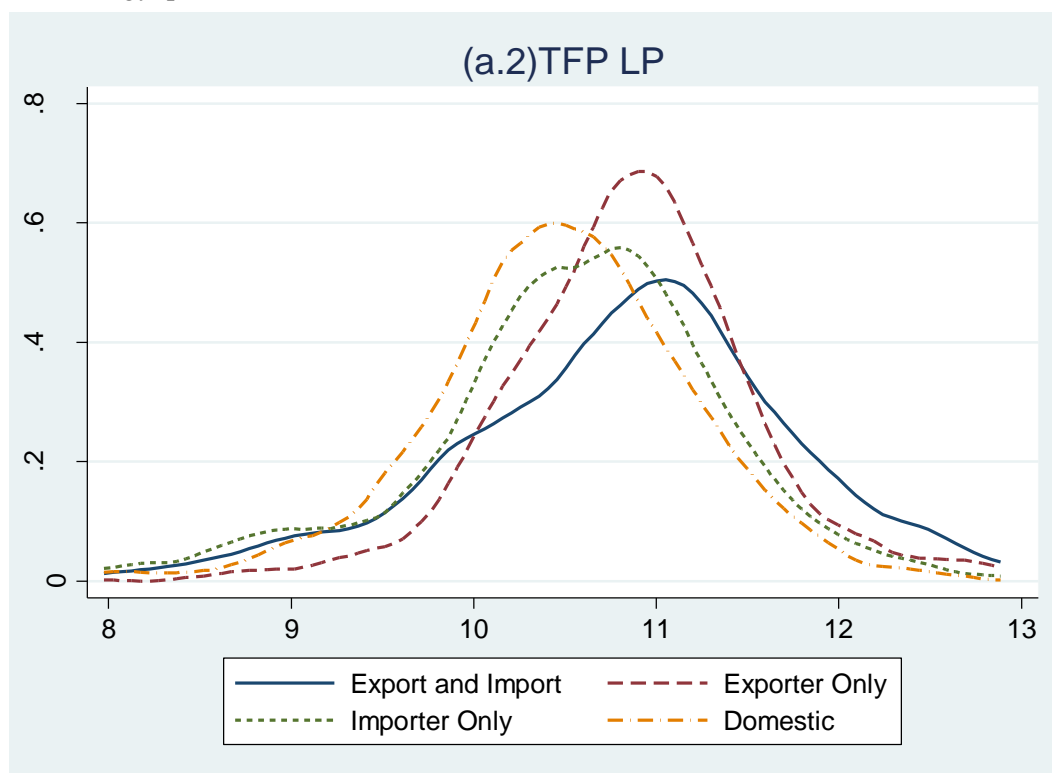
In order to further illustrate these features we present the kernel density distribution for selected variables in Figures 14 to 18.

Figure 14: Kernel distribution of Total Factor Productivity, Ackerberg et al. methodology, period 1999-2006



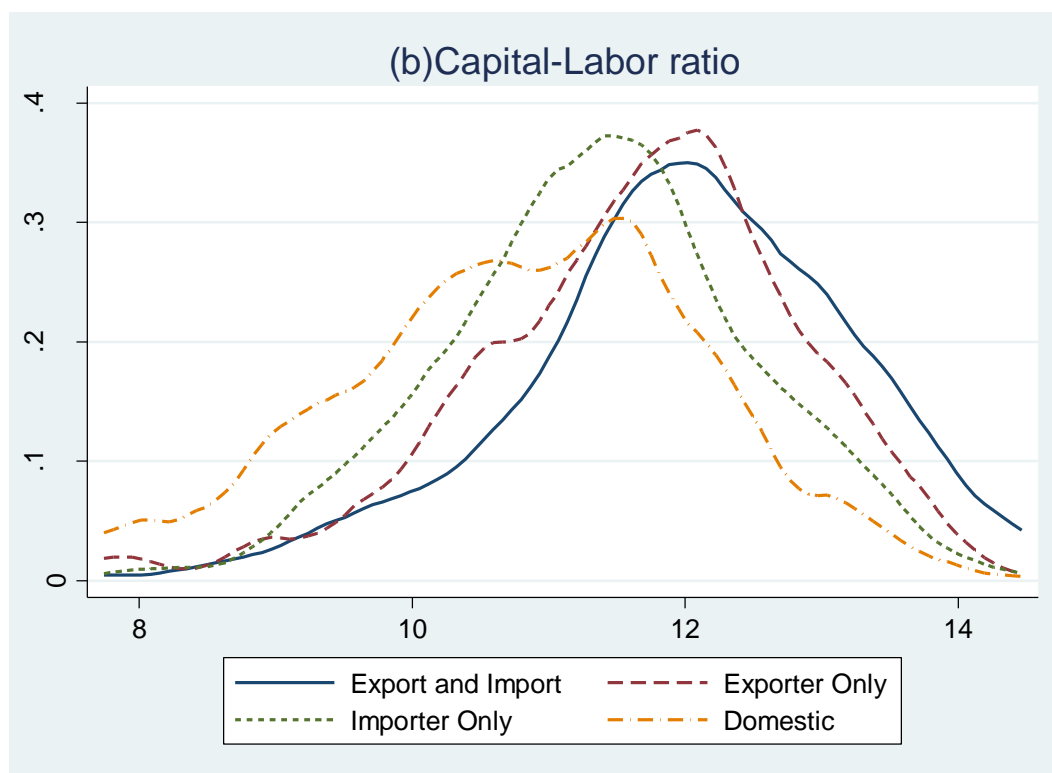
Source: own elaboration based on data of the INE and Dirección Nacional de Aduanas.

Figure 15: Kernel distribution of Total Factor Productivity, Levinshon and Petrin (2003) methodology, period 1999-2006



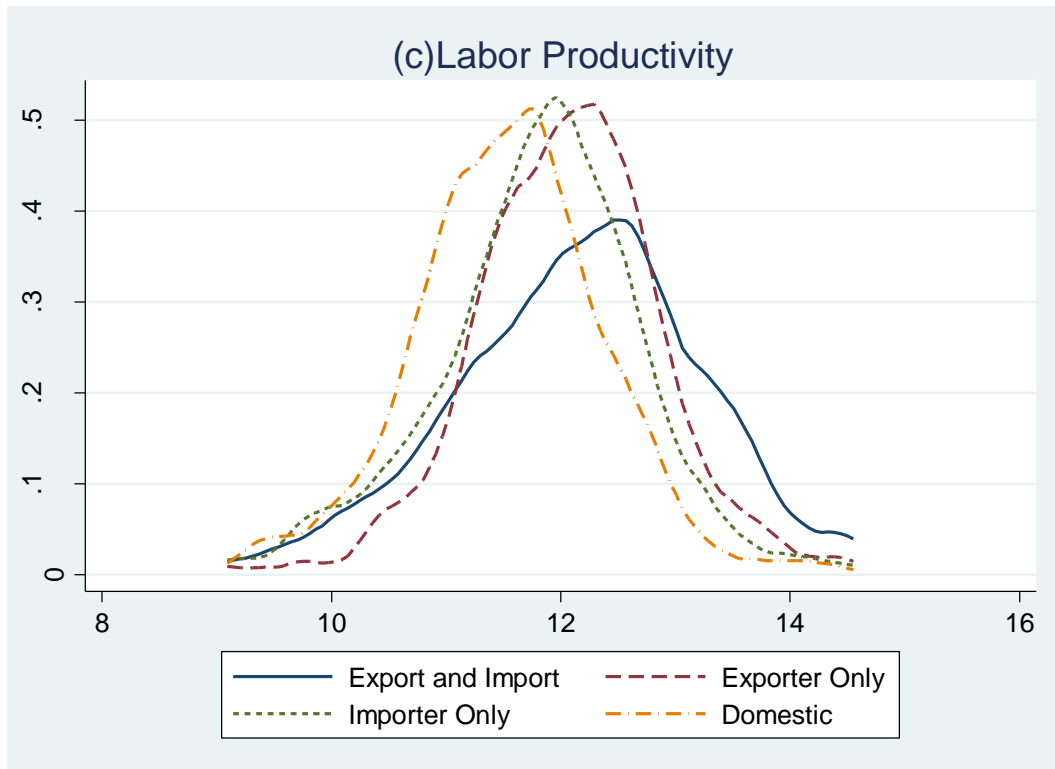
Source: own elaboration based on data of the INE and Dirección Nacional de Aduanas.

Figure 16: Kernel distribution of capital intensity by internationalization status, 1999-2006



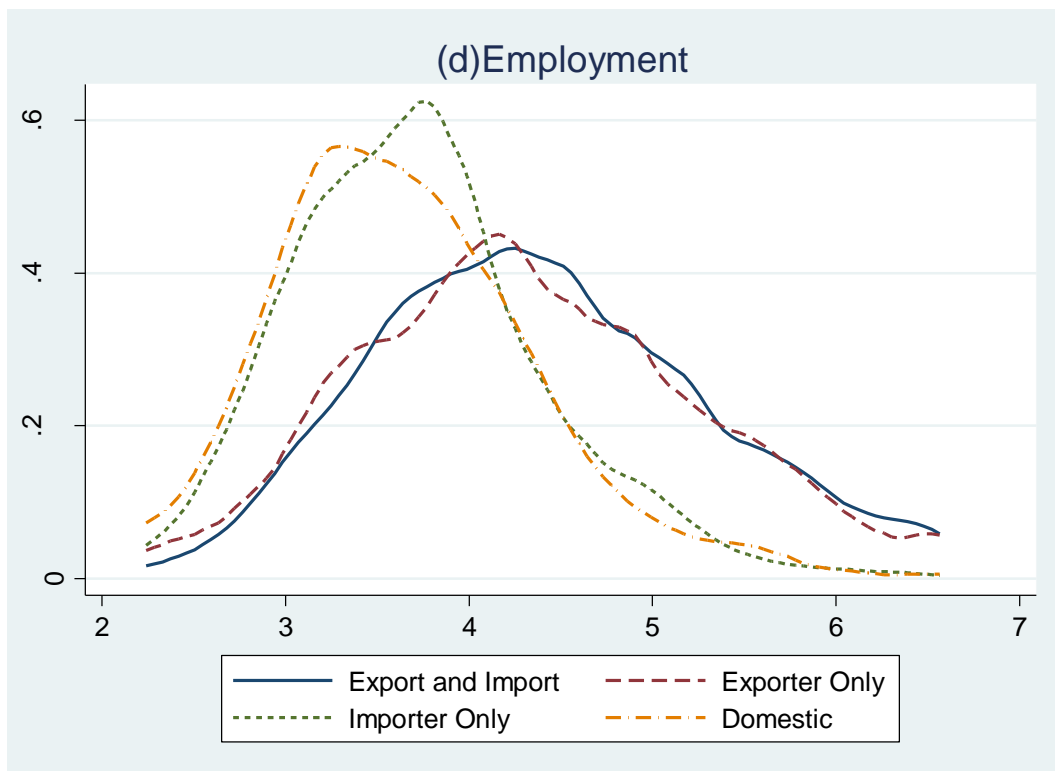
Source: own elaboration based on data of the INE and Dirección Nacional de Aduanas.

Figure 17: Kernel distribution of labor productivity by internationalization status, 1999-2006



Source: own elaboration based on data of the INE and Dirección Nacional de Aduanas.

Figure 18: Kernel distribution of employment by internationalization status, 1999-2006



Source: own elaboration based on data of the INE and Dirección Nacional de Aduanas.

Now we turn to the estimation of the association between the internationalization status and firm heterogeneity in performance, the so called performance premia. To this end we run the following equation:

$$y_{it} = \alpha_A + \beta_A D^{\text{two-way}}_{it} + \gamma_A D^{\text{import-only}}_{it} + \phi_A D^{\text{export-only}}_{it} + \Theta_A \text{controls}_{it} + v_{it}, \quad (1)$$

where y_{it} denotes the logarithm of sales, employment, TFP measured through Akerberg et al. (2006) and Levinsohn and Petrin (2003) methodology assuming a Cobb-Douglas production function, labor productivity –defined as value added over total employment–, and capital intensity defined as capital over total employment. $D^{\text{two-way}}$, $D^{\text{import-only}}$ and $D^{\text{export-only}}$ are dummy variables denoting the internationalization status of the firm. controls denotes a vector of firm characteristics: industry and year dummies and binary variables indicating whether the firm is medium size or big. Medium size stands for firms with 50-99 employees, and big firms are those with 100 or more employees.

In Table 7 we present the results for pooled Ordinary Least Squares estimation, while in Table 8 we control for fixed effects by firm. The coefficients β_A , γ_A and ϕ_A tell us the average premium of the three categories of internationalized firms with respect to domestic ones. We note that these are just associations.

The results for pooled OLS regressions show significant heterogeneity in productivity, size and capital intensity across firms with different degree of internationalization. International firms are more productive, larger and capital intensive than domestic oriented firms. Furthermore, there is a hierarchy among traders: two-ways traders are the firms with the highest premia, followed by importers and then exporters with a small difference among importers and exporters. These results contradict the descriptive figures presented before, but may be the result of controlling for size. If we consider two-ways traders they are 27,8 % more productive using ACF techniques than domestic firms, only importers are 10 % more productive and only exporters 9.9 %.

Table 7: Premia, pooled OLS, 1999-2006

VARIABLES	(1) lnTFP_ACF	(2) lnTFP_LP	(3) lnLP	(4) lnSALES	(5) lnEMP	(6) lnKINT
two_ways2	0.278*** (0.0338)	0.346*** (0.0432)	0.689*** (0.0416)	1.327*** (0.0497)	0.271*** (0.0198)	1.423*** (0.0649)
imp_noexp2	0.102*** (0.0326)	0.210*** (0.0413)	0.427*** (0.0387)	0.744*** (0.0475)	0.169*** (0.0205)	0.863*** (0.0657)
exp_noimp2	0.0996*** (0.0257)	0.189*** (0.0369)	0.357*** (0.0390)	0.550*** (0.0469)	0.0499*** (0.0192)	0.725*** (0.0546)
Medium	0.0416** (0.0192)	0.163*** (0.0288)	0.0458 (0.0290)	0.774*** (0.0308)	0.864*** (0.0102)	0.125*** (0.0378)
Big	0.156*** (0.0209)	0.329*** (0.0306)	0.160*** (0.0324)	1.894*** (0.0363)	1.900*** (0.0161)	0.321*** (0.0394)
Constant	7.955*** (0.0340)	10.09*** (0.0495)	11.15*** (0.0506)	16.21*** (0.0591)	3.526*** (0.0258)	10.83*** (0.0682)
Industry dummies	Yes	Yes	Yes	Yes	Yes	Yes
Time dummies	Yes	Yes	Yes	Yes	Yes	Yes
Observations	5,048	5,449	6,212	6,072	6,751	6,279
R-squared	0.232	0.287	0.357	0.607	0.790	0.331

Source: own elaboration based on data of the INE and Dirección Nacional de Aduanas.

When we consider the regressions with fixed effects by firms, that eliminates time invariant heterogeneity –though time variant due to unobservables may be still an issue- the differences between internationalized firms and domestic ones are reduced. For instance for TFP estimated using ACF techniques two-ways traders are 15 % more productive, only importers 13 % and there is no significant effect for only exporters. This result could be due to a stronger self-selection in the case of exporting.

Table 8: Performance premia FE by firm, 1999-2006

VARIABLES	(1) lnTFP_ACF	(2) lnTFP_LP	(3) lnLP	(4) lnSALES	(5) lnEMP	(6) lnKINT
two_ways2	0.150*** (0.0325)	0.135** (0.0557)	0.118** (0.0526)	0.412*** (0.0554)	0.202*** (0.0279)	0.0758 (0.0644)
imp_noexp2	0.127*** (0.0283)	0.100** (0.0495)	0.0757* (0.0448)	0.206*** (0.0472)	0.136*** (0.0260)	0.0393 (0.0548)
exp_noimp2	0.0233 (0.0257)	0.104** (0.0463)	0.125*** (0.0458)	0.161*** (0.0428)	0.0642*** (0.0212)	-0.0252 (0.0471)
Medium	0.0146 (0.0229)	0.0441 (0.0479)	-0.180*** (0.0500)	0.372*** (0.0397)	0.544*** (0.0272)	-0.297*** (0.0488)
Big	0.0464 (0.0379)	0.128* (0.0722)	-0.324*** (0.0755)	0.717*** (0.0626)	1.133*** (0.0505)	-0.578*** (0.0767)
Constant	8.203*** (0.148)	10.48*** (0.0761)	11.62*** (0.0934)	16.90*** (0.241)	3.566*** (0.167)	11.88*** (0.131)
Industry dummies	Yes	Yes	Yes	Yes	Yes	Yes
Time dummies	Yes	Yes	Yes	Yes	Yes	Yes
Observations	5,048	5,449	6,212	6,072	6,751	6,279
R-squared	0.042	0.098	0.069	0.242	0.457	0.102
Number of plantid	901	942	995	1,009	1,013	989

Source: own elaboration based on data of the INE and Dirección Nacional de Aduanas.

Thus we have shown that a few firms account for the vast majority of trade, and that they are in terms of markets and products, as well as larger, more productive and capital intense. While two-traders are the best performers, both exporters and importers have a better performance than domestic firms, and there is some evidence that export entry costs are higher than import entry costs. Now we analyze firm heterogeneity along the extensive country and product margins. We focus in on two-ways traders in order to determine the relative importance of the link between firm characteristics and the intensive margins, both on the export and import side. To this aim we estimate the following equation:

$$y_{it} = \alpha + \lambda_1 x_{it}^{npe} + \lambda_2 x_{it}^{npi} + \lambda_3 x_{it}^{nce} + \lambda_4 x_{it}^{nci} + \phi \text{controls}_{it} + v_{it} \quad (2)$$

Where y_{it} is a measure of productivity, size or capital intensity in natural logarithm, the x denote logarithm of number of products imported (npi), number of country of origin of imports (nci), number of destination countries (nce), number of origin countries (nci). Controls is a vector that includes size of the firm (medium and big) defined as explained above, industry and time dummies. Industry dummies are defined at the 3-digit ISIC level. Since we have expressed our dependent and explanatory variables in logarithms our estimates are the elasticities, which as Castellani et al. we named “diversification premium of internationalized firms”. While λ_1 can be interpreted as the average percentage premium associated with an increase in the number of products exported, λ_2 the premium of an increase in the number of products imported, λ_3 as

the premium associated with an increase in the number of destination countries, and λ_4 the premium associated with the number of source/origin countries.

We consider only the sub-sample of two-ways traders throughout the period (1999-2006). In Table 9 we report the results for pooled OLS. Even after controlling for firm size, industry and year effects we observe a positive premium on TFP ACF, employment and sales of the number of products imported and the number of destination countries. Surprisingly we find a not significant or negative effect for capital intensity of the number of exported products. The number of origin countries has only a positive and significant effect for capital intensity, which would be consistent with imports of other origins than the region when buying capital goods with a higher technological content. For the number of imported products (product extensive margin of imports) we find a positive and significant effect of 8 % on TFP ACF, 17 % on labor productivity, 31 % on sales, 15 % in employment, and 20 % in capital intensity. Moreover we observe a positive effect of the country extensive margin of exports of 8.5 % in TFP ACF, 24 % on sales, 11 % on employment and 13.5 % on capital intensity, and not significant effect on TFP_LP and labor productivity. In sum, the number of products imported and the number of countries of destinations have positive impacts on TFP ACF, sales, employment and capital intensity.

Table 9: Performance premia along the extensive margin, pooled OLS, 1999-2006

VARIABLES	(1) lnTFP_ACF	(2) lnTFP_LP	(3) lnLP	(4) lnSALES	(5) lnEMP	(6) lnKINT
lnNPI8d	0.0805*** (0.0198)	0.172*** (0.0341)	0.214*** (0.0336)	0.311*** (0.0295)	0.147*** (0.0136)	0.199*** (0.0385)
lnNPE8d	0.0124 (0.0166)	-0.0100 (0.0259)	-0.00546 (0.0266)	0.0337 (0.0261)	0.00644 (0.0111)	-0.0639** (0.0306)
lnNCE	0.0852*** (0.0177)	-0.00531 (0.0276)	-0.0211 (0.0294)	0.243*** (0.0278)	0.106*** (0.0126)	0.135*** (0.0348)
lnNCI	-0.0124 (0.0325)	-0.0228 (0.0543)	0.0233 (0.0554)	0.0796 (0.0500)	0.00618 (0.0209)	0.131** (0.0595)
Medium	-0.0498 (0.0326)	0.0290 (0.0513)	-0.0850 (0.0517)	0.458*** (0.0502)	0.715*** (0.0194)	-0.0279 (0.0573)
Big	-0.0140 (0.0364)	0.0959* (0.0575)	-0.158*** (0.0594)	1.220*** (0.0555)	1.583*** (0.0255)	-0.151** (0.0676)
Industry dummies	Yes	Yes	Yes	Yes	Yes	Yes
Time dummies	Yes	Yes	Yes	Yes	Yes	Yes
Constant	7.914*** (0.0581)	9.677*** (0.114)	10.63*** (0.115)	15.85*** (0.0881)	3.199*** (0.0418)	11.51*** (0.111)
Observations	2,161	2,197	2,406	2,460	2,778	2,635
R-squared	0.288	0.358	0.440	0.671	0.823	0.378

Robust standard errors in parentheses, ***p<0.01, **p<0.05, * p<0.1

Source: own elaboration based on data of the INE and Dirección Nacional de Aduanas.

In Table 10 we present the results when we control for fixed effects by firm, i.e. controlling for unobserved heterogeneity). We observe that this reduces the estimated premia but we still find positive and significant effects of the number of products imported of 4 % on TFP ACF, 11 % on sales, and 11 % on employment. The number of products exported has a positive significant impact on sales (5 %), and employment (3 %).

The number of destination countries has also a positive effect on TFP ACF (4 %), sales (9 %) and employment (2 %).

Finally, the number of source countries has a positive and significant impact on TFP ACF (4.5 %) and sales (8 %).

Thus the number of products imported, and the number of export countries has a positive effect on two key variables: productivity and employment.

Table 10: Performance premia along the extensive margin, FE by firms, 1999-2006

VARIABLES	(1) lnTFP_ACF	(2) lnTFP_LP	(3) lnLP	(4) lnSALES	(5) lnEMP	(6) lnKINT
lnNPI8d	0.0418** (0.0176)	-0.00937 (0.0446)	-0.0625 (0.0428)	0.113*** (0.0233)	0.110*** (0.0128)	-0.0370 (0.0294)
lnNPE8d	0.000252 (0.0153)	0.00306 (0.0388)	0.0272 (0.0375)	0.0525** (0.0206)	0.0299*** (0.0114)	0.0286 (0.0257)
lnNCE	0.0367** (0.0185)	0.0427 (0.0460)	-0.000756 (0.0441)	0.0877*** (0.0244)	0.0233* (0.0134)	-0.00990 (0.0307)
lnNCI	0.0446* (0.0258)	0.104 (0.0645)	0.104* (0.0622)	0.0813** (0.0342)	0.0193 (0.0187)	0.0396 (0.0427)
mediana	0.00872 (0.0311)	0.152** (0.0757)	-0.114 (0.0697)	0.299*** (0.0406)	0.477*** (0.0211)	-0.339*** (0.0494)
grande	-0.0150 (0.0445)	0.184* (0.109)	-0.351*** (0.100)	0.552*** (0.0575)	0.955*** (0.0302)	-0.613*** (0.0705)
Industry dummies	Yes	Yes	Yes	Yes	Yes	Yes
Time dummies	Yes	Yes	Yes	Yes	Yes	Yes
Constant	7.861*** (0.0807)	10.17*** (0.193)	11.84*** (0.206)	16.94*** (0.146)	3.351*** (0.0825)	12.90*** (0.188)
Observations	2,161	2,197	2,406	2,460	2,778	2,635
R-squared	0.074	0.101	0.076	0.336	0.515	0.128
Number of nro_in	537	554	583	599	605	591

Standard errors in parenthesis; ***p<0.01, **p<0.05, * p<0.1

Source: own elaboration based on data of the INE and Dirección Nacional de Aduanas.

It remains to analyze the effects on skilled labor, and also the impact of different blocs and to carry out the instrumental variable strategy, which can be done for the period 1999-2006 with Uruguayan own devaluation, and for the period 97-2006 with Brazilian and/or Argentinean devaluation.

5. Concluding remarks

We present a portrait of Uruguayan manufacturing firms, using a rich data base that combines information on firms's structural characteristics with Customs data on exporting and importing activities. We find evidence in line with the new-new trade models that incorporates firm's heterogeneity.

Firstly, we analyze trade (exports and imports), sales and employment concentration. In line with previous works we find that trade is more concentrated than employment and sales.

Then we analyze firms' performance premia for various international status (two-ways traders, only exporters, only importers) and we find that two-ways traders are the best performing firms. Thus, firms more engaged in international trade have a better performance. Furthermore, for the Uruguayan case it seems that export trade costs are higher than import entry costs. Further, research is needed in this case since this also has to do with the share of firms importing from neighboring countries.

Finally, we retain the subsample of two-ways traders and we analyze performance premia along the product and country extensive margins. We find that that the product extensive margin of imports and the country extensive margin of exports have a positive significant effect on two key variables: total factor productivity (ACF estimates) and the level of employment.

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Appendix 1

Number of matched firms (EAE and Customs data)

Year	Freq.	Percent	Cum.
1997	778	11.5	11.5
1998	696	10.29	21.78
1999	682	10.08	31.86
2000	642	9.49	41.35

2001	675	9.97	51.32
2002	672	9.93	61.25
2003	706	10.43	71.69
2004	724	10.7	82.39
2005	755	11.16	93.54
2006	437	6.46	100
Total	6,767	100	

Appendix 2: Share of exports and imports by economic blocs

Share of exports by economic blocs

Year	px_Merc	px_UCa	px_euro	px_asia	px_lac	px_row	px_Des
1999	0.6380	0.0774	0.0902	0.0208	0.1040	0.0372	0.1676
2000	0.6429	0.0744	0.0725	0.0238	0.1133	0.0326	0.1470
2001	0.5802	0.1048	0.0808	0.0217	0.1319	0.0370	0.1855
2002	0.4514	0.1144	0.1116	0.0350	0.1863	0.0621	0.2260
2003	0.4498	0.1221	0.1000	0.0298	0.1912	0.0609	0.2221
2004	0.4338	0.1209	0.0930	0.0339	0.1876	0.0557	0.2138
2005	0.4312	0.1170	0.0839	0.0396	0.1799	0.0732	0.2009
2006	0.4215	0.0881	0.0850	0.0422	0.1850	0.1210	0.1731
Total	0.5084	0.1026	0.0894	0.0306	0.1590	0.0586	0.1920

Source: own elaboration based on data of the INE and Dirección Nacional de Aduanas.

Share of imports by economic bloc

Year	pm_Merc	pm_UCa	pm_euro	pm_asia	pm_lac	pm_row	pm_Des
1999	0.4782	0.0891	0.2738	0.0695	0.0413	0.0459	0.3629
2000	0.4751	0.0778	0.2771	0.0712	0.0452	0.0486	0.3549
2001	0.4863	0.0886	0.2513	0.0753	0.0423	0.0534	0.3399
2002	0.4808	0.0811	0.2604	0.0699	0.0460	0.0608	0.3415
2003	0.5021	0.0784	0.2306	0.0760	0.0466	0.0636	0.3090
2004	0.5340	0.0727	0.2136	0.0809	0.0408	0.0568	0.2863
2005	0.5315	0.0719	0.2035	0.0937	0.0406	0.0568	0.2753
2006	0.5313	0.0712	0.1861	0.1045	0.0507	0.0559	0.2572
Total	0.5018	0.0791	0.2385	0.0793	0.0439	0.0551	0.3176

Source: own elaboration based on data of the INE and Dirección Nacional de Aduanas.