

THE MARGINS OF EXPORTS: FIRMS, PRODUCTS AND DESTINATIONS*

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1. INTRODUCTION

The recent literature on international trade has emphasized the importance of firms' decisions. As such, even aggregate variables like a country total export flows can be seen as the consequence of firms' decisions along different margins. In this article we focus on Portugal-based firms' decisions in terms of entry and exit into international markets (the participation margin), and in terms of the mode of participation with a focus on the decision of which country to export to (the destination margin) and which product to sell (the product margin). Expansion into foreign markets is an important decision for any firm. It can be defined as a risky decision with high potential returns. Risks arise from devoting resources to sell in markets where there is more uncertainty about the market structure, the shape of the demand curve and the institutional background. Returns from expanding into foreign markets derive from higher sales and profits, benefiting also from the diversification of market specific risks and economies of scale. Overall, the decision to enter a foreign market seems as significant as the decision to create a new firm.

Expansion into foreign markets requires decisions about which countries to approach and which products to export. Firms' foreign product mix is the result of a complex combination of factors. The decision of which products to offer in each market depends on production costs, destination country-specific costs, market structure and consumer's preferences and income. Before making decisions on expansion, firms can learn from other domestic firms operating in those markets or from their own experience in other markets.

The decisions related with the recomposition of the product-mix of mature exporters are also interesting to examine. In mature stages of the internationalization process firms keep facing idiosyncratic or country-market related shocks, which prompts a recomposition of the export mix. Product switching allows firms to survive to changes in the underlying market conditions and, at the macro level, it contributes to reallocate economic activity towards more efficient uses.

The main contribution of this article is to describe the joint destination/product strategies of exporters using a new transaction-level database for Portugal for the period 1996-2005. The database covers

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the universe of export and import transactions for firms located in Portugal and it provides extremely detailed information on products, values, quantities and other characteristics of the transactions.

We highlight two main aspects of our analysis.¹ Firstly, we find a high degree of firm heterogeneity in terms of international trade. Multi-product and multi-destination exporters (which do not necessarily coincide) are dominant and account for a more than proportional share of total exports. The range of products that they export is very diversified in several respects: it frequently spans multiple sectors (2-digits of the Harmonized System nomenclature), being the top product (and destination) in terms of firm export sales important but not dominant even for two- or three-product exporters. Moreover, we find evidence of frequent product (and destination) switching by firms. Secondly, we study how this heterogeneity is correlated with the growth rate of aggregate exports using a decomposition that involves three margins: firms, destinations and products. The breakdown of firms' sales growth rates along different margins is standard in the industrial organization (IO) literature. In our context, the different extensive margins in total exports reflect the foreign sales attributed to new exporters, new destinations or new products, while the different intensive margins reflect exports attributed to existing firms, existing markets or existing products. We show that while the intensive margin (sales of continuing products by continuing firms in continuing destinations) generally accounts for most of the yearly variation in exports, the gross contribution of the destination and product extensive margins (for continuing exporters) are as important as the gross contribution of entering and exiting firms and that all of them are as important as the intensive margin.

Our study is related to the recent (and still scarce) literature on multi-product firms and product switching (see Bernard *et al.* (2006)). Our paper differs from Bernard *et al.* (2006) in two respects: firstly, it explores jointly the destination and product dimensions instead of the product dimension only and, secondly, it focuses on the mix of exported products instead of on the mix of produced products. Other papers exploring the product dimension for exporting firms are Arkolakis and Muendler (2007), Bernard, Jensen, Redding and Schott (2007), Iacovone and Javorcik (2008) and Schott (2004). Arkolakis and Muendler (2007) shows that the distribution of the exporters' number of goods (the exporter scope) is approximately consistent with a Pareto distribution, thereby being strongly right-skewed, with most firms selling only one or two goods. In addition, it shows that the exporter scope is positively associated with average sales per good within destinations but not across destinations. Schott (2004) extends the analysis into the price dimension, showing that firms tend to specialize in some products. Furthermore, it should be noted that all these papers somehow link firm's entrance in foreign markets with classical IO results on firm survival (see for instance Klette and Kortum (2004) for some stylized facts). Finally, our article follows a recent strand of research based on the analysis of extensive international trade micro data. Other studies based on transaction-level data are Eaton, Eslava, Kugler and Tybout (2007) for Colombia; Eaton, Kortum and Kramarz (2007) for France; Muûls and Pisu (2007) for Belgium and Bernard, Jensen and Schott (2007) and Mayer and Ottaviano (2007) for a sample of European firms.

(1) An extended version of the analysis performed in this short paper can be found in Amador and Opromolla (2008) and Amador *et al.* (2009).

The paper is organized as follows. The next section describes the database used. Section 3 provides evidence on the behaviour of multi-product and multi-destination firms, on their product and destination portfolio and on the extent of product and destination switching. Section 4 decomposes Portuguese export growth along the firm, destination and product dimensions. Section 5 concludes.

2. DATA

Our analysis of product and destination mix is made possible by the use of a new database that combines detailed and comprehensive information on trading behaviour of firms. The database includes all export transactions by firms that are located in Portugal, on a monthly basis, from 1995 to 2005. A transaction record includes the firm's tax identification, an eight digit Combined Nomenclature product code, the value of the transaction, the quantity of exported goods (expressed in kilos), the destination country, the mean of transportation, the relevant international commercial term (FOB, CIF, etc.) and a variable indicating the type of transaction (transfer of ownership after payment, return of a product, etc.).² The data used comes from customs returns forms in the case of extra-EU trade and from the Intrastat form in the case of intra-EU trade and it adds up to total Portuguese exports as reported by Statistics Portugal (*Instituto Nacional de Estatística*). In the analysis, we consider only transactions that are worth more than 100 euros. Still, our data covers, on average, more than 99 percent of total exports and about 75 percent of the exporters. The data is aggregated at the annual level and all values are expressed in current euro. The analysis focuses on the 1996-2005 period. The consideration of this long time span requires adjustments in some six digit product codes in order to ensure the compatibility of two versions of the product classification. Although it would be possible to work at the six digit level of the Combined Nomenclature, we define products at four-digit level according to the HS. This approach avoids other possible classification problems related to Combined Nomenclature and still allows for a set of 1241 potential products.³ Appendix 1, shows an example of a HS four-digits product classification.

As shown in Table 1, our sample includes 13,632 exporters in 1996, exporting 1,117 products to 200 countries. The average exporter in 1996 ships 4.7 products to 3.6 destinations for a revenue of about 1.4 millions euro.⁴ Table 1 shows that, at the aggregate level, the number of exporters has increased considerably (more than 50 percent) between 1996 and 2005. The number of products exported and the number of destinations served has been instead quite stable. At the firm-level, the average number of products exported by a firm has not changed while the average number of destinations reached has decreased from 3.6 to 2.8. The lack of dynamics for the total number of products exported or destinations served and for the average number of products exported by a firm suggested by Table 1 are misleading. There is a high degree of reallocation of resources across firms

(2) The Combined Nomenclature system is comprised by the Harmonized System (HS) nomenclature with further European Community subdivisions. The Harmonized system is run by the World Customs Organisation (WCO). This classification of commodities is used by most trading nations and in international trade negotiations. The first six digits of the Combined Nomenclature system approximately coincide with the Harmonized System classification. While the Combined Nomenclature system is changed almost every year, the Harmonized System, created in 1988, was updated on January 1st 1996, January 1st 2002 and January 1st 2007. The adjustments were made at the six digit level and implied the aggregation of some categories.

(3) Robustness tests were performed and all results qualitatively hold at the six-digit HS level as well.

(4) Appendix 2, provides more information on Portuguese exports and exporters at the sectoral level.

Table 1

SUMMARY STATISTICS				
	1996	1999	2002	2005
Firm-level				
Number of products				
mean	4.7	4.6	4.9	4.6
median	2.0	2.0	2.0	2.0
standard deviation	11.3	10.8	12.9	12.2
Number of destinations				
mean	3.6	3.5	3.3	2.8
median	1.0	1.0	1.0	1.0
standard deviation	5.2	5.3	5.4	4.9
Export (Million euro)				
mean	1.4	1.5	1.6	1.4
median	0.1	0.0	0.0	0.0
standard deviation	18.0	17.4	19.5	17.8
Aggregate-level				
Number of firms	13 632	15 054	17 199	21 127
Number of products	1 117	1 118	1 126	1 143
Number of destinations	200	201	207	202
Export (Million euro)	18 876	22 984.2	27 345.1	29 619.9

Sources: INE (Trade Data) and authors' calculations.

Note: The top panel shows firm-level summary statistics while the bottom panel shows country-level aggregate statistics. A product is defined as an HS four-digit code (see Appendix A.1 for more details).

and within firms along the product and destination dimensions. The stability in the average number of products exported by a firm or in the total number of products exported by Portugal hides not only considerable firm entry and exit flows but also frequent and pervasive product and destination switching within firms. As shown by the high standard deviation figures in Table 1, there is a high degree of heterogeneity in terms of the number of destinations served, number of products exported and, as a consequence, of the revenue resulting from exports. Such reallocation and heterogeneity stand as the main motivations of this paper and they are analysed in detail in the next sections.

3. DISSECTING EXPORTS: FIRMS, PRODUCTS, DESTINATIONS

Aggregate figures often hide a high degree of heterogeneity and a significant reallocation of resources. The labour market literature, for example, starting with the seminal work of Davis and Haltiwanger at the end of the 80's, has compared job and worker flows and analysed the degree and the determinants of excess worker rotation (or churning), defined as the difference between the total number of hires (or separations) in a firm and net job creation.⁵ The industrial organization literature has, since many years ago, emphasized the differences between small and big firms or between young and old firms in terms of mean sales growth rates and in terms of volatility of sales. Recent developments in the international trade literature have also focused on firm heterogeneity and firm dynamics and

(5) See Centeno *et al.* (2008) for an analysis of jobs and workers flows in Portuguese firms.

studied, in some cases, the relationship between them and aggregate trade flows.⁶ In this section, we study the dynamics of Portugal's export flows, identifying the contributions of firms, destinations and products.

3.1. The Firm Margin: Entry and Exit into International Markets

We start by looking at firms entry and exit into international markets. This is a major decision that a firm can take. It requires, for example, a careful consideration of the differences between the domestic and the foreign markets in terms of demand characteristics and in terms of the costs (both fixed and variable) that entry entails. Table 2 decomposes the total number of exporters in each year into those that have been exporting for some time (continuing), those exiting foreign markets, those entering and those that export for just one year. Here we follow Eaton, Eslava, Kugler and Tybout (2007) in defining firm categories. Entrants in year t are those firms that did not export in $t-1$, export in t and will export in $t+1$ as well; exiters in year t are those firms that exported in $t-1$, export in t but will not export in $t+1$; continuing firms in year t are those firms that exported in $t-1$, export in t and will export in $t+1$ as well; finally, single-year exporters in year t are those firms that did not export in $t-1$,

Table 2

CONTINUING, ENTERING, EXITING AND SINGLE-YEAR EXPORTERS 1997-2004				
Number of firms				
Year	Continuing	Exiting	Entering	Single-Year
1997	8187	1438	2075	2601
1998	8471	1791	1925	3001
1999	8683	1713	1924	2734
2000	8729	1878	2279	3355
2001	8992	2016	2137	3435
2002	9213	1916	2292	3778
2003	9430	2075	2410	5473
2004	9664	2176	2942	5907
Exports per firm (thousands euro)				
Year	Continuing	Exiting	Entering	Single-Year
1997	2445	149	279	23
1998	2535	142	215	21
1999	2540	134	326	26
2000	2809	425	415	19
2001	2863	180	319	23
2002	2841	208	312	15
2003	2864	150	263	10
2004	2893	237	313	21

Sources: /NE (Trade Data) and authors' calculations.

Note: Entering exporters in year t are those firms that did not export in $t-1$, export in t and will export in $t+1$ as well; exiting exporters in year t are those firms that exported in $t-1$, export in t but will not export in $t+1$; continuing exporters in year t are those firms that exported in $t-1$, export in t and will export in $t+1$; single-year exporters in year t are those firms that did not export in $t-1$, export in t but will not export in $t+1$.

(6) See, among others, Bernard *et al.* (2003), Melitz (2003) and Irarrazabal and Oromolla (2008).

export in t but will not export in $t+1$. The top panel of Table 2 reports the number of firms falling in each category over time and the bottom panel reports average exports per firm for each category. Results show that about half of the firms are continuing exporters, single year firms represent about 20 per cent of the total and entering exporters are slightly more numerous than exiting ones. The share of continuing firms in total exports is overwhelming, representing more than 95 per cent. In contrast, single year firms represent less than one per cent of total exports. Thus the gap between exports per firm in each group is very wide. Entering and exiting firms, just like in the IO literature, are on average smaller, in terms of sales per firm, than incumbents. The numerous presence of single-year exporters is common to other countries as well (Eaton, Eslava, Kugler e Tybout (2007), for example, also find that single-year Colombian exporters are numerous but count little in terms of exports) and has generated significant interest in the literature. Two facts seem to characterize new exporters: (i) most of them do not survive (*i.e.* stop exporting) more than one year and (ii) those that survive thrive as their sales increase at high rates. In a companion paper (see Amador and Oromolla (2008)) we show that these two facts are confirmed in the Portuguese case. As a consequence of these (and other) findings the theoretical literature has started to investigate the role played by search frictions and learning processes in determining the entry and the success of firms in international markets (*e.g.* Eaton and Tybout (2009)).

3.2. Within The Firm: Multi-product and Multi-destination Exporters

We now depart (for a while) from the data longitudinal dimension and explore cross-sectional firm heterogeneity along two dimensions: products and destinations. We find that most of the firms export multiple products and multi-product exporters are responsible for 91 percent of total exports. Similarly, a large fraction of firms exports to multiple destinations and those firms are responsible for 94 percent of total exports. Table 3 reports the joint distribution of exporters over the number of products and the number of destinations while Table 4 reports the joint distribution of exports over the same two variables. The last rows of Tables 3 and 4 (the marginal distributions along the product dimension) show that almost half of the firms export only one product but they are responsible for

Table 3

JOINT DISTRIBUTION OF FIRMS OVER NUMBER OF PRODUCTS AND COUNTRIES, AVERAGE 1996-2005

Destinations	Products						Total
	1	2	3	4-10	11-50	51+	
1	36.0	8.3	3.5	6.0	2.4	0.4	56.6
2	3.9	3.6	1.7	3.1	1.2	0.2	13.7
3	1.8	1.3	1.0	2.1	0.7	0.1	7.0
4-10	3.1	3.0	2.1	5.6	1.9	0.2	15.9
11-50	0.5	0.8	0.8	2.9	1.6	0.1	6.7
51+	0.0	0.0	0.0	0.0	0.1	0.0	0.1
Total	45.3	17.0	9.1	19.7	7.9	1.0	100.0

Sources: INE (Trade Data) and authors' calculations.

Note: Each cell in the table represents the share of firms exporting a certain number of products (column category) to a certain number of destinations (row category). A product is defined as an HS four-digit code (see Appendix A.1 for more details).

Table 4

JOINT DISTRIBUTION OF EXPORTS OVER NUMBER OF PRODUCTS AND COUNTRIES, AVERAGE 1996-2005							
Destinations	Products						Total
	1	2	3	4-10	11-50	51+	
1	2.4	1.0	0.5	1.3	1.1	0.2	6.5
2	1.1	0.7	0.5	1.6	1.0	0.1	5.0
3	0.8	0.7	0.5	1.4	0.6	0.1	4.1
4-10	2.5	3.9	2.3	9.3	5.0	0.3	23.3
11-50	2.0	3.2	3.3	16.3	26.5	4.7	56.0
51+	0.0	0.1	0.2	2.1	1.9	1.0	5.3
Total	8.9	9.7	9.2	31.8	35.2	5.4	100.0

Sources: INE (Trade Data) and authors' calculations.

Note: Each cell in the table represents the share of total exports associated to firms exporting a certain number of products (column category) to a certain number of destinations (row category). A product is defined as an HS four-digit code (see Appendix A.1 for more details).

less than 10 percent of total exports. Multi-product firms represent the majority of the exporters: within this group, firms exporting between 4 and 50 products represent about one third of the exporters and account for two thirds of total exports. A small percentage of firms, about 9 percent, export more than 11 products but this accounts for about 40 percent of total exports. In terms of destinations, the results are similar: the last columns of Tables 3 and 4 (the marginal distributions along the destination dimension) show that more than half of the firms export to one destination and that these firms are very small, accounting for only 6 percent of total exports. Firms exporting to a number of countries between 4 and 50, on the contrary, are responsible for more than three fourths of total exports. The joint distribution shows that multi-product exporters are not always multi-destination and vice versa. For example, among firms that ship between 4 and 10 products, one out of three is reaching only one destination while 20 percent of the firms that sell to a number of countries between 4 and 10 export one product only. This said, firms that sell multiple products to multiple countries are very important: the subset of firms selling from 4 to 50 products to 4 to 50 countries account for two thirds of total exports. Bernard *et al.* (2006) obtain similar results while describing U.S. firms in terms of products (they use a more detailed product classification, do not consider export markets and ignore the destination dimension): 59 percent of U.S. firms are single-product and this set of firms accounts for 9 percent of total output. They also find that the average multi-product firm produces 4 goods.

We proceed by describing the product and destination portfolio in terms of shares of firm's exports and diversification across sectors. Table 5 reports the sales share of the top five products and destinations by firm type. The top panel shows that, although the main product exported by a firm is important, in terms of the firm's total exports, a sizeable share of firm's exports comes from the remaining products. For example, three-product firms get one fourth of their export sales from two of their products, with the least sold still accounting for 6 percent of total revenues. The bottom panel of Table 5 shows that the same holds in terms of destinations. Bernard *et al.* (2006) also find similar within-firm shares of products on total output.

Table 6 shows that the product mix of multi-product firms is quite diversified in terms of two-digit sec-

Table 5

TOP 5 PRODUCTS AND DESTINATIONS SHARES, BY FIRM TYPE, AVERAGE 1996-2005						
Product rank	Firm's product scope					
	1	2	3	4-10	11-50	51+
1	100	82.5	76	65.9	49.6	25.1
2		17.5	18.1	18.8	17.4	12.0
3			5.9	8.1	9.3	7.8
4				4.0	5.9	5.8
5				2.4	4.1	4.7

Destination rank	Firm's destination scope					
	1	2	3	4-10	11-50	51+
1	100	82.4	74.9	62.3	43.2	24.8
2		17.6	19.2	20.7	19.2	13.8
3			5.9	9.4	11.3	9.8
4				4.4	7.3	7.7
5				2.6	5.1	6.3

Sources: INE (Trade Data) and authors' calculations.

Note: The top panel shows the average sales share of each of the top five products exported by a firm, by firm type. Firms are classified according to the number of products in their export portfolio (product scope). A product is defined as an HS four-digit code (see Appendix A.1 for more details). The bottom panel shows the average sales share of each of the top five destinations served by a firm, by firm type. Firms are classified according to the number of destinations reached (destination scope).

Table 6

DISTRIBUTION OF FIRMS ACCORDING TO THE NUMBER OF 2-DIGIT SECTORS THEIR PRODUCTS BELONG TO, BY FIRM TYPE, AVERAGE 1996-2005						
Sectors (2 digits)	Firm's product scope (4-digits)					
	1	2	3	4-10	11-50	51+
1	100.0	49.1	27.7	9.9	0.1	0.0
2		50.9	42.1	22.0	2.3	0.0
3			30.2	24.4	3.8	0.0
4				20.7	5.9	0.0
5+				23.0	87.9	100.0

Sources: INE (Trade Data) and authors' calculations.

Note: The table shows the share of firms that exports products belonging to one, two, three, four or more than five sectors, by firm type. Firms are classified according to the number of products in their export portfolio (product scope). A product is defined as an HS four-digit code (see Appendix A.1 for more details).

tors. For type of exporter, we report the fraction of firms whose product portfolio is concentrated in one sector, two sectors, three sectors and so on. About half of the two-product exporters ship goods belonging to two different sectors. Almost two thirds of three-product exporters have a product portfolio that includes more than one sector and 30 percent ship three goods belonging to three different sectors. Multi-product firms export products which can be very different.

3.3. The Product and Destination Margins

Having established the importance of multi-product and multi-destination firms and the characteristics of their portfolio, we now ask how frequently exporters change products and destinations over time. We consider firms that export every year in the period from 1996 to 2005 and we consider two subperiods: (1) 1996-2000 and (2) 2001-2005. In each subperiod we classify firms in four categories: (1) None – the firm does not change its mix of products (2) Drop – the firm only drops products (3) Add – the firm only adds products (4) Both – the firm both adds and drops products. We compute the average percentage of firms in each category (across the two subperiods). The same calculations are also performed in terms of destination switches. The results are shown in Table 7. They indicate that product and destination switching are very frequent among all types of firms. Among single-product firms, 38 per cent add products within five years and 45 per cent add or drop products. Among multi-product firms, the percentage of firms that switch products goes from a minimum of 80 to a maximum of 100. Similarly, among single-destination firms, 40 percent of the firms add destinations within five

Table 7

PRODUCT AND DESTINATION SWITCHING BY PORTUGUESE EXPORTERS, 5 YEARS SPELLS, 1996-2005						
	Single-product	Multi-product				
		2	3	4-10	11-50	51+
None	55.3	19.5	6.2	1.4	0.1	0.0
Drop product(s) only	n.a.	26.8	29.3	20.6	5.7	0.6
Add product(s) only	38.0	24.8	13.4	6.1	0.4	0.0
Add and drop product(s)	6.7	28.9	51.2	72.0	93.8	99.4
	Single-destination	Multi-destination				
		2	3	4-10	11-50	51+
None	48.3	13.6	5.7	1.3	0.0	0.0
Drop destination(s) only	n.a.	22.5	22.3	18.7	5.8	4.8
Add destination(s) only	41.1	24.9	18.8	7.7	1.7	0.0
Add and drop destination(s)	10.6	39.0	53.2	72.4	92.5	95.2

Sources: INE (Trade Data) and authors' calculations.

Note: The top panel classifies exporters according to their product-switching behavior and their product scope. The bottom panel similarly classifies exporters according to their destination-switching behavior and their destination scope.

years and one out of two firms add or drop destinations. Among multi-destination firms, the percentage of firms that switch destinations goes from a minimum of 86 to a maximum of 100. Bernard *et al.* (2006), looking at U.S. firms production decisions, find that most firms switch products, that product switching is more frequent in multi-product firms compared to single-product firms and in large firms compared to small firms. These results are consistent with the behaviour of Portuguese firms in export markets. Gorg *et al.* (2007) also find that many firms add as well as drop products from the export mix in any given year and they study what determines the survival of products in the export mix. They find that characteristics of the products as well as characteristics of the firm matter.

4. FIRMS, PRODUCTS, DESTINATIONS AND AGGREGATE GROWTH

In this section we ask how our findings in terms of firms entry and exit patterns, heterogeneity in products and destinations and portfolio rotation affect aggregate exports flows. Our strategy is to decompose the growth rate of Portuguese exports into the contribution of firms, destinations and products. We find that yearly changes in the growth rate are explained mainly by the intensive margin, namely by the contribution of continuing firms selling continuing products in continuing destinations. However we also find that the gross contributions of the destination and product extensive margins (for continuing firms) are as important as the gross contribution of entering and exiting firms and that all of them are as important as the intensive margin.

4.1. Decomposing Exports Growth: Firms, Destinations and Products

We decompose Portugal's total exports growth in the contribution of three distinct decisions: the decision to entry/stay/exit in export markets, the decision of where to export and the decision of what to export. Firstly, we break down total exports growth in the contribution of "entering", "exiting" and "continuing" exporters, that is, in the extensive and intensive margin at the aggregate level along the firm dimension.

$$\Delta Y_t = \sum_{j \in N} \Delta Y_{jt} + \sum_{j \in X} \Delta Y_{jt} + \sum_{j \in C} \Delta Y_{jt}, \quad (1)$$

where ΔY_t is the change in Portugal exports from year $t-1$ to year t , N is the set of entering exporters, X is the set of exiting exporters and C is the set of continuing exporters. The next step is to break down the change in exports shipped by continuing exporters into "added destinations" (AD), "dropped destinations" (DD) and "continuing destinations" (CD), that is, in the extensive and intensive margins at the firm level along the destination dimension.

$$\sum_{j \in C} \Delta Y_{jt} = \sum_{z \in AD} \Delta Y_{zjt} + \sum_{z \in DD} \Delta Y_{zjt} + \sum_{z \in CD} \Delta Y_{zjt}, \quad (2)$$

Finally, we consider the product that firms choose to export in "continuing" destinations. We distinguish among "added" (AP), "dropped" (DP) and "continuing" (CP) products exported by firms in "continuing destinations", that is, the extensive and intensive margins at the firm level along the product dimension.

$$\sum_{z \in CD} \Delta Y_{zjt} = \sum_{v \in AP} \Delta Y_{vzjt} + \sum_{v \in DP} \Delta Y_{vzjt} + \sum_{v \in CP} \Delta Y_{vzjt}, \quad (3)$$

Substituting the previous equations we can write the change in Portuguese exports as:

$$\Delta Y_t = \sum_{j \in N} \Delta Y_{jt} + \sum_{j \in X} \Delta Y_{jt} + \sum_{j \in C} \left[\sum_{z \in DD} \Delta Y_{zjt} + \sum_{z \in CD} \left[\sum_{v \in AP} \Delta Y_{vzjt} + \sum_{v \in DP} \Delta Y_{vzjt} + \sum_{v \in CP} \Delta Y_{vzjt} \right] + \sum_{z \in AD} \Delta Y_{zjt} \right] \quad (4)$$

We compute the percent aggregate change in total exports by dividing each term in equation (4) by $(Y_t + Y_{t-1})/2$, i.e. the average between exports in t and $t-1$.⁷

Results from this breakdown are presented in Table 8. The table shows that the yearly change in total nominal exports is mainly driven by the change in exports of continuing firms, even though less so in the second half of the period. For example, this was the main force underlying the slowdown in nominal export growth in the 2000-2002 period and in the 2004-2005 period. This latter period is also characterized by a lower contribution of net entry, mostly because of a higher than usual impact of exiting firms. Over the whole period, from 1997 to 2005, average nominal aggregate export growth was 4.4 percent. One fifth of this average growth rate is accounted for by the extensive margin along the firm dimension. Eaton, Eslava, Kugler and Tybout (2007), using Colombian data for the 1997-2005 period, find that continuing firms drive most of the yearly fluctuations in aggregate exports. This is due to the fact that entering and exiting firms are, like we showed in Table 2, much smaller than incumbent firms. However, they also find that net entry over the course of the sample period accounts for one quarter of the cumulative total export expansion, while gross entry explains about half of total growth. This is due to the fact that surviving new exporters are typically able to rapidly expand (see Amador and Opromolla (2008)). When we focus on destinations, we see that the intensive margin, that is export growth in continuing destinations, accounts for almost the entire intensive margin along the firm dimension. However, the gross contribution of added destinations and dropped destinations among continuing firms is quite high. Therefore, there is a substantial reallocation of economic resources associated with destination switching. The decomposition at the product level also offers some interesting patterns. The net contribution of added and dropped products at continuing firms is usually small but the level of churning is very high. Bernard *et al.* (2006), looking at the growth of real U.S. output during the 1972-1997 period, also find that U.S. firms, selling on the domestic market, alter their productive capacity far more than reflected by their net contribution to total growth. The role of continuing products in continuing firms is crucial to explain changes in Portugal exports growth.

(7) As Eaton, Eslava, Kugler and Tybout (2007) explain, computing the growth rate as the change between two dates divided by the average level in the two dates rather than the change divided by the level in the earlier date has at least two advantages: (i) x percent growth followed by $-x$ percent growth returns us to the same level and (ii) values close to zero in the first year have a less extreme effect on the growth rate.

Table 8

DECOMPOSITION OF PORTUGAL TOTAL EXPORTS GROWTH RATE, EXTENSIVE AND INTENSIVE MARGINS, 1997-2005

	Aggregate growth	Extensive margin			Intensive margin
		Net	Entering firms	Exiting firms	Cont firms
1997-1998	6.2	0.9	2.2	-1.3	5.3
1998-1999	3.4	1.7	3.1	-1.4	1.7
1999-2000	13.6	2.9	4.1	-1.2	10.7
2000-2001	2.0	-0.3	2.9	-3.2	2.4
2001-2002	1.8	1.3	2.9	-1.6	0.5
2002-2003	2.4	0.9	2.5	-1.6	1.6
2003-2004	5.2	2.3	3.6	-1.3	2.9
2004-2005	0.4	0.8	3.0	-2.2	-0.5
Average	4.4	1.3	3.1	-1.8	3.1

	Cont firms	Extensive margin			Intensive margin
		Net	Added dest	Dropped dest	Cont dest
1997-1998	5.3	0.8	3.9	-3.1	4.5
1998-1999	1.7	0.0	2.9	-2.9	1.8
1999-2000	10.7	0.0	2.9	-2.9	10.7
2000-2001	2.4	-1.5	2.7	-4.2	3.9
2001-2002	0.5	0.2	3.0	-2.8	0.3
2002-2003	1.6	0.9	3.3	-2.4	0.7
2003-2004	2.9	0.9	3.1	-2.2	2.0
2004-2005	-0.5	-1.2	2.8	-4.0	0.8
Average	3.1	0.0	3.1	-3.1	3.1

	Cont dest	Extensive margin			Intensive margin
		Net	Added prod	Dropped prod	Cont prod
1997-1998	4.5	-0.1	3.2	-3.3	4.6
1998-1999	1.8	0.2	2.9	-2.7	1.6
1999-2000	10.7	0.8	3.7	-2.9	10.0
2000-2001	3.9	0.6	3.0	-2.4	3.4
2001-2002	0.3	-0.4	2.8	-3.2	0.7
2002-2003	0.7	0.4	3.6	-3.2	0.3
2003-2004	2.0	1.1	3.9	-2.8	1.0
2004-2005	0.8	-0.7	2.4	-3.1	1.4
Average	3.1	0.2	3.2	-3.0	2.9

Sources: INE (Trade Data) and authors' calculations.

5. CONCLUSIONS

Using a new transaction level trade database for the period 1996-2005, we describe the exports behaviour of Portugal-based firms in terms of the decision to export or not, which products to export and to which countries. Some of the facts shown are in line with and reinforce the conclusions of the still scarce literature on firm heterogeneity in terms of product and destination portfolio but some other are novel to the literature. Our main contribution is the analysis of the joint product and destination dimensions. We show that multi-product and multi-destination firms are crucial in explaining the level and growth rates of Portuguese exports. In particular, firms that export four or more products and operate in four or more destinations are responsible for over two thirds of total exports.

The exporter's portfolio is much diversified in terms of sectors and product tenure. Even when exporters are small in terms of product scope and ship only two products abroad, 50 percent of the times they export products that belong to two different Harmonized System 2-digits sectors. The product and destination portfolio changes frequently over time. Product and destination switching is widespread, even among single or two-product firms.

We break down the aggregate exports growth along three margins: firms, destinations and products. We show that while the intensive margin (sales of continuing products by continuing firms to continuing destinations) generally accounts for most of the yearly variation in exports, the gross contribution of the destination and product extensive margins (for continuing exporters) are as important as the gross contribution of entering and exiting firms and that all of them are as important as the intensive margin.

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APPENDIX 1

DATABASE Product definition

The following is an example of a four-digits HS product. Out of 21 possible Chapters, consider Chapter XVIII entitled “optical, photographic, cinematographic, measuring, checking, precision, medical or surgical instruments and apparatus; clocks and watches; musical instruments; parts and accessories thereof”. This includes three headings:

- 90 Optical, photographic, cinematographic, measuring, checking, precision, medical or surgical instruments and apparatus; parts and accessories thereof;
- 91 Clocks and watches and parts thereof;
- 92 Musical instruments; parts and accessories of such articles.

The third heading, number 92, further divides into:

- 9201 Pianos, including automatic pianos; harpsichords and other keyboard stringed instruments;
- 9202 Other string musical instruments (for example, guitars, violins, harps);
- 9203 Keyboard pipe organs; harmoniums and similar keyboard instruments with free;
- 9204 Accordions and similar instruments; mouth organs;
- 9205 Other wind musical instruments (for example, clarinets, trumpets, bagpipes);
- 9206 Percussion musical instruments (for example, drums, xylophones, cymbals, castanets, maracas);
- 9207 Musical instruments, the sound of which is produced, or must be amplified, electrically (for example, organs, guitars, accordions);
- 9208 Musical boxes, fairground organs, mechanical street organs, mechanical singing birds, musical saws and other musical instruments not falling within any other heading of this chapter; decoy calls of all kinds; whistles, call horns and other mouth-blown sound signalling instruments;
- 9209 Parts (for example, mechanisms for musical boxes) and accessories (for example, cards, discs and rolls for mechanical instruments) of musical instruments; metronomes, tuning forks and pitch pipes of all kinds;

which is the disaggregation level which corresponds to our definition of products.

APPENDIX 2

Here we provide some background on the sectoral structure of Portuguese exports and exporters. Table 9 shows the percentage of country exports accounted for by each sector for each year in the sample period. Similarly, Table 10 shows the percentage of exporters belonging to each sector.

Table 9

SUMMARY STATISTICS BY SECTOR				
1-Digit sector	Total Exports (per cent)			
	1996	1999	2000	2005
Animal products	1.5	1.5	1.6	1.7
Vegetable products	0.8	0.8	1.2	1.3
Animal or vegetable fats and oils	0.7	0.4	0.5	0.6
Prepared food, beverages and tobacco	4.3	4.3	4.5	4.9
Mineral products	3.4	2.5	2.5	5.6
Chemical products	3.4	3.6	4.2	5.3
Plastics and rubber	2.5	3.2	3.9	5.3
Leather and travel goods	0.4	0.3	0.4	0.3
Wood, cork products	4.6	4.8	4.8	4.5
Paper products	4.7	4.6	4.8	4.7
Textiles	22.8	20.7	18.0	13.1
Footwear	7.9	7.0	5.9	4.2
Plaster, cement, ceramic, glass	3.9	3.7	3.5	3.7
Jewellery	0.4	0.4	0.3	0.2
Base metals	3.9	4.9	5.5	7.6
Machinery, electrical equipment	16.2	19.1	19.7	18.6
Vehicles, aircraft, vessels	15.6	15.4	15.0	14.3
Optic., music, measur., med. instr.	1.0	0.8	1.0	0.7
Arms and ammunition	0.2	0.2	0.1	0.1
Miscellaneous manufactured articles	1.7	1.8	2.3	2.9
Works of art and antiques	0.0	0.0	0.0	0.0
Other	0.1	0.1	0.3	0.3

Note: Abbreviated Titles of the Chapters of the HS 1996 Description and Coding System.

Table 10

SUMMARY STATISTICS BY SECTOR – CONTINUED				
1-Digit sector	Total Exporters (per cent)			
	1996	1999	2000	2005
Animal products	2.5	2.1	2.0	2.1
Vegetable products	2.4	2.3	2.0	1.8
Animal or vegetable fats and oils	0.6	0.6	0.5	0.4
Prepared food, beverages and tobacco	5.1	4.8	4.5	4.2
Mineral products	1.2	1.0	1.0	1.1
Chemical products	3.9	4.1	3.8	3.3
Plastics and rubber	3.8	4.0	4.2	3.9
Leather and travel goods	1.0	0.9	1.0	0.8
Wood, cork products	4.8	4.4	4.0	3.4
Paper products	3.7	3.8	3.8	3.3
Textiles	19.8	18.2	16.4	12.2
Footwear	6.4	5.3	4.6	3.4
Plaster, cement, ceramic, glass	8.0	7.6	7.3	5.7
Jewellery	0.7	0.7	0.8	0.5
Base metals	5.9	6.5	6.4	6.2
Machinery, electrical equipment	16.0	18.5	17.5	16.1
Vehicles, aircraft, vessels	3.9	4.8	9.1	22.2
Optic., music, measur., med. instr.	2.3	2.5	2.7	2.3
Arms and ammunition	0.1	0.1	0.1	0.1
Miscellaneous manufactured articles	6.4	6.6	7.2	6.3
Works of art and antiques	0.2	0.2	0.3	0.2
Other	1.1	0.8	0.6	0.5

Note: Abbreviated Titles of the Chapters of the HS 1996 Description and Coding System.