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Firm Heterogeneity: do destinations of exports and origins of imports matter?

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Firm Heterogeneity: do destinations of exports and origins of imports matter?*

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Abstract

How do importing activities matter in explaining firm heterogeneity? How firm performances are related to foreign markets heterogeneity? Using a rich database on Italian manufacturing firms, this essay adds new evidence on the relationship between trade status and firm characteristics. We uncover evidence supporting recent theories on firm heterogeneity and international trade, together with some new facts. First, the availability of information on import and export enables us to differentiate firms involved in both trading activities - namely two-way traders - from firms that only export, and from those that only import. We show that firms engaged in both import and export outperform those involved in either importing or exporting only. Second, exploiting firm-level information on the destination of export and the origin of imports, we observe the heterogeneity among firms trading with different type of markets. We show that different destinations of exports and different origins of imports map into distinctive firm characteristics.

JEL codes: F10, F16, J21

Keywords: heterogeneous firms; exports; imports; productivity, performances, destinations

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1 Introduction

The trading behaviour of firms has received increasing research attention over the last two decades. As a general result, exporters turn out to be very different from the typical firm: they are larger, more productive, more capital and skill-intensive (Aw and Hwang, 1995; Bernard and Jensen, 1995).[1] These findings have been largely documented at both the firm and the plant level for a wide range of countries. A recent empirical work (The International Study Group on Export and Productivity, 2007) looks at the relationship between export and productivity by using comparable micro level panel data for 14 countries and identically specified empirical models. Results for this comparable study are in line with the big picture that is by now familiar from the literature, that is exporters are more productive than non-exporters when observed and unobserved heterogeneity is controlled for.

These new stylized facts have led to a series of new trade models which have been developed assuming firm heterogeneity (Melitz, 2003; Bernard et al., 2003). A first class of models, initiated by Melitz (2003), combine firm heterogeneity with a monopolistic competition framework. Melitz (2003) assumes that firms vary in terms of innate productivity randomly and relates firms' decision to export to their productivity level. Only the most productive firms enter the foreign market while less productive firms will restrict their activity to their home market. This self-selection mechanisms is due to the fact that entering the international markets entails comparatively higher sunk costs than operating in the domestic market. As in the Melitz framework, (Bernard et al., 2003) relate firm heterogeneity with export behavior, providing insights about why some producers export and other do not. Melitz's model predicts that only the most productive firms are engaged in foreign trade because they earn enough abroad to cover the fixed cost needed to start exporting. The Bernard et al. framework instead assumes that the engagement into foreign markets is limited to the most productive firms because they have cost advantages over all its competitors and therefore can fix a lower price. They propose a static Ricardian model - in which firms and countries differ in technological efficiency - with heterogeneous firms and imperfect competition a la Bertrand. An alternative, or complementary, theoretical explanation for the link between exporting and productivity is related to the idea that firms become more efficient after they begin exporting. The literature has identified a number of channels through which exporting may affect firm's productivity. One often cited reason for this post-entry effect is the so-called learning by exporting mechanism. Exporting firms may increase their technological knowledge through the access to new production methods or new product design from their buyers (Clerides et al., 1998). In addition to the learning mechanisms, firms that become exporters may improve their productivity simply by taking advantages of economies of scale, as exporting increases the relevant market size.

Empirical evidence has been rather robust on the self-selection hypothesis, while results on post-entry effects of export have been less univocal. Nonetheless, recent research by Aw et al. (1998) for Taiwan, Van Biesebroeck (2006) for Cote d'Ivoire, De Loecker (2007) for Slovenia and Serti and Tomasi (2007) for Italy have found evidence of an increase in productivity as a result of firms' exposure to exporting.

The empirical literature based on micro level data has recently moved forward by investigating some new aspects of traders' heterogeneity. In particular, these studies look at the diversification of firms' activities, both with respect to the number of products and the number of geographical markets in which they trade (i.e. product and country extensive margins).[2]

[1] See Wagner (2005) for a review of the literature on the relationship between export and productivity.

[2] The extensive margin of export (import) refers to the number of firms involved in exporting (importing)

These few studies are based on data from US (Bernard et al., 2007), France (Eaton et al., 2004), Belgium (Muuls and Pisu, 2007), Sweden (Andersson et al., 2007), Slovenia (Damijan et al., 1998) and Italy (Castellani et al., 2008). All of them find that a minority of firms accounts for a disproportionate fraction of aggregate exports (imports) and that these firms are characterized by a high degree of both product and geographical diversification. Moreover, Andersson et al. (2007) and Castellani et al. (2008) extend the analysis providing evidence of a positive relationship between productivity and geographical and product diversification. The literature further emphasizes the contribution of the country and the product extensive margins by revisiting the so-called gravity equation, which predicts bilateral trade flows based on the economic sizes and the distance between two countries. Bernard et al. (2007) show that the attractors of trade flows in the traditional gravity equation, namely size and distance, have an higher influence on the extensive margin than on the intensive margin. Similarly, Eaton et al. (2005) show how the number of firms selling in a market varies with the size of the market. Andersson (2007) proposes a link between familiarity and fixed entry costs, such that the cost of entering a familiar market is lower than entering an unfamiliar one.

Alongside the empirical evidence of heterogeneity among exporters in terms of geographical diversification, new models of exports with asymmetric countries and asymmetric sunk costs of entry have been developed. Helpman et al. (2007) and Chaney (2007) developed a modified version of Melitz's model and derive a gravity specification for bilateral trade flows where trade costs affect both the extensive and intensive margin of trade. In these models self-selection operates market by market. Firms will export to countries whose productivity threshold is lower than their productivity level, i.e. a sort of hierarchy emerges among the various destinations. It follows that firms with low productivity serve a limited number of markets with a low productivity threshold. By contrast, firms with high productivity can export to a large number of markets and with high productivity thresholds. Therefore, these models try to explain the interaction between firm heterogeneity and the extensive margins of exports by supposing that firms face different obstacles to enter different markets.

Through the lens of these models, the empirical relationship between firm characteristics and export destinations could be interpreted as evidence supporting the view that the self-selection mechanism depends on the type of market served by a firm. Indeed, there are several reasons why self-selection may vary across markets. The different productivity thresholds required to enter different countries could be determined, on the one hand, by the fact that different sunk costs are related to different markets' characteristics, such as distance, income, familiarity, language, legal and institutional structures. For instance, as trade costs increases with distance, lower productivity firms no longer find it profitable to serve export markets. Familiarity and affinity with the foreign market in question could be other determinants of the heterogeneity among trading firms. Additionally, the market-specific trade productivity premia could be explained by legal and institutional structures. On the other hand, following the (Bernard et al., 2003) model and the technology-gap models of trade (Dosi et al., 1990), one can argue that more advanced markets, characterized by an higher competitive pressure, should impose stronger productivity (or, more in general, performances) requirements to exporting firms. In this case, the drivers of these selection mechanisms are price-competitiveness and technological-capabilities gaps between firms belonging to different countries.

Only few empirical studies have considered how traders' performances vary with the charac-

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. See Mayer and Ottaviano (2007) for a discussion of this definition.

teristics of destinations. Damijan et al. (1998) report evidence on Slovenia exporters, showing that the productivity level required to enter developing countries (especially familiar markets such as CEEC and former Yugoslavia) is lower than that observed for firms serving high-income economies. In addition, learning effects are relatively greater for firms exporting to OECD countries. Ruane and Sutherland (2005) empirical analysis on Irish firms suggests that Non-UK exporters perform better than UK exporters. De Loecker (2007) finds significantly higher productivity premia for firms starting to export to higher income regions.

These empirical works have considered the relationship between exporters' performance and destinations, while, as far as we know, there are no studies documenting how importers' characteristics are associated to the type of country firms source from. More generally, the literature based on micro level data has largely neglected the import behaviour and firms' performances (Bernard et al., 2007; Tucci, 2005; Halpern et al., 2005; Andersson et al., 2007). This is unfortunate given the key role played by imports in firm's trade. As a matter of fact, the same sources of heterogeneous sunk costs (e.g., information cost) that are important for exporters could in principle be relevant also for importers. Hence, different productivity thresholds could be required to source from different countries. Moreover, to the extent that imported goods are technologically complex intermediate inputs or machinery, importing firms should need to develop adequate *absorptive capacities* in order to integrate such inputs and capital goods into their production processes. As a consequence, it is likely that such firms benefit from importing in terms of improved productivity trajectories, as the new literature on international technological diffusion (Acharya and Keller, 2007; Keller, 2004)[3] and the traditional vintage-models of growth (Solow, 1960)[4] would predict. These are additional dimensions of internalization activities that could interact with firm characteristics and create additional links between firm heterogeneity and exposure to foreign markets.

The limited evidence available on the relationship between traders characteristics and country and sector diversification or market heterogeneity - especially regarding importing firms - need to be filled up with new stylized facts. As emphasized in Eaton et al. (2004), such type of analysis is necessary to unravel the nature of entry costs and to what extent they differ among markets. Indeed, the aim of this essay is to enlarge the micro evidence on internationalized firms by giving a picture of trade activities of Italian firms. Combining data on firm's structural characteristics and economic performance with detailed data on their exporting and importing activity, we uncover evidence supporting recent theories on firm heterogeneity and international trade. Our analysis proceeds in two steps. We first convey a picture of firm heterogeneity associated to trade activities, distinguishing between firms that are engaged in both exporting and importing activities, from firms that only export, and from those that only import. Second, we extend the analysis by investigating if different destinations of exports and different origins of imports map into different firm characteristics, i.e. if they are useful to explain traders' heterogeneity.

The structure of the chapter is as follows. In Section 2 we present our data and provide a set of descriptive statistic. In Section 3, through non-parametric exercises, we describe how the characteristics of internationalized firms diverge from those of non-internationalized ones. In Section 4 we explore the relationship between firm performances and market heterogeneity. Section 5 will summarize the results and conclude.

[3]These papers relate technology transfer to intermediate inputs imports, showing that imports are often a major channel through which technological knowledge is transferred and productivity growth is transmitted.

[4]In the form of capital-embodied technological change.

2 Data Description

This paper relies upon a data panel which combines two different datasets developed by Italy's Bureau of Statistics (ISTAT), namely MICRO1 and COE. [5]

MICRO1 contains longitudinal data on a panel of 38.771 firms representing the entire universe of Italian manufacturing companies with 20 or more employees and it covers the years between 1989-97. Over the period covered by the data there are missing values partly due to the fact that some firms may come out in the database as they reach the threshold criteria of 20 employees or they may exit as they reduce their size and fall below the threshold. The existence of missing values makes MICRO1 an unbalanced panel data-set, containing information for an average of around 20.000 firms per year. As documented in Bottazzi and Grazzi (2007), despite the unbalanced nature, the validity of the database is largely supported by its census nature, which avoids possible biases in the data collection process, and by the fact that there are no particular trends or changes in the structure and performance of firms that do not appear for some years (i.e. firms that exit and re-appear again in the database). In addition, as reported in Bartelsman et al. (2004), though manufacturing firms with less than 20 employees account for about 88% of the total Italian firm population, large firms with 20+ employees cover almost 70% of the total employment.

Firms are classified according to their principal activity, as identified by ISTAT's standard codes for sectoral classification of business (Ateco), which correspond, to a large extent, to Eurostat's NACE 1.1 taxonomy. The database contains information on a number of variables appearing in a firm's balance sheet. We utilize the following pieces of information: number of employees, type of occupation of employees, labor costs, wages, capital, industry and geographical location (Italian regions). Capital is proxied by tangible fixed assets at historical costs. All the nominal variables are measured in millions of 1995 Italian liras and they are deflated using the corresponding 2 digit industry-level price indices provided by ISTAT.

The MICRO1 database has been merged with ISTAT's external trade register (COE) [6], which provides firm-level information on exports and imports over the 1993-1997 period. For each of the about 17,000 firms surveyed on average in the observation period, COE supplies data on firms' trade status and their volume of trade. Moreover, data are available on the destination of exports and the origin of imports. A table reporting all the countries for which we have detailed information is reported in Appendix 1.

The merging of balance sheet data with trade statistics implies a reduction in the size of our sample, which leaves us with an unbalanced database for an average of about 12.100 firms, covering the period between 1993 and 1997. [7]

Table 1 presents the number of firms active within the manufacturing sector, respectively for the original MICRO1 database and for the database obtained after the merge with the foreign survey (MICRO1-COE). The size of the sample stemming from the merge with COE

[5] The databases have been made available under the mandatory condition of censorship of any individual information.

[6] Detailed information on the implementation of the COE database on foreign trade statistics are available at www.coeweb.istat.it

[7] Though the 20 employees threshold do not allow us to consider the totality of firms involved in international trade and prevent us from analyzing the behavior and the performances of smaller units, the representativeness of MICRO 1 is endorsed by the fact that a large amount of the aggregate Italian trade is generated by large firms. As reported by the Italian Statistical Office (www.coeweb.istat.it), for instance in 2005 firms with less than 20 employees accounted for 10% of the total manufacturing export while nearly 90% of the aggregate value was generated by firms with more than 20 employees.

Table 1: Number of firms

Years	Micro1	Micro1-COE (merged)
1989	19922	
1990	21208	
1991	19740	
1992	21301	
1993	22076	14579
1994	21720	14036
1995	20004	12320
1996	17231	10512
1997	15532	9215
Mean	19859	12132

trading data corresponds to approximately 60% of the sample obtained from MICRO1 alone. [8]

In Table 2 we present summary statistics on all manufacturing firms, together with average values for a number of sub-samples of firms grouped according to geographical location, size, sector, and foreign ownership structure. We define three geographical area (North, Center and South) and four dimensional group (small, medium, large, very large). For the sectoral classification we group firms according the Pavitt's taxonomy (Pavitt, 1984) (see Appendix 2 for more details on this taxonomy). Finally, a firm is defined as foreign owned when the majority of its capital assets is controlled by foreign shareholders. [9]

We show the differences between firms considering various economic indicators: productivity, scale of operation, capital and skilled intensity. The simultaneous consideration of various firms' economic measures is intended to achieve the purposes of enriching the analysis and checking changes in the results with respect to different economic performances. To measure firm-level productivity we use two indicators: Labour Productivity (LP), i.e. value added per employee, and Total Factor Productivity (TFP) that is the residual of a two inputs (capital and labour) Cobb-Douglas production function estimated using the semiparametric method proposed by Levinsohn and Petrin (2003). The scale of operation is measured by total shipments (sales) and by total employment. With respect to capital endowment, we focus on the value of capital per employee (the so called capital intensity, CI). We built an index for the composition of the workforce, the skilled labor intensity (SLI), conventionally defined as the percentage of white collar workers over the total number of employees.

The majority of firms (75%) are from the North of Italy, 62% are firms with less than 50 employees (*small firms*), 56% belong to the so-called traditional sectors (*supplier dominated*), while only 2% are foreign owned firms. While the latter figure reflects the very strict definition of foreign owned firms, as allowed by the available data (see above), this subsample will enable us to partially capture the specificity of multinationals in terms of productivity and other firm's

[8] In order to check the consistency of the panel obtained through the merge of the two datasets, we compare the sectoral and the size distribution of the sample obtained by merging MICRO1 and COE and the original dataset, characterizing the entire population of firms. The test we compute (available from the authors upon request) support the hypothesis that our merged database is not statistically different from the entire population of firms, both in terms of sectoral and size distribution.

[9] This is a very restrictive definition which has implications on the size of this subsample of firms.

Table 2: Descriptive statistics, all firms

	LP	**TFP**	**N.Empl.**	**Sales**	**CI**	**SLI**	**% of firms**
Average Value	75	155	103	37688	112	22	
North	79	164	109	37895	114	24	75%
Center	67	142	91	48049	92	19	15%
South	56	107	74	19803	124	15	10%
Small (<50)	69	121	31	8146	96	19	62.6%
Medium (51-250)	83	187	100	31657	132	26	31.8%
Large (251-500)	96	297	345	120295	170	33	3.5%
Very large (>500)	103	430	1864	851513	202	39	2.1%
Supplier dominated	67	151	65	17397	94	18	56.2%
Scale intensive	91	125	170	82606	177	24	24.2%
Specialized suppliers	77	182	94	25339	79	31	15.4%
Science based	91	280	262	94582	97	46	4.3%
Non Foreign Owned	75	152	92	32820	111	22	97.8%
Foreign Owned	104	310	613	253513	163	40	2.2%

Note: Monetary values are expressed in millions of 1995 Italian liras.

characteristics. A remarkable heterogeneity is detected across sub-samples. The classification based on geographical distribution reveals that firms localized in the North are on average more productive, more capital and skilled labour intensive than those localized in the Center and in the South. Very similar properties are also observed for very large firms: they outperform, with respect to all variables, smaller firms. Additionally, we observe a ranking between the four size categories: highest values are detected for very large firms followed by large, medium and small firms. Similarly, foreign owned firms exhibit better performances with respect to non foreign owned firms.

Firms engaged in different economic activities are likely to differ in terms of organizational structures, corporate strategies and technological content. The distinction made according to the Pavitt's taxonomy seems to support the existence of different sectoral pattern. This finer level of disaggregation leads in fact to heterogeneous results in terms of productivity, size and other relevant characteristics. In particular, science based sectors are characterized by better economic performances with respect to other sectors. By contrast, on average, firms belonging to the suppliers dominated sectors low productivity and capital intensity levels, and the smallest number of employees and percentage of white collars.

3 Measuring traders premia

Several empirical studies have produced evidence on the relationship between firm heterogeneity and internationalization status. As discussed in the introduction there exists a long tradition documenting the better performances of internationalized firms relative to firms that serve only the domestic market, a stylized fact invariably emerging in the literature and suggesting the coexistence of firms, even within the same sector, characterized by heterogeneous performances. While most of these studies have considered the relationship between export

Table 3: Differences between non-traders and other trading categories (average values 1993-1997)

	Non-traders	**Two-way traders**	**Only Imp.**	**Only Exp.**
LP	53.8	83.9	74.4	65.9
TFP	101.9	179	130.5	125.8
N. Empl	40	132	59	78.2
Sales	6835	49131	18455	55505
CI	82.1	121.9	142.8	94.1
SLI	12.2	26.6	20.6	20
% of firms	24.1	65.4	5.0	5.4

status and firm performance, few works have analyzed the characteristics of importers. Although evidence is not as extensive as in the case of exports, these few empirical works have documented that importers tend to outperform firms that do not trade - as in the case of Bernard et al. (2007) for the US, Muuls and Pisu (2007) for Belgium, Tucci (2005) for India, Andersson et al. (2007) for Sweden, and Halpern et al. (2005) for Hungary. In this section we convey a picture of firm heterogeneity associated to trade activities, considering both the importing and exporting activities. We introduce in our analysis a basic distinction between firms serving the national market only, which we identify as "non traders", and internationalized firms, and we further group the latter into three classes: only importers, only exporters, and firms involved in both import and export activities, which we name "two-way traders".

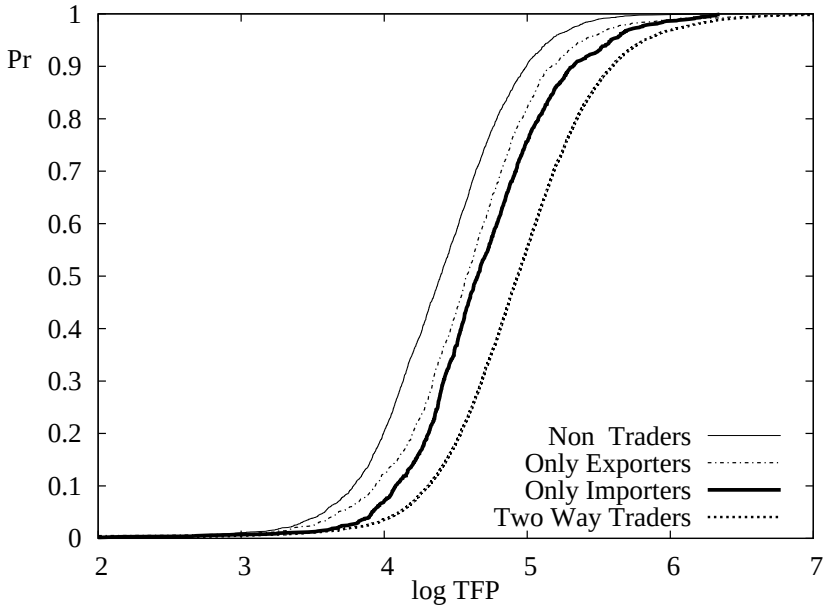
As illustrated in Table 3, around 75% of the sample firms are engaged in international activities, while a relatively small proportion is not internationalized. Among the internationalized firms, the large majority are involved in both import and export (on average, over the 1993-1997 period, 65.4% of all firms are two-way traders). These firms are the more engaged in international trade activities and we expect that a proportion of the import-export activity is linked to international fragmentation of production both within and across firm boundaries. Unfortunately, we have no data that allow to single out these firms from the group of two-way traders.

In order to provide an informative empirical account of the correlation between international involvement and firm performances we proceed in two step. First, we report simple descriptive statistics computed for the variable under analysis, grouping firms according to their mode of internationalization. Second, we describe the characteristics of internationalized firms by means of kernel estimates of firm performance probability densities.[10]

Table 3 provides some basic descriptive statistics on the sample firms. Consistently with other studies, we find that non traders are less productive, smaller (in terms of both total sales and number of employees) less capital and skilled intesive with respect to internationalized firms. Among this latter group, two-way traders outperform firms engaged in only importing or exporting activities. Firms doing only export or only import lie in between non-internationalized firms and two-way traders. This is in line with the findings of Muuls and Pisu (2007) on Belgium and Andersson et al. (2007) on Sweden. Moreover, such basic statistics would to a certain extent support the idea that increasing commitment to international trade

[10]Readers interested in the results of an equivalent parametric approach can refer to Castellani et al. (2008).

Figure 1: Cumulative Distribution Function: Total Factor Productivity (1993)



are associated with better performances.[11] The comparison of the two categories of one-way traders yields interesting results. Only exporters are larger (both in terms of sales and number of employees) than only importers, but the latter are more productive (both in terms of labour productivity and TFP) and, as illustrated by the comparison of the cumulative distributions of TFP (in Figure 1), this holds not only at the mean: the whole TFP distribution of only importers lies at the right of the distribution of only exporters. Moreover, it is worth noting that capital intensity is very high among only importers, so that on average they are even more capital intensive than two-way traders. One explanation for this fact is that firms internationalized only from the import side source mainly capital goods from abroad. However, it should also be borne in mind that these unconditional differences may well reflect a sectoral composition effect. In the case of import for example, the sectoral distribution reveals that only importers are relatively more likely in some capital intensive industries, such as Food and Beverages, Tobacco, Wood products, Printing and Publishing, Petroleum refining and Radio and TV equipments.

Further support of the positive relationship between involvement in international trade and firm performances can be drawn from a comparison of the densities obtained applying non parametric kernel estimation to manufacturing enterprises characteristics. Figure 2, 3 and 4 present kernel densities, on a log scale, of various economic indicators, comparing the firms belonging to two different internationalized classes - non traders and two-way traders.[12] As

[11] Among others, Greenaway et al. (2005) and Castellani and Zanfei (2007) find that both in the U.K and in Italy, domestic multinational firms outperform (non-multinational) exporters. Unfortunately, our data do not allow to identify multinational firms among exporters, but we expect that it would be unlikely that a multinational firm would not be engaged in any export to some market, and, to the extent that multinationals tend to fragment at least part of their production internationally, they would also be importing goods. Thus, we expect that, if we had the data, we would find multinational firms in the two-way traders group.

[12] The kernel densities shown in this work were performed using *gbutils*, a package of programs for parametric and non-parametric analysis of panel data, distributed under the General Public License and freely available at

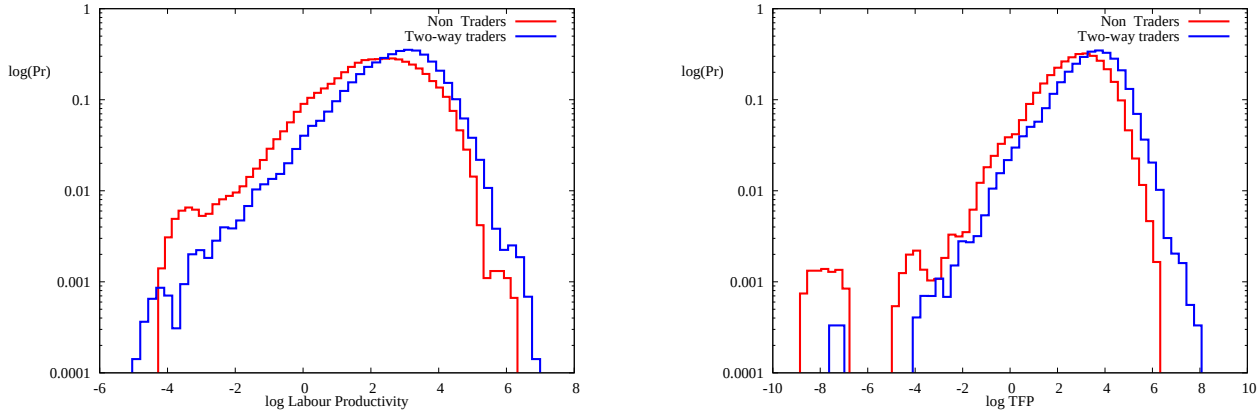


Figure 2: Empirical densities of firm productivity in 1993, by internationalization status. Productivity is proxied by LP (**left**) and TFP (**right**).

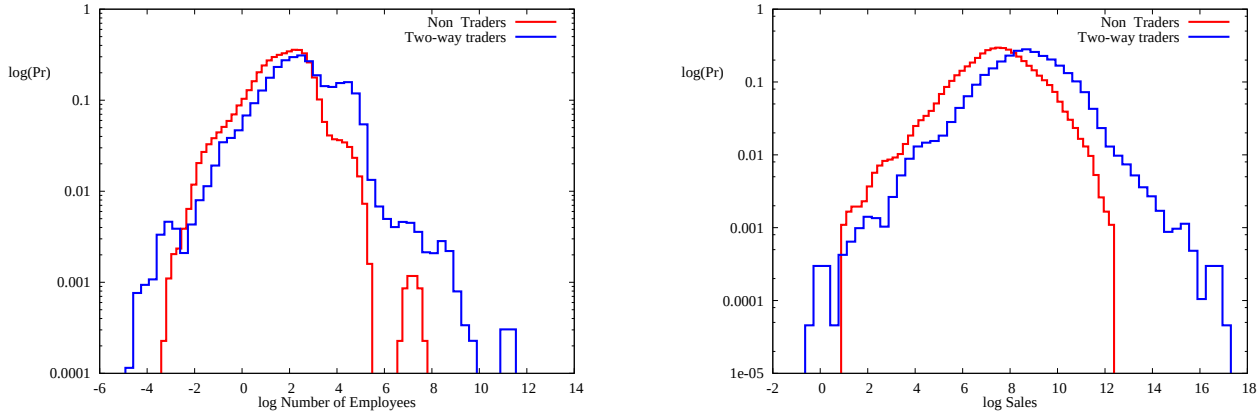


Figure 3: Empirical densities of firm size in 1993, by internationalization status. Size is proxied by N. of Employees (**left**) and Sales (**right**).

shown in Table 2 the heterogeneity of performances seems quite evident across firms belonging to different geographical area, size classes and sectoral groups. In order to control for this heterogeneity among firms we work with deviation of the value of a given firm characteristic from the corresponding industry, dimensional and geographical average, that is the average value for firms belonging to one of the four Pavitt group p, to one of the four size classes s and to one of the three geographical area a. Since we observe a considerable degree of stationarity over time we present here the kernel densities using only the observations for the year 1993.

A first interesting patter we get from the visual inspection of the plots is that all densities clearly span quite large supports, irrespective of the group and the variable considered. The fact that the supports of the distributions are rather wide is indicative of the existence of a widespread heterogeneity even among firms with the same degree of internationalization. Interestingly, in many cases we also note that the densities display wider supports, and therefore higher heterogeneity, within the two-way traders as compared to the non-traders group. As we will further examine in the next sections, many factors including the differences in the markets of destination or origin, may contribute to determine the diversity within the group of internationalized firms. A second noticeable result is that two-way traders appear to outper-

http://www.cafed.eu/gbutils. If not else specified, density estimation is performed using Epanenchnikov kernel and setting the bandwidth following the "rules" suggested in Section 3.4 of Silverman (1981).

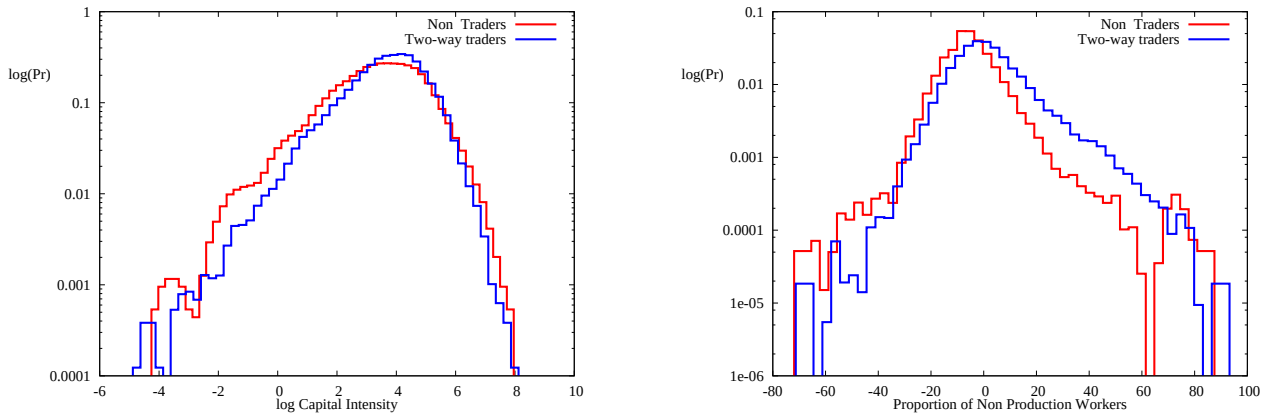


Figure 4: Empirical densities of firm capital (**left**) and skilled (**right**) intensity in 1993, by internationalization status.

form non internationalized firms for almost all values of the distribution of firm productivity, size, capital and skilled intensity. Indeed, the two-way traders distributions are shifted to the right with respect to those of non-traders. In other words, the kernel densities illustrate that the empirical differences between two-way traders and non traders we have discussed above hold not only when considering average values, but also when considering the whole frequency distribution of the examined variables. It is rather clear that the two way-traders cumulative distributions would lie somewhat below the corresponding non-traders ones, i.e. that, as in the Figure 1, two way-traders distributions first-order stochastically dominate non-traders ones. Looking at the productivity distribution reported in Figure 2 (left panel), one can observe that two-way traders, as compared to the other group, span noticeably wider supports. Moreover, it is rather clear that the modal value of the distribution is greater for two-way trader than for non-traders. Repeating the exercise estimating the kernel densities of TFP (right panel) does not substantially change our results. The differences between traders and non-traders are even more marked when we consider the scale of operation (Figure 3). Both in terms of number of employees and sales, internationalized firms display better performances with respect to non-traders. More similar shapes between traders and non traders are instead observed for both the capital and the skilled intensity (Figure 4). However, still firms engaged in international activities seem to outperform those serving only the domestic market.

4 Market heterogeneity

Up to this point, our analysis of the relationship between traders behavior and firm characteristics has been only focused on firm trade status. We highlighted that traders differ from non-traders in terms of economic performances. We introduced a distinction across traders, separating firms doing both import and export from firms involved in only one trading activity, and showed that this distinction is also associated with some diversity in performances. In this section we extend our analysis further by estimating trade premia for distinct markets. One in fact can argue that the heterogeneity among traders depends largely on the destinations of exports and on the origins of imports.

As discussed before there are several reasons which could make trade premia market-specific. Firms trading with countries characterized by similar institutional, political and cultural conditions may not have to be as competitive as firms that trade with more "distant"

markets in geographical terms and, even more so, in terms of cultural and institutional proximity. Traders with more "traditional" markets are likely to face lower sunk costs than firms trading with unfamiliar markets. For instance, the former may have access to well-established distributional networks. Hence, in general, heterogeneity among trading firms may emerge as a consequence of the different competitive pressures, technological competencies, institutional and legal structures characterizing the various markets of destination and origin.

Furthermore, there might exist some differences also between firms importing and firms exporting from/to the same country. This diversity may arise as a consequence of the type of product imported and/or exported to the same country, or it could be the result of different network established on the import and export side, or it may be due different legal barriers imposed to importers and exporters. For instance, according to the international trade data of NBER-UN World Trade Data (Feenstra et al., 2005), Italian imports of specialized capital goods (and more in general of capital goods) are mainly sourced from producers based in the major European countries.[13] Indeed, to the extent that buying high-tech capital goods requires the accumulation of absorptive capacity, import activity from these countries could be associated with a significant productivity premium. At the same time, Italian firms tend to export relatively low-skilled intensive goods to European countries and they are likely to have well-established exporting networks with those countries. It follows that a relatively low productivity level is required to serve these markets. In order to explore all these interpretation further, we extend our analysis by examining the behavior and the performances of trading firms when they supply and source from different markets.

Before moving to the analysis of the relationship between firm performances and market heterogeneity, we briefly present the export and import orientation of Italian manufacturing firms, by using detailed firm-level information on the countries of destination and origin. As a second step, we compute the trade premia differentiating firms according to where they direct their trade flows. Thought we do not make any conclusive statement about the direction of causality between international trade toward (or from) different countries and firm performances, we shall show that export and import market heterogeneity is associated with inter-firm diversity.

4.1 Pattern of export and import orientation

The aggregate trade flows to each destination and from each country of origin can be decomposed in terms of firm intensive and extensive margin. The intensive margin is given by the average value of export (import) per firm sell to and source from each market, while the extensive margin is given by the number of firms exporting to, or importing from, each country.

Important insights can be gained from Table 4 that presents the intensive margin of market-specific flows. Precisely, it shows the average level (column a) and the growth rate between 1993 and 1997 (column b) of trade intensity within each trading category. The trade intensity is given by exports over sales (export intensity) for only exporter and for the export side of two-way traders and by imports over sales (import intensity) for only importer and for the import side of two-way traders. Though the import intensity so defined is uncommon, we believe that this is a useful strategy to compare both sides of trade. Indeed, even if imports

[13] In 1993, about the 80 per cent of Italian imports value of Machinery (the SITC rev.2 sectors 7111 to 7849) came from developed European countries, while this percentage was of about 10 per cent for the aggregate of other non-European developed countries. Very similar percentages hold true if we concentrate on Machinery and Equipment Specialized for Particular Industries (the SITC rev.2 sectors 7281 and 7284).

Table 4: Trade intensity: developed and non developed countries

	Two-way traders export side		**Two-way traders import side**		**Only Exporter**		**Only Importer**	
	a	*b*	*a*	*b*	*a*	*b*	*a*	*b*
Trade intensity	33	21	10	16	16	9	7	4
% of trade intensity vs Dev	82	12	85	12	77	-3	93	5
% of Trade intensity vs NonDev	18	55	15	35	33	53	7	-5

Note: a = value in level; b = growth rate between 1993-1997. Trade intensity is given by Exports/Sales for only exporter and two way traders (export side) and by Import/Sales for only importers and two way traders (import side).

comprehend not only intermediate inputs but also capital goods, the import share in sales is a convenient way to compare firms' trade to firm size.

Though firms typically export a small fraction of their sales, the average export intensity is noticeably higher than the corresponding value for import. The fraction of sales exported abroad is 33% for two-way traders and 16% for only exporters, while the share of imports over sales is 10% for two-way traders and 7% for only importers.

In Table 4 we report the percentage of export (import) intensity exported to and imported from developed and non developed countries, respectively. Interestingly, around 80% of the fraction of sales exported abroad is directed to developed economies and only 20% to non-developed economies. The same holds true in the case of import. However, looking at the growth rate is revealing of the changing patterns in the markets served by trading firms. On the export side we observe for two-way traders and only exporter a positive and noteworthy growth rate of the export intensity towards developing economies (around 55% for both categories), while a lower positive value is reported for two-way traders exporting to rich countries (12%) and even negative for only exporters (-3%). A similar patter is found for the import side of two-way traders, though the growth rate of import intensity with respect to developing countries, which is around 35%, is somehow lower than in the export case. Different results are obtained for the only importer category, showing higher growth rate in the import intensity from developed (5%) than developing (-5%) countries.

Table 5 provides further details on market heterogeneity, reporting a more disaggregate analysis of market-specific flows. In the table we report the percentage of export (import) intensity (level and growth rate) directed to (and sourced from) the various countries. Detailed information on the most important markets with which firms trade reveal further interesting patterns of internationalization. Although the issue of the relationship between trade flows and market-size or distance is out of the scope of the present work, it is worth to notice that, at first sight, our data seems to validate the hypothesis that export (import) intensity increases with market size (proxied by GDP) and decreases with distance.[14] The percentage levels reported in columns a in fact clearly confirm that, on average, each firm's trade flows is mostly directed to and source from high-income and bordering countries. As already emphasized, trade with the richest economies, as EC, EFTA, US and other developed countries, reach the 80% of total trade. Exchanges with EC and EFTA, which are by far the more "closest" markets, cover more that 70% of the average firm trade volume, both in the export and

[14]The standard approach to modeling bilateral trade volume is the gravity equation, which relates exports (imports) from country i to country n to the markets size of n and i, and measures of the geographical barriers between them, such as distance.

Table 5: Trade flows: a more detailed analysis

	Two-way traders export side		**Two-way traders import side**		**Only Exporter**		**Only Importer**	
	a	*b*	*a*	*b*	*a*	*b*	*a*	*b*
EC	61	-10	63	3	49.5	-32	74	13
EFTA	9	-61	11	-106	11.1	-75	11	-176
US	6	13	5	10	7.4	29	5	18
Other Dev.Countries	6	29	5	16	9	39	3	-1
ACP	1	28	1	10	0.6	14	1	-8
OPEC	3	0	1	13	3.2	15	1	-27
NICs	6	34	3	7	6.1	37	1	-75
CEECs	5	51	5	38	7.0	60	3	39
PECs	1	43	2	34	0.4	37	1	-103
	A further disaggregation for European area							
France	15	-23	14	-13	13	-39	18	5
Belgium and Luxembourg	3	-29	4	-3	4	-48	4	15
Netherlands	3	-24	4	-3	2	-81	6	8
Germany	20	-28	25	-12	15	-58	28	-15
UK	5	-4	6	7	4	-2	5	-14
Ireland	0	16	0	-2	0.1	-444	0.4	60
Denmark	1	15	1	16	0.4	14	2	17
Greece	3	-26	1	-17	2.8	-32	1	-66
Portugal	2	-25	1	-14	1.4	-75	0.2	-686
Spain	6	-3	5	1	5	-57	4	39

Note: a = value in level; b = growth rate between 1993-1997. Trade intensity is given by Exports/Sales for only exporter and two way traders (export side) and by Import/Sales for only importers and two way traders (import side).

import activities. Besides, within the European countries the pattern emerging is much more similar to the story one would guess a priori, that is to observe the highest value for Germany, followed by France and Spain; the closest countries among the biggest EU economies. The fact that neighbours are the most frequent destinations for exporters and country of origin for importers confirms the importance of distance. Around 10% of exports and imports is traded with US and other developed countries, a result that is in line with the markets size hypothesis. Among developing economies the highest percentage is observed for Central and Eastern European countries (around 6% and 4% of exports and imports, respectively) and for the new industrialized countries (6% and 2% for the exports and imports, in that order).

Concerning the change over time in the destinations and market of origins, what is interesting to note is that, once again, both on the export and import side the highest growth rates are observed for low-income countries. This is true for all trading categories, but for only importers which show positive percentage only in the case of Central and Eastern European markets. Interestingly, the role played by these countries in the exporting and importing activities has become more and more important for Italian manufacturing firms. This may be interpreted as a signal of the raise of outsourcing processes involving Western and Central-Eastern Europe, although specific data would be necessary in order to properly measure this phenomena and to single out delocalizing firms from the group of two-way traders (Baldone et al., 2002; Hoekman and Djankov, 1996). Nevertheless, although low income countries have seen an important increase in the share of export and import, their importance in the average total trade of each firm is still relatively small. Among the developed countries, we observe

Table 6: Pattern of country of export and import for two-way traders

	EC	EFTA	US	Other Dev	ACP	OPEC	NICs	CEECs
% of firms exporting to	96	74	50	66	19	40	57	51
% of firms importing from	93	51	32	30	4	7	24	23

positive growth rate for US and other developed countries, while negative values, especially in the export case, are reported for EC and EFTA.

Having looked at the average firm's export and import intensity by foreign market, we now examine the number of firms across destinations and markets of origins, i.e. the extensive margin. Recent empirical analyses have estimated gravity equations for the aggregate value of exports to a destination d, distinguishing between the contribution of the number of firms (extensive margin) and the average value of exports per firm (intensive margin) (Bernard et al., 2007; Andersson, 2007; Mayer and Ottaviano, 2007). All these studies have observed that the effect of distance and income on bilateral trade flows operates mainly through adjustments on the extensive margin rather than on the intensive margin. By simply looking at the relationship between the number of trading firms and the variety of country of destinations and origins, we show that our data are consistent with these findings.

Table 6 provides information on the extensive margin, by showing the average percentage of two-way traders exporting to and importing from the most important markets.[15] In the first row of Table 6 one can read the average percentage of two-way traders exporting to the eight markets selected. So, for instance, almost all two-way traders (96%) export towards EC countries, that 74% of firms exports to EC and EFTA, 49% toward US, and so on and so forth. The second row of Table 6 is the analogous for two-way traders importing from the various markets. The analysis revels similar results as those found for the intensive margin. Suffice here to notice two important features. First, once again we observe that the majority of traders sell and buy their products to high-income countries (EC, EFTA, US and Other developed countries), whereas a lower fraction of the total number of firms trade with developing countries (ACP, OPEC, NICs, CEECs). Again, our data seems to confirm that the number of Italian firms selling (buying) abroad increases systematically with the foreign market size, defined as gross production. Second, the majority of firms trade within the European countries and the number of Italian firms selling (buying) abroad decreases with distance.

4.2 Is the performance premium constant across markets?

In the previous section we have seen how Italian trade flows are distributed among various markets. Though we did not explicitly estimate the gravity equation model, our results are in line with previous stylized facts which show that trade is increasing in GDP and decreasing in distance (of partner countries). According with prior empirical analyses, we observed that higher distance and lower market size also translates in variation in the number of traders (the

[15]Due to consideration of space, the corresponding tables for only exporters and only importer will not be reported. Results for these two groups of firms are almost the same as the ones reported for tow-way traders. The tables are available from the authors upon request

Table 7: Exporters and Importers difference: developed and non-developed countries

	Exporters to				**Importers from**			
	Dev	Non Dev	Both	P-value*	Dev	Non Dev	Both	P-value*
LP	76	72	85	0.01	78	68	90	0.00
TFP	141	151	185	0.02	151	122	209	0.00
N. Empl.	60	157	147	0.04	69	54	204	0.17
Sales	17733	46469	59159	0.04	22057	62051	78104	0.42
CI	125	105	119	0.00	118	95	132	0.00
SLI	21	25	28	0.00	24	20	30	0.00

Note: Dev= Trading only with Developed countries; Non Dev= Trading only with Non-Developed countries; Both= Trading with both developed and non-developed countries.
* P-value refers to t-test for the significance fo the difference of means between Dev and Non dev groups.

extensive margin), and therefore that it doesn't only affect the decision of how much to trade (intensive margin).

Recent theories of heterogeneous firms and trade do provide a theoretical rationale for the relationship between firm's export participation and country's characteristics, such as distance, income or familiarity (Chaney, 2007; Helpman et al., 2007). In these models, the rationale for an extensive margin that changes across markets stems from a combination of market-specific fixed costs and firm heterogeneity as regards productivity. As seen in Section 1, in such models self-selection occurs from market to market, which implies that each foreign market is associated with a productivity threshold.

Given this theoretical framework, the empirical analyses that have examined the reaction of the firm extensive margin of trade to gravitational forces rested on an assumption of a non-uniform distribution of productivities across exporting firms. However, these analyses do not observe the actual productivity of firms exporting to different markets. In this section we deepen further this issue, looking at the heterogeneity among firms exporting to or importing from different countries. We assess whether and how the relationship between trade activities and firm performances depends on the destination of exports and on the origin of imports. We consider the export as well as the import activities, focusing on *exporters* and *importers* firms.[16]

In order to test how firms' performances differ according to the type of market we first decompose the trading status of firms into exports to (imports from) only developed countries, only non-developed countries, and both type of countries. In the previous section we have seen that the majority of firms trade with developed countries, while a lower fraction sell and buy goods from less developed economies. Why is this so? Are these markets easier to serve because of lower *information-related* sunk costs? If this is the case, then it should be reflected also in a lower productivity level of firms trading with developed economies rather than with developing countries. However, at the same time one could argue that advanced markets are in principle those requiring high level of productivity since product differentiation and market competition are stronger and consumer requirements are more pronounced in these countries.

Table 7 shows the means of the various performance measures for firms exporting to and importing from various markets. Precisely, we distinguish between firms that trade only

[16]Exporters are given by only exporters plus two-way traders, whereas importers are given by only importers plus two way traders.

Table 8: Exporters and Importers difference: European countries, other developed countries, non-developed countries

	Exporters to				**Importers from**			
	EC	Other Dev	Non Dev	Other	EC	Other Dev	Non Dev	Other
LP	75	79	72	84	75	68	68	89
TFP	138	151	151	182	139	139	122	203
N. Empl.	55	71	157	141	55	167	54	177
Sales	15739	24520	46469	55985	15503	114141	62051	66314
CI	127	125	105	119	117	93	95	130
SLI	20	22	25	27	22	23	20	30

Note: EC= Trading only with European Countries; Other Dev= Trading only with Other developed countries; Non Dev= Trading only with Non-Developed countries; Other= Trading with more than one group of countries

with developed countries (*Dev*), only with non-developed countries (*Non Dev*) and with both type of countries (*Both*). Overall, Table 7 suggests that, as expected, traders' characteristics crucially hinge on heterogeneity of target foreign markets. Both in export and import we observe that firms trading with both countries appear to be the most productive, in terms of value added per workers and TFP, the largest, in terms of number of employees and sales, the most capital and skilled intensive. This result is consistent with the idea that productivity, as well as other firms' performances, is increasing in the number of countries which firms export to or import from. In line with the theoretical models of Chaney (2007) and Helpman et al. (2007), firms with higher productivity level can trade with a larger number of markets. The results for firms trading only with developed or only to non-developed countries are much less clear, even if some regularity emerge from the simple comparison of the average values.

The results for exporters suggest that firms selling goods only to developing economies tend to have a higher level of labour productivity with respect to firms exporting only to developed countries. However this result seems to be simply the consequence of the higher level of capital intensity. In fact, an opposite patter is observed when considering the difference between the two groups of firms in terms of TFP. Firms serving less developed countries show on average an higher level of TFP, as well as a bigger size and more skilled workers than those exporting to advanced countries. Implementing a standard t-test for equality of means we are able to reject the hypothesis of equality for these variables, which support the hypothesis of the superior performance of firms exporting to less-developed countries. The results become much less blurred once we turned the attention to the import behaviour. Importing from developed countries is associated with better performances then sourcing from less developed countries. This is true for all the variables under analysis, though the average values are not statistically different when considering the two proxies for size.

Though, this simple disaggregation is not enough to conclude that importing from the rich economies requires superior performances, and exporting to advanced countries is associated with lower characteristics. Table 8 shows that the distinction between developed and non-developed countries may be misleading, as a more accurate analysis reveals further interesting results. Indeed, in Table 8 we consider a detailed disaggregation and we group traders in four categories, firms exporting to (importing from) 1) only European countries, i.e. EC plus EFTA (*EC*); 2) only other developed countries, i.e. US, Canada and other developed countries (*Other Dev*); 3) only non-developed countries (*Non Dev*); and 4) more than one group of countries

Table 9: Trade premia by country: developed and non-developed. Pooled OLS regressions (1993-1997)

	LP	**TFP**	**Sales**	**N.Empl**	**CI**	**SLI**
E^{dev}	0.109***	0.076***	0.406***	0.057***	0.337***	3.910***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
E^{nondev}	0.118***	0.080***	0.730***	0.260***	0.350***	7.180***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
E^{both}	0.182***	0.149***	0.863***	0.335***	0.366***	7.771***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
I^{dev}	0.151***	0.120***	0.480***	0.176***	0.344***	3.023***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
I^{nondev}	0.112***	0.086***	0.229***	-0.063**	0.288***	3.597***
	(0.000)	(0.000)	(0.000)	(0.014)	(0.000)	(0.000)
I^{both}	0.244***	0.204***	1.176***	0.613***	0.461***	6.575***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
N. Obs	60661	59987	60652	60662	60031	60662
R-squared	0.39	0.53	0.52	0.31	0.39	0.45

Note: P-value in parenthesis below the coefficients. Asterisks denote significance levels (***: p<1%; **: p<5%; *: p<10%). All regressions include the log of employment (except regressions where the dependent variable is number of employees and sales), as well as the foreign-ownership dummy, 3-digit sector, region and year dummies as controls.

($Other$).[17]

The picture emerging from the analysis of exporters behaviour is much more similar to the story one would tell a priori, that is to observe lower performances associated to firm exporting to EC which could be considered as *local* markets, while, conversely higher performances for firms exporting to *more competitive* and *unfamiliar* destinations, such as US, Canada or non-developed countries where social, economic and legal structures are different from those normally faced. Consistently with such conjectures, we find that, exporters to non-EC countries are more productive, bigger and more skilled intensive that firms selling goods only to EC. Turning the attention to the relationship between performances and import behaviour, we observe that, similar to exports, the premium of importers increases with expansions in geographical scope. Firms sourcing from more that one group of countries are in fact the most productive, biggest, most capital and skilled intensive. This could be related to the high sunk costs due to the acquisition of information that a firm have to incur to serve various and different countries. The results for importer behaviour are much less clear and the comparison between firms importing from EC and non-EC is somewhat at odds with what observed for the export side. In fact, firms importing from EC have an higher level of labour productivity with respect to those sourcing from non-EC countries, though this fact could be explained by the higher level of capital intensity of the latter with respect to the former. The same average value is reported in terms of TFP for importers from EC and other developed countries. Importers from other advanced markets show, on average, the highest value in terms of number of employees and sales.

So far we have suggested that the country of destination and origin matter as a source of heterogeneity among traders. Of course, data in Table 7 and 8 only allow for rough compar-

[17] *Other* is given by all the possible other combinations.

isons, without any controls, of the diversity among firms trading in different counties. For a more precise analysis we shall make use of regression techniques. We shall first estimate the following expression

$$y_{it} = \alpha + \lambda_1 E_{it}^{dev} + \lambda_2 E_{it}^{nondev} + \lambda_3 E_{it}^{both} + \lambda_4 I_{it}^{dev} + \lambda_5 I_{it}^{nondev} + \lambda_6 I_{it}^{both} + \phi controls + \upsilon_{it} \quad , \quad (1)$$

where y_{it} is a measure of either firm productivity, size, skilled intensity or capital intensity, Es and Is denote the dummies for exporters and importers, respectively trading with only developed countries (dev), non-developed countries ($nondev$), and both group of countries ($both$). As usual, $controls$ is vector including the log of firm's employment together with sector, region and year dummies. The λ_i coefficients represent the percentage premia for firms exporting to and importing from the various markets, with respect to the baseline category of non-internationalized firms[18]. We estimate equation (1) by pooled OLS regressions. The same strategy is then repeated to explore further the differences between firms trading within European countries and firms exporting to or importing mainly from markets different from the EC. We fit the model

$$\begin{aligned} y_{it} &= \alpha + \beta_1 E_{it}^{ec} + \beta_2 E_{it}^{otherdev} + \beta_3 E_{it}^{nondev} + \beta_4 E_{it}^{other} + \\ &+ \beta_5 I_{it}^{ec} + \beta_6 I_{it}^{otherdev} + \beta_7 I_{it}^{nondev} + \beta_8 I_{it}^{other} + \phi controls + \upsilon_{it} \quad , \end{aligned} \quad (2)$$

where Es and Is denote the dummies for exporters and importers, trading only with European countries (ec), other developed countries ($otherdev$), non-developed countries ($nondev$), and more than one group of countries ($other$), respectively.

Table 9 and 10 present the results obtained by performing pooled OLS regressions. Overall, the results obtained by the parametric regressions confirm what previously observed by average values. However, the general agreement with the previous findings does not prevent us to observe interesting results emerging from the comparison between firms trading with different countries. A first interesting pattern concerns the characteristics of firms exporting to more than one group of destinations, which are by far relatively more productive, bigger, more capital and skilled labour intensive than firms exporting towards only developed or only non-developed countries. The same pattern holds true for what concerns the import side, with firms sourcing from more than one group of countries showing the highest premia. Another interesting result that is worth noting emerges from the comparison between the export and the import side, which reveals that importing matters comparatively more than exporting in explaining traders' heterogeneity, suggesting the possible existence of sunk cost and/or post-entry effects stronger for importers than for exporters.

Looking at the export side of Table 9, we observe that firms exporting towards non-developed economies show higher coefficients with respect to firms selling to rich countries. As already discussed such evidence could be to a good extent surprising, since one would tend to argue that exporting to advanced markets, characterized by stronger product differentiation and market competition, requires higher productivity levels. The work by Damijan et al. (1998) as well as the study of De Loecker (2007), suggest that exporting to developed countries is associated with better performances. This could be due either because higher productivity level is required for firms starting to export to advanced countries, as in Damijan et al.

[18]Since the dependent variable is in logs and the explanatory variable are dummy variables, the exact percentage differential is given by $(e_A^{\beta} - 1) \cdot 100$. In the case of SLI the coefficients are to be interpreted directly as percentage values, as the dependent variable is the percentage of white collars over employees

Table 10: Trade premia by country: European, Other developed and Non developed countries. Pooled OLS regressions (1993-1997)

	LP	**TFP**	**Sales**	**N.Empl**	**CI**	**SLI**
E^{ec}	0.097***	0.064***	0.341***	0.021	0.327***	3.219***
	(0.000)	(0.000)	(0.000)	(0.188)	(0.000)	(0.000)
$E^{otherdev}$	0.218***	0.177***	0.703***	0.211***	0.44***	5.772***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
E^{nondev}	0.116***	0.078***	0.724***	0.256***	0.350***	7.117***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
E^{other}	0.163***	0.13***	0.782***	0.283***	0.352***	7.096***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
I^{ec}	0.141***	0.111***	0.412***	0.128***	0.339***	2.335***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
$I^{otherdev}$	0.067***	0.048**	0.369***	0.117***	0.165***	3.260***
	(0.007)	(0.043)	(0.000)	(0.002)	(0.001)	(0.000)
I^{nondev}	0.121***	0.094***	0.259***	-0.042	0.294***	3.912***
	(0.000)	(0.000)	(0.000)	(0.102)	(0.000)	(0.000)
I^{other}	0.251***	0.210***	1.122***	0.586***	0.456***	6.826***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
N.obs	60661	59987	60652	60662	60031	60662
R-squared	0.39	0.53	0.52	0.3	0.39	0.45

Note: P-value in parenthesis below the coefficients. Asterisks denote significance levels (***: p<1%; **: p<5%; *: p<10%). All regressions include the log of employment (except regressions where the dependent variable is number of employees and sales), as well as the foreign-ownership dummy, 3-digit sector, region and year dummies as controls.

(1998), or because post-entry productivity gains are higher for firms exporting toward high income regions, as in De Loecker (2007). Accordingly, one would have conjectured to observe an opposite ranking in the estimated coefficients, with higher values for firms exporting to developed countries with respect to the other class. However, the estimates of the relevant parameters, reported in Table 10, yield further insights. In fact, the story that comes out when we further distinguish firms exporting only to European countries from those exporting only to other developed economies conforms to previous empirical findings. Looking at the exporters characteristics is revealing of the presence of two effects. On the one hand, firms exporting to advanced economies, excluding European countries, are those characterized by better performances. At the same time, on the other hand, firms exporting only to European countries are those with the lowest level of productivity, the smallest and the least capital and skilled intensive, suggesting that they face lesser barriers to trade and productivity requirements that non-EC exporters. These results are consistent with the view that the closer is a market the higher is the familiarity with its informal and formal institutions and the lower is the productivity level needed to enter this market.

Let us now turn to investigate the results for the heterogeneity among firms importing from different countries. Somehow contrary to the result for the export side, Table 9 shows that importers sourcing from developed countries are more productive, bigger, more capital and skilled intensive than firms buying only from developing countries. On the one hand, it is very likely that intermediate inputs and machinery sourced from developed countries are more technology intensive items with respect to goods imported from the developing coun-

Table 11: Trade premia by country: European, Other developed and Non developed countries. Fixed effect panel regressions (1993-1997)

	LP	**TFP**	**Sales**	**N.Empl**	**CI**	**SLI**
E^{ec}	0.025**	0.021*	0.056***	0.006	0.028*	0.139
	(0.036)	(0.071)	(0.000)	(0.424)	(0.087)	(0.522)
$E^{otherdev}$	0.044**	0.037*	0.084***	0.028**	-0.004	0.150
	(0.033)	(0.073)	(0.000)	(0.024)	(0.913)	(0.686)
E^{nondev}	0.031*	0.022	0.083***	0.038***	0.062*	0.039
	(0.074)	(0.205)	(0.000)	(0.004)	(0.056)	(0.920)
E^{other}	0.029**	0.022*	0.095***	0.023***	0.046**	0.170
	(0.023)	(0.073)	(0.000)	(0.003)	(0.044)	(0.477)
I^{ec}	0.024***	0.022***	0.033***	0.015***	0.025**	0.074
	(0.000)	(0.000)	(0.000)	(0.000)	(0.027)	(0.526)
$I^{otherdev}$	0.012	0.010	0.038**	0.017	-0.029	-0.515
	(0.492)	(0.540)	(0.035)	(0.145)	(0.430)	(0.347)
I^{nondev}	0.012	0.011	0.034	0.017	0.019	0.129
	(0.336)	(0.382)	(0.007)	(0.015)	(0.481)	(0.649)
I^{other}	0.033***	0.030***	0.076***	0.036***	0.033**	0.264**
	(0.000)	(0.000)	(0.000)	(0.000)	(0.014)	(0.050)
N. Obs	60661	59987	60652	60662	60031	60662
R-squared	0.04	0.03	0.1	0.04	0.07	0.03

Note: P-value in parenthesis below the coefficients. Asterisks denote significance levels (***: p<1%; **: p<5%; *: p<10%). All regressions include the log of employment (except regressions where the dependent variable is number of employees and Sales), as well as year dummies as controls.

tries. Therefore, to the extent that imported goods are technologically complex intermediate inputs or machinery, importing firms should have developed an adequate absorptive capacity, in terms of technological capabilities, to integrate such inputs and capital goods into their production process. As a consequence, firms importing from developed countries display relatively better characteristics because such features are a prerequisite to benefit from their trading activities. On the other hand, the relatively higher import premia for firms sourcing from high-income countries may also be associated to "learning by importing" effects. These effects are more likely to occur when firms import capital goods from developed economies, which may incorporate advanced technologies, rather than materials and other intermediate inputs imported from non-developed countries.

The further disaggregation proposed in Table 10 shows however some puzzling results. The ranking observed in the productivity premia among firms importing from different countries only partially meets the conjectures emerged when looking at the developed/non-developed distinction. We observe in fact that firms importing from European countries are those exhibit the highest productivity premia, as well as size and capital-intensity premia. These firms may be sourcing mainly high-tech capital goods from producers based in the major European countries. Indeed, to the extent that buying these type of goods requires the accumulation of absorptive capacity, import activity from these countries could be associated with significant productivity premium. Analogously, one should observe same, or at least similar premia among firms that import from other developed countries. However, though the coefficients attached to size and skilled intensity are high for this group of importers, the productivity premia is

instead lower compared to both firms importing from EC and sourcing from less-developed countries.

Looking for additional insight, we estimate equation (1) and equation (2) applying fixed effects model (FE). A model that takes into account firm fixed effects can be useful to give a "causal flavour" to the interpretation of the estimated coefficients, since it basically estimates a correlation between a change in the trade status and a change of the dependent variables under analysis. Differences between OLS and FE may thus emerge if time invariant firm characteristics are correlated with the internationalization status. Nevertheless, we should be careful when giving a strictly causal interpretation of the coefficients estimated with the FE regression. For example, it might well be that a shock contemporaneously determines a higher probability of switching into exporting (or importing) and a variation in the dependent variable under analysis.

We show in Table 11 the results obtained estimating equation (2).[19] Once we wipe out the time invariant firm heterogeneity, the differences between internationalized firms and non-internationalized firms sharply decline, and, in some cases, they become non statistically significant.

When looking at the export side, we can first of all notice that, in general, once selection based on time constant heterogeneity is washed out, the premia attached to the various destinations shrink and, with the exception of the "size" coefficients, the differences between them weaken. Therefore, one can argue that self selection of better firms into exporting to more "distant" and "unfamiliar" countries (other developed and non developed countries) and to an higher number of destinations (*other*) is the main reason behind the greater divergence of the OLS premia attached to exporting to EU with respect to other destinations premia. Moreover, it is also interesting to note that FE coefficients related to TFP, which roughly indicate the possible learning effects, turn out to be significantly different from zero only for the destinations related to developed countries. [20] Hence, as in De Loecker (2007) our results tend to exclude possible learning effects stemming from exporting to less developed countries and, additionally, suggests that selling to non EU developed countries could amplify TFP gains. Therefore, on the one hand, the higher OLS premium connected to exporting to non developed countries (with respect to exporting to EU) appear to be simply related to selection effects associated to distance and unfamiliarity, while, on the other hand, the divergence of OLS premia between the groups of developed countries seem to be due both to selection and to learning effects. The proportional difference in size between EU exporters and other exporters appears, instead, not to weaken as time constant heterogeneity is wiped out. Therefore, trading with more distant countries is easier for bigger firms and it also appears to entail greater gains in terms of size growth.

When looking at the import side the comparison between OLS coefficients (Table 10 and FE coefficients (Table 11) reveals some interesting patters. We can observe that, in general, once selection based on time constant heterogeneity is wiped out, the premia attached to the various destinations shrink: this means that self selection is a relevant phenomenon for all markets. However, even if self selection matters for all markets, it can explain the whole OLS premia only in the case of more distant countries (other dev and non dev): only the coefficients attached to EU and multiple destinations turn out to be significally different from zero. As a consequence, this analysis suggests learning by importing effects work only for EU

[19] Results of FE regressions for equation (1) are available from the authors upon request.

[20] The great majority of firms that exports to more than one group of countries (*other*) also trades with EU.

importers.[21] Therefore the high OLS premia attached to importing from EU can be explained both by self-selection and learning. This could be due to the fact that goods imported from EU countries are relatively more technologically complex, with respect to other developed countries, since the direct interaction between capital producers and users required to embed this capital goods into the production process is easier. Hence both *selection effects* - related to absorptive capacity - and *learning effects* - related to learning by using (Rosenberg 1982) and embodied technological change mechanisms - are greater in the case of EU importers. Overall, our results seem to confirm that productivity differences among firms can be explained by the variety of destinations and countries of origin with which firms trade. Indeed, the fact that performance premia are different between firms exporting to and importing from various markets might be interpreted as evidence of traders being particularly sensitive to where they sell or buy.

5 Concluding Remarks

The present paper has offered a portrait of Italian manufacturing firms that trade goods. The ultimate goal was to offer a comprehensive and empirically driven view about the possible "determinants" of intra-industry heterogeneity observed among trading firms. Exploiting a rich dataset which combines data on firms' structural characteristics and economic performance with data on their exporting and importing activity, we uncover evidence supporting recent theories on firm heterogeneity and international trade.

We confirm that firms with different exposure to international markets have different performances, in terms of productivity, size, capital and skilled intensity. In particular, in line with previous empirical results, we observe that firms more engaged in international activities (i.e. those involved in both importing and exporting) are the best performers.

Moreover, we show that countries of destination and of origin matter in explaining the observed disparities in traders' performances. Our results are consistent with the idea that self-selection mechanisms and post-entry effects naturally occur from market to market. Hence, firms will be more likely to enter (or to serve) those markets whose productivity threshold is lower than their own productivity level.

On the export side, we observe lower performances for firms exporting to European countries with respect to firms exporting only to non-European destinations (other developed area or non-developing countries). These results are consistent with the view that the closer is a market the higher is the familiarity with its informal and formal institutions and the lower is the productivity level needed to enter this market. Moreover, we detect possible post-entry effects, mainly through learning, only for firm exporting to developed countries.

Somehow contrary to the result for the export side, we show that importers sourcing from European countries are those exhibit the highest productivity premia, as well as size and capital-intensity premia. The significant productivity premium observed for these importers could be related with the type of goods sourced from these countries, mainly high-tech capital products. Moreover, we find learning by importing effects only for firms sourcing from European countries. This could be due to the different technological content of imports from European countries and to deeper and easier user-producer interactions.

All these results open up promising avenues for further investigation: the extent to which "learning by exporting", "learning by importing" and self-selection mechanisms occur seems

[21] The great majority of firms that imports from more than one group of countries (*other*) also imports from EU.

to depend on the characteristics of destination countries and of the markets of origin.

Appendix 1: Firm level market information

Destination of export and Origin of import

List of countries (or group of countries)
Developed Countries (total)
European Countries
European Free Trade Association (EFTA)
US and Canada
Other developed countries
Non-Developed Countries (total)
Associated EC
African, Caribbean and Pacific (ACP)
Organization of Petroleum Exporting Countries (OPEC)
Newly Industrialized Countries (NICs)
Other non-developed countries
Other countries
Central and Eastern European Countries (CEECs)
Planned economies countries (PECs)
Other countries
Disaggregated information on European countries
France
Belgium and Luxembourg
Netherlands
Germany
UK
Ireland
Denmark
Greece
Portugal
Spain

Appendix 2: Pavitt's taxonomy

Sector name	NACE code	Pavitt's category
Production, processing and preserving of meat and meat products	151	Scale Intensive
Processing and preserving of fish and fish products	152	Scale Intensive
Processing and preserving of fruit and vegetables	153	Scale Intensive
Manufacture of vegetable and animal oils and fats	154	Scale Intensive
Manufacture of dairy products	155	Scale Intensive
Manufacture of grain mill products, starches and starch products	156	Scale Intensive
Manufacture of prepared animal feeds	157	Scale Intensive
Manufacture of other food products	158	Scale Intensive
Manufacture of beverages	159	Scale Intensive
Manufacture of tobacco products	160	Scale Intensive
Preparation and spinning of textile fibres	171	Supplier Dominated
Textile weaving	172	Supplier Dominated
Finishing of textiles	173	Supplier Dominated
Manufacture of made-up textile articles	174	Supplier Dominated
Manufacture of other textiles	175	Supplier Dominated
Manufacture of knitted and crocheted fabrics	176	Supplier Dominated
Manufacture of knitted and crocheted articles	177	Supplier Dominated
Manufacture of leather clothes	181	Supplier Dominated
Manufacture of other wearing apparel and accessories	182	Supplier Dominated
Dressing and dyeing of fur	183	Supplier Dominated
Tanning and dressing of leather	191	Supplier Dominated
Manufacture of luggage, handbags	192	Supplier Dominated
Manufacture of footwear	193	Supplier Dominated
Sawmilling and planing of wood	201	Supplier Dominated
Manufacture of veneer sheets	202	Supplier Dominated
Manufacture of builders' carpentry and joinery	203	Supplier Dominated
Manufacture of wooden containers	204	Supplier Dominated
Manufacture of other products of wood	205	Supplier Dominated
Manufacture of pulp, paper and paperboard	211	Scale Intensive
Manufacture of articles of paper and paperboard	212	Supplier Dominated
Publishing	221	Supplier Dominated
Printing and service activities related to printing	222	Supplier Dominated
Reproduction of recorded media	223	Supplier Dominated
Manufacture of coke oven products	231	Scale Intensive
Manufacture of refined petroleum products	232	Scale Intensive
Processing of nuclear fuel	233	Scale Intensive
Manufacture of basic chemicals	241	Scale Intensive
Manufacture of pesticides and other agro-chemical products	242	Science based
Manufacture of paints	243	Scale Intensive
Manufacture of pharmaceuticals	244	Science based
Manufacture of soap and detergents	245	Scale Intensive
Manufacture of other chemical products	246	Scale Intensive
Manufacture of man-made fibres	247	Scale Intensive
Manufacture of rubber products	251	Supplier Dominated
Manufacture of plastic products	252	Supplier Dominated
Manufacture of glass and glass products	261	Scale Intensive
Manufacture of refractory ceramic products	262	Scale Intensive
Manufacture of ceramic tiles and flags	263	Scale Intensive
Manufacture of bricks, tiles and construction products, in baked clay	264	Scale Intensive
Manufacture of cement, lime and plaster	265	Scale Intensive
Manufacture of articles of concrete, plaster and cement	266	Science based
Cutting, shaping and finishing of ornamental and building stone	267	Science based
Manufacture of other non-metallic mineral products	268	Science based
Manufacture of basic iron and steel and of ferro-alloys	271	Scale Intensive
Manufacture of tubes	272	Scale Intensive
Other first processing of iron and steel	273	Scale Intensive
Manufacture of basic precious and non-ferrous metals	274	Scale Intensive
Casting of metals	275	Scale Intensive
Manufacture of structural metal products	281	Science based
Manufacture of tanks, reservoirs and containers of metal	282	Science based
Manufacture of steam generators, except central heating hot water boilers	283	Scale Intensive
Forging, pressing, stamping and roll forming of metal	284	Scale Intensive
Treatment and coating of metals	285	Science based
Manufacture of cutlery, tools and general hardware	286	Science based
Manufacture of other fabricated metal products	287	Science based
Manufacture of machinery for mechanical power	291	Specialized Supplier
Manufacture of other general purpose machinery	292	Specialized Supplier
Manufacture of agricultural and forestry machinery	293	Scale Intensive
Manufacture of machine tools	294	Specialized Supplier

Sector name	NACE code	Pavitt's category
Manufacture of other special purpose machinery	295	Specialized Supplier
Manufacture of weapons and ammunition	296	Scale Intensive
Manufacture of domestic appliances	297	Scale Intensive
Manufacture of office machinery and computers	300	Science based
Manufacture of electric motors, generators and transformers	311	Specialized Supplier
Manufacture of electricity distribution and control apparatus	312	Specialized Supplier
Manufacture of insulated wire and cable	313	Science based
Manufacture of accumulators, primary cells and primary batteries	314	Scale Intensive
Manufacture of lighting equipment and electric lamps	315	Scale Intensive
Manufacture of electrical equipment n.e.c.	316	Specialized Supplier
Manufacture of electronic valves and tubes and other electronic components	321	Science based
Manufacture of television and radio transmitters	322	Science based
Manufacture of television and radio receivers	323	Scale Intensive
Manufacture of medical and surgical equipment and orthopaedic appliances	331	Science based
Manufacture of instruments and appliances for measuring	332	Science based
Manufacture of industrial process control equipment	333	Science based
Manufacture of optical instruments and photographic equipment	334	Scale Intensive
Manufacture of watches and clocks	335	Scale Intensive
Manufacture of motor vehicles	341	Scale Intensive
Manufacture of bodies (coachwork) for motor vehicles	342	Scale Intensive
Manufacture of parts and accessories for motor vehicles and their engines	343	Scale Intensive
Building and repairing of ships and boats	351	Scale Intensive
Manufacture of railway and tramway locomotives and rolling stock	352	Scale Intensive
Manufacture of aircraft and spacecraft	353	Science based
Manufacture of motorcycles and bicycles	354	Scale Intensive
Manufacture of other transport equipment	355	Scale Intensive
Manufacture of furniture	361	Science based
Manufacture of jewellery and related articles	362	Science based
Manufacture of musical instruments	363	Science based
Manufacture of sports goods	364	Science based
Manufacture of games and toys	365	Science based
Miscellaneous manufacturing	366	Scale Intensive
Recycling of metal waste and scrap	371	Science based

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