Firms' international status and heterogeneity in performance: Evidence from Italy*

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Abstract

This paper revisits the empirical evidence about the link between firms' performance and their international status, based on a large sample of Italian enterprises. To this purpose, we merged two waves of the Capitalia survey (1998-2000, and 2001-2003) retrieving firm level data for roughly 7,000 units. Three results stand out from our empirical exercise. First, firms that engage in the foreign production of final goods, in addition to export activities, are more productive than firms that only export abroad. Second, firms that engage in final goods off-shoring are more productive than firms that engage in inputs off-shoring. Third, in terms of the productivity dynamics over the period 1998-2003, exporters' performance in Italy was not any better than non-exporters' one. Our results support the view that the better performance (in static terms) of globally engaged firms is chiefly due to the selection caused by the fixed costs associated to international operations.

JEL classifications: F10; F20; L10; L20; L60

Keywords: Export; Heterogeneous firms; Italy; Off-shoring; Productivity

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1. Introduction

Recent years have seen remarkable changes in the nature of trade and FDI flows. Globalization has stretched national boundaries and broadened firms' perspective, making business an international issue. As a result, the international involvement of firms has increased over time, and multinational enterprises have become key players of this globalized modern scenario.

Since international operations may be organized either "internally" – in wholly-owned subsidiaries – or "externally" – under arm's length contracts with independent local producers – the decision over the boundaries of multinational enterprises has received great attention by scholars worldwide.

While the make-or-buy choice of domestic producers was traditionally analysed by theorists of the firm, in the last few years, international economists made an attempt at extending those theories to the case of multinational enterprises. In doing so, they opened up of the "black box", originally explored at the microeconomic level, while providing a simultaneous endogenization of the market environment, as in the international economics tradition[1]. In particular, it is possible to identify three paradigms – the Grossman-Hart-Moore treatment of hold-up and contractual incompleteness (Grossman – Hart, 1986; Hart – Moore, 1990), the Holmstrom-Milgrom view of the firm as an incentive system (Holmstrom – Milgrom, 1994) and the Aghion-Tirole conceptualisation of formal and real authority in organisations (Aghion – Tirole, 1997) – that have been embedded in industry and general equilibrium models, offering a complete characterisation of the interactions between ownership and location decisions of global companies. The boundaries of the Multinational Enterprise are thus shaped by a comparison between governance and transaction costs in the Grossman-Hart-Moore framework (see, among others: Grossman - Helpman 2002, 2003; Antras – Helpman, 2004; Antras, 2003; Feenstra - Hanson 2003, 2004; Ottaviano – Turrini, 2007), by a trade-off between control and initiative in the Aghion-Tirole formalisation (Marin - Verdier 2002, 2003), while in Holmstrom-Milgrom-based contributions outsourcing tends to be characterized by high powered incentives whereas integration emerges when workers earn a fixed wage and use firms' tools (Grossman – Helpman, 2004; Feenstra – Hanson, 2003, 2004).

Adding to intra-firm trade and vertical specialisation, one of the most striking evidence of the last few years is the systematic relationship between firms' characteristics and their international involvement – including import, export and FDI activities. This evidence, in turns, has triggered academic research to better account for changes in trade and investment patterns, giving rise to theoretical and empirical refinements.

In theoretical terms, researchers have abandoned the representative firm's framework in favour of a new setting, due to Melitz (2003), in which firms are considered as heterogeneuos in terms of size and productivity. In Melitz's model, exposure to international trade leads more productive firms to export and less productive firms to exit the market, while further increases in an industry's exposure to trade induces an intra industry reallocation in favour of more productive firms. This approach has become the cornerstone of a

[1] For a survey see Gattai (2006).

growing literature that examines the role of heterogeneity in international trade and foreign direct investment, and its success derives from the fact that it provides rich predictions that can be easily confronted with the data.

In empirical terms, new challenges stem from the availability of extensive micro-level datasets, to test theoretical priors descending from heterogeneous firms' models.

Using firm-level data, researchers have documented that globally-engaged enterprises usually perform better than purely domestic ones. As a general result, exporters turn out to be a minority, and they tend to be more productive and larger (Tybout, 2003, Mayer – Ottaviano, 2007).

Looking at U.S. manufacturing enterprises, Bernard - Jensen (1995, 1999) show that exporters are relatively rare and large in size. Indeed, even in tradable goods industries, the large majority of firms does not export and looks smaller than those engaged in international operations. Adding to this, exporters are more productive and capital-intensive, they pay higher wages, and employ more technology and skilled workers than non exporters. These results are completed and reinforced in Bernard *et al.* (2005) where the analysis is extended to all sectors of the U.S. economy from 1993 to 2000, and also importers and foreign direct investors are included.

Eaton *at al.* (2004) examine French firm-level data and find that only 17% of total manufacturing firms were engaged in exporting activities in 1986, and export accounted only for 21% of their output, with lots of cross industry variations. Similar evidence is provided in Helpman *et al.* (2004) about U.S. firms, Clerides *et al.* (1998) for Colombia, Mexico and Morocco, Aw *et al.* (2000) for Taiwan, Delgado *et al.* (2002) for Spain, Baldwin - Gu (2003) for Canada, Head - Ries (2003) for Japan, giving a sort of general consensus to the idea that international involvement and firms' performance are inextricably linked, irrespective of the nationality and the destination market.

This paper builds on the above mentioned empirical literature, and provides new evidence from a large sample of Italian firms. For the purpose of the present study, we have merged two waves of the Capitalia survey (1998-2000, and 2001-2003) retrieving firm level data for roughly 7,000 units. Given that this is one of the largest and more reliable sources of information about Italian enterprises, we are quite confident that the picture drawn here depicts quite well the relationship between performance and international status for Italy. Unfortunately we do not have data on importers, as in Bernard *et al.* (2005) and MacGarvie (2003), however we rank international status along several other categories such as export, vertical off-shoring, horizontal off-shoring and foreign affiliates. Hence, our study departs from the existing empirical literature in three regards: first, we introduce the off-shoring dimension, which was previously ignored; second, we adopt a finer classification of sectors, based on two-digits NACE instead of using macro industries as in Bernard *et al.* (2005); third, to go deeper into the topic, we analyze the productivity dynamics over time, and shed light on the difference between purely domestic and globally engaged companies in terms of TFP.

Three results are worth mentioning from this empirical exercise: first, firms that engage in the foreign production of final goods, in addition to export activities, are more productive than firms that only export abroad. Second, firms that engage in final goods off-shoring are more productive than firms that engage in

inputs off-shoring. Third, in terms of the productivity dynamics over the period 1998-2003, exporters' performance in Italy was not any better than non-exporters' one.

The rest of the paper is organized as follows: section 2 provides a brief description of the dataset; section 3 contains the main definitions regarding firms' international status, and discuss whether exporters, off-shoring firms and foreign affiliates differ in their economic performance, through summary statistics and econometric regressions; section 4 is entirely dedicated to the productivity analysis, while section 5 concludes and sets future lines of research.

2. Description of the dataset

In this paper we use a panel of Italian manufacturing firms to explore the link between firms' performance and their international involvement. Our data are drawn from the Survey on Manufacturing Firms (*Indagine sulle Imprese Manifatturiere*) carried out by Capitalia, one of the largest Italian banks. We gather data from two subsequent waves, so that our time span goes from 1998 to 2003. The panel design is stratified and rotating, so that about half of the firms in the VIII wave (1998-2000) are dropped in the IX wave (2001-2003), with other new firms being added. The choice of firms to be dropped from the VIII wave, and of those to be added in the IX wave was casual, but still aimed at maintaining the stratified nature of the sample.

All companies with more than 500 employees and customers of Capitalia have been submitted a detailed questionnaire about their business, employment, R&D activity, internationalization and management. Additional balance sheet information has been derived from AIDA and *Centrale dei Bilanci*, two well-known and reliable sources of balance sheet data for Italy. The VIII wave of Capitalia contains detailed information on 4,680 firms. The IX wave of Capitalia gathered information on 4,289 firms, but we have balance sheet information for only 4,178 of them. In addition, we have only balance sheet information for other 5,511 firms over the period 2001-2003. The number of firms that is included both in the VIII wave and in the IX wave is 2,097.

Given the large number of observations, and the wide coverage in terms of geographic area, industry and size, we are quite confident that the data employed in this paper are highly representative of the Italian manufacturing sector.[2]

Our dataset provides information on firms that are purely domestic, exporters, and firms that engage in other forms of international activities (off-shoring, etc.). From our data, it is possible to sort exporters in two sub-categories, based on the destination market (EU, rest of the world), and to distinguish between off-shoring of final goods and off-shoring of inputs. Moreover, the dataset provides information about who controls the firm. It is then possible to know whether the control is exerted by a foreign resident, and in this case the firm can be classified as a foreign affiliate, as described below.

Before computing the descriptive statistics and performing the regressions, we identified a trimming procedure to get rid of some outliers (see Appendix A.1).[3]

[2] See Barba Navaretti *et al.* (2007) for a comparison, along several dimensions, of firms in the Capitalia dataset with the universe of Italian firms.

3. Main features of Italian exporters, off-shoring firms and foreign affiliates

In this section, we first define the different dimensions of Italian firms' international status. Then, we provide summary statistics and simple econometric regressions to discuss whether economic performance varies with international involvement.

3.1 Defining the international status: export, vertical off-shoring, horizontal off-shoring, foreign affiliates

Our definition of "exporters" is based on the Capitalia questionnaire. Indeed, firms are accounted to be exporters in the period 1998-2000 if they answered "yes" to the D1.1 question in the VIII wave (*Has the firm exported at least part of its output in 2000?*) and they are accounted to be exporters in the period 2001-2003 if they answered "yes" to the D1.1.1 question in the IX wave (*Has the firm exported at least part of its output in 2003?*).[4] Unfortunately we do not have data on imports.

Off-shoring firms are identified in detail just in the IX wave. They are those that answered "yes" to the D3.1 question (*At the present time, does the firm carry out at least part of its production activity in a foreign country?*). We can also distinguish between final goods' and inputs' off-shoring (question D3.2.1). We call the first *horizontal off-shoring*, and the second *vertical off-shoring*, the distinction being based on the type of product that is off-shored.

Thanks to question D3.2.5, there exists another way of detecting whether off-shoring if horizontal or vertical in nature, the distinction being now based on the final destination of the output produced abroad. If a firm has off-shored, it is classified as engaging in horizontal off-shoring if at least 50% of the output is sold abroad or is sold to final consumers in Italy. In other terms, a firm is classified to perform horizontal off-shoring if less than 50% of the output produced abroad is imported in Italy to be re-processed. If a firm has off-shored, and more than 50% of the output produced abroad is imported in Italy to be re-processed, then we say that the firm is involved in vertical off-shoring.[5]

As it is shown by Table 1, while there exists a strong correlation among the two ways of computing horizontal and vertical off-shoring, the correspondence is not perfect. A potential advantage of detecting horizontal and vertical off-shoring through question D3.2.5 is that, since it relies on thresholds based on shares, we are able to classify all off-shoring firms as either horizontal or vertical. Employing question D3.2.1, we are left with 79 firms (those that produce both final goods and inputs abroad) that we do not know how to classify. However, as Table 1 shows, the great majority of firms doing off-shoring of both final goods and inputs is *not* involved in mainly reprocessing off-shored output in Italy. For this reason, for the

[3] Statistics for exporters and off-shoring firms with industry breakdown were computed out of a few hundreds of firms. Consequently, we chose to exclude from descriptive statistics observations flagged in the trimming procedure in order to avoid that statistics be affected by outliers.

[4] See Appendix A.2 for details about questions in the IX Capitalia survey.

[5] This definition of horizontal and vertical off-shoring mirrors that in Benfratello and Razzolini (2007).

rest of the paper, we classify firms that simultaneously do inputs' and final goods' off-shoring together with firms that only do final goods' off-shoring.

[Insert Table 1 about here]

It is possible also to single out "foreign affiliates" through the A7 question in both waves. Following standard international definitions, we define as foreign affiliates foreign business enterprises in which there is foreign direct investment; that is, foreign business enterprises directly or indirectly owned or controlled by one foreign person to the extent of 10 percent or more of the voting securities.

3.2 Relevance of exporters, vertical off-shoring, horizontal off-shoring, foreign affiliates

In this section, we show a few tables about the relevance of exporters, off-shoring enterprises and foreign affiliates in our database in 2003. Table 2 displays the share of total sales and employment of *exporters*, relative to all firms belonging to the same (NACE2) industry.

[Insert Table 2 about here]

A very high share of firms in the sample are exporters (75%). This figure is higher than the one for the US reported in Bernard et al. (2008), where exporters represent only 18% of the total population[6]. Notice also that exporters account for a very large share of sales and employment, without remarkable cross industry variation.

In Table 3 exporters are first ranked according to their absolute amount of exports, in order to identify the top 1%, 5% and 10%; then, the share of total sales is computed, by (NACE2) industry and exporting performance. We thus measure to what extent firms that perform well in the world markets do that also at home. First of all, there is considerable variability among industries: while in some sectors the "exceptional exporters" share of sales at home is high, in other sectors this is not true. Among the sectors in which firms that perform particularly well abroad do that also at home, the three top sectors are Motor vehicles, Plastics and rubber, and Office equipments and PC.

[Insert Table 3 about here]

Table 4 further describes the distribution of top exporters. Export activity is very much concentrated: for instance, the top 1% of exporters is responsible for 32% of total exports.

[Insert Table 4 about here]

[6] This suggests that exporting firms are over represented in the Capitalia dataset. A possible explanation stems from the fact that, in the Capitalia sample, larger firms are over represented. As we know, there is a positive correlation between size and exporting behavior (see section 1).

A similar exercise is provided for *off-shoring* firms. Table 5 displays the share of total sales and employment of off-shoring firms, relative to all firms belonging to the same (NACE2) industry. For the whole manufacturing sector, the percentage of firms that is producing output off-shore is 7%, with a considerable cross-industry variation. The industry with more off-shoring firms is Clothing, followed by Leather products, and Office equipments and PC. Variability across industries is high also in terms of sales share and employment shares. The industries that are more intensely involved in off-shoring, in terms of domestic sales and domestic employment, are: Office equipments and PC; Clothing; Medical, precision and optical instruments.

[Insert Table 5 about here]

Table 6 distinguishes off-shoring of final goods and inputs, according to question D3.2.1.[7] Analyzing the relative sales and employment shares according to the type of good produced abroad, while in Office equipments and PC, and Medical, precision and optical instruments, the horizontal off-shoring strategy is predominant, in the Clothing sector a considerable fraction of output and employment is generated by firms engaged in vertical off-shoring. In terms of number of firms, the majority of off-shoring firms in the Leather industry is engaged in vertical off-shoring.

[Insert Table 6 about here]

Summing up, the evidence from the Capitalia dataset strengthens the claim that some traditional industries (such as Clothing and Leather) are strongly involved in off-shoring (particularly of the vertical type). This mode of international operations is also important for some categories of high-tech industries, such as Office equipments and PC, and Medical, precision, and optical instruments.

Unfortunately, due to data constraint, we cannot rank off-shoring firms in absolute terms as we did for exporters, nor we can give their distribution.

Table 7 displays the shares in terms of total sales, employment, and overall number by *foreign affiliates* in the sample, relative to all firms belonging to the same (NACE2) industry for the year 2003. It also displays the relevance of foreign affiliates among exporters and non-exporters. Coherently with what one would expect, foreign affiliates are more represented among exporters than among non-exporters.

[Insert Table 7 about here]

[7] For each variable of interest (sales, employment, number of firms) the sum of the two columns in Table 6 for final goods off-shoring and inputs off-shoring could be different from the total figures reported in Table 5 due to the rounding of decimals, or to the fact that some firms reported to be off-shoring, but they did not specify the nature of the products off-shored.

In Table 8 foreign affiliates are first ranked according to their absolute amount of sales, in order to identify the top 1%, 5% and 10%; then, the share of total sales is computed, by sales' performance, for the total of foreign affiliates.[8] The concentration in terms of sales for top foreign affiliates is smaller than in the case of top exporters.

[Insert Table 8 about here]

3.3 Comparing firm's performance based on their international status

In this section, we discuss whether international status is correlated with economic performance, to see if exporters, off-shoring firms and foreign affiliates are different from non exporting, non off-shoring, and domestic enterprises.

First of all, as in Bernard - Jensen (1999), selected characteristics of firm i – such as sales, employment, capital per worker, value added per worker and average wage – are regressed against an export dummy and industry fixed effects (j is the industry subscript), according to the following specification:

$$ln\ X_i = \alpha + \beta * Export_i + \gamma * Industry_j + u_i$$

Actually, we run four separate regressions. In the first, we do not distinguish about the final destination of the export flows. In the remaining ones, we do distinguish among different destinations, employing the information provided by those firms that answered to question D1.2. In the second regression we consider an export dummy for firms that made some exports towards one of the 26 European Union partners of Italy. Then, in the third regression, the export dummy takes value one for those firms that made some exports to countries in the world other than those belonging to the EU. Obviously, if the firm makes shipments to both destinations, the export dummy takes value one in both regressions. In the last regression, we concentrate just on firms that were exporting towards both destination areas (EU and non-EU countries). Table 9 reports the estimates. Coefficients and p-values (in parenthesis) are displayed.

[Insert Table 9 about here]

The evidence indicates that exporters have a better performance than non-exporters along several dimensions. One would also expect that firms that are able to reach a larger number of foreign markets, or markets located at a greater distance, be better performing than other exporters. The emerging differences in performance according to destination areas do not support this view. Coefficients' estimates for firms that are involved in exporting both to the EU and to the rest of the world *are not* larger than for the rest of firms.

As a second step, the same firms' characteristics are regressed against an off-shoring dummy and industry fixed effects, according to the following specification:

[8] We do not show the breakdown by industry for top 1%, 5%, and 10% foreign affiliates in terms of total sales, since the total number of foreign affiliates by industry is small. We only provide the breakdown of top firms for the whole manufacturing sector.

$ln\ X_i = \alpha + \beta * Off\text{-}shoring_i + \gamma * Industry_j + u_i$

Table 10 reports the estimates. Coefficients and *p*-values (in parenthesis) are displayed.

[Insert Table 10 about here]

Firms that off-shore appear to be larger, more capital intensive, and pay higher wages than the rest of firms in the panel. One may wonder at this point whether these features of off-shoring firms are always true, irrespective of the product being off-shored. Analyzing firms that off-shore the production of final products (question D3.2.1), all the performance indicators, with the exception of value-added, are still positive and statistically different from zero. On the contrary, the firms that are off-shoring inputs appear to be just larger than the rest of firms in the panel, with the point estimates of the coefficients on sales and employment being smaller than in the case of final goods' off-shorers. Vertical off-shoring firms look bigger than other firms in the panel, but not as big as the horizontal off-shoring ones. Hence, vertical disintegration, and the off-shoring of inputs production, is associated, to some extent, to a less brilliant performance with respect to horizontal off-shoring.[9] Overall, also off-shoring turns out to be different from other firms in the sample.

As a third step, sales, employment, capital per worker, value added per worker and average wage are regressed against the foreign affiliate dummy and industry fixed effects, according to the following specification:

$ln\ X_i = \alpha + \beta * Foreign\_Aff_i + \gamma * Industry_j + u_i$

Table 11 reports the estimates. Coefficients and *p*-values (in parenthesis) are displayed.

[Insert Table 11 about here]

The performance indicators are all highly and positively correlated with the status of being a foreign affiliate firm: they are also different.

The evidence we have presented so far neatly shows that Italian firms involved in international operations (both actively, as exporters and off-shorers, and passively, as foreign affiliates) are different from other firms. All the performance indicators we considered are statistically larger in the case of firms characterized by some form of international status. As already pointed out in the literature (see, for example, Mayer - Ottaviano, 2007) the causality could run in both ways. One explanation is that only better performing firms can raise the funds necessary to overcome the fixed costs associated to international operations (in the case of exports and off-shoring) or can attract foreign investors (in the case of foreign affiliates). The other explanation is that firms being involved in international operations improve, through a learning process, their efficiency thanks to international exposure, widening the gap in terms of performance with the non-internationalized enterprises. In the section that follows we try to shed some light on this important issue, focusing on one specific performance measure: productivity.

[9] We further analyze this issue below, in Section 4, which is entirely dedicated to productivity analysis.

4. Total factor productivity and international status

4.1 Methodology

In this section we focus on firms' productivity as our performance index. Our goal is two-fold. First, we want to check whether firms can be ranked in productivity terms according to their international status. Second, we want to test whether, in the Capitalia panel, internationalized firms experienced a faster growth in productivity with respect to other firms in the panel over the period 1998-2003.

We estimate a separate Cobb-Douglas production function for each of 14 different categories. These categories result from the aggregation of the 20 two-digit NACE sectors on the basis of technological similarities (see Table 12).

[Insert Table 12 about here]

The production function for a generic category *j* can be written as follows (all variables are in logarithm):

$$\ln Y_{ijt} = \alpha_i + \beta_1 W_{ijt} + \beta_2 B_{ijt} + \beta_3 K_{ijt} + \omega_{it} + \varepsilon_{ijt} \qquad \textbf{(1)}$$

where Y_{ijt} is value added by firm i in category j in year t, deflated by the Producer Price Index for the appropriate two-digit NACE industry to the year 2000; K_{ijt} are fixed assets, deflated by the simple average of the deflators for all NACE sectors, as in Smarzynska Javorcik (2004); W_{ijt} is the number of white collars employed; B_{ijt} is the number of blue collars employed; ω_{it} is the productivity component. The statistical properties of the productivity residual change according to the estimator employed. Productivity is assumed to be time-invariant ($\omega_{it}=\omega_i$ for every year t) in the case of fixed effects estimation, while it is allowed to be time-variant in the case of the semi-parametric approach proposed by Levinsohn - Petrin (2003). We follow both procedures to derive the productivity residual.[10]

After the estimation of productivity at the firm level through fixed effects and the semi-parametric approach, we are set to disentangle whether firms differently involved in international operations can be sorted according to their productivity.

We first replicate Benfratello - Razzolini (2007), BR hereafter, based on the definition of horizontal and vertical off-shoring based on Q. D3.2.5 (see section 3):[11]

[10] Notice that, as mentioned above, the trimming procedure is performed *before* the fixed effects and Levinsohn-Petrin estimators are run: trimming serves the purpose to flag single observations that are subsequently excluded from the estimation of the production function.

[11] Our approach in the estimation of the production function is different from Benfratello - Razzolini (2007) under several respects. Here we mention just the following two main reasons. First, they use just the IX wave while our dataset results from the merge of the VIII and IX wave. We esteem that the production function estimation is improved in this manner, since *(i)* for roughly a half of firms surveyed in the VIII and the IX wave the production function is estimated over a 6-year time period, instead than a 3-year period, and *(ii)* after merging the VIII and IX wave the total number of different firms used in the TFP estimation is roughly doubled. Second, they consider a production function where no distinction is made between skilled and unskilled workers, because they use total labor cost from balance sheet as the labor input. In the production function (1) we considered two separate labor inputs: the total number of skilled workers, and the total number of unskilled workers employed each year by the firm. This follows standard

- *Purely domestic firms.* They do not export nor they are engaged in any off-shoring of production.
- *Purely exporting firms; exporters doing vertical off-shoring*. This category encompasses those firms who engage in exports only, and those firms doing exports and engaging in the off-shoring of output that is then mainly reprocessed in Italy.
- *Exporting firms doing horizontal off-shoring*. This category encompasses those firms that export and simultaneously engage in off-shoring of goods that are not mainly reprocessed in Italy.

The evidence presented in Figure 1 (fixed effects) and Figure 2 (Levinsohn and Petrin) is consistent with the theory (Helpman *et al.*, 2003), and with other previous works for Italy or other countries. Purely domestic firms are less productive than firms engaging in export. In turn, firms that engage in export and horizontal off-shoring are more productive than firms that engage only in export or in export and vertical off-shoring. We then checked whether the aforementioned pattern is robust to a different way of computing the horizontal and vertical off-shoring status (this time following Q. D3.2.1). Results, reported for the Levinsohn and Petrin methodology only, are virtually unaffected (Figure 3).

[Insert Figures 1, 2 and 3 about here]

Then, we turn to another issue. Estimates from Table 10 show that, on average, off-shoring firms are better performers than non-off-shoring firms. However, final goods off-shoring and inputs off-shoring firms behave differently, with the former performing on average better than the latter. Abstracting from the role of exports, we then try to sort firms in productivity terms according to the type of good that is off-shored. Saying it in another way, we study whether firms that off-shore final goods are more productive than firms that off-shore inputs, and whether these two groups of firms are different from purely domestic enterprises.

For this purpose, we consider three different modes of internationalization:

- *Purely domestic firms.* They do not export nor they are engaged in any off-shoring of production.
- *Vertical off-shoring firms*. Firms that off-shore only inputs of production.
- *Horizontal off-shoring firms*. Firms that off-shore only final goods, or both final goods and inputs.

For each mode, we compute the cumulative distribution functions, and plot them simultaneously in Figure 4 (fixed effects) and Figure 5 (Levinsohn and Petrin). Firms that off-shore inputs turn out to be more productive than purely domestic firms. They also turn out to be less productive than firms doing horizontal off-shoring, consistently with results from Table 10. What is driving such a sorting in productivity terms? The evidence is consistent with the existence of fixed costs that are the lowest for domestic firms, intermediate for vertical off-shoring, and the highest for horizontal off-shoring. The existence of fixed costs may explain why only more productive firms are able to off-shore production, and why, among off-shoring firms, only the most productive of them are able to off-shore final products. For example, firms doing horizontal off-shoring may need marketing activities for their products (advertising, the search of local

practices in the estimation of the production function, and allows us to control for the skill composition of the workforce, thus cleaning the TFP residual from this component.

representatives abroad, etc.), which constitute an extra cost that is not incurred by firms engaged in vertical off-shoring.

[Insert Figures 4 and 5 about here]

Generalizing our findings, to the extent that different degrees of involvement in international operations are associated to different fixed costs (e.g., pure exporting vs. exporting and horizontal off-shoring; vertical off-shoring vs. horizontal off-shoring), firms are expected to be naturally sorted by the modes of international operations according to their productivity level, and this is precisely what we observe in the data.

4.2 Evolution over time of productivity indices: exporters, non-exporters, foreign affiliates

The evolution over time of aggregate productivity indices can be used to assess whether Italian firms also behave differently in *dynamic terms* according to their international status. This issue is important since it helps us to understand the direction of causality: from performance to international status (as we were discussing above), or from international status to performance, or both of them. If firms involved in international operations are found to be better performing than non-internationalized firms also in dynamics terms, we can conclude that a sort of learning process is set in motion, by which firms exposed to international operations perform increasingly better than the others.

Productivity indices aggregate for each sector the production function's residuals computed according to the Levinsohn and Petrin methodology. There are several ways to build these indices. We follow Levinsohn - Petrin (1999) and Petrin – Levinsohn (2006). For each sector (one of the 14 categories identified before) and each year, we aggregate individual TFP through a weighted average, where the weights are given by each firm's value-added share with respect to total value added in that year of the category it belongs to. These indices are then normalized with respect to 1998 (the base year). The results are presented in Table 13 (all firms) Table 14 (non-exporters), Table 15 (exporters).[12] Since there are a few hundreds of foreign affiliates in the sample, for this class we computed only the aggregate evolution of productivity for the whole manufacturing sector, normalized to the 1998 aggregate productivity level. The evolution of the index over the 1998-2003 period turns out to be: 1; 0.995; 1.034; 1.033; 1.000; 0.984.

[Insert Tables 13, 14 and 15 about here]

It is interesting to note that, for the whole manufacturing sector, exporters' growth in aggregate productivity was not faster than non-exporters'. The exporters' advantage in terms of a higher *level* of productivity, which constitutes a well-documented empirical regularity, also in the present paper, does not seem to entail any difference in terms of the *dynamics* of productivity over the 6-year's period we analyzed. Similarly, the

[12] As mentioned elsewhere, questions about off-shoring are present just in the IX wave, so this prevented us from building productivity indices also for this internationalization mode.

productivity dynamics of foreign affiliates in the sample cannot be ranked as being faster than that of non-exporters.

Generalizing our findings, to the extent that different degrees of involvement in international operations are not associated to a better productivity dynamics, Italian firms do not appear to be learning or improving their performance due to international exposure. Going back to the causality issue, we find weak support to the view that the better performance of international firms is caused by the involvement in international operations.

5. Concluding remarks

In this paper we analyzed the evidence concerning the link between firms' performance indicators – such as sales, employment, capital per worker, value-added per worker, average wage, productivity - and their involvement in international operations. More precisely, we distinguished between purely domestic firms, exporters, vertical off-shorers, horizontal off-shorers and foreign affiliates to capture different degrees of international exposure. Our results suggest that, as elsewhere documented in the literature (see, for a survey, Tybout, 2003) there exist wide differences in performance according to firms' international involvement. Moreover, in dynamics terms, we found scanty evidence on a differential performance of firms according to the export status. Our results support the view that the better performance (in static terms) of globally engaged firms is chiefly due to the selection caused by fixed costs associated to international operations.

It should be noted that our classification is by no means exhaustive of the different modes of internationalization, since it is possible to conceive other ways of classifying them. For instance, Barba Navaretti *et al.* (2007) note that exporters are not all alike, and further divide them in two sub-categories: those who export less than 40% of total sales, and those who export more than 40% of total sales.

This paper can be regarded as a first step in the direction of exploring the link between economic performance and international involvement of Italian enterprises, in that it provides new empirical evidence on the topic. Given the promising results achieved here, we believe that it is worth carrying out future research on this topic, trying to figure out with greater accuracy the specific factors behind heterogeneity in performance.

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Appendix

A.1. Trimming procedure

Our trimming procedure consists in flagging observations with an *extreme* growth rate for any of the following variables: value added, capital, number of white collars, number of blue collars. We do not drop observations with extreme values in the growth rate of intermediates' consumption. In particular, we consider a growth rate as an extreme one if it belongs to the upper (99.5%) and bottom (0.05%) tails of the corresponding distribution across the firms in the panel, for a given couple of years. For example, observations for the years 2001 and 2002 are flagged if the growth rate in value added between 2001 and 2002 belongs to the bottom 0.5% of the distribution, or if it belongs to the upper 99.5% of the distribution.

A.2. Questions about control, export, and off-shoring in the IX Capitalia survey

A7. Firm's control

State, in a descending order in terms of voting securities owned, the characteristics of persons that own and/or directly control the business enterprise.

	Persons (keep anonymous)	* Type of person (see note)	Share of voting securities held by the person	Does the person exert a direct control on the firm?	Does the person has voting deals with others?
A7.1.	Person a	1 2 3 4 5	_____ %	1. Yes 2. No	1. Yes 2. No
A7.2.	Person b	1 2 3 4 5	_____ %	1. Yes 2. No	1. Yes 2. No
A7.3.	Person c	1 2 3 4 5	_____ %	1. Yes 2. No	1. Yes 2. No
A7.4.	Others		_____ %		
Total			100 %		

*Indicate as follows:
1) Person non resident in Italy
2) Physical person resident in Italy
3) Italian business enterprise operating in manufacturing
4) Italian business enterprise operating in services
5) Italian banks and other Italian financial institutions

D1. Export

D1.1.1 Has the firm exported at least part of its output in 2003? (*Yes; No)*

...

D1.2 Final geographic destination of exports, in percentage terms:

D1.2.1.	EU-15 countries	_____ %
D1.2.2.	Countries that joined EU in 2004	_____ %
D1.2.3.	Russia, Turkey and other European countries	_____ %
D1.2.4.	Africa	_____ %
D1.2.5.	Asia (apart from China)	_____ %
D1.2.6.	China	_____ %
D1.2.7.	United States, Canada and Mexico	_____ %
D1.2.8.	Central and South America	_____ %
D1.2.9.	Australia and Oceania	_____ %
Total		100 %

…

D3. Off-shoring

D3.1. At the present time, does the firm carry out at least part of its production activity in a foreign country? (*Yes; No)*

D3.2 In which countries did you off-shore production? *(Romania; Hungary; Croatia; Poland; Morocco; Tunisia; China; Others (specify)……)*

D3.2.1 The firm off-shores production of:

Final goods (*Yes; No)*

Inputs or Components (*Yes; No)*

Both of them (*Yes; No)*

…

D3.2.5. Final destination of the production made abroad, in percentage terms

D3.2.5.1. Sold in the country where the productive unit is located: (*%*)

D3.2.5.2. Imported in Italy to re-enter the production process: (*%*)

D3.2.5.3. Imported to be sold on the Italian market: (*%*)

D3.2.5.4. Imported to be re-exported to third countries: (*%*)

D3.2.5.5. Sold directly to third countries: (*%*)

Total: 100 %

Tables

Table 1: Correspondence between the two ways of computing horizontal and vertical off-shoring employed in the paper (Question D3.2.1 and Question D3.2.5).

		Type of output offsh. (Q. D3.2.1)			
		Final goods (Horizontal)	Inputs (Vertical)	Both of them	Total (row)
Final destination of output offsh. (Q. D3.2.5)	Mainly re-processed in Italy (Vertical)	8	64	18	90
	Mainly other destinations (Horizontal)	120	37	61	218
	Total (column)	128	101	79	308

Table 2: Share of exporting firms in: total sales, employment, and total number of firms, by (NACE2) industry.

	NACE	Sales share	Employment share	Percentage of Firms
Food & beverages	15	69%	75%	66%
Textiles	17	90%	89%	81%
Clothing	18	92%	87%	84%
Leather	19	96%	87%	86%
Wood	20	67%	69%	65%
Paper products	21	66%	72%	68%
Publishing and printing	22	65%	60%	48%
Coke, refined petroleum and nuclear fuel	23	86%	37%	34%
Chemicals	24	61%	81%	78%
Plastics and rubber	25	97%	94%	83%
Non-metal minerals	26	80%	74%	50%
Metals	27	96%	92%	78%
Metal products	28	85%	78%	64%
Mechanical machineries	29	96%	95%	90%
Office equipments and PC	30	99%	91%	67%
Electric machinery	31	85%	87%	82%
TV and radio transmitters	32	85%	93%	70%
Medical, precision and optical instruments	33	94%	91%	83%
Motor vehicles	34	89%	92%	75%
Other transportation	35	97%	97%	79%
Furniture; Other Manufacturing	36	96%	93%	86%
Total manufacturing		93%	92%	75%

Table 3: Share of total sales by top 1%, 5% and 10% exporters, by (NACE2) industry.

	NACE	Share of total sales belonging to 1%	Share of total sales belonging to 5%	Share of total sales belonging to 10%
Food & beverages	15	0%	5%	9%
Textiles	17	2%	8%	13%
Clothing	18	0%	11%	15%
Leather	19	0%	22%	24%
Wood	20	0%	4%	4%
Paper products	21	0%	8%	12%
Publishing and printing	22	0%	5%	5%
Coke, refined petroleum and nuclear fuel	23	10%	10%	25%
Chemicals	24	4%	9%	11%
Plastics and rubber	25	14%	19%	19%
Non-metal minerals	26	0%	4%	23%
Metals	27	5%	17%	17%
Metal products	28	3%	6%	25%
Mechanical machineries	29	11%	19%	19%
Office equipments and PC	30	18%	18%	22%
Electric machinery	31	4%	11%	18%
TV and radio transmitters	32	4%	12%	16%
Medical, precision and optical instruments	33	10%	22%	25%
Motor vehicles	34	23%	25%	26%
Other transportation	35	6%	16%	17%
Furniture; Other Manufacturing	36	4%	10%	14%
Total manufacturing		2%	5%	20%

Table 4: Distribution of exporters.

	Number	Total exports (millions Euro)	% of total exports
Top1%	31	19,700	32%
Top 5%	153	36,100	59%
Top 10%	306	44,400	72%
Total	3,057	61,600	100%

Table 5: Share of off-shoring firms in: total sales, employment and total number of firms, by (NACE2) industry.

	NACE	Sales share	Employment share	Percentage of Firms
Food & beverages	15	1.0%	0.8%	0.8%
Textiles	17	20%	18%	13%
Clothing	18	58%	50%	39%
Leather	19	22%	28%	19%
Wood	20	18%	17%	8%
Paper products	21	0%	0%	0%
Publishing and printing	22	1.5%	2%	1.4%
Coke, refined petroleum and nuclear fuel	23	11%	26%	4%
Chemicals	24	5%	5%	5%
Plastics and rubber	25	5%	8%	5%
Non-metal minerals	26	13%	12%	1.4%
Metals	27	2%	1.0%	1.6%
Metal products	28	7%	9%	4%
Mechanical machineries	29	17%	16%	7%
Office equipments and PC	30	66%	45%	14%
Electric machinery	31	10%	11%	9%
TV and radio transmitters	32	12%	12%	5%
Medical, precision and optical instruments	33	47%	53%	11%
Motor vehicles	34	10%	16%	11%
Other transportation	35	4%	5%	10%
Furniture; Other Manufacturing	36	30%	22%	7%
Total Manufacturing		12%	14%	7%

Table 6: Share of total sales, employment and number of off-shoring firms, by (NACE2) industry and type of off-shored activity.

		Final goods			Inputs		
	NACE	Sales share	Employment share	Percentage of Firms	Sales share	Employment share	Percentage of Firms
Food & beverages	15	0.7%	0.4%	0.5%	0.3%	0.5%	0.3%
Textiles	17	12%	10%	8%	7%	7%	5%
Clothing	18	35%	34%	30%	23%	16%	9%
Leather	19	15%	16%	8%	7%	11%	10%
Wood	20	14%	11%	2%	4%	6%	6%
Paper products	21	0%	0%	0%	0%	0%	0%
Publishing and printing	22	0%	0%	0%	1.4%	2%	1.4%
Coke, refined petroleum and nuclear fuel	23	0%	0%	0%	11%	26%	4%
Chemicals	24	5%	5%	5%	0%	0%	0%
Plastics and rubber	25	4%	5%	3%	0.8%	2%	1.1%
Non-metal minerals	26	13%	12%	1.4%	0%	0%	0%
Metals	27	2%	1.0%	1.6%	0%	0%	0%
Metal products	28	5%	7%	3%	1.6%	2%	1.3%
Mechanical machineries	29	11%	9%	5%	3%	5%	2%
Office equipments and PC	30	66%	45%	14%	0%	0%	0%
Electric machinery	31	5%	6%	5%	5%	5%	4%
TV and radio transmitters	32	12%	12%	5%	0%	0%	0%
Medical, precision and optical instruments	33	35%	45%	7%	13%	8%	4%
Motor vehicles	34	5%	6%	7%	6%	10%	4%
Other transportation	35	2%	3%	7%	1.3%	1.4%	3%
Furniture; Other Manufacturing	36	26%	18%	4%	4%	4%	2%
Total Manufacturing		8%	9%	5%	3%	4%	2%

Table 7: Share of total sales, employment and number of foreign affiliates firms, by (NACE2) industry.

	NACE	Total no. of foreign affiliates	Sales share	Employment share	Percentage of foreign affiliates	Percentage among exporters in the sample	Percentage among non-exporters in the sample
Food & beverages	15	12	8%	9%	2%	3%	2%
Textiles	17	16	13%	11%	5%	6%	0%
Clothing	18	9	21%	17%	6%	6%	9%
Leather	19	4	3%	3%	2%	3%	0%
Wood	20	2	4%	4%	2%	3%	0%
Paper products	21	5	16%	17%	4%	7%	0%
Publishing and printing	22	10	23%	25%	9%	10%	9%
Coke, refined petroleum and nuclear fuel	23	2	2%	19%	7%	10%	5%
Chemicals	24	36	21%	27%	15%	17%	7%
Plastics and rubber	25	13	31%	25%	6%	7%	0%
Non-metal minerals	26	19	6%	10%	7%	12%	3%
Metals	27	18	26%	28%	11%	13%	3%
Metal products	28	29	16%	17%	5%	8%	1%
Mechanical machineries	29	74	24%	20%	12%	12%	9%
Office equipments and PC	30	1	73%	53%	8%	13%	0%
Electric machinery	31	20	28%	28%	12%	12%	9%
TV and radio transmitters	32	13	55%	55%	16%	21%	4%
Medical, precision and optical instruments	33	14	22%	17%	17%	15%	25%
Motor vehicles	34	10	11%	19%	14%	17%	5%
Other transportation	35	3	16%	16%	7%	9%	0%
Furniture; Other Manufacturing	36	14	3%	4%	5%	6%	2%
Total Manufacturing		324	18%	19%	8%	9%	4%

Table 8: Distribution of foreign affiliates.

	Number	Total sales (millions Euro)	% of total sales
Top 1%	3	3,450	11%
Top 5%	16	10,810	36%
Top 10%	32	15,390	51%
Total	324	30,070	100%

Table 9: Exporter's premia in the Capitalia dataset.

	All exporting plants	Destination		
		EU	Not EU	Both EU and non-EU
Log Sales	0.871 (0.000)***	0.567 (0.000)***	0.361 (0.000)***	0.452 (0.000)***
Log Employment	0.663 (0.000)***	0.458 (0.000)***	0.339 (0.000)***	0.409 (0.000)***
Log Capital per worker	0.231 (0.000)***	0.254 (0.003)**	0.007 (0.879)	0.062 (0.125)
Log VA per worker	0.262 (0.000)***	0.226 (0.088)*	-0.036 (0.576)	0.153 (0.802)
Log Average wage	0.068 (0.000)***	0.075 (0.045)**	0.430 (0.020)**	0.055 (0.002)**

Table 10: Off-shorer's premia in the Capitalia dataset.

	All types of off-shoring	Types	
		Final products	Inputs
Log Sales	1.076 (0.000)***	1.114 (0.000)***	0.589 (0.000)***
Log Employment	0.800 (0.000)***	0.770*** (0.000)	0.675 (0.000) ***
Log Capital per worker	0.350 (0.000)***	0.421 (0.000)***	0.050 (0.649)
Log VA per worker	0.105 (0. 279)	0.144 (0.223)	0.020 (0.898)
Log Average wage	0.050 (0.027)**	0.088 (0.002)***	-0.022 (0.544)

Table 11: Foreign affiliate's premia in the Capitalia dataset.

	Foreign affiliates
Log Sales	1.143 (0.000)***
Log Employment	1.045 (0.000)***
Log Capital per worker	0.264 (0.000)***
Log VA per worker	0.374 (0.000)***
Log Average wage	0.158 (0.000)***

Table 12: Sectoral disaggregation employed for the TFP estimation.

NACE		number of firms	Category
15	Food and beverage	625	1
17	Textiles	721	2
18	Clothing		
19	Leather	271	3
20	Wood	166	4
21	Paper products	331	5
22	Printing and publishing		
24	Chemicals	296	6
25	Rubber and plastics	319	7
26	Non-metal minerals	359	8
27	Metals	1,024	9
28	Metal products		
29	Non-electric machinery	816	10
30	Office equipment and computers	499	11
31	Electric machinery		
32	Electronic material		
33	Medical apparels and instruments		
34	Vehicles	167	12
35	Other transportation		
36.1	Furniture and musical instruments	295	13
Other 36	Other Manufacturing	112	14
Total		6,001	

Table 13: Evolution over time of the productivity index: All firms

NACE		category	1998	1999	2000	2001	2002	2003
15	Food and beverage	1	1	0.998	0.999	0.988	0.967	0.971
17	Textiles	2	1	1.003	1.004	1.022	1.020	1.010
18	Clothing							
19	Leather	3	1	0.999	1.004	1.039	1.042	1.027
20	Wood	4	1	1.017	1.035	1.052	1.065	1.064
21	Paper products	5	1	1.014	1.048	1.089	1.080	1.089
22	Printing and publishing							
24	Chemicals	6	1	1.013	1.012	1.042	1.033	1.079
25	Rubber and plastics	7	1	1.011	1.013	1.083	1.084	1.079
26	Non-metal minerals	8	1	1.016	1.034	1.065	1.080	1.071
27	Metals	9	1	1.008	1.008	1.047	1.038	1.029
28	Metal products							
29	Non-electric machinery	10	1	0.992	0.982	1.050	1.048	1.026
30	Office equipment and computers	11	1	1.009	1.061	1.024	1.011	0.996
31	Electric machinery							
32	Electronic material							
33	Medical apparels and instruments							
34	Vehicles	12	1	1.002	1.028	1.027	1.012	1.002
35	Other transportation							
36.1	Furniture and musical instruments	13	1	1.005	1.027	1.133	1.114	1.075
Other 36	Other manufacturing	14	1	0.975	0.971	1.021	0.959	0.974
	Average Manufacturing		1	1.005	1.030	1.038	1.027	1.025

Table 14: Evolution over time of the productivity index: Non-exporters

NACE		Category	1998	1999	2000	2001	2002	2003
15	Food and beverage	1	1	1.008	1.024	1.032	1.030	1.039
17	Textiles	2	1	1.008	1.014	1.075	1.065	1.060
18	Clothing							
19	Leather	3	1	1.001	1.031	1.083	1.061	1.039
20	Wood	4	1	1.028	1.038	1.029	1.045	1.080
21	Paper products	5	1	1.018	1.035	1.080	1.088	1.085
22	Printing and publishing							
24	Chemicals	6	1	1.002	0.920	1.029	1.025	1.018
25	Rubber and plastics	7	1	1.004	1.011	1.090	1.064	1.068
26	Non-metal minerals	8	1	1.022	1.049	0.995	0.975	0.995
27	Metals	9	1	1.009	1.008	1.046	1.037	1.039
28	Metal products							
29	Non-electric machinery	10	1	0.985	0.948	1.067	1.068	1.055
30	Office equipment and computers	11	1	1.005	1.066	1.158	1.167	1.141
31	Electric machinery							
32	Electronic material							
33	Medical apparels and instruments							
34	Vehicles	12	1	1.012	1.066	0.849	0.833	0.825
35	Other transportation							
36.1	Furniture and musical instruments	13	1	1.012	1.021	1.075	1.067	1.062
Other 36	Other manufacturing	14	1	0.948	0.924	0.939	0.940	0.942
	Average Manufacturing		1	1.008	1.022	1.080	1.079	1.088

Table 15: Evolution over time of the productivity index: Exporters

NACE		Category	1998	1999	2000	2001	2002	2003
15	Food and beverage	1	1	0.996	0.990	0.967	0.929	0.928
17	Textiles	2	1	1.002	1.003	1.016	1.016	1.005
18	Clothing							
19	Leather	3	1	0.999	1.002	1.039	1.043	1.028
20	Wood	4	1	1.016	1.033	1.023	1.035	1.032
21	Paper products	5	1	1.009	1.045	1.056	1.055	1.057
22	Printing and publishing							
24	Chemicals	6	1	1.014	1.021	1.033	1.022	1.088
25	Rubber and plastics	7	1	1.010	1.012	1.077	1.079	1.075
26	Non-metal minerals	8	1	1.013	1.022	1.085	1.106	1.095
27	Metals	9	1	1.008	1.007	1.039	1.030	1.020
28	Metal products							
29	Non-electric machinery	10	1	0.992	0.982	1.047	1.045	1.023
30	Office equipment and computers	11	1	1.009	1.057	1.020	1.008	0.994
31	Electric machinery							
32	Electronic material							
33	Medical apparels and instruments							
34	Vehicles	12	1	1.001	1.012	1.052	1.045	1.033
35	Other transportation							
36.1	Furniture and musical instruments	13	1	1.004	1.027	1.126	1.108	1.068
Other 36	Other manufacturing	14	1	0.976	0.972	1.028	0.961	0.977
	Average Manufacturing		1	1.005	1.030	1.028	1.016	1.013

Figures

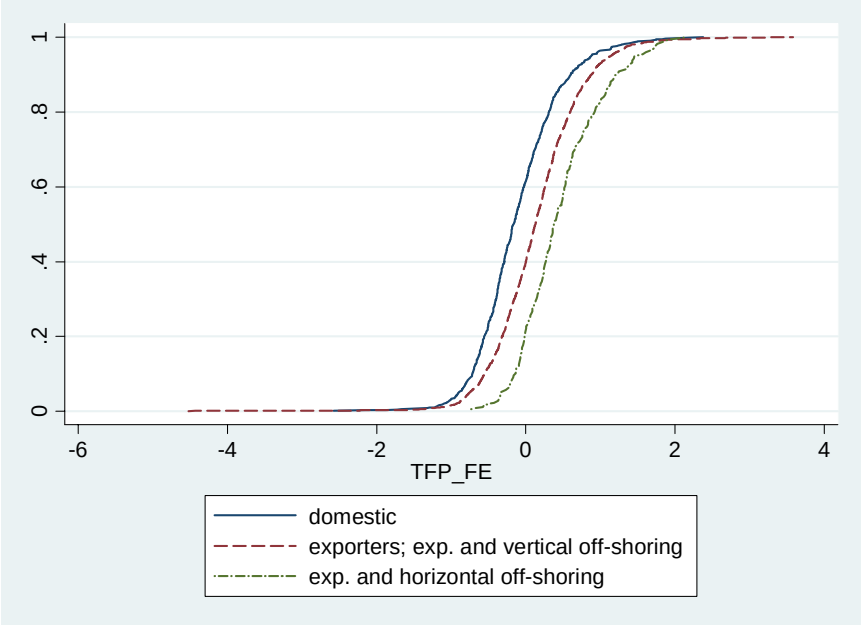

Figure 1: Plot of the cumulative distribution function of TFP: purely domestic, exporters, horizontal off-shorers (fixed effects method; BR classification)

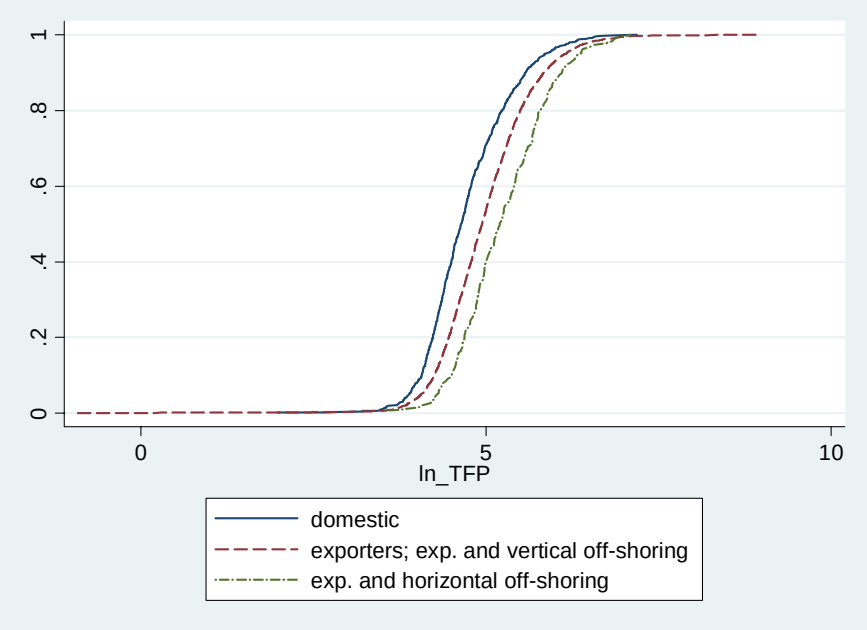

Figure 2: Plot of the cumulative distribution function of TFP: purely domestic, exporters, horizontal off-shorers (Levinsohn-Petrin method; BR classification)

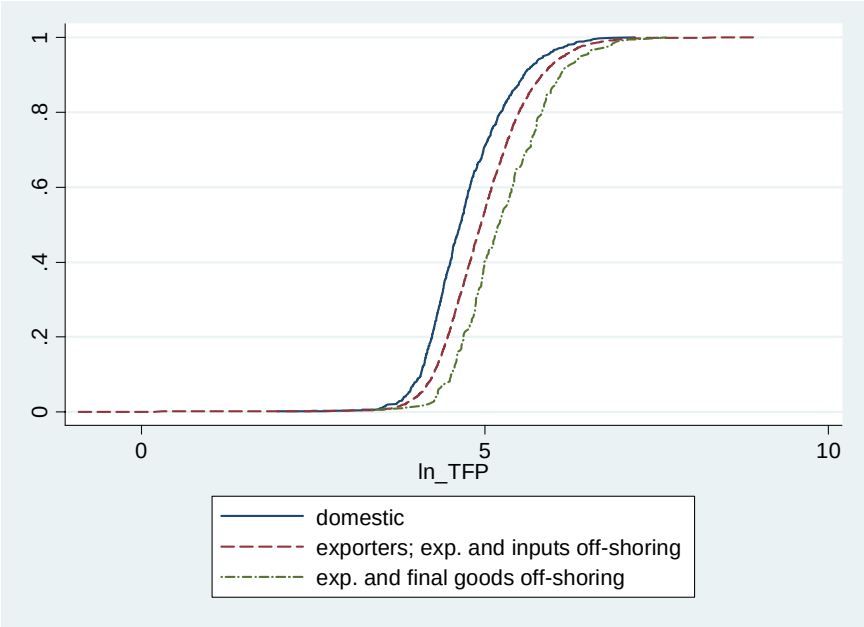

Figure 3: Plot of the cumulative distribution function of TFP: purely domestic, exporters, horizontal off-shorers (Levinsohn-Petrin method; classification based on Question D3.2.1)

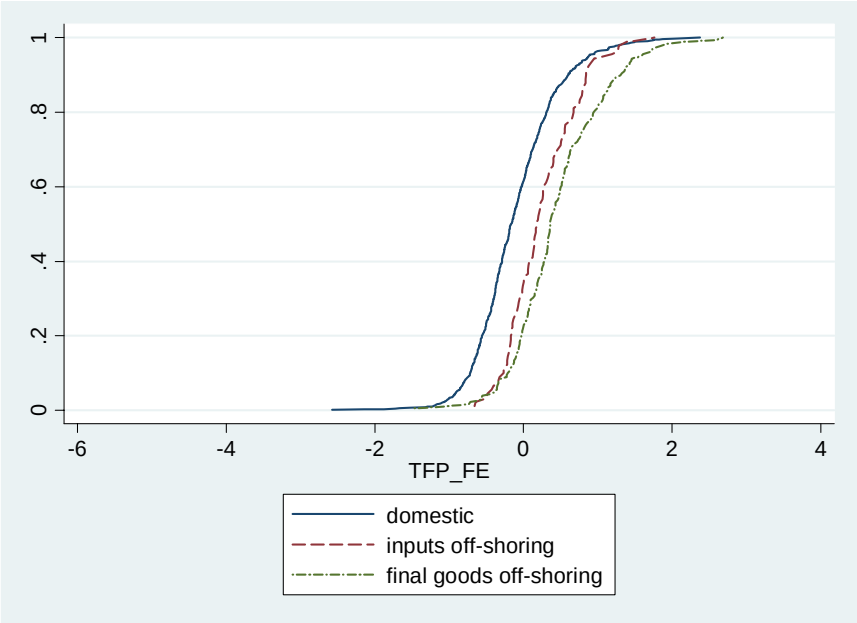

Figure 4: Plot of the cumulative distribution function of TFP: purely domestic, inputs off-shoring, final goods off-shoring (fixed effects method; classification based on Question D3.2.1)

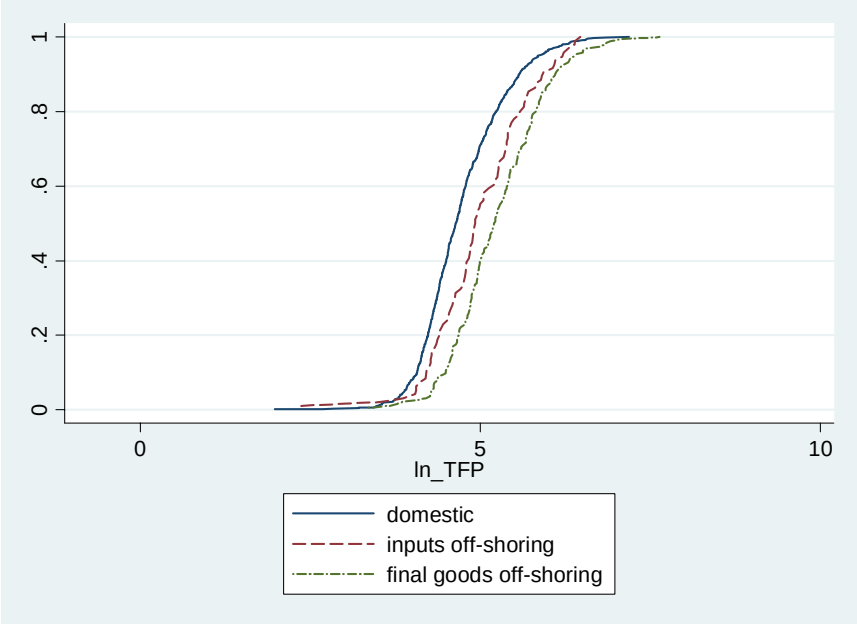

Figure 5: Plot of the cumulative distribution function of TFP: purely domestic, inputs off-shoring, final goods off-shoring (Levinsohn-Petrin method; classification based on Question D3.2.1)