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Export Premia and Sub-Contracting Discount

Passive Strategies and Performance in Domestic and Foreign Markets ^a

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1. INTRODUCTION

Globalisation has given an impulse to the emergence of new organizational structures of international firms. International subcontracting is one of such examples. By focusing the analysis on subcontracting firms, that is on manufacturers who “*produce to order*” by providing intermediate or finished products to other firms at home or in foreign markets, the present study contributes to two streams of literature. The first one studies the fragmentation of the production system and, in particular, analyses offshoring (i.e. the relocation of some activities in foreign countries) and outsourcing (i.e. contracting parts of the production process to external providers) strategies. To that respect, subcontracting activities clearly represent the mirror image of outsourcing (and, in case of production orders coming from abroad, of offshoring-outsourcing).

On the other hand, since shipments to fulfil foreign production orders represent a type of exporting, the subcontracting activity is also related to a second stream of literature, which emphasizes heterogeneity within trading firms (Bernard et al. 2010). While studies on fragmentation and outsourcing focus on the optimal strategy to increase efficiency in production and in the provision of inputs, this second stream of literature investigates the selection of firms into foreign markets and the link between internationalisation and performance. In accordance to this view, we consider subcontracting as an organizational choice strongly associated with firms’ productivity which emerges as the result of a self-selection process, where the optimal choice depends on the interplay of firm heterogeneity, unitary costs, and pre-investment effort (Melitz, 2003; Helpman et al., 2004).

In addition, our paper has several points of contact with recent studies on the nature of fixed cost of exporting (Ahn et al., 2010; Akerman, 2010; Felbermayr and Jung, 2009) that highlight the

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fundamental role of intermediaries in reducing the fixed cost of entering foreign markets. The presence of wholesalers with economies of scale and scope in distribution and marketing activities reduces the selection process and fosters the exports of smaller and less productive firms, who are labelled *indirect exporters*. In a similar vein, foreign sub-contractors, which are the object of our analysis, simply replying to production orders from foreign manufacturers, can be considered as a particular subset of exporting firms, which we label as *passive exporters*. As Greenaway and Kneller (2007a) pointed out, there

“might be a difference between firms that are passive and active in their export decision. [...]. For those firms that are passive, no pre-entry investments are made and productivity changes are likely to occur with the start of export sales” (Greenaway and Kneller, 2007a, p.149)

Differently from *direct (or active)* exporters that need to incur all sunk costs for market research and the setting up of new distribution channels, *passive* exporters can bypass part of these investments, so as to lower the threshold productivity level required to make positive profits in foreign markets.

Using a unique dataset on a large sample of Italian manufacturing firms observed for the years 1998-2003 we are able to disentangle, on the one hand, domestic and foreign sales and, on the other hand, sales to third manufacturing parties (sub-contracting) and sales that reach the final market. Therefore, it is possible to investigate how the internationalization and internal organizational choices are jointly related to firms' performance. This is accomplished by computing productivity measures for all firms in our sample and by using them to compare all types of manufacturers. First, productivity measures are regressed on current export activity and current domestic and/or foreign sub-contracting. Second, productivity is used as a left hand side variable in a regression relating performance to our six firms' categories. Third, fully exploiting the longitudinal nature of our dataset, the *self-selection hypothesis* is tested by looking at pre-entry differences in productivity levels and growth rates between “future export starters” and “never exporters”. Finally, the not mutually exclusive hypothesis that exporters increase their performance after entry is tested by looking at the post entry productivity growth rates for (*active*) export starters as compared to the other categories (*passive* export starters, export stoppers, always exporters, never exporters). This is known in the literature as the *learning by exporting* hypothesis (Bernard and Jensen, 1995 and 1999), according to which the exporting choice allows firms to increase their productivity thanks to the new knowledge and expertise they are able to accumulate in foreign markets.

Beyond confirming the presence of the well known *export premia*, our estimates also show that sub-contractors are characterized by lower levels of productivity, a finding that we label as *sub-contracting discount*. That means that firms not using the sub-contracting channel in the domestic

market turn out to be more productive than sub-contractors whereas, considering sales in foreign countries, active exporters outperform *passive* exporters.

Our results are also consistent with the view that *active* future exporters self-select into foreign markets. However, we find that there are no significant pre-entry differences in productivity levels and growth rates between *passive* exporters and non-exporters. Finally, an important contribution of the paper is to show that *active* export starters exhibit growth rates which are positive and significantly higher than the other firm categories, a result which is consistent with the *learning by exporting* hypothesis.¹

The remainder of the paper is organized as follows. Section 2 discusses at some detail the concepts of sub-contracting and production to order. Section 3 reviews the relevant theoretical and empirical literature, while Sections 4 and 5 present the dataset and the empirical results. Section 6 includes some robustness checks, and Section 7 concludes.

2. SUB-CONTRACTING AS PRODUCTION TO ORDER

As pointed out by Sharpston (1975) and Kimura (2002), the term *sub-contracting* includes a variety of (sometimes very different) sub-categories. In fact, as to the object of the contract, sub-contracting can refer to the management of a phase of the production process (i.e. the assembling phase), or to the manufacturing of a (customized or non-customized) component (i.e. an engine) or of a finished product (i.e. a shoe). As to the contracting parties, the commissioning firm can be a producer, a wholesaler or a retailer, and has generally a much bigger size than the other counterpart. Turning towards the relationship between the outsourcer and the sub-contractor, they can either be part of the same business group, or they can be independent firms involved in a long-term contract or in a one-shot relationship, and so on. In this paper, we follow the definition suggested by Sharpston (1975, p.94), according to which sub-contracting refers to: “*all sales of articles which are ordered in advance, and where the giver of the order arranges the marketing*”.

While the distinctive feature of sub-contracting is that it allows the sub-contractor to avoid the marketing problems associated with outlets, brand names, advertising, market research, and so on, a second important aspect may concern the passive attitude of subcontractors, especially in foreign markets, towards activating learning processes. In fact these firms just fulfil production orders where the product characteristics (i.e. their composition, their recipe, their tailoring to different customer needs and different geographical final markets) are fully specified. As such, they are not directly exposed to the foreign environment and cannot take benefit from information flows and knowledge spillovers. For the aforementioned reasons, we consider subcontracting as a

¹ This focus on the learning attitude of trading firms is the main reason why we prefer to use the term *passive exporters* instead of the alternative *indirect exporters*.

“*passive strategy*”, as compared to the alternative choice of finding an outlet for the own production by actively engaging in advertising and selling activities.

Production with the purpose to satisfy the request of a contractor is a widespread and growing organizational choice. Kimura (2002) shows using Japanese data for the years 1966-1987 that labor-intensive industries (textile and clothing) as well as industries manufacturing goods that are positioned backward in the vertical chain such as plastic, rubber, metal and machinery, were making an extensive use of sub-contracting. Such a strategy is pervasive also in Italian manufacturing, where small firms are organised in “*industrial districts*”, and are specialised in particular production phases by working as sub-contractors for downstream firms. In the most recent years, such a form of production is increasing precisely for the same reasons that explain the increase of outsourcing, i.e. the spreading of ICT technologies, computer-aided manufacturing, the use of more flexible labour force, and so on. As a matter of fact, as already pointed out in the introductory section, *production to order* may be considered as the mirror image of outsourcing.

3. LITERATURE REVIEW

Starting from the seminal empirical works of Bernard and Jensen (1995 and 1999), who found that exporters were more productive than non-exporting firms, theoretical models have been developed to show that internationalisation strategies, such as export activities and *foreign direct investments*, are due to a combination of sunk costs and heterogeneity in the underlying characteristics of firms.

Melitz (2003) shows that, in the presence of firm heterogeneity and fixed costs of exporting, one should observe a selection of more productive firms into exporting while the least productive firms are expected to serve the domestic market only. Helpman et al. (2004) add to this set up also the further choice to integrate into foreign markets, i.e. to shift from the status of an exporting firm into that of a multinational company. In a context of a free entry monopolistic competition model, CES preferences, and iceberg transportation costs, the authors show that the firm’s choice between exporting, undertaking horizontal FDI activities, engaging in both strategies, or serving the domestic market only, is due to a trade-off between sunk costs in the FDI alternative and trade costs in the export mode. If productivity is greater than a certain threshold, FDI turns out to be the best choice, followed in turn by export and domestic only strategies as long as firm productivity decreases.

This basic framework has been also used, integrated with the incomplete contracts theory, to investigate *outsourcing* and *offshoring* activities too (Antras and Helpman, 2004). As to the choice between offshoring insourcing and domestic insourcing, there is a trade off between the possibility to benefit from lower variable costs in foreign markets and the necessity to bear some fixed cost of

installing a foreign activity abroad (only via FDI, since the export activity is not taken into consideration). As far as the outsourcing decision is concerned, there is a bargaining between the outsourcer and the external contractor for the price of the specialised intermediate input to be delivered (Grossman and Helpman, 2002). By controlling the production of most of the inputs (low contractual input intensity), firms might incur higher production costs, but by relying heavily on external suppliers (high contractual input intensity), they may suffer from agency problems. The model predicts for headquarter-intensive sectors a productivity range such that the most productive firms choose to insource abroad, (i.e. to engage in vertical FDI by settling foreign subsidiaries to produce the intermediate input), while outsourcing abroad (i.e. the purchase of the intermediate input from foreign external suppliers), insourcing at home (i.e. vertical integration without FDI) and outsourcing at home are the other strategies in correspondence of progressively lower productivity levels. Tomiura (2007) jointly analyses the export-FDI choice for selling final products and the outsourcing choice for manufacturing the intermediate inputs in a simple model inspired by Helpman et al. (2004) and Antras and Helpman (2004). As for the first option, the trade off is between bearing iceberg transportation costs in the case of exports and undertaking the fixed investment required to build a plant and sell final products abroad (horizontal FDI). As for the outsourcing choice (analysed in this context with respect to foreign markets only), the trade off is between leaving a share of the intermediate input's revenue in the case of an external contractor and bearing the fixed costs of settling a plant abroad for manufacturing the intermediate input (vertical FDI). In addition to the usual preference for horizontal FDI versus exports as a way to sell final products in foreign markets in correspondence of high productivity levels, the model foresees also that, for what concerns the intermediate inputs, more productive firms engage in vertical FDI and less productive firms outsource abroad by relying on external suppliers.

In this paper, we analyse the choice of firms to be vertically integrated at *downstream* stages², that is to sell directly their products, or, alternatively, to produce on the basis of orders which are collected from other firms. These two types of strategies can be pursued both in domestic and foreign markets. As shown by Razzolini and Vannoni (2007), the decision is driven by a trade off between the higher fixed costs of being (forward) vertically integrated and the portion of revenues, that, as a result of a bargaining struggle, must be given to the firms which buy the products in the case of the “*production to order*” strategy. In the case of the decision to serve the foreign market, one can consider transport costs in both *active* and *passive* export strategies, but an additional amount of fixed costs is required to organize a selling activity abroad in the former case.

² In the case of outsourcing the choice is between being vertically integrated at *upstream* stages or relying on an external provider of the input. Here, we look at the choice to be vertically integrated at *downstream* stages versus working as a sub-contractor that fulfils the order of a commissioning firm.

The usual prediction that more productive firms self select into exporting while less productive firms concentrate on domestic activities is thus further qualified here. Firms associated with the highest productivity levels would choose both to export in foreign markets and to be vertically integrated, while firms associated with the lowest productivity levels would choose to serve the domestic market only with the “production to order” modality. At intermediate levels of productivity lie the other two strategies, that is to export via “production to order” and to be vertically integrated at home.

On the one hand, as far as the domestic production is concerned, our analysis is clearly related to Antras and Helpman (2004). While they discuss the choice between domestic outsourcing and backward integration, we deal with the choice between domestic subcontracting versus forward integration. On the other hand, regarding the decision to export in foreign markets, our investigation presents some similarities with a recent body of literature emphasizing the existence of great heterogeneity among trading firms and focusing on the role of wholesalers and intermediaries in facilitating international trade (Bernard et al., 2010). In particular, the availability of intermediaries endowed with some marginal or fixed cost advantages might considerably affect the entry costs in foreign and domestic markets for subcontracting firms. The role of wholesalers has been modelled by Ahn et al. (2010) and Akerman (2010), who, similarly to Razzolini and Vannoni (2007), suggest to distinguish between different types of exporters. They both develop a Melitz’s type model in which, beyond choosing between exporting and selling exclusively in the domestic market, firms can rely on wholesalers as a mean to engage in trade without directly exporting products. This third type of firm, labelled *indirect exporter*, exhibits an intermediate productivity level.

Table 1 summarizes the productivity rankings exhibited by the above mentioned papers.³ Leaving aside foreign direct investments, our paper contributes to the literature on the organization of domestic production and on the choice to enter foreign markets directly or through arms length’s trade (either by buying inputs in the case of foreign outsourcing or by selling goods and inputs to foreign intermediaries or to foreign firms working at forward vertical stages in the case of indirect/passive exporting).

³ As discussed in the comprehensive survey by Helpman (2006), different productivity rankings can emerge by modifying some of the assumptions (for example the ranking of fixed costs) or by introducing some new elements into the analysis. For example, Antras and Helpman (2004) discuss that, for industries which are very intensive in low-skilled jobs, outsourcing dominates integration, and only two organizational forms (domestic outsourcing and international outsourcing) are chosen. Grossman and Helpman (2004), by introducing into the picture the imperfect ability to observe the supplier’s performance, generate a somewhat reversed ranking, where international outsourcing turns out to be the preferred strategy for both low and high levels of productivity, and where vertical integration at home exhibits a higher productivity threshold than FDI.

The existing empirical literature typically treats exporting activities as if all firms are adopting the same mode of distributing their goods in foreign markets. The results of the large amount of empirical studies have been recently reviewed by Greenaway and Kneller (2007a), Wagner (2007), and by the International Study Group on Exports and Productivity (2008). The latter study, in particular, provided comparable evidence on the link between exports and productivity for 14 countries, finding that:

“The overall results are in line with the big picture that is by now familiar from the literature: Exporters are more productive than non-exporters when observed and unobserved heterogeneity are controlled for, and these exporter productivity premia tend to increase with the share of exports in total sales; there is evidence in favour of self-selection of more productive firms into export markets, but nearly no evidence in favour of the learning-by-exporting hypothesis” (ISGEP, 2008, p. 596)

For recent evidence showing that, under specific circumstances, learning by exporting may also occur, see Greenaway and Kneller (2007b), Serti and Tomasi (2008), De Loecker (2007), and Kneller and Pisu (2010). Greenaway and Kneller (2007a) review also the empirical studies comparing exports and FDI, showing that the overall results are in favour of the presence of a productivity premium for the latter strategy.⁴ While little attention has been given so far to the role played by sub-contractors and intermediaries in activating passive/indirect ways to serve foreign markets, the empirical literature on outsourcing is growing in the recent years. Olsen (2006) states that the empirical evidence on the determinants and on the effects of outsourcing and offshoring is providing mixed results, as far as manufacturing is concerned, while positive effects are found for services. However, some recent studies (Tomiura, 2007; Gorg et al., 2008; Farinas and Martin-Marcos, 2010) show evidence in favour of Antras and Helpman (2004) prediction that firms undertaking outsourcing exhibit higher productivity levels than firms which do not source abroad.⁵

4. DATA

We employ firm level data from the 8th and 9th Unicredit-Capitalia surveys, one of the largest database available for Italy, that includes all large Italian firms with more than 500 employees and selects small and medium-sized firms with less than 500 employees on the basis of a stratified sample.⁶ The surveys contain accounting information from balance sheet as well as information on geographical location, exporting, sub-contracting and innovation activities. The 8th wave covers the 1998-2000 period and contains data on 4,680 firms, whereas the 9th wave provides

⁴ However, the review of such studies is well beyond the scope of the present paper, which focuses only on the exporting activity.

⁵ Tomiura (2007) found also that foreign outsourcers and exporters were exerting roughly the same productivity level.

⁶ Our dataset can be considered as fairly representative of the whole population of Italian manufacturing firms with more than 10 employees. However, in order to tackle the issue of self selection, all regressions have been run also by re-weighting the sample. See Section 6 and Appendix 1 for more details.

information on 4,289 firms for the years 2001-2003. Our sample is restricted to firms belonging to the manufacturing sectors that are included in both waves and for which there is complete information on accounting data and exporting and sub-contracting activity. After standard trimming procedures, the final dataset consists of a panel of 1,537 firms.⁷ Unfortunately, information on exporting and/or the amount of turnover from “*production to order*” is not available year by year but only for the entire three years period covered by each wave. Therefore, we do not know exactly the year in which firms enter or exit from export or sub-contracting status.

a. Export

Information on the exporting activity is provided by a direct question in the survey: firms report whether they exported or not during the last three years. Panel A of Table 2 displays the dynamics of manufacturers in and out of the exporting activity. Approximately 65 per cent of firms always export (“always” exporter). Manufacturers never involved in exporting (“never” exporter) represent only 24 per cent of the sample, thus meaning that all remaining firms exported at least once in the period 1998-2003. Manufacturers that start to export in 2001-2003 period (“starter”) are only 5 per cent of the sample, and 5 per cent are also the firms that export in 1998-2000 but cease this activity in the last period (“stopper”). Therefore, only 10 per cent of manufacturers change their exporting decision over the period 1998-2003, thus indicating a considerable persistence in the export status.

b. Sub-contracting

Firms report the percentage of turnover by production orders (“*produzione su commessa*”) over total turnover during the last three year period. Since this percentage is disentangled by the type of firm which commissioned the order, we can identify the portion of production orders received by the domestic economy and the one received by foreign firms. Two dummy measures of firm involvement in “*production order*” activities have been constructed, one for domestic activities and the other for foreign ones.⁸ It is worth noticing that a value equal to one for these dummies

⁷ In some cases we do not observe balance sheet data for all 6 years, so that our full sample includes 1,537 firms and 8,787 observations. See Appendix 1.

⁸ We decided to use dummies and not sales percentages since approximately 55 per cent of the reported percentages were taking values of 0 and of 100. We tried also different specifications of the sub-contracting activity, for instance, by raising the percentage of turnover by “*production to order*” required to be defined as a sub-contractor. Such changes implied slight variations in the differences among sub-contractors and not sub-contractors, without modifying the qualitative nature of our results.

identifies manufacturers who are involved *also* in sub-contracting (domestic or foreign) but not necessary devoted *exclusively* to “*production to order*” activity.⁹

Panel B of Table 2 reports transitions in and out of the sub-contracting status (both domestic and foreign). The majority of manufacturers do not change status over time, even if sub-contracting is characterized by a greater dynamism and by a lower persistence than the exporting activity: 65 per cent are always engaged in sub-contracting (“*always*” sub-contractor) and 12 per cent are never involved in this activity (“*never*” sub-contractor).

c. Classification of Firms

Since foreign sub-contractors are, by definition, exporters (see footnote 9), we can define six different categories of firms according to export, domestic and foreign sub-contracting statuses. We use the following notation. Firms exporting are indexed with X whereas firms serving only the domestic market are indexed with D. Manufacturers that sell in the domestic market via domestic sub-contracting are indexed with S_h irrespective of whether *production to order* represent the totality or just a portion of firm’s turnover. We index by S_f those exporters that adopt foreign sub-contracting as an additional channel to serve foreign markets.¹⁰ XS_f (DS_h) are exporters (domestic firms) which use the sub-contracting channel too but only to serve the foreign (domestic market). Manufacturers denoted as XS_h export, but not via foreign sub-contracting, and are domestic sub-contractors, while XS_fS_h are firms that export, also as sub-contractors, and serve the domestic market, totally or partially, via sub-contracting.

Table 3 shows the distribution of the above six types of firms over the entire period 1998-2003. The majority of observations, 45 per cent, belong to exporting firms engaged in both domestic or foreign sub-contracting. Domestic firms which use sub-contracting and exporting manufacturers which are not using sub-contracting at home or in foreign markets represent respectively 22 per cent and 18 per cent of observations in the sample. “Vertically integrated” domestic firms represent 8 per cent of observations in the sample. Finally, as expected, there are few firms that implement an internal organizational choice at home and a different one abroad.

⁹ We do not consider as sub-contractors those manufacturers that exclusively carry out assignments by firms belonging to the same corporate group since they may simply reflect the fulfilment of ordinary intra-group activity. In addition, there are only 14 (12 in 9th and 2 in 8th) firms that answer not being an exporter but declare a positive amount of *production orders* from foreign manufacturers. In order to facilitate the comparison among the groups, we recode these firms to be exporters. Manufacturers that opt to fulfil *production orders* from abroad thus represent a *subset* of exporters.

¹⁰ In other words firms not indexed by S_h (S_f) serve the domestic (foreign) market via a vertically integrated structure.

d. Productivity Measures

Our measures of TFP at the firm level are constructed by estimating a two-factor logarithmic Cobb-Douglas industry specific production function¹¹, with value added (deflated with 3 digit producer price index) as output and labour (labour costs deflated by wage index) and capital (measured as deflated book value) as inputs. In order to avoid the simultaneity problem between input decisions and productivity shock the semi-parametric technique developed by Levinsohn and Petrin (2003) is implemented (see Appendix 2). We thus consider the transmitted productivity component estimated by the model as a proxy for productivity. In order to purge our TFP index of industry and year effects we construct a relative measure by dividing productivity by the industry mean in the same year. The same procedure applies to labour productivity and size, the former being computed as the ratio of value added divided by the total employment, and the latter as the total number of workers.¹²

5. EMPIRICAL RESULTS

According to the models discussed in Section 3, we expect to observe a positive selection for exporting activity, with exporters being more productive and exhibiting an *export premia* as compared to non exporters. As far as the sub-contracting activity is concerned, we need to distinguish two cases. First, everything else equal (i.e. exporting and sub-contracting abroad) firms that sub-contract at home are expected to be endowed with a *sub-contracting discount* with respect to “vertically integrated” firms. Second, manufacturers exporting in the foreign market only through direct exports are expected to be more productive than firms selling abroad as a response to foreign production orders. That is, *active* exporters should outperform *passive* exporters.

a. Productivity Comparisons

Table 4 reports descriptive statistics by exporting (panel A) and by sub-contracting (panel B) types over the entire period 1998-2003. Exporters are characterized by productivity levels,

¹¹ We are aware that estimation of a common industry specific production function for both sub-contractors and vertically integrated firms may bias our estimates of TFP because of differences in production technology or in selling prices. Sub-contractors may carry out phases of manufacturing characterized by lower content of value added or by different intensity in input usage. Firms opting for “*production order*” may sell at lower prices as compared to vertically integrated firms or industry average, due for instance to a weaker bargaining position. Unfortunately, the limited size of the sample does not allow us to consistently estimate separate production functions for sub-contractors and non sub-contractors. Since we do not know who are the commissioning firms (the demand side of sub-contracting) and the amount of output they purchased, we are not able to characterize an industry equilibrium and we are compelled to divide value added at current prices by a common deflator for all manufacturers in the same industry. See section 6 for more discussion on this issue.

¹² See Van Biesebroeck (2008) for a comparison across different methodologies for measuring productivity. The author provides also an application in which evidence consistent with the learning by exporting hypothesis is found for a sample of Colombian manufacturing plants as well as for a sample of manufacturing firms in Zimbabwe.

measured by TFP and value added per worker, that are higher than non-exporters, both in absolute and relative terms, and are all characterised by a larger size. Firms that are not involved in “*production to order*” (both domestic or foreign) clearly outperform sub-contractors in term of absolute and relative measures of productivity. As expected, sub-contractors are much smaller than non sub-contractors, thus confirming that this production channel is mainly activated by small manufacturers.

Table 5 reports relative productivity indices and relative measures of size for the six categories of manufactures defined in Section 4.c. Manufacturers exporting but not undertaking any kind of sub-contracting at home or abroad (i.e. our X category) are clearly the biggest and the most productive category of firms, while firms serving only domestic market also by resorting to sub-contracting channel (DS_h) are the smallest and the least productive.

Interesting results emerge from the analysis of the role of foreign sub-contracting. Among exporters not engaged in domestic sub-contracting, those who fulfil foreign production orders (XS_f category) are smaller and less productive than manufacturers not involved at all in this activity (X category). This can be due to the fact that *passive* exporters have to bear lower pre-entry investments to serve foreign markets (i.e. the productivity threshold level to self-select into exporting is lower). Moreover, among exporting manufacturers working also with domestic sub-contracting, those who fulfil foreign production orders (XS_fS_h category) are only marginally greater and more productive than manufacturers not receiving production assignments from abroad (XS_h category).¹³ Since XS_fS_h , XS_h , and XS_f types are hybrid forms, it is not surprising that they exhibit relative TFP values which are not very dissimilar to the one recorded for domestic vertically integrated firms (D).

The differences in productivity levels can be analysed by comparing the distributions of the estimated TFP of different firms’ types. Figure 1 shows that the cumulative distribution of exporters not involved in any foreign sub-contracting (X) clearly lies to the right of the one for XS_f firms. The Kolmogorov-Smirnov test of first order stochastic dominance (see Appendix 2 for details) and the Fligner-Policello test¹⁴ confirm that the cumulative distribution of *active* exporters first order stochastically dominates that of *passive* exporters. In a similar vein, Figure 2 shows that the cumulative distribution of domestic vertically integrated firms (D) lies to the right of the one for domestic sub-contractors (DS_h), and both the Kolmogorov-Smirnov and the Fligner-Policello tests

¹³ Descriptive statistics in Table 3 display that the two types of firms have similar shares of turnover due to domestic sub-contracting (54 per cent). However, the export activity weights 37 per cent of sales for the XS_fS_h category, of which 33 per cent is due to foreign subcontracting, and 22 per cent for the XS_h type. Therefore, the TFP values are similar because the higher shares of domestic sales (24 per cent) and direct exports (22 per cent) in the XS_h case jointly produce the same effect than the higher share of passive exports (33 per cent) in the XS_fS_h case.

¹⁴ The Fligner-Policello test is a two-sample robust rank test that does not assume normality or equality of variances between groups of firms. For a full description of the test see Fligner and Policello (1981)

confirm that the former stochastically dominates the latter. Jointly considering the above two results, it appears that the *sub-contracting discount* is present both at home and abroad.

With the aim of further investigating firms' performances by export and sub-contracting activity, Table 6 reports estimates from regressions of the logarithm of our two productivity measures and logarithm of size on dummies for export status (X), and for domestic (S_h) and foreign sub-contracting statuses (S_f). Area (dummies for geographical location in North-West, North-East, Center and South of Italy), year and 2 digit industry dummies have been included among the regressors. This modelling strategy follows the standard approach – see the recent survey by Wagner (2007, p.62) – for the computation of the *export premia*, which is enriched here by taking into consideration the sub-contracting activity at home or abroad. The estimates show in the first three columns that exporters and vertically integrated firms (the omitted category) are always bigger and more productive than the other firm types. The results for foreign sub-contracting are less clear-cut, probably because in our dataset foreign sub-contracting is associated with an exporting activity (4,208 observations) and with domestic sub-contracting (3,986 observations).

In order to shed more light on this, Table 7 reports the estimates of the measures of productivity and size on five of the six categories of firms (the excluded category is DS_h). The first column shows that direct exporters are the most productive, followed in turn by the XS_f , XS_fS_h and the D categories. Exporting firms working with sub-contracting at home only and domestic firms engaged in domestic sub-contracting are the least productive group of firms.

b. TFP and Transition Dynamics

Figure 3 shows the pattern of relative TFP measures for four types of firms: manufacturers that exported in both periods (“*always*”), firms that never exported (“*never*”), firms that started to export in 2001-2003 period (“*start*”) and manufactures that exported in 1998-2000 but not in 2001-2003 (“*stop*”). Always exporters are found to be the most productive, while firms never exporting are the least productive. “*Starters*” exhibit similar productivity levels than “*stoppers*” in the 1998-2000 period, but performance is increasing for the former and reducing for the latter through time. Panel B highlights that, within the export starters category, only *active* exporters are steadily increasing productivity, while *passive* exporters show a flat pattern.

Panel A of Figure 4 shows the pattern of TFP over time for the transition in and out of the sub-contracting activity, here defined as domestic plus foreign sub-contracting. As expected, firms *always* (*never*) engaged in *production to order* are the least (most) productive, and “*starters*”, i.e. firms beginning sub-contracting are less productive than “*stoppers*”. However, by limiting the attention to domestic sub-contracting only, panel B of Figure 4 shows that the differences between

starters and *stoppers* are much smaller, suggesting that part of the differences in productivity may be associated with the transition in and out of the foreign sub-contracting activity. Therefore, differently from the pattern shown by export starters and export stoppers in Figure 3, in the case of sub-contracting there is not a clear dynamic pattern for entrants and exitors.

The results presented in section 5.a should be interpreted as simple correlations between TFP and exporting/subcontracting activity (Table 6), and between TPF and firm types (Table 7). The fact that our dataset covers a period of six years allows us to move some step forward and explore the direction of causality.

In Table 8 we test the self-selection hypothesis, following which the most productive firms are the ones who decide to enter export markets, by looking at the sub-sample of export starters (83 firms) and never exporters (375 firms).¹⁵ The left hand side variables are past productivity levels and productivity growth rates, and explanatory variables are firm types. The coefficients for export starters are larger than the coefficients of never exporters, especially for *active* exporters (Type 1 firms, i.e. exporters which do not make use of the foreign subcontracting channel), and in some cases the differences are statistically significant. This suggests that *active* export starters in the 2001-2003 period were more productive than never exporters in the 1998-2000 period already, when both types of firms were serving the domestic market only. Such a result is not found for *passive* export starters, who do not exhibit a significantly different pattern as compared to never exporters. The regressions reported in the last two columns use 1998-2000 productivity growth rates as dependent variables. The positive coefficient for *active* export starters, and the fact that the difference with respect to the coefficients for never exporters are significantly different from zero, show that the former were outperforming the latter, in terms of productivity growth rates, in the years prior to entry in foreign markets.

Table 9 tests the *learning by exporting* hypothesis, according to which it is entry into export markets that leads to an increase in productivity, by looking at post-entry growth rates of productivity for the sub-sample of firms that were not exporting in the 1998-2000 period. *Active* export starters impact positively on TFP growth, and the difference with respect to the coefficient associated to the never exporting category is significant. Again, *passive* exporting strategies (Type 2) are not leading to significantly higher TFP growth, suggesting that firms who engage in foreign subcontracting are not benefiting from learning by exporting. The last four columns of Table 9

¹⁵ The percentages of export starters as compared to non exporters, or to the total number of firms, are in line with the ones reported in the empirical literature (see ISGEP, 2008; De Loecker, 2007; Girma et al., 2004).

show that the inclusion among the regressors of the pre-entry growth rate¹⁶ does not affect qualitatively the results.

Finally, Table 10 jointly takes into consideration the effects of exporting, foreign and domestic subcontracting activities on TFP growth for all the firms in the sample. The first two columns, consistently with the results of Table 9, show that *active* export starters increase their TFP more than never exporters (the omitted category). The coefficient for export stoppers is negative, according to expectations, but it does not reach a satisfactory level of significance. In a similar vein, in column 3 there is evidence that stopping to serve as subcontractors in domestic markets fosters productivity. The last two columns show that the positive impact of active exporting strategies on post-entry TFP growth is robust to the inclusion of the variables relative to the domestic subcontracting activity.^{17 18}

6. ROBUSTNESS

As has been shown in section 5, our results point towards the presence of a *subcontracting discount*, together with the traditional *export premia*. Moreover, *passive exporters* are outperformed by *active exporters* in both the pre-entry and post-entry periods. Since our estimates could potentially suffer from problems connected with sample selection, distortions on the computation of the export premia and of the subcontracting discount, some robustness checks are required.

As to the issue of sample selection, the *Unicredit-Capitalia* survey can be considered overall as fairly representative of the universe of Italian manufacturing firms with more than ten employees. However, the sample has not been randomly drawn from the population, but has been stratified by firm size (number of employees) geographical area, and industry classification, so that our results could be affected from self-selection bias. This could potentially lead to inconsistent and biased estimates of the parameters of interest. Fortunately, the dataset provides for each observed firm the weights that represent the inverse probability of selection, and such an information makes it possible to correct the estimates from the possible distortions due to the sampling procedure. After having run all the regressions using re-weighted samples, we obtained similar estimates, and key results were virtually unchanged.

Turning to the computation of the *subcontracting discount*, as pointed out in footnote 11, our TFP estimates for sub-contractors may be downward biased, as the left hand side variable (i.e.

¹⁶ By conditioning on this variable we are controlling that export starters are not simply continuing a previous pattern of growth.

¹⁷ As shown in Table 3, the X_{SfS_h} category accounts for 45 per cent of observations. Since the results reported on the first two columns of Table 10 are not duly taking into account the subcontracting activity at home, the estimates of the coefficients relative to the Type 2 category could be potentially biased downwards.

¹⁸ In a set of not reported regressions, we found that the results are not affected by the inclusion of the pre entry growth rate as an additional regressor.

value added) can be relatively lower due to their weak bargaining position. A first observation is that in the regression reported in Table 6, domestic and foreign sub-contracting activities have been included as dichotomous variables. This is a choice running against our results, since a lower value added can be reasonably expected only (or mostly) for firms exhibiting high sales shares due to “*production to order*” activities. In a set of not reported regressions, we included the sales share due to sub-contracting, together with its squared value, as additional explanatory variables. The coefficient of the former regressor was negative and significant, while the one for the quadratic variable was positive and significant. This latter result is clearly not consistent with the “weak bargaining position” story. As an additional check, we included among the right hand side variables the sales share directed towards other firms.¹⁹ Although a weak bargaining position would imply a negative impact of such a proxy, its coefficient turned out to be not significantly different from zero. Finally, a proxy for the number of firms using outsourcing in the same industry in which the firm is active was included only for the sub-sample of firms participating to the 9th wave (this information is not available for the 1998-2000 period). This would capture the effect of *the demand side* of outsourcing. While the variable was found, according to expectations, to impact positively on productivity, the other results were virtually unchanged.

Finally, it could be argued that our subcontracting variable, that we use to identify firms pursuing *passive exporting* strategies, is too broad, since it may include firms who are actively investing in brand name and in market research. For example, let us imagine two Italian products (for example, two cappuccino machines) that can be found in the shelves of a foreign large scale retailer like Wal-Mart. One product is bearing the brand and the trademark of the Italian manufacturer, while the other is a cheaper unit manufactured by an Italian firm according to Wal-Mart’s specifications and sold under one of Wal-Mart’s store brand names. Clearly, according to the definition given in Section 2, the latter manufacturer is the typical *passive* exporter we are interested in. A first observation is that the possible presence of *active* subcontractors among our firms runs again the findings of a subcontracting discount, which is instead a robust result of our analysis. However, we tried to tackle this issue by fully exploiting the informative content of our dataset. The information about sales distribution highlight that large retailers are responsible of 25 per cent of sales of foreign subcontractors (unfortunately, this information is available only for the 1998-2000 period), while data on foreign commercial penetration highlight that 17.60 per cent of firms undertook market penetration activities. In order to account for the impact of “active” exporting strategies for foreign subcontractors we included in Table 6 a new variable, $S_f^*Penetration$, that is the interaction between foreign subcontracting and foreign commercial

¹⁹ The Unicredit-Capitalia survey includes detailed information on how sales are distributed among retailers, gross retailers, distribution channels, direct sales to families and to other firms.

penetration. The results of the last three columns of Table 6 show that, while the export premia and the subcontracting discount in the domestic market are confirmed, the coefficient on S_f turns out to be negative and significant, while the coefficient on the interaction term is positive, significant, and of a larger magnitude. This gives robustness to our hypothesis that *passive* exporting strategies are associated with lower productivity levels, while more active strategies (*direct exporting* and, to a lesser extent, marketing investments for foreign subcontractors) are associated with better TFP performance.

7. CONCLUSIONS

Manufacturers typically choose in which markets to be active and how to serve them. For example, they can decide to remain confined within the national borders or to expand their activities abroad. In both cases, they can act as (forwardly) vertically integrated structures and/or as subcontractors that fulfill production orders placed by commissioning firms.

This paper considers both sub-contracting and exporting as the result of a self-selection process. We argue that the different internationalisation choices and internal organizational structures are related to the trade-off between unitary costs (required to reward the outsourcing firm that purchases the goods in the case of sub-contracting and to ship the goods abroad in the presence of an export activity) and fixed costs (required to organize the selling activity in domestic and foreign markets). The most productive firms should select *active* exporting strategies, while the poorest performers should act as sub-contractors in the domestic market. The other two options, i.e. using the sub-contracting channel to serve foreign markets and being vertically integrated at home, are associated with intermediate TFP values. Using a large dataset on Italian manufacturing firms observed for the years 1998-2003, we obtain results consistent with theoretical expectations. Descriptive statistics of estimated TFP levels display a productivity ranking where *active* strategies are found to be clearly superior to *passive* ones, and tests of stochastic dominance as well as appropriate regression analysis confirm the presence of an *export premia* and of a *sub-contracting discount*.

Looking at the dynamics of firms' types across the two periods under observation (1998-2000 and 2001-2003), we found that *persistent* exporters (*persistent* sub-contractors) are associated with the highest (lowest) TFP level, while both starting to export and, to a lesser extent, stopping to sub-contract have a positive impact on performance. The pre-entry and post-entry TFP growth rates confirm both the *self-selection hypothesis*, according to which more productive firms go abroad, and the *learning by exporting hypothesis*, according to which export entrants become more productive after entry in foreign markets, but only for *active* exporting strategies.

Overall, our results show that sub-contracting matters. In our dataset, exporters and domestic firms which do not use such a channel cover only 18 per cent and 8 per cent of observations, respectively, while a domestic (foreign) sub-contracting activity is found for 72 per cent (48 per cent) of observations. Neglecting such a pervasive phenomenon in empirical studies, that is considering *passive* and *active* export behaviour as two undifferentiated strategies, could seriously bias the results. Such findings contribute to a recent body of literature highlighting that, beyond differentiating between domestic firms and exporters, one should investigate deeply on the existing heterogeneity among trading firms too (Bernard et al., 2010; Ahn et al., 2010).

APPENDIX 1. DATASET

The Unicredit-Capitalia dataset (Survey on Manufacturing Firms) provides detailed qualitative and quantitative information on a large sample of Italian Manufacturing firms. The two waves which have been used cover respectively the period 1998-2000 and 2001-2003.

All firms with more than 500 employees are included in the sample, while firms hiring between 11 and 500 employees are stratified. The stratification of the sample has been implemented by dividing the universe of firms in different strata according to geographical area, size class (number of workers), and Pavitt's industry classification, and by using the average value added as stratification factor. Sample size and composition of each stratum have been obtained by using Neyman's formula, which seeks to minimize the sample variance. Sample weights are available, so that it is possible to translate the information at the sample level into information about the entire population of manufacturing firms with more than 10 employees.

Trimming procedure

Our original sample contained 1,847 firms. We retained those firms for which we observe in both waves balance sheet data and information on exporting and subcontracting, and we dropped firms that were not belonging to manufacturing sectors, i.e. firms in the classes 10, 23 and 39 of Ateco 91, two digit classification. The following trimming procedure, to get rid of firms which might have implemented merging or de-merging activity, was adopted: firms with annual growth rates in value added per worker, i.e. Va/L, greater than 100% and/or lower than -50% have been excluded.

TABLE A.1.1
Original sample and retained firms

	Original sample	After trimming procedure
Number of firms	1,847	1,537
Number of observations	11,082	8,787

Table A.1.2. compares information about firm size distribution and about the incidence of exporters (two obvious key indicators for the purposes of our paper) included in our sample with the same information recoverable from census data. While in our sample big firms and exporters are, as expected, over represented²⁰, the table shows that our sample is fairly representative of the universe.

TABLE A.1.2
Exporter Participation Rate and Size Distribution

Size-classes (employees)	% of Exporting Firms		% of Firms	
	Universe*	Our sample	Universe*	Our sample
10-19	41%	58%	59%	31%
20-49	58%	69%	28%	42%
50-249	76%	86%	11%	20%
250	83%	93%	2%	7%
Total	50%	70%	100%	100%

*Source: ISTAT (Italian Statistical Institute) - year 2005

²⁰ While in Italian manufacturing one over two firms with more than 10 employees is exporting (the aggregate exporter participation rate reduces to less than 20 per cent if we include firms with less than 10 employees), in our final dataset 7 over 10 firms are classified as exporters.

APPENDIX 2. TFP ESTIMATION

We assume a two-factor industry specific production function.

$$\ln Y_{it} = \gamma + \alpha L_{it} + \beta K_{it} + \omega_{it} + \eta_{it}$$

where Y_{it} is valued added, L_{it} is deflated labour cost and K_{it} is capital. η_{it} is a iid component and ω_{it} is the transmitted component that is used as a measure of productivity. By using intermediate inputs to control for correlation between input and unobserved productivity, Levinsohn and Petrin (2003) semi-parametric method solves the problem of simultaneity. This procedure was implemented using the `levpet` STATA procedure (see Petrin et al., 2004). In order to have enough observations to employ this procedure we estimated industry specific production functions for 13 “macro” industrial sectors instead of the 20 two digit manufacturing classes.

TABLE A.2
Industry aggregation adopted for the estimation of production functions

Ateco 91 2 digit classification	Number of observations	Aggregated industries	Number of observations
15 – Food and beverages	679	1	679
17 – Textiles	714	2	1,026
18 – Clothing	312	2	
19 – Leather	379	3	379
20 – Wood	336	4	336
21 – Paper products	267	5	490
22 – Printing and publishing	223	5	
24 – Chemicals	401	6	401
25 – Rubber and plastics	500	7	500
26 – Non metal minerals	558	8	558
27 – Metals	250	9	1,502
28 – Metal products	1,252	9	
29 – Non-electric machinery	1,387	10	1,387
30 – Office equipment and computers	28	11	732
31 – Electric machinery	348	11	
32 – Electronic material	194	11	
33 – Medical apparel and instruments	162	11	
34 – Vehicles	154	12	210
35 – Other transportation	56	12	
36 – Furniture	587	13	587

Kolmogorov-Smirnov tests

In order to test whether a cumulative distribution $F(z)$ first order stochastically dominates a cumulative distribution $G(z)$ we perform Kolmogorov-Smirnov two sided and one sided tests.

The two sided tests considers the following hypothesis:

$$H_0 : F(z) - G(z) = 0 \quad \forall z \in \mathfrak{R} \quad \text{vs.} \quad F(z) - G(z) \neq 0 \quad \text{for some } z \in \mathfrak{R}$$

The one sided tests considers the following hypothesis:

$$H_0 : F(z) - G(z) \leq 0 \quad \forall z \in \mathfrak{R} \quad \text{vs.} \quad F(z) - G(z) > 0 \quad \text{for some } z \in \mathfrak{R}$$

The cumulative distribution $F(z)$ stochastically dominates (i.e. is to the right of) $G(z)$ if the null hypothesis in the two-sided test is rejected (the two distributions are not equal) and the null hypothesis in the one-sided test is not rejected. For further details see Delgado et al. (2002).

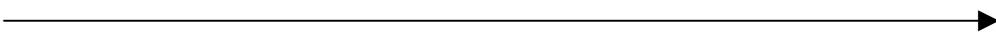
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TABLE 1

Productivity Rankings: Domestic Firms, Exporters, Multinational Companies

DOMESTIC PRODUCTION		TRADE WITH INTERMEDIARIES		DIRECT EXPORT	FDI	
<i>Domestic Outsourcing/ Subcontracting</i>	<i>Vertical Integration in Domestic Market</i>	<i>Passive/Indirect Export</i>	<i>Foreign Outsourcing</i>			
<i>Increasing Levels of Productivity</i> 						
Domestic Production		-	-	Export	-	Melitz (2003)
Domestic Production		-	-	Export	FDI ^a	Helpman et al. (2004)
Domestic Outsourcing	Domestic Integration (backward)		Foreign Outsourcing	-	FDI ^b	Antras and Helpman (2004)
Domestic Production		-	-	Export	FDI ^a	Tomiura (2007)
-		-	Foreign Outsourcing	-	FDI ^b	
Domestic Production		<i>Indirect</i> Export	-	Export	-	Ahn et al. (2010), Akerman (2010)
Domestic Subcontracting	Domestic Integration (forward)	<i>Passive</i> Export	-	Export	-	Razzolini and Vannoni (2007)

* The theoretical models do not predict a productivity ranking between Export and Foreign Outsourcing, even if Tomiura (2007) empirically found that the two strategies were sorting roughly the same productivity levels.

a. Horizontal FDI; *b.* Vertical FDI

TABLE 2
Transition Matrix in and out of Exporting (Panel A) and Sub-Contracting Activities (Panel B)

	Panel A		Panel B		
	Export in 2001-2003	No export in 2001-2003	Sub- contractor in 2001-2003	No sub- contractor in 2001-2003	
Export In 1998-2000	1,003 (5,739)	76 (435)	Sub-contractor in 1998-2000	999 (5716)	183 (1,051)
Do not export in 1998-2000	83 (480)	375 (2,133)	No sub-contractor in 1998-2000	163 (930)	192 (1,090)

Note: Number of observations in parenthesis.

TABLE 3
Descriptive Statistics by Firm's Type

	X	XS _f	D	XS _h	XS _f S _h	DS _h
Number observations	1,586	222	672	404	3,986	1,917
Percentage	18%	3%	8%	5%	45%	22%
Sales share of domestic sub-contracting	-	-	-	54% (35.94)	54% (29.63)	90% (23.50)
Sales share of foreign sub- contracting	-	58% (35.12)	-	-	33% (26.76)	-
Sales share of exports (2001-2003) [†]	40% (28.32)	70% (28.13)	-	22% (19.44)	37% (28.27)	-

Note: Standard deviations in parenthesis. [†] This share includes sales from direct export plus sales from foreign sub-contracting. Information on the percentage of exports over turnover for the period 1998-2000 is not available.

TABLE 4
Firms' Characteristics by Export status (Panel A) and Sub-Contracting Status (Panel B).

	Panel A		Panel B	
	Exporters	Non exporters	Sub-contractors	Non Sub-contractors
Absolute TFP	7.07 (4.38)	6.34 (3.36)	6.67 (3.44)	7.46 (5.76)
TFP relative to industry average	1.04 (0.42)	.89 (0.33)	0.96 (0.34)	1.12 (0.54)
Absolute Va/L	45.73 (21.75)	41.83 (22.89)	42.90 (19.12)	50.00 (29.31)
Va/L relative to industry average	1.03 (0.46)	0.93 (0.46)	0.97 (0.41)	1.08 (0.59)
Absolute Size	104.66 (294.53)	45.43 (215.16)	62.26 (155.92)	167.70 (482.18)
Size relative to industry average	1.18 (2.86)	0.56 (1.71)	0.75 (1.52)	1.81 (4.47)
N° Observations	6,198	2,589	6,706	2,081

Note: Standard deviations in parenthesis.

TABLE 5

Firms' Characteristics by Export Status (Panel A) and by Sub-Contracting Status (Panel B).

	Exporting firms				Non exporting firms	
	With domestic sub-contracting		Without domestic sub-contracting		With domestic sub-contracting	Without domestic sub-contracting
	With foreign sub-Contracting	Without foreign sub-contracting	With foreign sub-contracting	Without foreign sub-contracting		
	$XS_f S_h$	XS_h	XS_f	X	DS_h	D
TFP relative to industry average	1.00 (0.35)	0.97 (0.36)	1.00 (0.32)	1.17 (0.55)	0.86 (0.25)	1.00 (0.49)
Va/L relative to industry average	1.01 (0.42)	0.93 (0.37)	0.96 (0.42)	1.12 (0.56)	0.90 (0.34)	1.02 (0.68)
Size relative to industry average	0.84 (1.68)	0.77 (0.99)	1.05 (2.11)	2.16 (4.76)	0.42 (0.41)	1.00 (3.25)
N° observations	3,986	404	222	1,586	1917	672

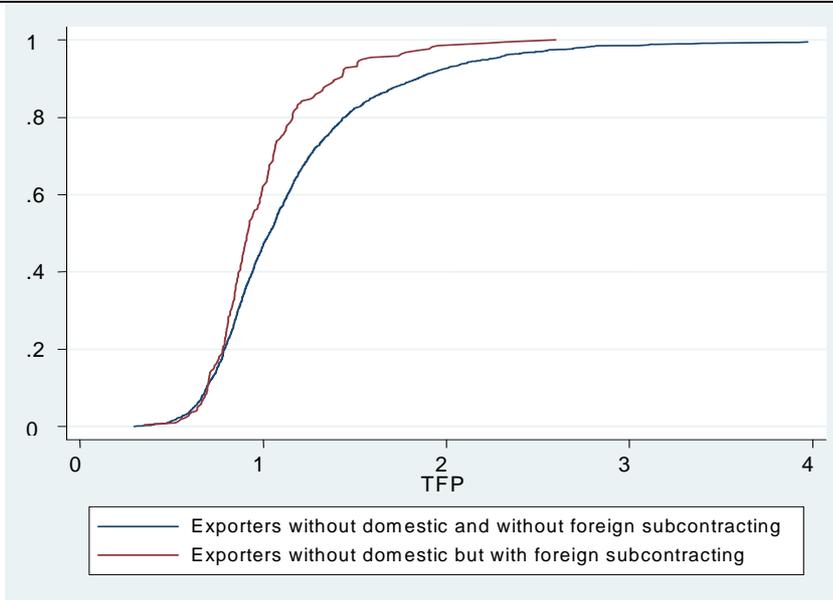
Note: Standard deviations in parenthesis

FIGURE 1

Comparison of Cumulative Distribution Functions of Estimated TFP for Exporters with (XS_f) and without Foreign Sub-Contracting (X)

(a)

Cumulative distributions functions of estimated TFP for exporters with and without foreign sub-contracting



(b)

Two-sample test for equality of distribution functions

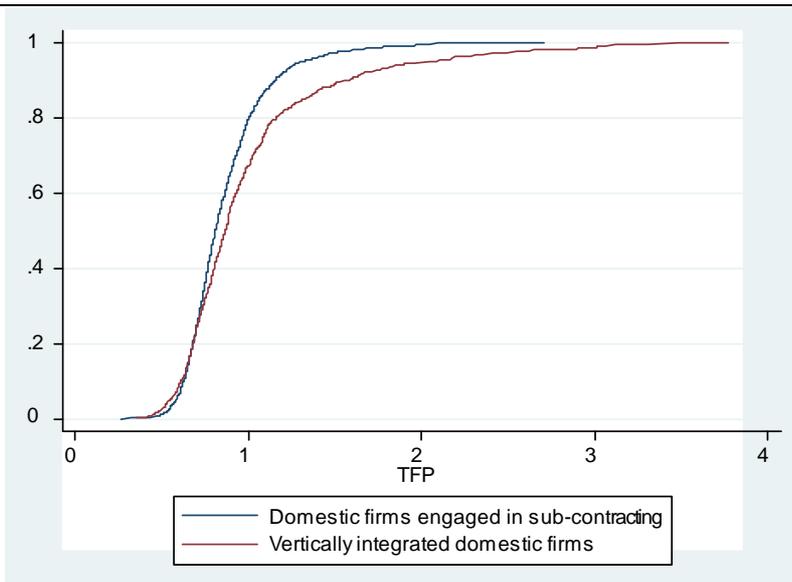
Kolmogorov-Smirnov test	
Two sided test	0.1988 [0.000]
One sided test	-0.0020 [0.856]
Combined K-S	0.1988 [0.000]
Fligner-Policello test	
U	-8.891 [0.000]

FIGURE 2

Comparison of Cumulative Distribution Functions of Estimated TFP for Domestic Vertically Integrated Firms (D) and Domestic Firms Engaged in Sub-Contracting (DS_h)

(a)

Cumulative distributions functions of estimated TFP for domestic vertically integrated firms and domestic sub-contractors



(b)

Two-sample test for equality of distribution functions

Kolmogorov-Smirnov test	
Two sided test	0.1318 [0.000]
One sided test	-0.0248 [0.542]
Combined K-S	0.1318 [0.000]
Fligner-Policello test	
U	-4.561 [0.000]

TABLE 6
Estimates of Export Premia and Sub-Contracting Discount

Dependent variable	lnTFP	ln(Va/L)	lnSize	lnTFP	ln(Va/L)	lnSize
Exporting (X)	0.142*** (0.012)	0.094*** (0.016)	0.585*** (0.035)	0.144*** (0.012)	0.096*** (0.016)	0.593*** (0.035)
Domestic sub-contracting (S _h)	-0.111*** (0.011)	-0.087*** (0.014)	-0.291*** (0.031)	-0.111*** (0.011)	-0.086*** (0.014)	-0.290*** (0.031)
Foreign sub-contracting (S _f)	-0.012 (0.012)	-0.001 (0.015)	-0.168*** (0.035)	-0.041*** (.012)	-0.032** (0.016)	-0.279*** (0.036)
S _f *Penetration	-	-	-	0.093*** (0.010)	0.102*** (0.012)	0.360*** (0.033)
Constant	0.864*** (0.019)	3.746*** (0.029)	3.269*** (0.051)	0.867*** (.019)	3.749*** (0.029)	3.279*** (0.051)
Observations	8,787	8,787	8,787	8,787	8,787	8,787
R-squared	0.65	0.15	0.12	0.65	0.16	0.13

Note: Robust standard error in parenthesis. All regressions include 2 digit industry dummies, year dummies and geographical dummies. *** significant at 1%, ** significant at 5%, * significant at 10%.

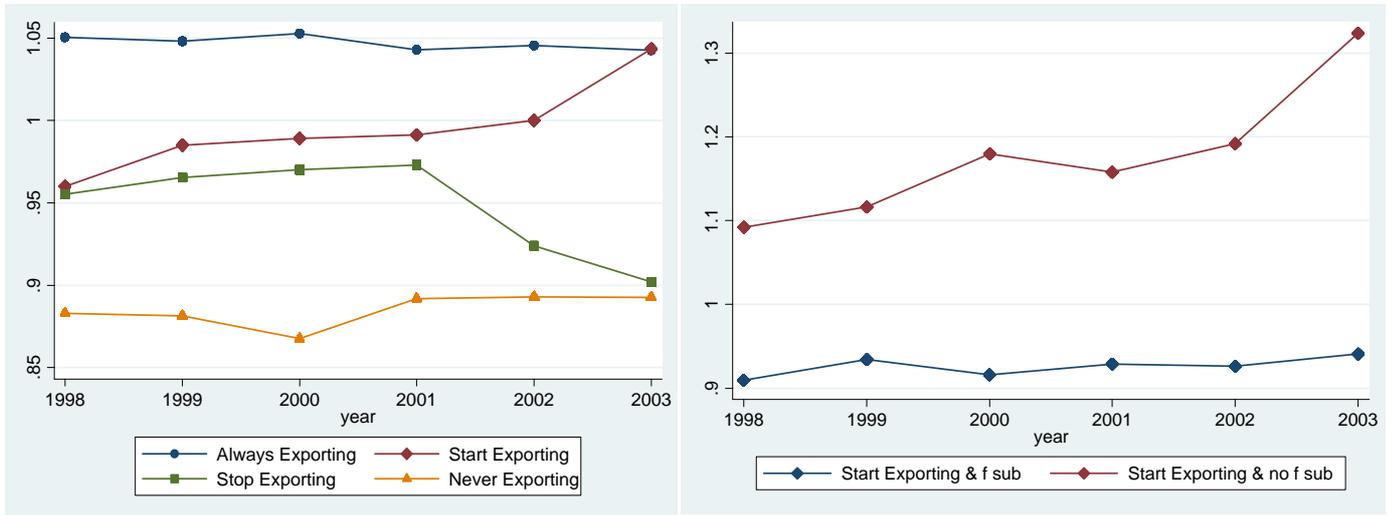
TABLE 7
Productivity Measures and Firm's Type

Dependent variable	LnTFP	ln(Va/L)	lnSize
X	0.267*** (0.012)	0.198*** (0.014)	0.899*** (0.037)
XS _f	0.143*** (0.020)	0.062** (0.028)	0.548*** (0.070)
XS _f S _h	0.137*** (0.008)	0.100*** (0.010)	0.407*** (0.020)
D	0.116*** (0.017)	0.087*** (0.022)	0.212*** (0.043)
XS _h	0.094*** (0.017)	0.029 (0.020)	0.398*** (0.045)
Constant	0.750*** (0.019)	3.657*** (0.028)	3.008*** (0.049)
Observations	8,787	8,787	8,787
R ²	0.65	0.15	0.12
Implied differences			
X-XS _f	0.124 [0.000]	0.136 [0.000]	0.352 [0.000]
X-XS _f S _h	0.130 [0.000]	0.097 [0.000]	0.492 [0.000]
XS _f -XS _f S _h	0.006 [0.770]	-0.039 [0.156]	0.141 [0.044]
XS _f -D	0.0271 [0.280]	-0.025 [0.459]	0.336 [0.000]
XS _f S _h -D	0.0213 [0.207]	0.014 [0.537]	0.195 [0.000]
XS _f S _h -XS _h	0.0429 [0.009]	0.071 [0.000]	0.009 [0.838]
D-XS _h	0.0216 [0.329]	0.057 [0.036]	-0.186 [0.002]

Note: Robust standard error in parenthesis. P-values in square brackets. All regressions include 2 digit industry dummies, year dummies and geographical dummies. *** significant at 1%, ** significant at 5%, * significant at 10%. The omitted category is DS_h.

FIGURE 3

Patterns of Relative TFP Measures according to “Transition” in and out of Exporting



(a)

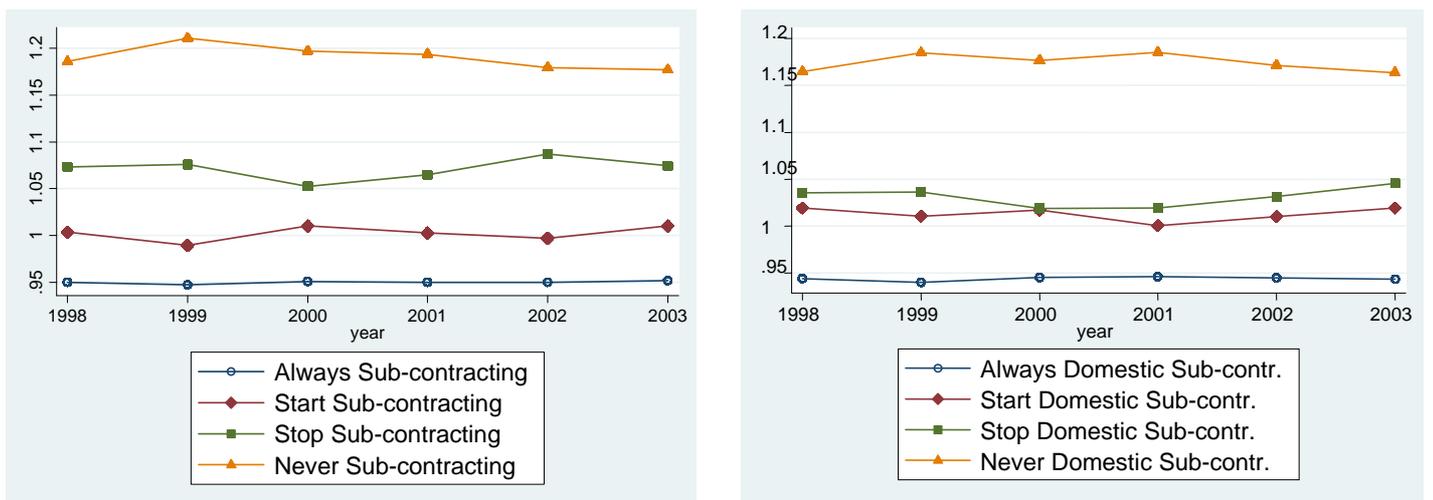
Transition in and out of exporting

(b)

Export starters with and without foreign sub-contracting

FIGURE 4

Patterns of Relative TFP Measure According to “Transition” in/out of Sub-Contracting



(a)

Transition in and out sub-contracting (domestic or foreign).

(b)

Transition in and out domestic sub-contracting status

TABLE 8
Pre-Entry Differences in Productivity

Dependent variable	Productivity levels						Productivity growth rates	
	lnTFP 1998	lnTFP 1999	lnTFP 2000	ln(Va/L) 1998	ln(Va/L) 1999	ln(Va/L) 2000	Δ lnTFP 1998-2000	Δ ln(Va/L) 1998-2000
Start exporting <i>Type 1</i>	0.994*** (0.097)	1.030*** (0.089)	1.041*** (0.094)	3.528*** (0.179)	3.569*** (0.185)	3.642*** (0.176)	0.047 (0.060)	0.109* (0.059)
Start exporting <i>Type 2</i>	0.917*** (0.056)	0.937*** (0.059)	0.885*** (0.059)	3.548*** (0.108)	3.599*** (0.107)	3.583*** (0.102)	-0.031 (0.042)	0.032 (0.041)
Never exporters	0.893*** (0.046)	0.890*** (0.049)	0.850*** (0.048)	3.541*** (0.091)	3.566*** (0.091)	3.542*** (0.086)	-0.046 (0.033)	-0.006 (0.030)
Observations	458	458	458	458	458	458	458	458
R-squared	0.98	0.98	0.97	0.99	0.99	0.99	0.07	0.09
Test								
<i>Type 1</i> = never exporting	[0.31]	[0.11]	[0.04]	[0.93]	[0.99]	[0.50]	[0.09]	[0.04]
<i>Type 2</i> = never exporting	[0.45]	[0.21]	[0.34]	[0.89]	[0.52]	[0.43]	[0.62]	[0.21]
<i>Type 1</i> = <i>Type 2</i>	[0.45]	[0.31]	[0.11]	[0.90]	[0.84]	[0.70]	[0.20]	[0.21]

Robust standard errors in parentheses. P-values in square brackets. All regressions include 2 digit industry dummies and geographical dummies. Regressions on TFP levels include years dummies. * significant at 10%; ** significant at 5%; *** significant at 1%. The sample includes firms that do not export in 1998-2000. *Type 1*: export starters without foreign sub-contracting; *Type 2*: export starters with foreign subcontracting.

TABLE 9
Post-Entry Growth Rates

	$\Delta \ln TFP$ 2001-2003	$\Delta \ln TFP$ 2002-2003	$\Delta \ln(Va/L)$ 2001-2003	$\Delta \ln(Va/L)$ 2002-2003	$\Delta \ln TFP$ 2001-2003	$\Delta \ln TFP$ 2002-2003	$\Delta \ln(Va/L)$ 2001-2003	$\Delta \ln(Va/L)$ 2002-2003
Start exporting <i>Type 1</i>	0.148** (0.066)	0.060 (0.052)	0.224*** (0.073)	0.061 (0.059)	0.156** (0.062)	0.062 (0.052)	0.230*** (0.073)	0.059 (0.060)
Start exporting <i>Type 2</i>	0.028 (0.049)	-0.009 (0.037)	0.079 (0.052)	-0.025 (0.042)	0.025 (0.049)	-0.010 (0.037)	0.082 (0.052)	-0.027 (0.042)
Never exporting	0.021 (0.034)	-0.000 (0.024)	0.075** (0.033)	-0.002 (0.028)	0.014 (0.034)	-0.002 (0.024)	0.075** (0.033)	-0.002 (0.028)
$\Delta \ln TFP$ 1998-2000					-0.165 (0.069)	-0.050 (0.047)	-0.052 (0.070)	0.023 (0.046)
Observations	359	386	359	386	359	386	359	386
R-squared	0.11	0.08	0.13	0.09	0.10	0.08	0.13	0.09
Test								
<i>Type 1</i> = never exporting	[0.02]	[0.21]	[0.02]	[0.21]	[0.02]	[0.17]	[0.01]	[0.23]
<i>Type 2</i> = never exporting	[0.83]	[0.75]	[0.92]	[0.44]	[0.83]	[0.77]	[0.85]	[0.41]
<i>Type 1</i> = <i>Type 2</i>	[0.05]	[0.20]	[0.03]	[0.13]	[0.05]	[0.17]	[0.02]	[0.13]

Robust standard errors in parentheses. * significant at 10%; ** significant at 5%; *** significant at 1%. All regressions include 2 digit industry dummies and geographical dummies. The sample includes firms that do not export in 1998-2000. The number of observations does not coincide with number of starters and never exporting, i.e. 83+375=458, due to missing values in the measures of productivity in 2001, 2002 and/or 2003.

TABLE 10
Post-Entry and Post-Integration Growth Rates

	$\Delta \ln TFP$ 2001-2003	$\Delta \ln(Va/L)$ 2001-2003	$\Delta \ln TFP$ 2001-2003	$\Delta \ln(Va/L)$ 2001-2003	$\Delta \ln TFP$ 2001-2003	$\Delta \ln(Va/L)$ 2001-2003
Start exporting <i>Type 1</i>	0.117** (0.057)	0.140** (0.066)			0.108* (0.059)	0.135** (0.067)
Start exporting <i>Type 2</i>	-0.000 (0.032)	0.001 (0.037)			0.004 (0.032)	0.003 (0.037)
Stop exporting	-0.035 (0.030)	-0.019 (0.033)			-0.036 (0.030)	-0.021 (0.033)
Always exporting	0.017 (0.016)	0.014 (0.018)			0.015 (0.016)	0.013 (0.018)
Stop Domestic Sub-contr.			0.032* (0.018)	0.018 (0.021)	0.029 (0.019)	0.014 (0.021)
Never Dom. Sub-contr.			0.027 (0.021)	0.020 (0.022)	0.023 (0.021)	0.015 (0.022)
Start Domestic Sub-contr.			0.006 (0.019)	-0.004 (0.022)	0.002 (0.019)	-0.007 (0.022)
Constant	0.042* (0.025)	0.064** (0.027)	0.033 (0.026)	0.063** (0.029)	0.026 (0.027)	0.056* (0.030)
Observations	1,233	1,233	1,233	1,233	1,233	1,233
R-squared	0.04	0.05	0.04	0.04	0.05	0.05

Robust standard errors in parentheses. * significant at 10%; ** significant at 5%; *** significant at 1%.

All regressions include 2 digit industry dummies and geographical dummies. The omitted categories are “never exporting” and “always domestic subcontractor”. The number of observations does not coincide with the number of firms in the full sample (1537) due to missing values in the measures of productivity in 2001 and/or 2003.