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Trade and Profitability: Is there an export Premium? Evidence from Italian manufacturing firms

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Trade and Profitability: Is there an export premium? Evidence from Italian manufacturing firms*

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Abstract

Using firm level data this study investigates the relation between export activity and firm's profitability. The paper shows that, contrary to other performance indicators such as productivity, exporting activity is not systematically associated to higher firm's profitability. This is shown both by means of non-parametric methods and, with an approach that is more standard within the empirical trade literature, by regression techniques that try to identify an "export premium".

JEL codes: F1 - Trade; D2 - Production and Organizations; L6 - Industry Studies: Manufacturing

Keywords: export premium; productivity; profitability

1 Introduction

Growing attention in industrial economics is devoted to understanding the differences between exporting and non-exporting firms and the effects of these differentials on industry dynamics (Bernard et al.; 2007).

Such trend in the trade literature is part of a broader research project that, employing the recently available firm-level database, has contributed to identify relevant and persistent intra-industry heterogeneities (see, among the many contributions, Bartelsman et al.; 2009; Dosi; 2007; Jensen and McGuckin; 1997). Export is considered because it is one of the factor that is associated with the observed differences among firms, and also because trade, via its

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pro-competitive effects is thought to possibly shape the dynamics of industries, in terms of market shares, average productivity and profits.

In general, it is possible to identify the common reference to this resurgence in empirical works in those theoretical models of industry dynamics where firms are selected on the basis of their productivity, with more productive enterprises taking on larger shares of the market and less productive units shrinking and eventually exiting.[1] This concept was initially put forward in an analytical setting of industry dynamics where trade was not contemplated (see, among the others Jovanovic; 1982; Hopenhayn; 1992; Ericson and Pakes; 1995). It was only later that these models started to encompass international trade, too (see for instance Melitz; 2003; Melitz and Ottaviano; 2008). This reveals an effort of the theory to account for the many empirical contributions that started to appear, reporting substantial productivity differentials between exporting/ non-exporting firms (see Bernard and Jensen; 1995 for the U.S. and Bernard and Wagner; 1997 for Germany). This stylized fact was formalized, generally in a monopolistic competition setting, through the assertion that trade, by substantially increasing the size of the market, would generate pro-competitive effects. In particular, trade would highlight and exacerbate the already existing productivity differences among firms. Firms would now be competing on a bigger market with resulting smaller mark-ups, that would turn the "selection" switch on, as a result, only firms whose productivity is higher than a given threshold would survive. As a consequence, the resulting distribution of industry productivity after that trade is introduced, would shift to the right as market shares of unproductive (and exiting) firms are re-allocated to more productive (and surviving and expanding) companies.[2]

The theoretical conjecture that foresees a relevant productivity gap between exporting and non-exporting firms is very well supported by empirical evidence. Thus attention soon shifted to questions regarding how and when such differential came to be (Bernard and Jensen; 1999, 2004; Girma et al.; 2004). That is, scholars started to investigate if exporting firms were already over-performing before entry on the export market or, on the contrary, if they emerged as more productive afterwards (see for instance Wagner; 2002). The latter hypothesis contemplates various mechanisms of learning that are related to the activity of export, as for instance, climbing up the learning curve thanks to the higher quantity that is being produced, that sort of 'technological' learning due to international contacts (Aw et al.; 2000), or through yet other mechanisms. Although there exists evidence supporting both hypothesis, self-selection and post-entry mechanisms, respectively, the conjecture that firms are more productive before starting to export has gained consensus, also thanks to some theoretical models that incorporate such hypothesis (most notably Melitz; 2003; Melitz and Ottaviano; 2008).

This brief account of the recent development in the trade literature has shown that the attention, both at the theoretical and at the empirical level, has for long been much centered on the existences of a productivity gap between exporting and non-exporting firms. More productive firms do expand, and when trade is introduced, they can afford the sunk cost and eventually start exporting.

[1] A disclaimer is due in this respect. Although this is the main idea underpinnings most of the theoretical models, evidence is more blurred. Many empirical works report, for instance, that in the decomposition of sectoral productivity growth, the term that accounts for firms/plants level productivity growth (*within term*) is bigger than that accounting for the reallocation of market share to more productive firms/plants (*between term*). See for instance Baily et al. (1992); Foster et al. (2001); Baldwin and Gu (2006). A similar exercise that provides germane results is that in Bottazzi et al. (2008).

[2] As said, this latter mechanism, that involves ascribing the biggest share of the productivity growth to reallocation, receive more contrasting evidence. For instance the results in Baily et al. (1992) and Baldwin and Gu (2006) report that for Canada and US the main driving force of (industry) productivity growth resides in the firm-level effect (the so-called within effect in the productivity growth decomposition).

In this paper we investigate the relation between export activity and profitability using a recently released firm level database of Italian enterprises. We directly address the question of whether exporting firms are more profitable and grow more than their non-exporting competitors. In other words, is it possible to identify an export premium also for profitability, similarly to what has been found for productivity? To the best of our knowledge the first attempts in this direction, and the only one to date, are the papers by Fryges and Wagner (2008) and Loecker and Warzynski (2009). In the former, the authors, that employ two surveys from the German Statistical Office, found a significant, though rather small, profitability difference in favor of exporting firms. At the theoretical level, the only work to explicitly address the issue of profitability, as price mark-ups, is that by Melitz and Ottaviano (2008). In such a setting, trade, or, for that matter, trade liberalization,[3] by causing a bigger size of the market, lights up the market "selection" device, so that, due to increased competition, less productive firms, also those with lower mark-ups, are doomed to exit. As in Melitz (2003) it is only a subset of the more productive firms to export. The surviving firms with a higher cost draw would only serve the domestic market and would enjoy smaller mark-ups with respect to exporting, lower cost firms. Thus, as far as profitability is concerned, this framework delivers two main messages. The first concerns the comparative static effects associated to any trade liberalization, that is all surviving firms are worse off in terms of price mark-ups, and this is due to the pro-competitive effects of trade that affect all firms indistinguishably. Second, trade preserves the rankings of firms by profitability, as price mark-ups. Profitability, is assigned once and for all with the draw of a firm's productivity. Thus high productivity (low cost) firms will permanently enjoy higher mark-ups than their competitors and in an open economy they will also get a share of their profits from their revenues abroad.

In this work we directly address the question of whether exporting firms also appear to be more profitable and if they grow more than their industry competitors. In order to do that we will employ the census of Italian firms. We start with some exploratory data analysis aimed at looking for the existence of a more adequate definition of exporter that would take into consideration the export intensity of firms. That is, we try to identify if the differences among firms, along several dimensions of their activity, arise with the simple status of exporter, or on the contrary, if such differences become apparent only beyond some threshold level of export intensity. Then, before attacking head on the issue of profitability, we verify the existence of a significant productivity export premium also after the euro introduction, in order to make sure that this empirical regularity holds across time, as well as under different institutional settings. After that the productivity premium has been confirmed for both sub-periods, pre and post euro, we show both by non-parametric and parametric methods that there does not exist clear evidence of a positive relation between export activity and profitability; and not only that, but there are even a few sectors displaying a negative effect associated to the export status of a firm.

We proceed as follows. Section 2 describes the database that has been used in the empirical analysis. Section 3 reports descriptive statistics on the proportion of firms exporting in the various manufacturing sectors and also considers how imposing a threshold - on the basis of export intensity - affects the analysis. Further, Section 4 and 5 report the results, respectively, of the non-parametric analysis and of the regressions. Section 6 concludes.

[3]In between, notice that the euro introduction can be considered as one of such trade liberalization event.

NACE - SECTOR	'89	'90	'91	'92	'93	'94	'95	'96	'97	'98	'99	'00	'01	'02	'03	'04
15 Food, beverage	51.1	52.2	52.8	56.4	60.8	66.5	52.1	67.5	57.5	73.4	74.1	75.0	75.9	75.3	75.6	75.3
17 Textiles	62.4	62.1	62.0	63.9	68.8	71.1	59.2	69.3	60.7	75.2	74.2	75.7	76.3	76.8	78.0	77.4
18 Wearing apparel	49.4	45.3	44.9	45.5	48.8	50.6	42.4	52.3	47.4	61.5	60.1	61.4	61.6	61.5	64.4	64.5
19 Tanning leather luggage footwear	76.9	72.5	74.5	74.1	77.5	79.3	59.5	76.5	68.2	83.6	83.8	81.5	82.3	82.8	82.1	82.1
20 Wood & cork	46.4	48.5	48.8	50.8	53.8	59.8	54.7	65.5	58.4	65.5	65.9	65.8	68.8	68.5	67.4	68.2
21 Pulp & paper	61.8	63.4	65.2	71.7	72.8	76.5	66.1	74.4	69.7	82.6	81.8	81.0	82.7	84.6	84.3	83.6
22 Recorded media	44.3	44.3	43.6	48.5	57.1	60.7	44.1	62.5	53.2	63.6	59.3	60.9	63.2	63.0	66.0	63.4
23 Coke, petroleum	34.2	33.7	39.5	37.9	49.4	50.6	37.5	50.0	42.1	53.7	45.7	43.9	52.2	55.1	48.9	48.4
24 Chemicals prod	77.2	78.8	78.4	85.3	84.3	87.5	76.1	80.9	72.0	89.5	90.0	91.9	91.5	89.9	92.2	92.4
25 Rubber, plastic	73.5	74.3	77.0	80.5	82.8	86.8	72.0	84.5	72.6	88.3	88.0	86.9	88.6	88.5	89.1	89.0
26 Other non-metall	54.1	52.8	53.2	55.3	57.4	60.9	44.6	64.6	57.8	65.1	64.3	64.4	63.8	63.1	62.3	63.9
27 Basic metals	69.0	67.7	68.0	74.3	75.9	80.1	64.1	78.5	62.9	81.5	80.7	82.0	82.3	81.2	83.1	84.3
28 Fabricated metal	54.5	55.1	56.8	57.6	59.7	63.7	46.0	64.7	55.6	64.3	62.7	62.9	64.2	64.4	65.4	65.8
29 Machinery	84.1	84.5	85.0	86.3	86.5	88.1	72.8	84.7	74.0	88.9	88.3	88.3	88.9	88.9	88.9	88.8
30 Office machinery	62.2	73.9	80.0	82.6	76.4	73.2	69.8	78.6	51.2	71.0	71.1	75.2	71.5	71.9	71.9	69.1
31 Electrical mach	61.2	61.4	62.2	65.9	68.0	72.5	61.1	71.1	61.6	73.6	74.4	73.3	74.0	76.0	76.1	77.4
32 Radio, tv, TLC	72.3	73.4	71.6	73.4	69.6	72.9	59.6	67.0	59.3	73.1	77.2	73.1	73.9	75.9	75.4	77.7
33 Medical, optical	75.8	70.2	75.8	76.7	78.3	80.9	73.0	83.0	71.2	84.2	85.8	83.9	84.0	85.3	85.0	87.8
34 Motor vehicles	72.5	70.2	73.8	74.6	78.1	81.2	68.7	80.2	74.6	83.1	83.4	84.5	84.8	84.7	85.1	85.5
35 Other transport	65.2	64.2	66.8	65.5	65.3	74.5	53.5	63.9	57.4	68.8	69.0	67.8	68.4	66.2	62.9	62.5
36 Manufact nec	72.2	73.3	74.3	77.3	77.4	82.8	60.0	82.8	74.5	88.4	87.7	87.6	87.2	87.7	88.0	87.0

Table 1: Percentage of firms exporting (UE and extra-UE) in each 2 digit sector. Source: Our elaboration on Micro.3 and COE.

2 Data

The research we present here draws upon the Micro.3 databank jointly developed with the Italian Statistical Office (ISTAT).[4] Micro.3 is based on the census of Italian firms yearly conducted by ISTAT and contains information on firms in all sectors of the economy for the period 1989-2004. The census conducted by ISTAT contains standard accounting information appearing in firms' financial statement. Further, exploiting the existence of a unique code for the identification of the firm, it was possible to link to Micro.3 other information collected by Istat, most notably for the present work, the data on international trade ("commercio con l'estero" - COE). The census monitors firms bigger than 20 employees. In particular, starting in 1998 the census of the whole population of firms only concerns companies with more than 100 employees. As far as firms in the range of employment 20-99 are concerned, ISTAT directly monitors a "rotating sample" which varies every five years. At the same time, 1998, ISTAT has started to collect data from the financial statement that limited liability firms have to disclose in accordance to Italian law.[5] This last source of information has contributed to further increase the coverage of the present database Grazzi et al. (2009).

In synthesis, then, three sources of information on Italian firms have been merged: the census for firms bigger than 100 employees, a "rotating sample" survey for firms in the range of employment 20-100, and data from financial statements. Incidentally, note that in some cases we had two different sources of information providing data for the same firm and variable. Thus, it was possible to check for the reliability and consistency of the two sources. The results of these checks were largely positive and are available in Grazzi et al. (2009).

In the end, Micro.3 contains data for around 130000 Italian firms; 60000 of them are active

[4]The database has been made available for work after careful censorship of individual information. More detailed information concerning the development of the database Micro.3 are in Grazzi et al. (2009).

[5]Limited companies (*società di capitali*) have to hand in a copy of their financial statement to the Register of Firms at the local Chamber of Commerce in accomplishment to article 2435 of the Civil Code. Then the Union of the Chambers of Commerce gather the data from local units, and it is this latter database that is finally provided to ISTAT.

	t+1		
t	0	1	Total
0	16,082	4,132	20,214
	(79.56)	(20.44)	(100)
1	5,054	43,503	48,557
	(10.41)	(89.59)	(100)
Total	21,136	47,635	68,771
	(30.73)	(69.27)	(100)

	t+1		
t	0	1	Total
0	159,516	13,781	173,297
	(92.05)	(7.95)	(100)
1	5,054	155,940	170,753
	(8.68)	(91.32)	(100)
Total	174,329	169,721	344,050
	(50.67)	(49.33)	(100)

Table 2: Transition matrix in and out the export market. Absolute and relative (in brackets) frequencies. Our elaboration on Micro.3 and COE.

in the Manufacturing sectors which will be the object of this study. The possibility to resort to a further source of data from 1998 onward also resulted in an increased representativity of Micro.3 on the whole manufacturing sector. In general, to give some coordinates, Micro.3 covers around - depending on the year of observation - 50-60% of the value added generated by all Italian firms in the manufacturing sectors, NACE 15 to 37 (more details in Grazzi et al.; 2009).

3 Descriptive Statistics

Micro.3 covers a pretty long time span, 1989-2004. This period also includes the introduction of the euro, thus one would expect to observe an increase in the percentage of exporters between the beginning and the end of the period. This conjecture is confirmed by the growing proportion of firms exporting as displayed in Table 1.[6] The table reports, for different years, the share of firms exporting in each sector. A firm is considered to be an exporter, no matter of the share of its cross-boarder sales. The percentages in Table 1 report an increasing share over time of the proportion of firms that export, and such trend is common to all manufacturing sectors.

In particular, it is quite impressive to notice that in some sectors, like for instance that of Manufacturing of Chemical Products (NACE 24) and Machinery and Equipment n.e.c. (NACE 29) around 90% of firms were exporting as of 2004, among firms with more than 20 employees.

Given these very high proportions of exporting firms in all years, how persistent is the export status? What is the probability to continue exporting given that a firm is already exporting? There are reasons to believe that the export status is quite stable. If a firm undergoes the sunk cost of establishing a sales force abroad, one would expect that it has deliberately planned to sell abroad for a few years to follow. Previous investigations on Italy (Basile; 2001; Castellani; 2002) and other countries (Roberts and Tybout; 1997) support this conjecture, and so does the evidence on our database as reported in Table 2. Note that we have split our sample in two sub-periods, 1991-1995 and 1999-2004, to account for possible differences in the pre and post euro regime[7].

[6]Consider that trade data are collected by Istat on *every single* cross-national transaction, thus we are not introducing any sample bias in the analyses that follow.

[7]The pre-euro period finishes in 1995 because starting in end of 1996 it is already possible to note much more stable Italian Lira/Deutsche Mark exchange rate, and some convergence to the level of exchange that was later fixed by the Council of the European Union.

NACE - SECTOR	'89	'90	'91	'92	'93	'94	'95	'96	'97	'98	'99	'00	'01	'02	'03	'04
15 Food, beverage	4.4	4.2	4.6	5.3	4.9	4.9	4.4	5.0	4.7	5.0	5.2	4.9	5.1	5.5	5.6	5.4
17 Textiles	6.1	6.0	5.7	5.7	6.5	5.8	5.1	5.0	4.4	6.2	5.9	5.7	5.8	5.7	5.3	4.9
18 Wearing apparel	3.0	3.1	3.2	3.1	3.7	3.7	3.2	3.4	3.2	3.8	3.7	3.5	3.8	4.0	4.0	3.8
19 Tanning leather luggage footwear	4.2	4.3	3.7	3.8	4.9	4.9	4.1	4.7	3.3	4.9	4.8	4.9	5.2	5.1	4.7	4.5
20 Wood & cork	0.5	0.5	0.5	0.5	0.7	0.7	0.6	0.6	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.6
21 Pulp & paper	1.5	1.3	1.7	1.7	1.7	1.5	1.8	1.6	1.6	1.7	1.8	1.8	1.6	1.9	1.9	1.8
22 Recorded media	0.9	0.7	0.8	0.7	0.7	0.6	0.6	0.7	0.6	0.8	0.8	0.7	0.7	0.7	0.7	0.7
23 Coke, petroleum	2.7	2.9	2.0	2.0	1.9	1.3	1.1	1.3	1.7	1.4	1.5	2.4	2.4	1.4	1.9	1.9
24 Chemicals prod	9.2	8.8	8.4	10.0	8.6	8.9	9.5	9.0	8.4	8.7	8.9	9.1	8.6	9.2	9.2	9.5
25 Rubber, plastic	4.1	3.9	4.1	4.0	4.9	4.6	4.6	4.6	4.6	4.6	4.7	4.5	4.4	4.6	4.7	4.7
26 Other non-metall	4.0	3.4	3.9	4.0	4.1	4.1	3.9	3.8	3.7	3.7	3.7	3.5	3.4	3.4	3.4	3.3
27 Basic metals	6.8	6.2	6.0	5.3	4.1	5.3	5.4	3.5	4.1	4.8	4.2	4.8	4.7	4.8	4.9	6.1
28 Fabricated metal	4.1	4.2	4.3	4.5	4.3	4.2	4.3	4.3	4.4	5.3	5.4	5.2	5.4	5.5	5.7	5.9
29 Machinery	20.7	21.2	21.0	20.5	19.9	20.2	20.8	21.3	21.4	21.8	21.1	20.0	20.2	20.3	20.7	20.8
30 Office machinery	2.9	2.8	4.1	2.9	3.3	3.1	3.1	2.9	2.1	0.5	0.4	1.0	1.2	0.8	0.8	0.6
31 Electrical mach	3.3	3.5	2.7	3.5	3.2	3.3	3.2	3.2	3.5	3.4	3.4	3.4	3.5	3.5	3.6	3.8
32 Radio, tv, TLC	2.3	2.3	2.3	2.3	2.5	2.5	2.7	3.2	3.2	2.9	3.2	3.7	3.5	2.7	2.4	2.3
33 Medical, optical	2.3	1.7	1.9	1.9	1.7	1.7	1.7	1.9	1.4	1.9	2.0	2.1	2.2	2.4	2.4	2.4
34 Motor vehicles	11.1	12.2	12.6	10.9	10.0	10.3	12.6	13.1	15.0	9.4	9.6	9.2	8.6	8.3	8.8	8.6
35 Other transport	2.3	2.6	2.4	3.2	2.5	2.4	2.0	1.7	1.9	2.7	2.8	3.1	3.2	3.8	3.3	3.4
36 Manufact nec	3.7	4.1	4.2	4.1	5.9	5.9	5.4	5.4	6.0	5.8	5.9	5.8	5.7	5.7	5.3	5.0

Table 3: Contribution (percentage) of each sector to total export of the manufacturing industry. Source: Our elaboration on Micro.3 and COE.

Table 2 shows that the probability to export in $t+1$ given that a firm was already exporting in the previous year is around .9 and is roughly stable in the two sub-periods, 1991-1995 and 1999-2004, respectively. Thus, there is a very high persistency in the status of export. Also notice the relevant increase in the number of observations in the second sub-periods. That is due to the new procedure adopted for data collection by Istat.

For the present analysis it is also relevant to identify those sectors that contribute most to the Italian export, and conversely, how these sectors account for the whole GDP of the manufacturing industry. This will provide us some insights on those sectors in which exporting is more relevant, and it will be on this sectors that we will focus more in the following. In this respect, Table 3 reports the contribution (in percentage) of each sector to the total export of manufacturing in all years of our sample; and Table 4 displays the share of each sector over the whole turnover of firms in the manufacturing industry. The comparison of these two tables reveals what one might call the propensity to export of a sector. It is possible, for instance, to identify some sectors that have a high propensity to export, that is, sectors that account more in terms of export share than in terms of turnover share; this is the case, most notably, of Machinery and equipment n.e.c. (NACE 29), which in 2004 is accounting for 12.71% of the total turnover in manufacturing sectors (cf. Table 4) and represents the 20.5% in terms of export share. An example of the opposite case is the sector of Food Products and Beverage (NACE 15) that accounts for 11.5% of total turnover share, but grants a mere 5% of Italian exports. Apparently, there exists sectoral characteristics that affect the decision and probably the ease of entry in the export market. It is also worth noting that the ranking of sectors accounting for the biggest share of Italian export (see Table 3) is almost unchanged between 1989 and 2004. Machinery and equipment n.e.c (NACE 29) accounts for around one fifth of all Italian exports and another fifth comes from Motor vehicles and Trailers (NACE 34) and the chemical sectors (NACE 24) together.

What one observes is, on one side, the diffused increase in the share of exporting firms, and on the other, the importance of few sectors in accounting for a large share of Italian exports. Thus, trade is a phenomenon that now concern more Italian firms than in the past, but still

NACE - SECTOR	'89	'90	'91	'92	'93	'94	'95	'96	'97	'98	'99	'00	'01	'02	'03	'04
15 Food, beverage	11.5	11.4	12.3	12.8	13.0	12.3	11.2	11.3	10.7	11.1	10.7	10.3	10.8	11.3	12.2	11.6
17 Textiles	5.3	5.3	4.8	4.8	5.1	5.1	4.5	4.5	4.0	5.2	4.6	4.5	4.5	4.5	4.1	3.8
18 Wearing apparel	2.8	2.9	2.8	2.8	2.9	2.7	2.4	2.4	2.0	3.0	2.8	2.5	2.8	2.9	2.7	2.8
19 Tanning leather luggage footwear	1.9	2.0	1.9	1.9	2.2	2.4	2.2	2.4	1.4	2.6	2.5	2.6	2.8	2.8	2.7	2.4
20 Wood & cork	0.9	1.0	0.9	1.0	1.0	1.0	1.0	0.9	0.9	1.0	1.1	1.0	1.1	1.2	1.1	1.2
21 Pulp & paper	2.0	2.1	2.1	2.0	2.2	2.3	2.8	2.4	2.3	2.4	2.4	2.6	2.2	2.6	2.8	2.6
22 Recorded media	2.7	2.7	2.7	2.8	2.9	2.7	2.4	2.6	2.7	2.6	2.5	2.5	2.5	2.7	2.6	2.8
23 Coke, petroleum	8.9	9.4	11.1	10.6	10.5	9.2	10.1	11.5	11.9	7.8	8.7	10.6	9.4	4.5	5.1	5.1
24 Chemicals prod	9.6	10.0	10.4	10.3	11.0	10.9	10.9	11.1	10.3	9.7	9.4	9.7	9.8	10.5	10.5	10.6
25 Rubber, plastic	3.2	3.1	3.1	3.2	3.3	3.5	3.5	3.5	3.4	4.0	4.1	4.0	4.0	4.4	4.3	4.3
26 Other non-metall	4.3	4.6	4.5	4.7	4.5	4.1	3.9	3.7	3.5	4.0	4.1	4.0	4.1	4.8	4.8	4.8
27 Basic metals	8.0	6.4	5.9	5.8	5.1	6.5	7.0	5.5	6.3	5.7	5.2	5.6	5.3	5.7	5.8	6.9
28 Fabricated metal	4.4	4.4	4.2	4.4	4.5	4.6	4.7	4.5	4.5	6.2	6.2	6.1	6.3	6.8	6.8	7.2
29 Machinery	10.5	10.6	10.7	11.0	10.9	11.1	11.5	11.7	12.0	12.8	13.7	12.2	12.3	13.2	13.2	12.9
30 Office machinery	1.6	2.2	2.3	1.8	1.8	1.6	1.5	1.4	1.5	0.5	0.4	0.6	0.7	0.6	0.5	0.5
31 Electrical mach	3.6	3.5	3.7	3.9	3.8	3.6	3.6	3.3	3.8	3.7	3.6	3.4	3.4	3.6	3.5	3.5
32 Radio, tv, TLC	2.2	2.1	2.3	2.2	2.3	2.1	1.9	2.2	2.5	2.2	2.1	2.1	2.3	1.8	1.5	1.5
33 Medical, optical	1.4	1.5	1.4	1.4	1.4	1.4	1.5	1.7	1.1	1.5	1.7	1.6	1.7	2.0	2.0	1.9
34 Motor vehicles	10.2	9.7	7.8	7.2	6.0	7.0	8.0	8.6	10.1	8.2	8.3	8.0	8.1	8.2	7.8	7.6
35 Other transport	2.2	2.2	2.1	2.3	2.3	2.3	2.1	1.9	1.9	2.2	2.4	2.5	2.1	2.2	2.2	2.3
36 Manufact nec	2.7	2.9	2.8	3.1	3.3	3.3	3.2	3.1	3.1	3.6	3.6	3.6	3.7	3.9	3.8	3.6

Table 4: Contribution (percentage) of each sector to the turnover (as total sales) of manufacturing. Source: Our elaboration on Micro.3

with specificities that largely depend on the kind of activity and output. But then, within each sector, which are the features of those firms exporting? To address this issue, let us start focusing on the relation between export status and some performance variables of the firms. In particular we will consider here size, labor productivity,[8] growth rates and Return On Sales, ROS, where ROS is defined as Gross Operative Margin[9] over total sales. Such a definition of profitability that considers the ratio between a measure of profits and total revenues, is a standard and widely used proxy for firm's profitability. In particular, given that we have access to a wide range of variables, we pick a basic measure of profits, such as Gross Margins, that is not heavily influenced by accounting interferences.

Plots in Figure 1 display, for 1989, 2000 and 2004 and for the sector of Machinery and equipment, NACE 29, the empirical density of size, labor productivity, ROS, and growth rates, for the groups of exporting and non-exporting firms, respectively. Note that for sales and productivity the x-axis reports the log of the original values, and that the y-axis is on a logarithmic scale in all plots.

Figure 1 shows that the only two variables that are able to distinguish the two groups of firms are size (as proxied by total sales) and labor productivity.[10] Indeed, the distribution of exporting firms for these two variables lies on the right of the distributions of firms belonging to the other group. That means, in other terms, that exporting firms are indeed bigger and perform better in terms of labor productivity than non exporting firms. Also notice that

[8] Although many measures of multi-factor productivity could in principle be employed, sticking to labor productivity prevents from introducing possible biases due to the misspecification of the function representing the technology. Further, the concern for biased regression coefficients due to omitted variables (i.e. technology, capital, work-force skill, etc) is mitigated by recent work by Foster et al. (2001) which shows a close correlation between multi-factor productivity and labor productivity in U.S. See also the estimates in Haltiwanger et al. (1999).

[9] Gross Operative Margin is valued added minus wages, salaries, and social insurances paid by the firm.

[10] The size and productivity differentials between exporting and non-exporting firms were already put forward in previous empirical analyses on Italian firms (see, among the other Serti and Tomasi; 2008; Bugamelli and Infante; 2003; Castellani; 2002; Basile; 2001; Sterlacchini; 2001; Ferragina and Quintieri; 2000).

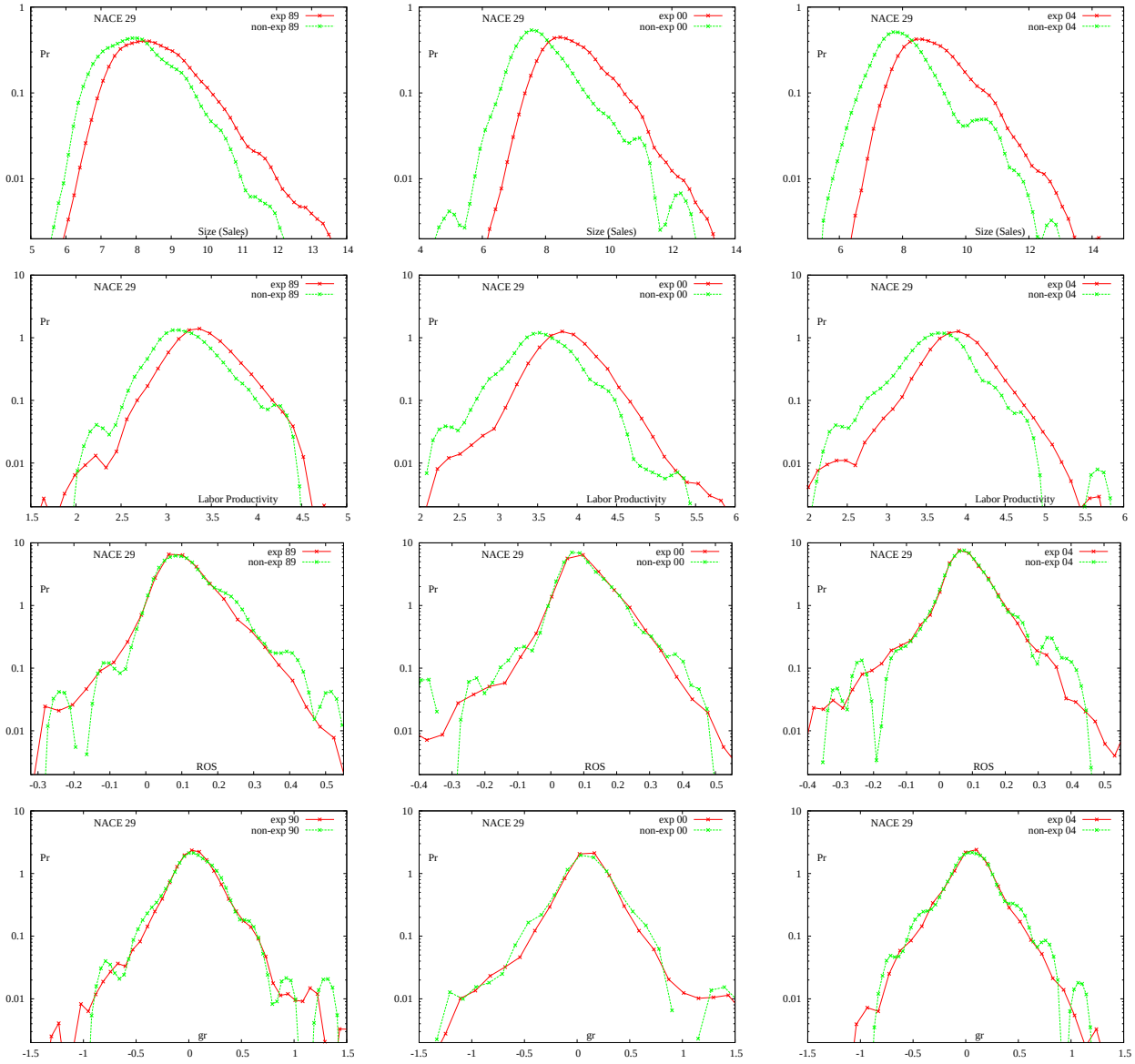

Figure 1: **First Row:** Empirical density of size (as total sales) for exporters and non exporters NACE 29 in 1989, 2000, 2004. **Second Row:** Empirical density of labor productivity, same sector and years. **Third Row:** Empirical density of ROS, same sector and years. **Fourth Row:** Empirical density of growth rates, same sector and years.

although there is some dynamics in the distributions over time, the ranking of the two groups of firms is invariant. Differences in terms of size and productivity appear to be a distinctive feature independently of the year of analysis. Since here we are not interested in the dynamics of the variables over time, but rather with relative performance of the two groups, we consider nominal value for size and labor productivity.

Note that, Surprisingly, there has been no shrink in the support of the distributions of productivity over time, as could have been forecasted on the basis of theoretical models predicting tough competition and the exit of less efficient firms.

Notice that the plots of the empirical distributional of labor productivity represent a snapshot of the industry at a given point in time. Since ours is not a balanced panel, those firms

that appeared in the lower end of the productivity distribution in 1991, for instance, do not need to be the same that show up in the lower end in 2004. Those firms that were poorly performing in 1991 might well have exited the industry.[11] However the permanence of a wide support for the distribution of labor productivity in 2004 suggests that in the industry there has remained room for firms with very (very) different levels of efficiency as it was in 1991. This result is even more surprising if one considers that the period under investigation also comprises an exogenous shock as the introduction of a new common currency for EU countries in 1999. Of course, the introduction of the euro significantly cut the cost related to export for firms in EU countries: not only they were not anymore incurring in currency exchange costs, but they also were not bearing the risk of currency appreciation/devaluation. As such the introduction of the euro can be considered a trade liberalization event, that should have contributed to drive out of the market less efficient firms even more rapidly. Nonetheless, the analysis of the distributions reveals that this process of selection did not occur or that it is going to take quite many years to display its effects.

Let us now focus on the empirical density of profitability (as proxied by ROS) and firms' growth rates at the bottom of Figure 1. As far as the distribution of these variables is concerned, their visual representations do not allow to detect if the two groups differ. This first descriptive evidence is already putting forward some puzzle. Indeed, one might expect that the productivity difference gets reflected in a similar gap in profitability, as put forward in theoretical contributions (Melitz and Ottaviano; 2008).

We now investigate if this result was somehow driven by a particular definition of exporting firms, thus we will check the robustness of this evidence with respect to different threshold of export. Then, in the following Section 4, in order to gain statistical precision to our analysis, we will present the results of statistical tests on the distributions of these variables.

3.1 Export Threshold

So far, we have classified as exporter a firm that has any positive share of turnover from sales abroad. Accordingly Table 1 reported the percentage of exporting firms without considering any threshold of export intensity, and so did the distributional analysis in Figure 1.

To what extent the results of the previous distributional analysis depend on the different definition of exporters? Of course, it would be helpful to identify some sort of threshold of export intensity, so that one could sort out "occasional" from "intensive" exporters. For an "occasional" exporter selling abroad is a rare event and does not have a significant impact on its business. On the contrary an "intensive" exporter constantly relies on the share of turnover generated abroad, and accordingly, it has build an *ad hoc* infrastructure for selling abroad and it has borne the related sunk costs. Even though scholars have investigated the issue of export intensity in relation to performance variables, most notably firm's productivity (see, among the others, Aw et al.; 2000; Castellani; 2002; Bernard et al.; 2003), in general, the literature does not provide a clear benchmark level in order to classify a firm as exporter or even a rough rule of thumb such as, firm A is classified as exporter if its export intensity is higher than, say, 5%. To this purpose and in order to provide some evidence on the issue of export threshold, we will focus on those sectors accounting for a relevant share of national export (as shown in Table 3), that is sectors were export matters. At the same time we will choose sectors also in order to provide a representative picture of the whole manufacturing

[11] Also consider that, as far as "surviving" firms are concerned, we know that labor productivity is a relatively stable variable (cf Dosi and Grazzi; 2006; Dosi et al.; 2010).

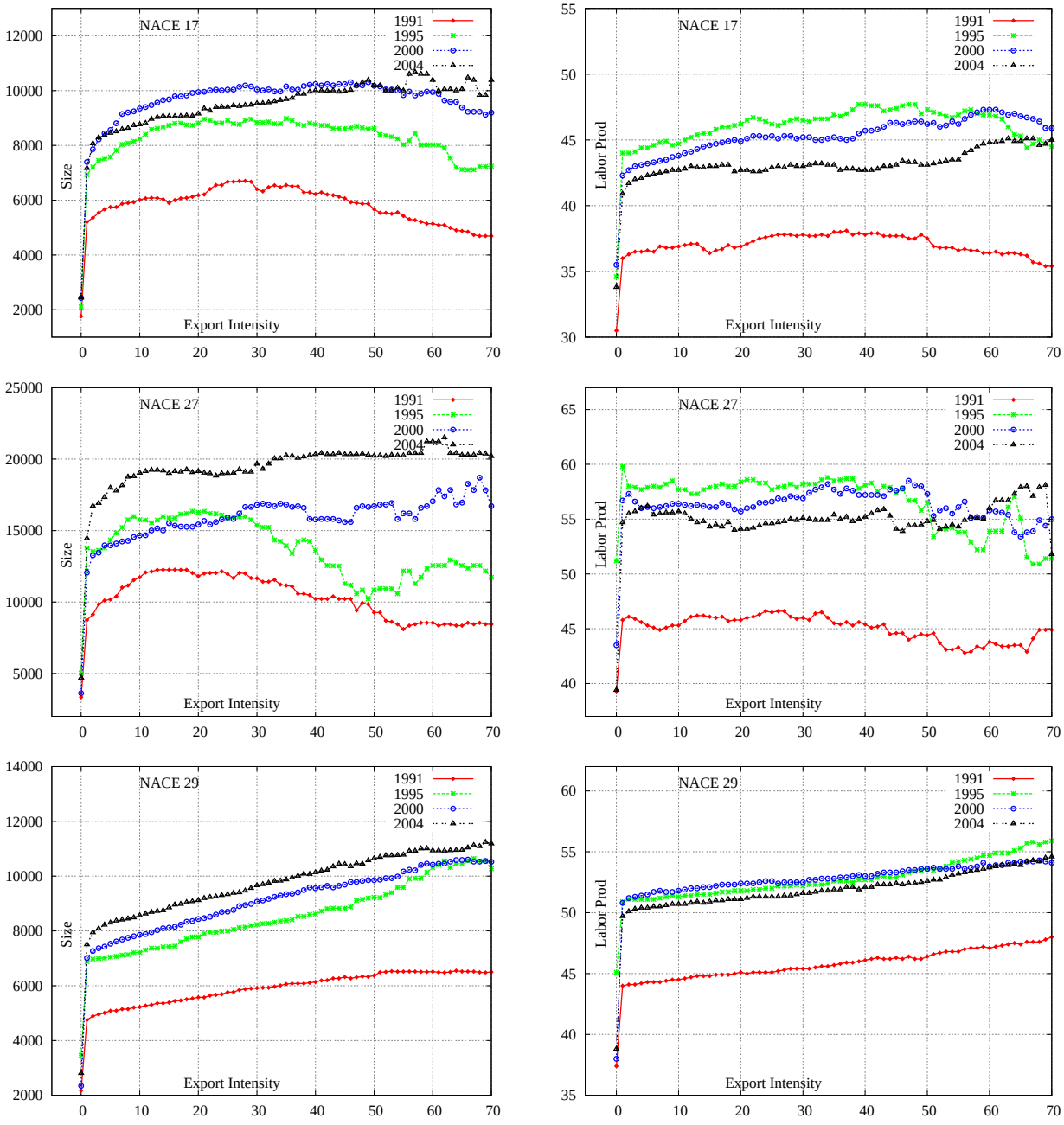

Figure 2: **Left Side** Median size (as total sales in thousands of euro) at different threshold of export intensity. **Right Side** Real average labor productivity at different threshold of export intensity.

industry in Italy. To this end we consider the sectors of Manufacture of textile (NACE 17), Basic metals (NACE 27), Machinery and equipment n.e.c. (NACE 29) as they satisfy these criteria, and in addition these sectors also have a high number of observations.

Figure 2 and 3 display a measure of central tendency of some performance variables, namely size as proxied by total sales, productivity, profitability, and growth, for firms exporting more than a given threshold of their turnover. The aim is to better understand if beyond a certain threshold of export intensity we do observe a given pattern in the variable of interest. In particular, our interest is to verify if the differences between the two groups of firms, exporters and non exporters, arise after some threshold of export intensity, or if, on the contrary, the

only discriminant cutoff is the export status, irrespectively of its intensity.

Every dot in the graphs represents the average[12] value of a given variable for firms exporting more than $x\%$ of their sales. Of course, we are aware that the performance variables that we are investigating are not normally distributed and they do display a very wide support (see for instance Bottazzi et al.; 2007; Bottazzi and Secchi; 2006; Bottazzi et al.; 2005) so that sometimes the mean is a noisy indicator. In principle, one would want to compare at every threshold of export intensity the whole distribution of a variable for exporters and for non exporters in order to get a more precise assessment of the differences between the two groups. For the moment, let us content with comparing a synthetic measure, such as the mean or the median. Then, in the next section, we will convey statistical support to these results by means of non-parametric tests.

Let us now consider the relation between different thresholds of export intensity and the median[13] size of firms associated to that threshold. Many empirical works show that bigger firms are more likely to be exporters (Serti and Tomasi; 2008; Bernard et al.; 2007; Castellani; 2002), and this is shown also in the plots in the left panel of Figure 2. However, we now investigate the pattern of this relation for different threshold of export intensity. The plots for size, left panel of Figure 2, display a clear gap in size when switching from non-exporters to exporters. Such a gap remains also at higher level of export intensity. Also notice that in the machine tool sector (NACE 29) after the clear gap that distinguishes the size of exporters from that of non-exporters, we do observe also a slight increase of the median size for higher export intensities, so that, for instance, firms exporting more than 60% of their revenues are bigger than firms exporting a small fraction of their sales. The other sectors included in the analysis do not display such a feature: the size gap that one observes switching from non-export to export status does not change when considering different thresholds of export intensity.

The relation between labor productivity and export intensity is represented by plots in the right column of Figure 2. Let us focus on the plot on the top-right of Figure 2, where we consider the labor productivity of firms in the textile sector, NACE 17. In 2000 and 2004 the average labor productivity of all non-exporters was around 35 thousands euro (deflated with the sectoral production price index) as marked by the corresponding dots at the extreme left of the plot. Notice the relevant productivity gap (also called "premium") that is associated to firms exporting. Again such difference has more to do with export status than export intensity. The average labor productivity of all firms exporting any positive share of their turnover is, both in 2000 and 2004, around 40 thousands euro, registering an increase of 15% with respect to non-exporting firms. This is very robust evidence, as it holds across all sectors included and is valid for all years.[14] If one considers the broad category of exporters, independently of their export intensity, then such a distinction is already enough to determine a gap in terms of productivity *vis à vis* non exporters. The legitimate question then, is if such a gap increases when considering "intensive exporters", that is, when one is introducing a definition of exporter that implies having a certain threshold in terms of export intensity. By looking at the plots on the right of Figure 2 that display labor productivity, one receives

[12]For the size of the firm, as proxied by sales, we choose the median as indicator of central tendency.

[13]Given the well known non-normality of the size distribution of firms we consider the median, rather than the mean as an indicator of the central tendency of the distribution.

[14]Of course, there are reasons to believe that the well known evidence in favor of the productivity premia for exporting firms is also related to size. For we know that bigger firms are generally more productive (see, for the Italian case, Bottazzi and Grazzi; forthcoming, 2009) and we also know that bigger firms are more likely to export. The section on parametric analysis (5) will try to disentangle these effects, for the time being let us focus on the issue of export threshold only.

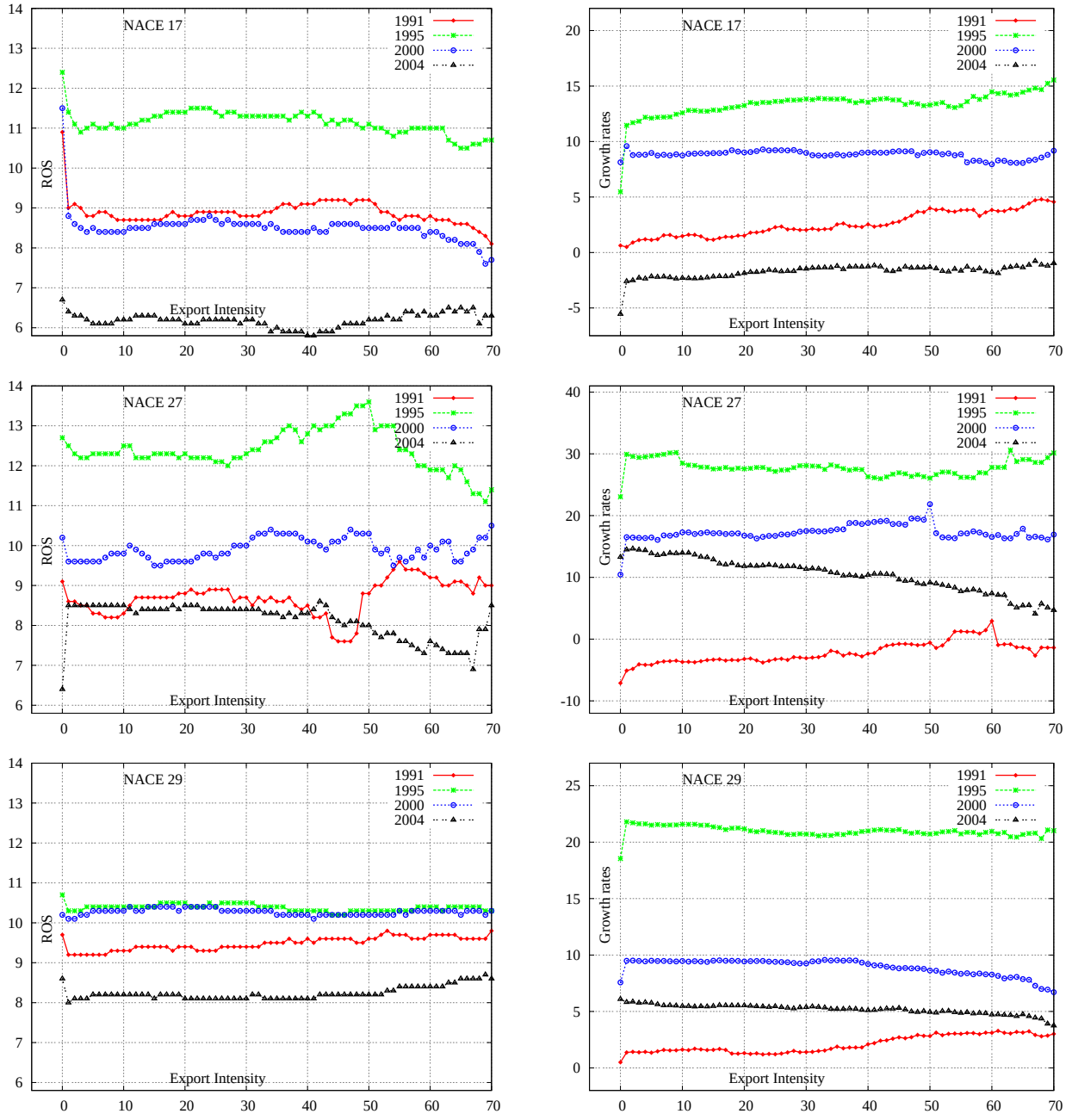

Figure 3: **Left Side** Average profitability (as ROS) at different threshold of export intensity. **Right Side** Average one-year growth rates at different threshold of export intensity.

mixed evidence. Let us consider the sector of machine tool, NACE 29, as in this industry there is a large number of firms, and the high number of observations gets reflected in the smooth trend in the plot. Again, it is apparent the gap switching from non-exporters to export status, but here one also notices that intensive exporters appear to be more productive than marginal exporters, and that the trend is linear. Such a relationship is common and stable for all years in the analysis. The machine tool sector is the only one sector to display such regularity: exporting firms are more productive, and intensive exporters also appear to be more productive than marginal exporters. It is likely, that such a regularity is much related to the high proportion of exporters in the industry, indeed one of the highest. Given that almost

all firms in the sector are exporting (see Table 1) differences among firms arise not exclusively with the export status but also with their export intensity. This confirms the existence and relevance of sectoral specificities that has to be taken into account in both empirical and theoretical analysis (for a focus on the diversities in the growth process of firms, see Bottazzi et al.; 2007).

Figure 3 compares the profitability of non-exporters to that of firms with different intensity of export. As far as profitability is concerned we do register, in most sectors and years, the opposite trend to that observed for productivity, that is when we compare non-exporters and exporters, irrespectively of the chosen threshold, the latter group report a lower profitability. Consider for instance, the sector of machine tool (NACE 29) as again, given the large number of exporters, it displays stable and smooth trends. It is apparent that when we switch from non-exporter to exporters profitability decreases. The same lack of relationship is also apparent between export and firms' growth, as displayed by the plots in the right panel of Figure 3, that report the average growth rates of firms at different threshold of export intensity. It does not appear that imposing a threshold on share of revenues abroad affects the average level of firm growth.

Concluding, the evidence in Figure 2 and 3 confirm the results of the distributional analysis presented in Figure 1 for the machine tool sector, NACE 29. That is, firms that export are bigger and more productive, but they are not more profitable nor faster-growing. Further, as far as export threshold is concerned we can conclude that the dichotomous distinction (exporter, non-exporter) is already sufficient to generate relevant differences when they do exist, as for instance in the case of size and productivity. Conversely, for those variables, i.e. profitability and growth, that do not display differences between non-exporters and exporters, however defined, it does not help to impose a threshold on export intensity. Thus, it would appear that either a variable is able to sort out the two groups of firms, as it happens for productivity and size, or if there is not such a difference in the two groups of firms, it won't be 'artificially' created imposing a threshold. As a result, in the following we will stick to the "naif" definition of exporter: a firm that is selling abroad any fraction of its turnover.[15]

4 Non-parametric analysis

In order to gain statistical precision in the comparison between the two groups of firms, we will perform formal tests of distributional equality. In particular, given the relevant non-normalities in the distribution of the variables of interest (see, for instance, Dosi and Grazzi; 2006; Bottazzi et al.; 2007), an appropriate measure of the relative position of the two samples is provided by the concept of stochastic (in)equality as proposed by Fligner and Policello (1981). Let F_E and F_{NE} be the distributions of the variable of interest for the two distinct groups of exporters and non-exporters. Let us denote with $\mathbf{X}_E \sim F_E$ and $\mathbf{X}_{NE} \sim F_{NE}$ the associated random variables, and with X_E and X_{NE} the two respective realizations. The distribution F_E is said to dominate F_{NE} if $\text{Prob}\{X_E > X_{NE}\} > 1/2$. That is, if one randomly selects two firms, one from the E group and one from the NE group, the probability that the latter displays a smaller value of X is more than $1/2$, or, in other terms, it has a higher

[15]Note however, that, as a double-check, in the Appendix we report result on some statistical tests where we define exporters as those firms with more than 20% of export intensity. The change in the definition of exporter does not affect the results.

	size				lab prod				ROS				Growth			
	'91	'95	'00	'04	'91	'95	'00	'04	'91	'95	'00	'04	'91	'95	'00	'04
15	**7.90**	**12.13**	**9.35**	**9.16**	**6.91**	**10.41**	**7.85**	**7.32**	**4.85**	**4.52**	**3.40**	**2.41**	**4.14**	**1.95**	-1.15	**-3.57**
	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.02	0.00	0.05	0.25	0.00
17	**15.45**	**17.78**	**9.06**	**7.49**	**6.89**	**10.22**	**4.08**	**3.04**	-1.55	-0.30	-0.08	-1.57	-1.85	**4.92**	**-2.13**	**-2.12**
	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.12	0.77	0.93	0.12	0.06	0.00	0.03	0.03
18	**37.58**	**41.59**	**28.26**	**23.61**	**23.98**	**28.35**	**21.19**	**18.38**	2.91	0.66	**3.30**	**3.69**	0.56	**4.75**	0.19	**-2.47**
	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.51	0.00	0.00	0.57	0.00	0.85	0.01
19	**11.01**	**19.28**	**11.86**	**11.75**	**9.58**	**14.85**	**7.51**	**5.67**	1.18	-1.52	0.83	-0.79	-0.25	0.68	0.31	**-2.27**
	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.24	0.13	0.41	0.43	0.80	0.49	0.76	0.02
20	**8.45**	**9.66**	**11.03**	**9.47**	**4.88**	**6.11**	**7.40**	**6.84**	0.18	0.83	1.33	**2.79**	1.55	1.83	0.23	-0.10
	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.86	0.41	0.18	0.01	0.12	0.07	0.82	0.92
21	**5.10**	**4.64**	**3.85**	**3.37**	**2.01**	1.44	**3.37**	**3.05**	0.37	0.61	1.13	1.51	**2.61**	1.09	-0.63	-0.78
	0.00	0.00	0.00	0.00	0.04	0.15	0.00	0.00	0.71	0.54	0.26	0.13	0.01	0.28	0.53	0.44
22	**8.23**	**12.35**	**5.54**	**4.31**	**3.88**	**5.42**	1.82	0.51	-0.21	-0.27	-0.37	-1.08	1.26	**3.14**	0.85	0.17
	0.00	0.00	0.00	0.00	0.00	0.00	0.07	0.61	0.83	0.79	0.71	0.28	0.21	0.00	0.40	0.86
23	**3.96**	**5.05**	**3.86**	**4.70**	**2.61**	1.05	0.94	0.91	-1.34	**-3.36**	**-2.01**	**-1.97**	**-2.21**	0.04	0.98	0.07
	0.00	0.00	0.00	0.00	0.01	0.29	0.35	0.36	0.18	0.00	0.04	0.05	0.03	0.97	0.33	0.95
24	-0.12	-1.42	-0.13	0.28	-0.04	**-2.90**	-0.94	-1.31	0.55	**-3.29**	0.70	-0.05	-0.04	**-1.95**	-3.04	-0.51
	0.90	0.16	0.90	0.78	0.97	0.00	0.35	0.19	0.58	0.00	0.48	0.96	0.97	0.05	0.00	0.61
25	1.84	**5.21**	**4.54**	**4.60**	0.27	**1.98**	**2.45**	**2.66**	-2.54	-1.55	0.76	-0.73	-0.11	1.18	-1.82	-1.89
	0.07	0.00	0.00	0.00	0.79	0.05	0.01	0.01	0.01	0.12	0.45	0.46	0.92	0.24	0.07	0.06
26	**4.33**	**13.14**	**6.15**	**5.27**	1.06	**9.04**	**3.90**	**2.44**	**-3.42**	**2.45**	**2.25**	0.31	**-2.37**	**3.24**	**-4.78**	**-2.24**
	0.00	0.00	0.00	0.00	0.29	0.00	0.00	0.01	0.00	0.01	0.02	0.76	0.02	0.00	0.00	0.02
27	**5.22**	**7.11**	**5.33**	**4.16**	**3.76**	**4.15**	**4.10**	**4.66**	1.85	-0.70	**2.13**	**3.12**	1.95	1.10	-1.18	1.02
	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.06	0.49	0.03	0.00	0.05	0.27	0.24	0.31
28	**18.80**	**27.38**	**21.68**	**19.88**	**14.08**	**18.02**	**15.92**	**14.72**	0.16	**2.63**	**5.11**	**4.58**	**2.65**	1.47	-1.11	-1.16
	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.87	0.01	0.00	0.00	0.01	0.14	0.27	0.25
29	**2.58**	**6.88**	**7.70**	**7.50**	**-2.53**	**2.67**	**2.07**	**2.25**	-0.32	0.78	**2.05**	1.69	1.30	1.53	-0.01	-0.76
	0.01	0.00	0.00	0.00	0.01	0.01	0.04	0.02	0.75	0.44	0.04	0.09	0.19	0.13	1.00	0.45
30	0.21	**3.13**	0.46	**2.19**	-1.93	0.58	-0.36	1.19	0.04	0.07	**-3.17**	0.82	-0.53	0.41	-0.10	0.52
	0.83	0.00	0.64	0.03	0.06	0.56	0.72	0.23	0.97	0.94	0.00	0.41	0.59	0.68	0.92	0.60
31	**8.15**	**9.41**	**9.67**	**9.50**	**5.13**	**7.28**	**6.76**	**7.19**	1.43	1.53	**2.99**	**2.21**	**-2.12**	**1.98**	**-2.63**	-1.08
	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.15	0.13	0.00	0.03	0.03	0.05	0.01	0.28
32	**4.99**	**5.91**	**5.47**	**2.76**	**4.07**	**3.37**	**4.80**	**2.24**	1.60	-0.11	**2.18**	1.16	0.73	0.97	-1.01	-0.15
	0.00	0.00	0.00	0.01	0.00	0.00	0.00	0.03	0.11	0.91	0.03	0.25	0.47	0.33	0.31	0.88
33	**2.52**	1.48	**3.51**	**2.43**	-1.09	**-2.25**	**-1.58**	**-1.32**	0.40	0.81	-1.73	-0.99	0.80	0.50	1.40	-0.22
	0.01	0.14	0.00	0.02	0.28	0.02	0.11	0.19	0.69	0.42	0.08	0.32	0.42	0.62	0.16	0.83
34	**2.44**	**2.69**	**2.13**	0.94	**2.98**	**2.47**	0.75	0.43	1.61	0.64	0.63	-0.10	0.33	0.30	-1.29	1.15
	0.01	0.01	0.03	0.35	0.00	0.01	0.46	0.67	0.11	0.52	0.53	0.92	0.74	0.77	0.20	0.25
35	**3.62**	**5.56**	**6.42**	**7.21**	1.86	**3.47**	**4.74**	**5.16**	-0.13	0.48	0.61	0.30	-0.81	0.56	-0.59	-1.79
	0.00	0.00	0.00	0.00	0.06	0.00	0.00	0.00	0.90	0.63	0.54	0.76	0.42	0.57	0.56	0.07
36	**6.88**	**12.14**	**5.44**	**4.57**	**4.44**	**9.49**	**4.51**	**2.76**	-0.39	0.02	0.42	-0.62	-1.52	1.32	-1.30	-1.29
	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.69	0.98	0.68	0.54	0.13	0.19	0.19	0.20

Table 5: Fligner-Policello Test of stochastic equality on size (as total sales), labor productivity, returns on sales and growth rates for Exporting *vs* Non-Exporting firms. Value of the observed statistic (FP) and associated p-value. Significant values are in bold. A firm is classified as exporter if it has any fraction of revenues from export. Same analysis with threshold on export intensity is in Table 9.

probability of having the smallest value. Now, since

$$\text{Prob}\{X_E > X_{NE}\} = \int dF_E(X)\, F_{NE}(X) \quad , \tag{1}$$

a statistical procedure to assess which of the two distributions dominates can be formulated as a test of

$$H_0 : \int dF_E\, F_{NE} = \frac{1}{2} \quad \text{vs} \quad H_1 : \int dF_E\, F_{NE} \neq \frac{1}{2} \quad . \tag{2}$$

The procedure developed in Fligner and Policello (1981) provides a valid statistic for H_0. We apply their procedure exploiting the fact that, in case of rejection of the null, the sign of the Fligner-Policello (FP) statistic tells us which of the two distributions is dominating: a positive (negative) sign means that exporting (non-exporting) firms have a higher probability to take on higher values of a given variable.

Table 5 reports the results obtained for 2 digit manufacturing sectors in selected years.[16] When considering size, as proxied by total sales, and labor productivity then exporting firms

[16]Results are largely consistent with those obtained for the Wilcoxon-Mann-Witney test (WMW) - Table 8 in the Appendix - that implicitly assumes that the two compared samples only differ for a shift of location, while having identical shapes. Also considers that the Wilcoxon-Mann-Witney test does not allow to draw conclusion on where the distribution of one group of firms lies with respect to other group.

stand up as clearly bigger and more productive than their non-exporting competitors. This is true for almost all sectors and years considered. When in a given sector the two groups differ, such differences in productivity and size are persistent, as emphasized by the positive and significative values in Table 5. This lends further support to our findings. Let us now focus on profitability and growth rates whose results are in the right part of Table 5. Notice the rare presence of positive and significant values of the test statistics and, even more surprising, the existence of negative and significant signs, meaning that in some industries and years firms that are not exporting have reported a better performance in terms of profitability or growth rates than their exporting competitors. Consider for instance the sector of machine tool, NACE 29, that is by far one of the most representative for Italian exports. In all but one of the years under investigation there is no evidence of superior profitability for firms exporting. Then in terms of growth rates, the two groups of firms never appear to differ. Also consider the other sectors making up the biggest share of Italian export, NACE 17, 24 and 34 cf. Table 3. Not even in these sectors exporting firms do report a higher profitability (or growth rates) than non exporting firms. In addition, such results do not change when we impose a threshold on export intensity in order to classify a firm as exporter or not. The results of such an exercise, where we define as exporters those firms with more than 20% of their turnover from sales abroad, are reported in Table 9 in the Appendix.

In concluding, the results in Table 5 confirms the evidence of the distributional analysis in Figure 1. Exporters are bigger and more productive than their non-exporting industry competitors, nevertheless there is no clear evidence of a superior performance in terms of profitability and growth for exporting firms.

5 Regression results

We now investigate the effects associated to the status of exporter in the more standard parametric framework of the export premia that is generally employed to assess the productivity advantage of exporting firms (see among the others Bernard et al.; 2007). In so doing, one has to bear in mind that on January 1^{st} 1998 the euro was introduced. As already remarked, the Euro introduction, unfolding its effect as a trade liberalization event, could be assumed to have fostered the process of market share reallocation between firms in every industry and, as a result, in such a parametric setting one would expect to see an export premia both in terms of productivity and profitability. In order to account for the potential shock due to the Euro introduction, we split our sample in two sub-periods, 1991-1995 and 1999-2004.

In estimating the effects associated to export activity we also consider other variables that according to theory and empirical analyses might have an impact on our dependent variables. In particular, we are going to control for the size of the firm, as proxied by the number of employees and for the innovation activity as proxied by patents of the firm, a dummy that takes value one if the firm has at least one registered patents.[17] Finally, we also control for geographical location of firms in Italy, with dummies accounting for five macro-regions, North-West, North-East, Center, South and islands.

Thus, for any sub-periods, we are going to estimate the following model,[18]

[17]There are 1883 firms with registered patents in our database. And patenting activity appears to be positively related to firms' performance in terms of productivity and profitability (to a less extent), but not in terms of firms' growth.

[18]In principle it would probably be more senseful to think of a regression model where the export status stands on the left-hand side of the equation, and conversely labor productivity is on the right-hand. Indeed,

$$y_{it} = \alpha_i + \beta_1 \, \text{size}_{it} + \beta_2 \, \text{exp}_{it} + \beta_3 \, \text{pat}_{it} + \gamma \, \text{geo dummies}_{it} + \varepsilon_{it} \tag{3}$$

where y is either productivity or profitability, and exp_{it} is a dummy taking value 1 if the firm i is exporting in year t, or zero otherwise.[19]

A number of econometric techniques is available to estimate the model in (3), in particular the availability of a short time series for every firm in both sub-samples would suggest, at first, to opt for fixed effects. However, one has to be aware that most of the variables on the right hand side of equation (3) are very sticky if not, sometimes, constant. For instance, it might well happen that a firm is not relocating during the period of investigation, so that the geographic dummy is invariant. Further, as we have shown in Section 3, the export status, the variable we are mostly interested in, is very sticky. If a firm is exporting in a given year, it will export in the following year too, with a probability of .9, and there are many firms that have been exporting for all the years in which they appear in the sample. It goes without saying that with the fixed effects model we would not estimate the coefficient that are time invariant, and the coefficients of variables that are very stable would be heavily downward biased (see also Hsiao; 2007; Mairesse; 2007). Resorting to random effects model would not resolve the problem either, since in our case the so-called "unobserved" terms are correlated with our regressors and they cannot be assumed as random. Further, since our interest lies primarily in estimating the effects of variables that are highly stable, export status *in primis*,[20] we will consider pooled ordinary least squares. We will consider two different sub-periods, accounting for the pre and post euro introduction.

Results for productivity, see Table 6, are very much coherent with evidence on most recent contribution on trade (see Bernard et al.; 2007 for the U.S., Mayer and Ottaviano; 2008 for European countries, and Serti and Tomasi; 2008 for Italy). Export activity is related to productivity advantage over non-exporting firms. This is evident in most sectors and in both sub-periods. As could be expected also size and patenting activity have a positive effect on firm's productivity. Due to space constraints we do not report the coefficients of the geographical dummies, that are only seldomly significant. Also notice, that apparently the introduction of the euro has not really changed the structural relations between variables. Indeed, the magnitude of the coefficients in the two sub-periods has changed only slightly. In particular, one notices that the coefficients accounting for export status are in general bigger in the second sub-period. This would suggest that following the euro introduction, the gap in productivity between the two groups of firms has widened.

Let us now focus on the results for profitability and refer to Table 7. The coefficient accounting for the effect of export on profitability is seldomly positive and significant, and some sectors also display a negative relation between export and return on sales. Again, as for productivity, such results are much coherent with evidence of non-parametric analysis. The result of an apparent lack of relationship between export status and profitability (if not the existence of a negative relationship!) remains compelling even if one focuses on more export-

this would reflect more closely what suggested by the theory: it is those firms that are more productive to start with that, after trade liberalization, are more likely to export. Or to put it in another way, one would like better a model where productivity "causes" a higher probability to export. However, in order to ensure the comparability of our results to those in the literature, we conform to the standard "export premia" regressions where the export dummy is on the right hand side of the equation.

[19] As it could be expected, due to the almost irrelevance of the threshold of export (as shown in Figure 2), results do not change substantially if considering export share or a dummy that considers a given threshold of export share of total sales.

[20] Also size as number of employees is very stable.

	1991-95				1999-2004			
	const	size	exp	pat	const	size	exp	pat
15	**3.415**	**0.057**	**0.168**	0.167	**3.476**	**0.027**	**0.250**	**0.289**
	(0.031)	(0.007)	(0.013)	(0.090)	(0.029)	(0.007)	(0.013)	(0.053)
17	**3.142**	**0.095**	**0.205**	**0.402**	**3.320**	**0.064**	**0.139**	**0.260**
	(0.027)	(0.007)	(0.011)	(0.068)	(0.025)	(0.006)	(0.011)	(0.038)
18	**2.194**	**0.142**	**0.410**	**1.377**	**2.278**	**0.128**	**0.549**	0.162
	(0.028)	(0.007)	(0.010)	(0.251)	(0.035)	(0.009)	(0.013)	(0.100)
19	**2.493**	**0.138**	**0.357**	**0.686**	**2.721**	**0.109**	**0.279**	**0.140**
	(0.037)	(0.010)	(0.015)	(0.094)	(0.034)	(0.009)	(0.015)	(0.049)
20	**2.966**	**0.135**	**0.111**	0.086	**2.870**	**0.134**	**0.159**	**0.106**
	(0.049)	(0.013)	(0.015)	(0.102)	(0.041)	(0.011)	(0.015)	(0.053)
21	**3.397**	**0.103**	**0.108**	0.176	**3.130**	**0.157**	**0.140**	**0.155**
	(0.046)	(0.011)	(0.020)	(0.094)	(0.040)	(0.010)	(0.021)	(0.052)
22	**3.026**	**0.190**	0.022	-0.135	**2.936**	**0.211**	**0.018**	-0.153
	(0.038)	(0.009)	(0.015)	(0.127)	(0.038)	(0.009)	(0.015)	(0.080)
23	**3.728**	**0.158**	-0.081	0.529	**3.799**	**0.198**	-0.205	0.190
	(0.110)	(0.021)	(0.059)	(0.277)	(0.116)	(0.025)	**0.060**	(0.329)
24	**3.758**	**0.048**	**0.069**	**0.124**	**3.579**	**0.082**	**0.156**	**0.155**
	(0.043)	(0.008)	(0.022)	(0.031)	(0.042)	(0.007)	(0.027)	(0.024)
25	**3.192**	**0.083**	**0.192**	**0.193**	**3.101**	**0.082**	**0.265**	**0.156**
	(0.036)	(0.008)	(0.016)	(0.036)	(0.025)	(0.006)	(0.013)	(0.018)
26	**3.211**	**0.125**	**-0.057**	0.047	**3.173**	**0.149**	**-0.078**	**0.062**
	(0.028)	(0.007)	(0.012)	(0.063)	(0.026)	(0.006)	(0.011)	(0.029)
27	**3.546**	0.009	**0.128**	0.019	**3.389**	**0.059**	**0.198**	0.025
	(0.044)	(0.008)	(0.019)	(0.072)	(0.036)	(0.008)	(0.018)	(0.039)
28	**3.095**	**0.091**	**0.136**	**0.177**	**3.192**	**0.073**	**0.182**	**0.101**
	(0.020)	(0.005)	(0.007)	(0.027)	(0.016)	(0.004)	(0.005)	(0.015)
29	**3.360**	**0.054**	**0.088**	**0.150**	**3.331**	**0.058**	**0.185**	**0.092**
	(0.019)	(0.004)	(0.009)	(0.014)	(0.016)	(0.003)	(0.009)	(0.008)
30	**3.251**	**0.092**	0.100	0.281	**3.756**	-0.033	**0.288**	0.064
	(0.139)	(0.029)	(0.092)	(0.183)	(0.130)	(0.033)	(0.058)	(0.101)
31	**3.050**	**0.085**	**0.214**	**0.207**	**3.179**	**0.039**	**0.334**	**0.197**
	(0.034)	(0.007)	(0.016)	(0.048)	(0.031)	(0.007)	(0.014)	(0.024)
32	**3.199**	**0.029**	**0.262**	0.212	**3.415**	-0.006	**0.332**	**0.213**
	(0.066)	(0.013)	(0.035)	(0.087)	(0.058)	(0.013)	(0.029)	(0.051)
33	**3.220**	**0.070**	**0.203**	**0.328**	**3.231**	**0.067**	**0.322**	**0.191**
	(0.049)	(0.010)	(0.022)	(0.041)	(0.044)	(0.009)	(0.022)	(0.024)
34	**3.324**	**0.030**	**0.132**	**0.162**	**3.303**	**0.030**	**0.157**	**0.167**
	(0.050)	(0.009)	(0.024)	(0.060)	(0.045)	(0.008)	(0.026)	(0.034)
35	**3.234**	**0.080**	-0.091	0.077	**3.269**	**0.038**	**0.294**	0.065
	(0.159)	(0.028)	(0.067)	(0.097)	(0.057)	(0.013)	(0.028)	(0.053)
36	**2.874**	**0.137**	**0.106**	**0.317**	**2.813**	**0.123**	**0.182**	**0.212**
	(0.028)	(0.007)	(0.011)	(0.038)	(0.026)	(0.006)	(0.013)	(0.022)

Table 6: Labor productivity regression. Pooled OLS estimates. Standard errors in brackets. Coefficients significant at the 5% are in bold.

intensive sectors, such as NACE 17, 24, 27, 29 and 34, that jointly account for more than half of Italian exports. In general, in comparing the two sub-periods, one notices that the number of positive and significant coefficients increases in the second period, yet the number of those coefficients that are non significant or even negative, is still overwhelming.

6 Conclusion

In this paper we have shown that although, on the one side, there exists clear evidence of an export premium for productivity, as largely shown in both theoretical and empirical literature, on the other side, there is no such evidence of higher profitability for exporters vis a vis non-exporters. The missing link between export and profitability appears even more puzzling if one considers the correlation that is known to exist between productivity and profitability. Such relation between these two variables is generally assumed in theoretical models assessing the impact of trade within an industry (as for instance in Melitz and Ottaviano; 2008). This raises interesting puzzles for the understanding of the motivations behind the firm's decision to entry the export market. As we have discussed in the introduction, it is generally assumed that it is the productivity draw of a firm that determines its advantages over industry competitors. In the - generally assumed - monopolistic competition setting, more productive firms expand their market shares, and less productive ones shrink; further more productive

	1991-95				1999-2004			
	const	size	exp	pat	const	size	exp	pat
15	**0.085**	**-0.002**	**0.017**	0.012	**0.075**	**-0.002**	**0.015**	**0.048**
	(0.005)	(0.001)	(0.002)	(0.014)	(0.004)	(0.001)	(0.002)	(0.008)
17	**0.107**	**0.006**	**-0.022**	**0.063**	**0.052**	**0.009**	**-0.019**	**0.028**
	(0.005)	(0.001)	(0.002)	(0.013)	(0.005)	(0.001)	(0.002)	(0.008)
18	**0.096**	**-0.008**	**0.004**	**0.218**	**-0.037**	**0.012**	**0.041**	-0.006
	(0.006)	(0.002)	(0.002)	(0.057)	(0.011)	(0.003)	(0.004)	(0.031)
19	**0.079**	**0.004**	**-0.021**	**0.053**	**0.040**	**0.005**	0.002	-0.002
	(0.006)	(0.002)	(0.002)	(0.015)	(0.006)	(0.002)	(0.003)	(0.009)
20	**0.107**	0.001	0.003	0.036	**0.039**	**0.012**	0.003	0.008
	(0.009)	(0.003)	(0.003)	(0.020)	(0.007)	(0.002)	(0.002)	(0.008)
21	**0.098**	0.003	0.004	**0.040**	**0.038**	**0.012**	-0.001	**0.018**
	(0.008)	(0.002)	(0.004)	(0.017)	(0.007)	(0.002)	(0.003)	(0.009)
22	**0.113**	**-0.004**	-0.001	0.029	**0.068**	**0.009**	**-0.011**	-0.017
	(0.010)	(0.002)	(0.004)	(0.033)	(0.008)	(0.002)	(0.003)	(0.017)
23	**0.079**	**0.015**	**-0.048**	**0.096**	**0.183**	0.003	**-0.061**	0.045
	(0.021)	(0.004)	(0.011)	(0.052)	(0.021)	(0.004)	(0.011)	(0.058)
24	**0.123**	**-0.004**	0.001	**0.022**	**0.070**	**0.007**	0.002	**0.035**
	(0.009)	(0.002)	(0.004)	(0.006)	(0.007)	(0.001)	(0.005)	(0.004)
25	**0.082**	0.002	**0.013**	**0.035**	**0.068**	**0.004**	**0.010**	**0.023**
	(0.007)	(0.002)	(0.003)	(0.007)	(0.005)	(0.001)	(0.003)	(0.004)
26	**0.095**	**0.009**	**-0.016**	0.003	**0.060**	**0.012**	-0.001	0.016
	(0.007)	(0.002)	(0.003)	(0.015)	(0.013)	(0.003)	(0.005)	(0.014)
27	**0.138**	**-0.010**	-0.001	0.014	**0.282**	**-0.095**	**0.245**	0.076
	(0.008)	(0.002)	(0.004)	(0.014)	(0.224)	(0.047)	(0.114)	(0.245)
28	**0.107**	**-0.003**	-0.002	**0.027**	**0.101**	**-0.003**	**0.005**	**0.014**
	(0.005)	(0.001)	(0.002)	(0.007)	(0.004)	(0.001)	(0.001)	(0.004)
29	**0.090**	0.000	**-0.004**	**0.014**	**0.076**	**0.005**	-0.003	0.001
	(0.005)	(0.001)	(0.002)	(0.003)	(0.004)	(0.001)	(0.002)	(0.002)
30	**0.139**	0.000	-0.026	0.030	**0.151**	-0.012	-0.014	0.041
	(0.036)	(0.007)	0.024	(0.048)	(0.032)	(0.008)	0.014	(0.024)
31	**0.067**	**0.006**	0.007	**0.051**	**0.058**	0.001	**0.023**	**0.044**
	(0.010)	(0.002)	(0.004)	(0.014)	(0.006)	(0.001)	(0.003)	(0.005)
32	**0.182**	**-0.009**	**-0.021**	0.051	**0.082**	-0.003	**0.020**	0.014
	(0.017)	(0.003)	(0.009)	(0.022)	(0.017)	(0.004)	(0.009)	(0.015)
33	**0.074**	**0.005**	**0.013**	**0.039**	**0.065**	**0.006**	**0.019**	**0.028**
	(0.012)	(0.002)	(0.005)	(0.010)	(0.010)	(0.002)	(0.005)	(0.005)
34	**0.070**	-0.003	**0.015**	0.014	**0.020**	0.027	-0.086	0.080
	(0.013)	(0.002)	(0.006)	(0.015)	(0.401)	(0.075)	(0.235)	(0.303)
35	**0.126**	0.006	**-0.045**	0.010	**0.031**	0.000	**0.042**	0.011
	(0.044)	(0.008)	(0.018)	(0.027)	(0.026)	(0.006)	(0.013)	(0.024)
36	**0.079**	0.001	0.001	**0.023**	**0.052**	**0.007**	**-0.007**	**0.012**
	(0.005)	(0.001)	(0.002)	(0.007)	(0.005)	(0.001)	(0.002)	(0.004)

Table 7: Profitability (as return on sales) regression. Pooled OLS estimates. Standard errors in brackets. Coefficients significant at the 5% are in bold.

firms correspondingly enjoy higher profits, under the forms of price mark-ups. Thus, in those models, higher productivity gets automatically translated into superior profitability. Then, switching to an open economy, or in correspondence to a trade liberalization event, it is the more productive firms, those with the higher mark-ups, that can afford the sunk costs needed to enter the export market. Once that trade is accounted for in the model, the rankings in productivity and profitability are preserved, even though all firms (exporters and not) enjoy lower profitability due to harsher competition.

In this paper we have shown that, contrary to what is foreseen by the theory, exporters are not more profitable than non exporters. We found such result applying both non parametric methods, such as comparing the distributions of profitability for exporters and non exporters, and also in a parametric setting, by means of regression techniques. In both cases, although it appears that exporters are systematically more productive, we do not find evidence of a superior performance in terms of profitability.

In search for an explanation of this fact, let us cast our attention on a few facts that we believe are related to the observed phenomenon.

First, at least in the manufacturing sectors, most of firms are exporting. Although the proportion of exporters varies with the sector of interest, in 2004, in most industries, more than 75% of firms were exporting, and in some industries the proportion of exporters was even above 85%.[21] Second, it appears that much of the differences between the groups of

[21]Of course, bear in mind that here we are only considering medium to big sized firms with 20 employees or

firms (exporters and non exporters) are simply related to the export status, i.e. exporting any fraction of total sales, and not to a certain threshold of export intensity. We have investigated the issue of a threshold for export intensity and we have found that this is seldomly relevant: it appears that the differences in performance for the two groups - when existing - arise when switching from non-export to export status, and not to a given threshold of export intensity. That is, it matters to export, not the proportion of sales abroad. Third, export status is positively and significantly related both to productivity and size. Such evidence, that we have documented both on the basis of the non-parametric distributional analysis (see Fig. 1 and 2) and on the parametric one (see Table 6), is coherent with recent findings in the literature.

All the foregoing pieces of evidence are coherent in suggesting the existence of two broad groups of firms. On the one side, smaller, less productive and not exporting firms, that survive serving exclusively the domestic market. On the other side, there are bigger, more efficient and exporting firms, that are involved in the domestic as well as in the export market. The little fraction of smaller, not exporting firms might serve some residual market niches, so that their profitability is not squeezed by competitors (both national and international). On the contrary, the bigger and exporting firms, although more productive, see their margins curbed by international competition. This is providing a first interpretation of why exporters and non-exporters, though differing in many respects, display similar profitability patterns. Such a result, puzzling at first, demands for comparative evidence from other countries and it suggests that efforts shall be devoted to develop a broader formal framework that would not solely rely on productivity cutoff levels and sunk cost of exporting in order to explain the observed stylized facts.

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7 Appendix

	size				lab prod				ROS				Growth			
	1991	1995	2000	2004	1991	1995	2000	2004	1991	1995	2000	2004	1991	1995	2000	2004
15	**490438**	**537812**	**609441**	**623373**	**477003**	**522464**	**573495**	**596389**	**463216**	**483520**	**431059**	**471909**	**373446**	340530	323377	**292984**
	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.02	0.00	0.06	0.28	0.00
17	**766823**	**758465**	**754400**	**474203**	**685769**	**699722**	**675909**	**421255**	599104	600417	538790	338257	465226	**476500**	**465075**	**282457**
	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.13	0.77	0.94	0.12	0.07	0.00	0.04	0.04
18	**703237**	**617978**	**678009**	**486786**	**655458**	**585670**	**632339**	**456340**	521034	431239	**474889**	**331479**	392173	**330521**	311100	**171528**
	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.52	0.00	0.00	0.57	0.00	0.85	0.02
19	**180087**	**306225**	**259126**	**194560**	**175093**	**294707**	**238553**	**167934**	144125	224231	167186	122711	97180	134663	107192	**76568**
	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.25	0.13	0.43	0.43	0.80	0.49	0.76	0.03
20	**88548**	**83553**	**129467**	**118877**	**82886**	**78405**	**120384**	**112192**	74443	68937	88629	**86101**	63354	50684	63508	57656
	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.86	0.41	0.19	0.01	0.12	0.07	0.83	0.92
21	40221	44511	**50485**	**42851**	36608	40295	**48448**	**41220**	34582	39174	39405	34128	**28145**	27106	28316	25558
	0.00	0.00	0.00	0.00	0.05	0.16	0.00	0.01	0.71	0.55	0.28	0.15	0.01	0.28	0.54	0.47
22	**129951**	**139902**	219483	182553	**119603**	**124415**	196937	167837	108317	109371	155106	150374	91263	**92874**	129449	110828
	0.00	0.00	0.00	0.00	0.00	0.00	0.08	0.62	0.83	0.79	0.72	0.30	0.21	0.00	0.40	0.86
23	**1668**	1326	2616	2531	**1568**	1038	2189	1934	1156	**675**	**1449**	**1411**	**859**	803	1833	1750
	0.00	0.00	0.00	0.00	0.01	0.30	0.34	0.36	0.17	0.00	0.04	0.05	0.03	0.97	0.32	0.95
24	58234	**62357**	51929	52586	58190	**58705**	48677	46959	59553	**57930**	44387	44111	46306	42011	28366	33921
	0.91	0.18	0.91	0.81	0.97	0.01	0.42	0.23	0.59	0.00	0.52	0.96	0.97	0.06	0.00	0.63
25	**106790**	**170309**	**256154**	**206707**	**98800**	**156658**	**238873**	**189749**	89513	142192	213287	157937	79412	99670	138881	113421
	0.07	0.00	0.00	0.00	0.79	0.06	0.02	0.01	0.01	0.13	0.45	0.46	0.92	0.25	0.09	0.09
26	**473769**	**449050**	**594954**	**566749**	**447433**	**423089**	**565271**	**531265**	**413929**	**382578**	**494595**	463911	**351460**	**306123**	**359657**	**368878**
	0.00	0.00	0.00	0.00	0.29	0.00	0.00	0.02	0.00	0.02	0.03	0.76	0.02	0.00	0.00	0.03
27	**77698**	**82546**	**85156**	**70380**	**74340**	**77249**	**80002**	**69373**	70458	67358	**67741**	**59641**	54761	51246	52198	47620
	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.08	0.49	0.04	0.00	0.06	0.28	0.26	0.31
28	**1522572**	**2064152**	**4997642**	**4904015**	**1459110**	**1937752**	**4752818**	**4653868**	1240270	**1667222**	**4042760**	**4070200**	**909180**	1113050	2682721	2549998
	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.87	0.01	0.00	0.00	0.01	0.14	0.28	0.26
29	545983	**1034908**	**1361146**	**1192403**	475655	**961151**	**1205292**	**1047810**	505308	930557	**1105780**	944094	379833	682962	779210	654826
	0.01	0.00	0.00	0.00	0.01	0.01	0.05	0.03	0.75	0.45	0.04	0.10	0.20	0.13	1.00	0.47
30	131	575	2161	2722	90	426	1909	2551	127	401	**1211**	2400	105	267	1044	1509
	0.84	0.01	0.66	0.05	0.14	0.56	0.74	0.24	0.97	0.94	0.01	0.42	0.63	0.67	0.92	0.62
31	**141802**	**163891**	**299789**	**244874**	**133613**	**158060**	**282117**	**230642**	122237	140198	**231952**	**184728**	**82507**	**91445**	**126444**	118795
	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.16	0.13	0.00	0.03	0.04	0.05	0.01	0.32
32	8842	**16202**	**35419**	**19805**	8382	**14980**	**33876**	**18249**	7522	13071	**27415**	16840	5074	8688	16700	11426
	0.00	0.00	0.00	0.01	0.00	0.00	0.00	0.04	0.13	0.91	0.03	0.26	0.52	0.35	0.34	0.89
33	21375	**25710**	**43996**	**33699**	17747	**21776**	**34737**	**27257**	19142	24997	30054	23924	16301	16240	26350	18744
	0.02	0.15	0.00	0.02	0.29	0.04	0.14	0.20	0.69	0.43	0.11	0.31	0.42	0.62	0.16	0.83
34	**23960**	**26497**	35188	26897	**24178**	**25986**	32232	25846	22867	24162	29193	22792	17015	15392	20356	18562
	0.02	0.01	0.04	0.37	0.01	0.02	0.46	0.68	0.13	0.54	0.55	0.92	0.75	0.76	0.22	0.29
35	11975	**16551**	**33108**	**39624**	10887	**15739**	**30805**	**36390**	9573	13992	22675	26355	7552	9452	15426	17473
	0.00	0.00	0.00	0.00	0.08	0.00	0.00	0.00	0.90	0.63	0.53	0.76	0.41	0.57	0.56	0.08
36	**317195**	**534940**	**315166**	**308992**	**300356**	**511544**	**303730**	**289660**	267976	439301	227243	243715	213240	320425	160044	164036
	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.71	0.98	0.68	0.56	0.12	0.19	0.21	0.23

Table 8: Wilcoxon-Mann-Witney Test of differences in medians on size (as total sales), labor productivity, returns on sales and growth rates for Exporting *vs* Non-Exporting firms. Value of the observed statistic (FP) and associated p-value. Significant values are in bold. A firm is classified as exporter if it has any fraction of revenues from export.

NACE	size				lab prod				ROS				Growth			
	1991	1995	2000	2004	1991	1995	2000	2004	1991	1995	2000	2004	1991	1995	2000	2004
15	**3.26**	**8.00**	**11.88**	**13.04**	**2.77**	**8.93**	**9.52**	**12.45**	**3.28**	**5.92**	**6.93**	**7.96**	**2.40**	**4.22**	0.19	0.52
	0.00	0.00	0.00	0.00	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.02	0.00	0.85	0.60
17	**23.17**	**24.11**	**16.09**	**12.77**	**8.24**	**11.81**	**5.13**	**3.20**	**-4.31**	-1.84	**-2.17**	-1.45	-0.25	**8.58**	0.14	-0.33
	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.07	0.03	0.15	0.80	0.00	0.89	0.74
18	**27.06**	**42.30**	**76.40**	**60.67**	**16.82**	**26.22**	**35.85**	**38.58**	1.69	0.88	**4.16**	**4.83**	-0.80	**5.16**	**3.16**	**-2.02**
	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.09	0.38	0.00	0.00	0.42	0.00	0.00	0.04
19	**12.02**	**26.80**	**13.15**	**10.64**	**9.34**	**15.53**	**9.20**	**6.17**	-0.66	**-3.51**	1.28	-0.39	0.86	0.16	-0.71	-1.24
	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.51	0.00	0.20	0.69	0.39	0.88	0.48	0.22
20	**4.90**	**9.91**	**15.11**	**12.68**	1.24	**5.49**	**7.43**	**7.44**	-1.03	0.11	0.15	-1.26	-0.23	1.72	1.20	-0.83
	0.00	0.00	0.00	0.00	0.22	0.00	0.00	0.00	0.30	0.91	0.88	0.21	0.82	0.08	0.23	0.41
21	**8.37**	**6.74**	**6.43**	**5.87**	**4.22**	**2.78**	**4.66**	**4.15**	0.78	-0.33	**2.04**	**2.39**	**5.04**	**-2.24**	-0.82	-1.19
	0.00	0.00	0.00	0.00	0.00	0.01	0.00	0.00	0.44	0.74	0.04	0.02	0.00	0.03	0.41	0.23
22	**4.07**	**6.48**	**10.47**	**8.27**	1.16	1.23	**3.70**	1.33	-0.53	0.22	-0.84	-1.75	-0.03	1.64	**2.09**	0.08
	0.00	0.00	0.00	0.00	0.25	0.22	0.00	0.18	0.60	0.83	0.40	0.08	0.97	0.10	0.04	0.94
23	**1.73**	**2.67**	0.61	**13.90**	**2.56**	0.03	0.07	**6.36**	1.28	**-2.68**	**-2.58**	-1.40	**-4.13**	-0.15	-0.11	**2.71**
	0.08	0.01	0.54	0.00	0.01	0.97	0.95	0.00	0.20	0.01	0.01	0.16	0.00	0.88	0.91	0.01
24	**4.21**	**2.77**	0.67	-0.20	**2.05**	**3.68**	-0.42	-0.19	-0.92	**2.00**	**2.42**	0.59	1.34	**2.14**	0.07	0.04
	0.00	0.01	0.50	0.84	0.04	0.00	0.67	0.85	0.36	0.05	0.02	0.55	0.18	0.03	0.94	0.97
25	**4.62**	**9.32**	**6.52**	**6.69**	**2.02**	**4.04**	**3.76**	**2.24**	0.43	-0.12	1.59	-0.59	0.84	-0.12	**-2.68**	**-2.34**
	0.00	0.00	0.00	0.00	0.04	0.00	0.00	0.03	0.67	0.90	0.11	0.56	0.40	0.91	0.01	0.02
26	**3.47**	**12.60**	**9.21**	**5.93**	-1.00	**7.92**	**4.77**	-0.46	**-6.93**	**2.27**	0.93	**-2.83**	**-5.29**	**3.54**	**-4.08**	**-4.28**
	0.00	0.00	0.00	0.00	0.32	0.00	0.00	0.65	0.00	0.02	0.35	0.00	0.00	0.00	0.00	0.00
27	**10.84**	**10.25**	**9.05**	**6.37**	**4.23**	**3.75**	**4.42**	**5.48**	-0.35	-1.41	0.44	**2.76**	**2.09**	0.57	0.59	0.84
	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.73	0.16	0.66	0.01	0.04	0.57	0.56	0.40
28	**22.96**	**26.20**	**43.18**	**43.81**	**13.25**	**15.74**	**25.40**	**25.37**	-0.92	**2.53**	**4.63**	**4.05**	**2.38**	-0.47	0.14	0.45
	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.36	0.01	0.00	0.00	0.02	0.64	0.89	0.65
29	**4.50**	**9.18**	**9.01**	**8.92**	-0.55	**4.21**	**3.24**	**2.89**	-1.00	-0.39	1.72	0.57	-0.18	1.55	-0.55	-1.46
	0.00	0.00	0.00	0.00	0.58	0.00	0.00	0.00	0.32	0.70	0.08	0.57	0.86	0.12	0.58	0.14
30	-0.42	**3.91**	**8.51**	**6.91**	-0.36	**4.14**	**3.73**	**2.25**	-0.86	**1.99**	**-3.02**	-0.44	0.42	**4.59**	0.78	1.00
	0.68	0.00	0.00	0.00	0.72	0.00	0.00	0.02	0.39	0.05	0.00	0.66	0.68	0.00	0.43	0.32
31	**11.52**	**13.96**	**15.30**	**12.52**	**6.22**	**10.04**	**12.32**	**9.25**	0.08	1.69	**4.67**	**3.71**	**-2.52**	**2.32**	-0.27	-0.27
	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.93	0.09	0.00	0.00	0.01	0.02	0.79	0.79
32	**7.27**	**9.71**	**9.96**	**5.23**	**2.95**	**4.11**	**5.70**	**3.87**	-1.27	-1.51	0.76	1.85	0.84	**1.97**	-1.27	1.53
	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.20	0.13	0.44	0.06	0.40	0.05	0.21	0.13
33	**3.72**	**3.19**	**4.82**	**3.12**	0.41	0.52	-0.80	-1.69	-0.41	0.57	**-2.16**	**-2.07**	0.34	-0.71	1.50	-0.17
	0.00	0.00	0.00	0.00	0.68	0.61	0.42	0.09	0.68	0.57	0.03	0.04	0.73	0.48	0.13	0.87
34	**4.07**	**4.05**	**3.65**	**2.98**	**4.28**	**4.44**	**3.06**	**2.32**	**2.59**	1.46	1.16	0.03	1.86	0.38	-1.93	-0.58
	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.02	0.01	0.14	0.24	0.98	0.06	0.70	0.05	0.56
35	**3.28**	**5.86**	**9.24**	**17.56**	**2.25**	**3.84**	**6.22**	**8.01**	-0.33	0.72	1.52	1.06	-2.00	-0.57	0.65	-1.30
	0.00	0.00	0.00	0.00	0.02	0.00	0.00	0.00	0.74	0.47	0.13	0.29	0.05	0.57	0.52	0.19
36	**12.91**	**15.96**	**6.27**	**6.18**	**7.26**	**10.45**	**4.32**	**3.37**	-1.01	-1.39	0.15	0.39	-0.03	**3.75**	-1.17	**-2.08**
	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.31	0.16	0.88	0.70	0.97	0.00	0.24	0.04

Table 9: Fligner-Policello Test of stochastic equality on labor productivity, returns on sales and growth rates for Exporting *vs* Non-Exporting firms. Value of the observed statistic (FP) and associated p-value. Significant values are in bold. A firm is classified as exporter if it has more than 20% of its revenues from export.