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Do Portuguese manufacturing firms self select to exports?[*]

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Abstract

Using a longitudinal database (1996-2003) at the plant level, this paper aims to shed light, on the thesis that most productive domestic firms self select to export markets. Self selection and learning by exporting are two non-mutually exclusive theses that try to explain the high correlation between international trade involvement of firms and their superior performance, relative to domestic firms. In general, we find evidence of a self-selection to exports. However, there is a significant heterogeneity according to the destination of sales, to firms' import status before exporting and to the specificities of sectors firms' belong to.

Keywords: Exports, Imports, Self selection.
JEL codes: F14, D24.

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1. Introduction

Since the 60s, cross-country macroeconomic literature has established a positive correlation between trade and growth. However, at the firm level, there is still an on-going debate on the relationship between trade and firms' performances, namely productivity. Pioneered by the works of Bernard and Jensen (1995) and Aw and Hang (1995), several works have been produced in recent years aiming to shed light on this issue.

There are two non-mutually exclusives theses to explain the observed high correlation between trade and productivity, at the firm level: the "self-selection" thesis (SS) argue that the most productive firms become exporters while the "learning-by-exporting" thesis (LBE), claims that firms become more efficient by exporting and experience an acceleration in productivity growth compared to non-exporters.

SS is based on the existence of strong fixed costs for foreign market entry (e.g., Jovanovic, 1982; Roberts and Tybout, 1997). Thus, only the most productive firms could overcome such costs and would self-select into foreign markets. Several theoretical models assume the higher productivity of some firms to be one of their intrinsic features with an exogenous origin (e.g., Melitz, 2003; Bernard et al., 2003; Melitz and Ottaviano, 2008); these models consider those firms have received a positive random draw from a productivity distribution. Other authors consider that some firms make a conscious decision to begin exporting (e.g., Yeaple, 2005), and consequently those firms deliberately "invest" to become exporters; in these cases, the productivity growth would result of such policies and preparation for future foreign market participation.

LBE is often taken as a black-box function with an unclear learning mechanism behind the productivity growth, but there are several mechanisms identified in the literature that could fill that gap: (i) exporting positively affects product and process innovation (e.g., Salomon and Shaver, 2005; Cassiman and Martinez-Ros, 2007); (ii) large and more

competitive markets provide the conditions for exporters to become more efficient (competition effect); (iii) a wider network of contacts with distinct sources, such as clients, suppliers, competitors, professional and scientific institutions may enhance efficiency improvements and innovations; (iv) the bigger dimension of international markets may offer better conditions for scale economies. Nevertheless, the absence of a coherent theory to support and explain the LBE thesis may be due to difficulties in controlling the learning mechanisms in empirical research, and this difficulty block further theoretical advances. However, a growing body of literature has claimed that exports produce learning effects, which would result from adjustments in the process governing firm's productivity growth. The basic theoretical argument behind the LBE thesis is that firms operating in international markets can better capture knowledge and technological spillovers from international contacts.

The empirical literature (e.g., Wagner, 2007 reports studies for 34 countries) seems to confirm only the self-selection thesis. On the other hand, LBE tests have been produced for several countries but overall, post-entry effects seem weak or at most are mainly observed in less developed countries or in restrict groups of exporters.

In order to contribute to this discussion, we test the Self Selection thesis for Portuguese firms for the first time. We use a large sample of Portuguese manufacturing firms for the period 1996-2003 for which data is available on both financial and international trade variables. Applying both probit models and OLS regressions we test SS and, in general, we found clear evidence of it. In order to reveal the heterogeneity of SS effects, we analysed the connections between SS and imports, on one hand, and between SS and the export market destinations, on the other hand.

The remainder of the paper is organized as follows. Section 2 presents a review of the main literature on Self Selection and on the determinants of firms´export entry. Section 3

describes the data. Section 4 tests econometrically whether ex-ante firms' features influence the decision to enter into export markets. Section 5 presents some concluding remarks.

2. Self selection reviewed

The large majority of empirical studies found strong evidence of SS (Wagner, 2007).[1] Nevertheless, few research based on micro level data has investigated how future exporters' characteristics vary with the country of destinations. In a rare study concerning all these factors, De Loecker (2007) finds significantly higher productivity premia for Slovenian firms starting to export to higher income markets. Verhoogen (2008), using a sample of Mexican manufacturing firms, shows, for a developing country, that an increase in the incentive to export forces exporting firms to upgrade their production process and their technologies and, as a consequence, to maintain higher quality workforce.

Conceptually, Self Selection may be explained by two main hypotheses: (i) forward-looking firms increase their productivity with the explicit purpose of becoming exporters in the future and then to benefit from larger markets (conscious self selection); (ii) firms become more productive for reasons not related to exporting and later decide to export. This is important for policy design; if firms become more productive in order to export, then policies to incentive exports should improve productivity.

The idea that forward-looking firms may increase their productivity when targeting export markets is partly based on the observation that goods produced for foreign markets are, at least in developing countries, of a higher quality than analogous products made for the domestic market (e.g., Keesing, 1983; and Keesing and Lall, 1992). Thus, a firm attempting to become an exporter may need to produce higher-quality goods, often by using more advanced technologies and more efficient organization schemes. The argument that potentially higher returns available in international markets constitute an incentive to increase

[1] McCann (2009) in a study for Irish firms is one of the few known exceptions.

productivity is supported by anecdotal evidence and case studies (Haussmann and Rodrik, 2003 present several examples).

Complementarily, the idea that distinct firm features are required to export with various foreign markets has been considered recently in the theoretical model proposed by Chaney (2008). Expanding Melitz (2003), the Channey´s model assumes that the combination of market specific fixed entry costs and productivity differences among firms may explain why the number of firms - the extensive margin - able to overcome trade barriers change from market to market. This model of self-selection notices that it occurs from market to market, which implies that each foreign market is associated with a distinct productivity threshold. In this line, it should be observed that exporting firms with lower productivity serve a limited number of markets with low productivity thresholds. By contrast, exporting firms with higher productivity should export to a large number of markets with high productivity thresholds.

Reviewing the literature, we may distinguish three groups of factors influencing the propensity of a firm to export, in general, and to begin exporting, in particular: (i) firms' features and performances before export entry; (ii) sunk costs of entering markets firms want to sell to; (iii) macroeconomic variables that influence all firm' ability to export.

In the theoretical modelling literature there are explicit and implicit references to the decision of exporting. It is worth mentioning two different models of international trade that assumed, for the first time, firms' heterogeneity regarding productivity. Bernard et al. (2003) developed a multi-country Ricardian based model and Melitz (2003) introduced the referred novelty in an intra-industry trade model *a la* Krugman (1980).

Melitz's model assumes conditions of monopolistic competition in which firms produce a variety of goods and draw their productivity from a fixed distribution. There are fixed production costs and fixed and variable entry costs in export markets and thus the productivity of the firm and the expected probability of entering the foreign market are positively related.

In fact, entering export market entails several costs such as market research costs, market development and distribution channel development costs. A forward looking manager would weight these sunk costs incurred during market entry, against the future expected stream of income. Thus, entering in export markets becomes a question of which firms have the capacity to undertake this investment (e.g., Nagaraj, 2009).

However, none of those models explained the occurence of eventual LBE effects as both assumed that participation decisions in export markets are determined completely by a combination of foreign market entry sunk-costs and firms' exogenous differences in productivity. In the same line, Falvey et al. (2004), extending the basic Melitz's model, assume self-selection of new exporting firms to be stronger when the degree of substitution across products was high.

However, the fact that the entry costs depends on the previous firm's export status confers an intertemporal character to the decision of exporting. Roberts and Tybout (1997) present a review of the sunk-entry cost theoretical literature that had begun with Baldwin and Krugman (1989). In that literature it is assumed that firms face sunk-costs for (re)entering in foreign markets and that those costs rely on the time absence from foreign markets. Adittionally, two more assumptions are made as exports increment the expected profits by a certain level and there is also an exit cost. Hence, managers are assumed to choose, in each period, the infinite sequence of decisions to export or not that maximize the expected present value of payoffs.[2] In line with this, other models (e.g., Sjöholm and Takii, 2008) also present dynamic models of the export decision performed by profit-maximizing firms.

At the financial level, Chaney (2008) builds a model of international trade with liquidity constraints. After him, if firms must pay some entry cost to access foreign markets and if they face liquidity constraints to finance these costs, only firms with sufficient liquidity are able to

[2] Using a Bellman's equation.

export. In fact, there is a literature linking financial development and international trade: for example, Fanelli and Keifman (2002) had already underlined that for countries with a weak financial system one could expect the concentratation of exports in big and well established firms. They point out that the access to financial markets, besides firms' size and age, is a relevant factor determining firms' export ability and, thus, having a well developed financial system can be thought as a key element in determining countries' non-price competitiveness. Indeed, as exporters must incur vital costs to enter foreign markets, therefore countries with a well developed financial system will enjoy some advantage for export activities.[3]

In empirical studies, the export-market participation with sunk costs model has been tested for firms belonging to developed and developing countries (e.g., Clerides et al., 1998; Bernard and Wagner, 2001; Bernard and Jensen, 2004; Girma et al., 2004). Roughly speaking, those authors aim to quantify the impact of entry-exit costs on the probability of exporting (and some of them also test the presence of the LBE). The empirical findings emphasise the significance of passed export experience to explain firms' ability to export, confirming the relevance of the sunk cost model to explain firms' export status. Espanol (2007) refers that there is a wide consensus concerning firms' features that explain their export status: size, age, structure of capital ownership and productivity performance are the most significant factors. Besides, Bernard and Jensen (2004, p. 569) conclude that the doubt does not refer to the variables explaining the decision to export but the "key unanswered question is how firms obtain the characteristics that allow them to easily enter to the export market".

There is also a literature that studies macroeconomic factors affecting firm's propensity to export. Das et al. (2007) show that these changes are most relevant for firms who export little, the fringe players in export markets (Tybout, 2003). Variables which changes produce waves of entry and exit in exports are exchange rates, policy innovation and agglomeration

[3] Given the prooved negative relation between firms' size and the access to the finantial system, we proxy the first variable by the use of a dummy for smaller firms.

effects. Sjöholm and Takii (2008) assume that the binary variable, behind the dinamic binary choice model of exporting, relies on parameters that reflect distinct sunk costs related with past export skills and firms' network of foreign contacts, and on time-specific factors common to all firms (exchange rates and trade policies) and plant-specific factors (e.g., value added per worker, share of white collar workers and plant size). The former two variables affect plant earnings and good quality, thus affecting the probability of exporting.

3. Data

The empirical analysis relies on a dataset that combines two different data sources developed by the Portuguese National Statistics Institute (INE): balance sheet information (IAE) and external trade information (ECE). The two datasets are linked by firms' non revealed fiscal number. IAE provides information of firms' balance sheets,[4] and uses a survey sample of all the universe of manufacturing Portuguese firms, from 1996-2003. In this paper, we used: number of employees, turnover, value added, investment, labour cost, stock of capital assets, liabilities and earnings.[5] Firms are classified according to their main activity, as identified by INE standard codes for sectoral classification of business activities (CAE), which has a high correlation with Eurostat NACE 1.1 taxonomy.

We define an "active firm criteria" that involves firms experiencing three conditions: firms with at least 2 employees; firms with a global turnover of at least 1.000€; firms with a positive net fixed asset register. We also define "Exporter" as a firm which exports at least 1% of their turnover. Given those restrictions and the natural entry and exit of firms or the lack of information on some variables, the dataset is unbalanced. Nevertheless, it contains

[4] Since 2004, INE has changed its methodology and works with the universe of Portuguese manufacturing firms but before 2004 the only data available is the one we use. INE ensures the representativity of the sample used.

[5] Unfortunately, we do not have other types of data that would have been useful, such as: innovation performance, workforce composition, workforce educational level or data about affiliates of Portuguese multinationals.

information for an average of 4,500 firms per year. Capital is proxied by tangible fixed assets at book value (net of depreciation).

In turn, ECE provides information of all Portuguese firms that exported and imported over the 1996-2003 period. For each firm, ECE supplies data on trade volume (exports and imports) aggregated by year and by country (destination of exports and origin of imports) and it also display information on the types of products/sectors traded for each transaction.[6] There is also information on the volumes (Kilograms) involved.

All nominal variables are measured in 1996 Euros and are deflated using 2 digit industry-level price indices provided by INE; for capital stock we use the same deflator for all sectors. The firm-level productivity is measured using two concepts: value-added per employee (LP) and Total Factor Productivity (TFP). Since it is highly probable that profit-maximizing firms immediately adjust their input levels (especially capital) each time they notice productivity shocks, then productivity and input choices are likely to be correlated and TFP estimation involves problems.

In line with several authors (e.g., Sharma and Mishra, 2009; Maggioni, 2009), TFP is estimated using the semi-parametric method of Levinsohn and Petrin (2003). This method recognizes the simultaneity bias in computing TFP as firms observe the productivity shocks but econometricians do not. Thus, Levinsohn and Petrin (2003) compute TFP as the residual of a Cobb-Douglas production function in which: the value added of each firm is the independent variable; capital, labour and unobservable productivity level are the dependent ones. This method assumes that intermediate inputs present a monotonic positive relationship with productivity and thus could be used as proxies. Given our data availability we use

[6] Our data includes 14 different sectoral types of traded products.

intermediate inputs as the values of "supplies and services from thirds" at book value. We estimate production function for every 2-digit sector separately.[7]

4. Self selection to export in Portuguese firms

Silva et al. (2010) have verified the positive correlation between trade and performance, namely TFP. Another simple test to this hypothesis would be a Granger-causality test. Appendix A suggests the existence of a bi-directional causality: productivity Granger-causes exports and exports Granger-cause productivity.

Nevertheless, as we are interested in shedding more light on one of these causal relationship directions, we propose to evaluate more carefully SS. Thus, we studied firms starting to export in the sample period and, as "control group", the firms which never export throughout the period – there are 996 control firms in our database. We defined as "export starter" firms that export in t and t+1 years, and that had never exported in the two previous years, t-1 and t-2. We ended up with five cohorts, one for each year from 1998 to 2002 totalling 220 different starters (7 firms are starters two times and we eliminate such records.). Table 1 shows the number of starters across cohorts.

Table 1 – Export Starters

Year	1998	1999	2000	2001	2002
Starters	54	43	47	34	42

Source: Own calculations.

Empirically, to evaluate SS we could apply two distinct approaches: (i) a random effect probit, testing the probability of a firm to become an exporter due to some lagged variables, such as size, foreign ownership status, sector fixed effects and mainly productivity levels before entry (e.g., McCann, 2009); (ii) an analysis of ex-ante differences between export starters and never exporters, using a parametric exercise (e.g., Bernard and Jensen, 1999).

[7] Details on the Levinshon and Petrin methodology are in Maggioni, 2009.

Using the first approach, we tested a model in which the dependent variable is a dummy indicating if a firm became a new exporter in that year and the explanatory variables, lagged one year, include: productivity, capital, investment, number of employees, a dummy for small firms, sector dummies, time dummies, a dummy for firms that import, a dummy for firms having employees devoted exclusively to R&D activities and at last a dummy for foreign capital participation. The selection approach is confirmed as a positive significant coefficient on lagged TFP is observed in Table 2. Moreover, lagged imports and investment are also significant suggesting that firms to become more productive had to invest and to import.

Table 2 – Self selection to export (probit model)

Variable	TFP_{t-1}	$Capital_{t-1}$	$Investment_{t-1}$	$Employees_{t-1}$	$Imports_{t-1}$	$R\&D_{t-1}$	$Forcap_{t-1}$	Obs.
	0.392 (0.227)	-0.004^{+} (0.011)	0.219 (0.101)	0.001^{+} (0.006)	0.032 (0.01)	0.086^{+} (0.16)	0.111^{+} (0.161)	3,413

Source: Own calculations.
Note: Robust standard errors in parentheses. If nothing mentioned coefficients are significant at least at 10%. $^{+}$ means not significant. Estimations obtained with Stata 10 software.

Nevertheless, if we split the starters into two groups: (i) starters that are already importers even before exporting (only importers) and (ii) starters which did not import before exporting (purely domestic firms), we find that SS is observed only for firms that were importers before starting to export; for non traders the SS thesis is not confirmed (Table 3).

Table 3 – Self selection to export using import status (probit model)

	Only importers become also exporters	Non traders become exporters
TFP_{t-1}	1.57 (0.004)	0.005^{+} (0.333)

Source: Own calculations
Note: see Table 2.

Given the fact that firms which import may have already supported part of the sunk costs of entry in external markets, when they initiated their imports, we can argue that they are more likely prepared to face the challenge of exporting. Moreover, combining the fact that lagged imports and investment are also significant in Table 2 with the findings of Table 3, we could also argue that the self selection of the most productive firms into the export

markets requires imports. At the other hand, if new exporters are not the most efficient firms, then previous imports are not needed and thus are not revealed.

Bearing in mind that we are interested in evaluating SS not only regarding productivity indicators (TFP and labour productivity), but also with regard to other characteristics (size, capital intensity (CI) or wages) and also in order to test for conscious self-selection, we developed a second approach to test for SS. In fact, in line with Bernard and Jensen (1999) and Serti and Tomasi (2008a), we regressed our performance variables (all in logarithms) in period *t* on dummies indicating if a firm is an export starter at time *t*+δ and on a set of controls (sectoral dummies, time dummies and size).

$$y_{i,t-\delta} = \alpha + \beta_1 Starter_{i,t} + \beta_2 Controls_{i,t-\delta} + \varepsilon_{i,t} , \quad (1)$$

where: $Starter_{i,t}$ is a dummy variable equal to 1 if the firm starts exporting in *t*; $y_{i,t-\delta}$ is our performance variable, in logarithms, at the pre-export time; and $0<\delta<5$. Table 4 shows, for relevant dependent variables, the transformed estimated coefficients of (1) i.e., the conditional percentage differential between starters and never exporters, in levels.

By investigating variables in levels (Table 4), we found support for SS: more productive firms become exporters. This is confirmed by using either Labour Productivity (LP), or TFP. In fact, before entry into export markets, the starters are more productive, larger, present higher Capital Intensity (CI) and higher sales than never exporters. On the five years average, the ex-ante TFP of starters is around 33% higher than that observed for never exporters. Besides, future exporters' Labor Cost per unit of sales (ULC) is on average half of the value observed for the control group thus indicating starters´ higher efficiency before exporting. Regarding firms' sales, we observed that, as the time of internationalization approaches, future exporters also appear to be increasingly more successful in domestic markets. They also display superior firm size (number of employees).

We also found that starters invest more than never exporters, mainly 3 years before entry, thus giving some support to the thesis of "conscious self-selection" of firms to export; this investment performance also explains their strong advantage in capital and size terms. López (2009) has proposed the idea that SS to exports, in developing countries, may be a conscious process by which some firms increase their productivity with the aim of becoming exporters. This can be due to the need to produce top quality goods for exports to more developed countries. Thus, firms that aim to export would be compelled to buy new technologies and to invest in new capital in order to produce top-quality goods. Moreover, the use of a new technology increases the value added by future exporters, thereby increasing measured productivity relative to non-exporting firms, which continue to produce low-quality goods for domestic markets.[8]

Table 4 – Self-Selection: levels

	t-5	*t*-4	*t*-3	*t*-2	*t*-1
TFP	36.3^{+} (0.001)	28.4 (0.001)	25.9 (0.001)	35.9 (0.002)	41.5 (0.002)
LP[(a)]	32.1^{+} (0.01)	37.2 (0.02)	43.2 (0.003)	49.1 (0.01)	52.1 (0.001)
Employees	68.1 (0.05)	58.1 (0.084)	55.2 (0.01)	72.3 (0.007)	83.5 (0.003)
Sales	192 (0.000)	177 (0.03)	166 (0.02)	211 (0.001)	203 (0.000)
Capital	139 (0.04)	169 (0.006)	228 (0.01)	225^{+} (0.012)	205 (0.000)
CI[(b)]	43 (0.33)	79 (0.012)	163 (0.013)	112 (0.005)	100 (0.01)
Investment	32.5 (0.025)	32.6 (0.031)	66.3 (0.004)	27.2^{+} (0.28)	75.1 (0.04)
ULC[(c)]	-39 (0.02)	-75 (0.000)	-85 (0.000)	-56 (0.01)	-41 (0.01)
Obs.[(d)]	1,237	2,312	3,918	5,152	5,320

Source: Own calculations.
Notes: [(a)] means Labour Productivity; [(b)] is capital intensity; [(c)] represents Unit Labour Cost; [(d)] is the maximum number of observations available for each time lag; In computing the coefficients we use the exact percentage differential given by (e^{β_1}-1) x100; *p*-value of robust *t*-test are in brackets below estimates. See also Table 2.

[8] Important theoretical support for the idea that entry to export markets is not an exogenous process but a conscious decision is provided by Yeaple (2005).

Hence, some Portuguese firms may have made a conscious effort to increase their productivity once they began to focus on the export markets. Thus, the increase in productivity in some firms does not seem to be entirely exogenous: it may be motivated by the expectation of future access to export markets. However, alternative explanations cannot be totally ruled out. It is quite possible that firms invest simply to succeed in the domestic market without any intention to become exporters but then, after experiencing domestic success, decide to enter in export markets, eventually also motivated by governmental support.

Looking for further insights, we tested if fims modify their behaviour, in the pre-entry period, according to their future export status. Indeed, it seemed wiser to study the dynamics of future exporters' premia rather than studying only level differences.

$$ln\, y_{i,t-s} - ln\, y_{i,t-\delta} = \alpha + \beta_1 Starter_{i,t} + \beta_2 Controls_{i,t-\delta} + \varepsilon_{i,t}\,,\ 0 \le \delta \le 5 \text{ and } 0 \le s \le 4 \qquad (2)$$

For relevant dependent variables, Table 5 reports the transformed estimates of conditional percentage differential between growth rates of starters and never exporters.

Looking at the growth rate differentials between different time spans, we found a significant increase in the pre-entry export premia of starters, in terms of firms' dimension (number of employees), sales and capital; this superior dynamic of future exporters, extends just to the entry year but seems to be larger three years before the internationalization begins. The coefficients, employing the two productivity proxies as dependent variables, are almost never significant: in the pre-entry period, starters and never exporters' efficiency dynamics are, on average, similar.

The superior capital growth of starters is reflected by a capital deepening (i.e. capital intensity) just until *t*-3. Thus, any eventual change in the productive structure of starters (which could be materialized with several years of higher capital growth) seems to occur "long" before exports begin, suggesting the need of a long time sparrow to perform such a decision. Moreover, as ULC coefficients are non-significant, during the pre-entrance period,

future exporters may not undertake substantial structural changes in terms of organization and technology of production (in comparison to never exporters), but instead they do grow (in size) comparatively more. Overall, these facts suggest that, in the five years preceding export market entry, new exporters are not more dynamic in improving their efficiency than never exporters but are, in general, more dynamic in terms of capital, employees and sales growth.

Table 5 – Self-Selection: growth-rates

	t-4 / *t*-5	*t*-3 / *t*-4	*t*-2 / *t*-3	*t*-1 / *t*-2	*t* / *t*-1
TFP	-0.018^{+} (0.66)	-0.017^{+} (0.60)	0.053^{+} (0.18)	0.001^{+} (0.26)	-0.041^{+} (0.87)
LP[(a)]	0.005^{+} (0.953)	-0.016^{+} (0.63)	0.052^{+} (0.22)	0.001^{+} (0.01)	-0.132^{+} (0.90)
Employees	-0.061^{+} (0.56)	0.057** (0.02)	0.076** (0.03)	0.087^{+} (0.49)	0.050** (0.01)
Sales	0.045^{+} (0.76)	0.058* (0.40)	0.147** (0.01)	0.045^{+} (0.67)	0.034^{+} (0.56)
Capital	0.084^{+} (0.100)	0.076* (0.06)	0.101** (0.01)	-0.028^{+} (0.62)	0.052^{+} (0.10)
CI[(b)]	0.144* (0.09)	0.019** (0.07)	0.028^{+} (0.58)	-0.087^{+} (0.59)	0.003^{+} (0.95)
Investment	-0.431^{+} (0.491)	0.272** (0.01)	-0.007^{+} (0.96)	-0.022^{+} (0.92)	0.131^{+} (0.43)
ULC[(c)]	-0.040^{+} (0.980)	0.812** (0.16)	-0.461^{+} (0.46)	-0.029^{+} (0.70)	0.025^{+} (0.73)
Obs.[(d)]	871	1,567	1,354	1,533	1,335

Source: Own calculations.

Notes: All regressions include foreign-ownership dummy, sectoral, number of employees – except when the number of employees is the dependent variable - and year dummies as controls. Robust standard errors appear below the coefficients' estimates in parenthesis. * and ** mean statistical significance at 10% and 5%, respectively; $^{+}$ means not statistically significant; if nothing is mentioned, estimates are significant at 1% level. Estimations obtained with Stata 10 software.

As Serti and Tomasi (2008a, p. 673) said "In the spirit of self-selection, this means that prior to exporting a firm must have certain characteristics in terms of productivity, size, human capital, and capital intensity in order to sell its goods abroad". Yet, as we stressed there is little evidence indicating that firms prepare themselves before entering the foreign markets. In fact, any preparation would consciously involve a higher investment growth, which is only partially detected, or a subjection to some common shock but both facts would represent a change in their structure of production and in efficiency which is almost undetected. It seems, instead, that future exporters have superior features from the beginning

of our database, vis-à-vis never exporters. This suggests that SS is not "built up" in that short period previous to export market entry.

At another level, in the pre-entry period, we also found some important evidence about import activity (Table 6). There is a consistent difference in the import share, measured by the ratio between imports and turnover, between never exporters and starters, mainly until the entry time. Moreover, in the years before entry we can observe a constant import share for never exporters, while starters increase their higher import share.

Table 6 – Import share trend of starters and of never exporters before and after exports begin

Time	*t*-5	*t*-4	*t*-3	*t*-2	*t*-1	*t*	*t*+1	*t*+2	*t*+3
ever exporters	5	5	5	5	5	6	6	5	4
All Starters	17	21	22	23	23	22	20	19	18

Source: Own calculations.

One possible explanation for these numbers is that some firms in order to enter the export market also start importing materials and machines or increase their import levels. After export entry (*t*+1 to *t*+3) the import share declines a little, but is still much higher for starters. Firms that want to export may need to improve the quality of goods and/or adapt them to the requirements and tastes of foreign customers. To fullfil these needs, foreign materials could be more suitable; moreover, as firms start being involved in the international market, by importing, they create networks with foreign contacts that potentiate exports.

To sum up, it is important to bear in mind that an important share of export starters are also involved in importing, which may start in conjunction with export entry. Table 7 confirms the idea that starters accelerate import growth some years before exporting begins.

Another important issue is the possibility of a "secondary" form of SS, in line with Chenny (2008). In fact, it is likely that more productive firms choose to become exporters, but also that the most efficient among them may also choose to serve more demanding markets. In this line, if self-selection of more efficient firms to export is indeed a consequence of the

existence of market-entry costs, and given that entry costs are very heterogeneous across markets, thus is possible that SS differs across markets.

Table 7 – Growth of imports (%) for export starters

Time	*t*-2 / *t*-3	*t*-1 / *t*-2	*t* / *t*-1	*t* +1 / *t*	*t*+2 / *t*+1	*t*+3 / *t*+2
Starter 1999	21	6	-4	10	0	-11
Starter 2000	20	0	-8	-15	30	-11
Starter 2001	8	10	-2	-25	11	-
Starter 2002	15	12	2	3	-	-

Source: Own calculations.

In fact, there are several reasons why SS may vary across markets since different sunk costs are related to different markets' features, such as: distance, income, familiarity, cultural affinity, language or legal and institutional structures. Besides, in line with some models such as Bernard et al. (2003) or the technology-gap models of trade of Cimoli and Soete (1992), one can argue that more advanced markets are characterized by a higher competitive level, which could be associated with stronger efficiency requirements to future exporters.

Hence, if the nature of entry costs or the product quality requirements vary across markets, this may translate into ex-ante differences in terms of performances between firms exporting to different countries. Thus, it is expectable, for instance, that exporting to distant and unfamiliar countries may entail higher entry sunk costs or exporting to high productive and rich countries could require higher productivity, top-quality goods and marketing. In this line, the ideal empirical test would be a mix analysis using both the development level of export destinations but also other characteristics of the geographical area of such markets (e.g., population, distance or exchange rate between countries). For the moment and in order to test all these claims, we estimated the regression (in line with Serti and Tomasi, 2008b):

$$\ln y_{i,t-s} = \alpha + \alpha_1 E_{i,t}^{EU} + \alpha_2 E_{i,t}^{PL} + \alpha_3 E_{i,t}^{EU+PL} + \alpha_4 E_{i,t}^{Dev} + \alpha_5 E_{i,t}^{NDev} + \alpha_6 E_{i,t}^{EU+Dev} + \alpha_7 E_{i,t}^{Multiple} + \beta Controls_{i,t} + \varepsilon_{i,t} \quad (3)$$

We regressed as dependent variables the logarithm of the two productivity measures, LP and TFP, at pre-entry time.[9] As dependent variables we used dummy variables indicating if a firm is an export starter at time *t* but distinguishing among several groups of destination markets. Controls include: firm size, sectoral dummies for two digit CAE and year dummies. To test how each firms' performance differs according to the type of market they trade with, we separated starters exporting into 5 mutually exclusive groups of export destinations: (i.1) only to Spain; (i.2) only to other European Union countries (EU); (i.3) only to Portuguese language countries (PL); (i.4) only to other Developed countries ouside EU (Dev);[10] (i.5) only to Non-Developed countries (NDev). Additionally, we considered firms that export to more than one group of markets, namely to: (ii.1) EU and PL countries (EU+PL); (ii.2) EU and Dev countries (EU+Dev); (ii.3) all other possible combinations of markets (Multiple).

The estimation results are consistent with our expectations. In fact, firms that start exporting only to developed countries (Dev) are the most productive ones in the pre-entry period, together with firms that export to Multiple countries. Moreover, firms that start exporting to countries with Portuguese official language, to European Union countries or to both destinations are the ones with a smaller productivity advantage over non exporters, in the pre-entry period. Exports to Non Developed countries revealed mixed results: in more distant years relative to export entry there are negative coefficients but in years close to the entry year positive levels appear; this could be a reflection of contraditory forces as most of those countries are geographically and culturally distant from Portuguese firms but on the other hand are probably not highly demanding in terms of quality and productivity. Curiously, firms

[9] We also estimate similar regressions for the following variables; number of employees, capital intensity and investment. The same conclusions apply: firms that start trading with more developed countries invest the most and firms that start trading with countries withl Portuguese as an official language (PL) and Spain invest the least.

[10] In this group we included (using GNP per capita): The USA, Japan, Australia, New Zealand, South Korea, Singapore, Hong-Kong, Canada, Israel, Taiwan, Switzerland, Kuwait, Oman, Qatar, UAE, Bahrain, Saudi Arabia.

that start exporting only to Spain show an intermediate level of TFP and LP, suggesting that the Spanish market is more demanding than the average EU market and PL markets. Overall, this analysis indicates that SS varies across markets, thus suggesting that each foreign market may be associated with a different productivity threshold.

Table 8 – Self selection by destination country of exports

	TFP				LP			
	t-4	*t*-3	*t*-2	*t*-1	*t*-4	*t*-3	*t*-2	*t*-1
Spain	0.394	0.147^{+}	0.245**	0.225^{+}	0.645	0.559	0.405	0.331**
	(0.11)	(0.21)	(0.11)	(0.18)	(0.08)	(0.13)	(0.09)	(0.17)
EU	0.254	0.126^{+}	0.160*	0.070^{+}	0.330*	0.300^{+}	0.321**	0.227^{+}
	(0.12)	(0.21)	(0.09)	(0.16)	(0.20)	(0.24)	(0.15)	(0.20)
PL)	0.067^{+}	0.051^{+}	-0.178*	-0.025^{+}	0.101^{+}	0.051^{+}	0.141^{+}	0.125^{+}
	(0.15)	(0.17)	(0.10)	(0.12)	(0.19)	(0.17)	(0.23)	(0.15)
EU+PL	-	-0.021*	-0.127	0.074	-	0.088	-0.017^{+}	0.222
		(0.10)	(0.01)	(0.01)		(0.01)	(0.01)	(0.01)
Dev	0.579	0.507	0.512	0.427**	0.979	0.942	0.931	0.667
	(0.01)	(0.06)	(0.19)	(0.13)	(0.02)	(0.07)	(0.19)	(0.12)
EU+Dev	-	0.551	0.452	0.428**	-	0.781*	0.791	0.828
		(0.25)	(0.19)	(0.23)		(0.43)	(0.30)	(0.30)
NDev	-0.156	-0.167	0.442**	0.391	-0.281	-0.107	0.712**	0.651
	(0.01)	(0.01)	(0.24)	(0.19)	(0.01)	(0.01)	(0.21)	(0.24)
Multiple	0.056^{+}	0.426*	0.621	0.975	0.246^{+}	0.467*	0.831	1.202
	(0.28)	(0.27)	(0.21)	(0.38)	(0.53)	(0.29)	(0.23)	(0.41)
R squared	0.15	0.15	0.15	0.10	0.10	0.10	0.10	0.10

Source: Own calculations.
Notes: See Table 5.

We could also argue that the SS of more productive firms into foreign markets is also conditioned by the heterogeneity among the sectors firms belong to. We thus analysed the SS thesis, in levels, but now splitting firms according to the technological sophistication of the sectors they belong to.

Thus, we aggregated the initial 23 two-digit sectoral codes and 201 five-digit sectoral codes (the original INE desegregation) into five sectoral classification based on technological sophistication (in line with Pavitt, 1984 - adapted): Group 1 (Gr1) with the lowest technical sophistication (food, beverages and tobacco); Group 2 (Gr2) - (textiles, wearing apparel and

leather); Group 3 (Gr3) - (wood, pulp, paper, printing and furniture); Group 4 (Gr4) - (chemicals, rubber, plastic, non-metallic goods, basic-metallic goods, fabricated-metallic goods and recycling sectors); Group 5 (Gr5) with the highest technical sophistication - (machinery, office machines, computers, electrical machinery, medical instruments, motor vehicles and other transport equipment).

Using these five groups we repeated the regression (1), only for TFP, and noticed (Table 9) that SS is stronger for firms of group 1, the lowest technological-level sector.

Table 9 – Self-Selection in levels for different groups of sectors

TFP	*t*-5	*t*-4	*t*-3	*t*-2	*t*-1
Gr 1	5.7^{+}	-	15.1	23.5	24.7
	(0.12)		(0.09)	(0.09)	(0.09)
Gr 2	-	-5.1^{+}	-5.1^{+}	-13.1^{+}	-9.6^{+}
		(0.11)	(0.11)	(0.11)	(0.11)
Gr 3	-4.7^{+}	-	7.2	1.1	11.1^{+}
	(0.09)		(0.05)	(0.03)	(0.09)
Gr 4	-	-1.9^{+}	4.9^{+}	8.6	9.2
		(0.09)	(0.08)	(0.04)	(0.03)
Gr 5	2.7^{+}	-	6.93^{+}	10.8	11.2
	(0.069)		(0.058)	(0.056)	(0.052)

Source: Own calculations.
Notes: See Table 4.

On the contrary, SS is undectected for firms that belong to sectors of Group 2 and only partially observed in firms of the other groups.

Moreover, in Appendix B, we observed that firms from Group 2 (textiles, wearing apparel and leather) have the lowest propensity to start exporting, given the high weight of this sector in total exporters, in the Portuguese economy. Taken together, these facts suggest that starters from Group 2 are not the most efficient firms which may be explained by the fact that the most efficient ones probably have become exporters long time ago. Besides, we acknowledge that Silva and Leitão (2007) found that, between 1995 and 1997, Portuguese industrial firms of the clothing and footwear industries worked on an outsourcing basis,

adopting a low-price strategy which did not rely on product innovation. In this respect, we confirmed that firms of Group 2, unlike firms of all other sectors, do not have (previously to start exporting) higher wage levels than never exporters (Table 10)

Table 10 – Self-Selection in wage levels for all firms and Group 2 firms

Wages	*t*-5	*t*-4	*t*-3	*t*-2	*t*-1
All firms	24.7 (0.00)	23.4 (0.00)	23.0 (0.00)	24.8 (0.00)	23.5 (0.00)
Group 2		11.1^{+} (0.44)	13.5^{+} (0.26)	10.1^{+} (0.34)	10.9^{+} (0.37)

Source: Own calculations.
Notes: See Table 4.

In this line, we could argue that if there is no evidence of SS, for some firms or for groups of firms it derives from the fact that not all firms trying to enter into export markets may need to: (i) make contacts with potential foreign customers, (ii) establish distribution channels, (iii) modify their products to foreign tastes or to country-specific regulations. In fact, if some firms begin to export on an outsourcing basis it is very likely that they are "chosen" for their "moderate" wage level and not for their higher efficiency patterns. In these cases a different and perverse Selection is observed: moderate level wage firms are selected or select themselves into exports.

5. Concluding remarks

Given the importance of exports for Portuguese economy and assuming a positive correlation between firms' efficiency and international trade involvement, we study, for the first time for Portuguese firms, for 1996-2003 period, the self-selection thesis of domestic firms to exports.

We found that, for all the variables under analysis and particularly for efficieny indicators, future exporters display advantages with respect to firms that decided not to export later on. However, when looking at the growth rates of the relevant features, in the pre-entry period, we observed that starters and never exporters, in general, do not differ in terms of their dynamic path, with the exception of the scale of production and sales. This may mean that

future exporters are “better” than never exporters even before the year we begin our analysis, suggesting SS takes time to be prepared.

Recent contributions of some models (e.g. Chaney, 2008), assume that SS is an heterogenous phenomenon depending on the destinations markets of starters. In this line, our study also confirmed that self-selection of firms that begin exporting reveals significant heterogeneity according to the destination of exports: the most productive starters are able to export to more demanding markets while the least productive ones seem fit to begin exporting to less exigent destinations. Moreover, we could also uncover the importance of imports for SS of most productive firms and of some sectoral specificity: for firms of some industries we noticed a different and perverse Self Selection as moderate level wage firms are selected (or self select) to future exporters, not the most productive ones.

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APPENDIX A – Granger Causality tests between ln TFP and Export Ratio

(Vector auto-regressions estimated by OLS and Granger-Causality tests based on F-Tests)

$$ln\,TFP_{i,t} = a_i + \sum_{j=1}^{5} \rho_j\, ln\,TFP_{i,t-j} + \sum_{j=1}^{5} \alpha_j\, Exp.Ratio_{i,t-j} + e_{i,t}$$

$$Exp.Ratio_{i,t} = b_i + \sum_{j=1}^{5} \omega_j \ln TFP_{i,t-j} + \sum_{j=1}^{5} \varphi_j\, Exp.Ratio_{i,t-j} + u_{i,t}$$

H0: $\alpha_1 = \alpha_2 = \alpha_3 = 0$; F (3, 4056) = 0,92 ; Prob > F = 0,421

H0: $\varphi_1 = \varphi_2 = \varphi_3 = 0$; F (3, 4053) = 0,72 ; Prob > F = 0,542

Note: Exp. Ratio = Exports / Turnover; we used 5 years lags.

APPENDIX B – Percentual differential between the weight of each industrial sector in export starters and in all exporters (1997-2002)

CAE	15	17	18	19	20	21	22	24	25	26
Dif (p.p.)	+3	-2	-3	-2	+3	0	+3	0	0	-1
CAE	27	28	29	31	32	33	34	35	36	37
Dif (p.p.)	+2	+1	+2	+1	0	0	0	+1	0	0

Source: Own calculations.

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