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Productivity vs. Management: What Matters in the Export Process?

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Productivity vs. Management: What Matters in the Export Process? *

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Abstract

In this paper, both a theoretical and an empirical model to study the contribution of productivity and management practices on exporter status are presented. On the theoretical side, a multiple heterogeneity model is developed, where firms can differ in their levels of two different kinds of productivity: in cost (φ) and in management (ζ), in a context of monopolistic competition. With this, in the autarkic case, the model achieves two conditions (Zero Cut-Off Profit Condition and Free Entry Condition) that firstly determine which firms enter and produce in the market. Then, by opening the economy to the rest of the world, the model not only shows which firms survive in the domestic market but also which ones export. Therefore, the most productive firms would not necessarily export, because export decision also depends on how effectively firms carry out a set of management practices to adapt their product to foreign demand. On the empirical side, productivity and management practices at firm level are measured by using several methods and specifications to identify their effect on exporter status, exploiting the waves of The World Bank Enterprise Surveys of 2006, 2010 and 2017 for Argentina. The main results indicate that both productivity and management practices positively affect the probability of being an exporter, and their effects are very similar in magnitude.

JEL classification: F12, F14

Keywords: Multiple Heterogeneity Model, Productivity, Management, Export Process.

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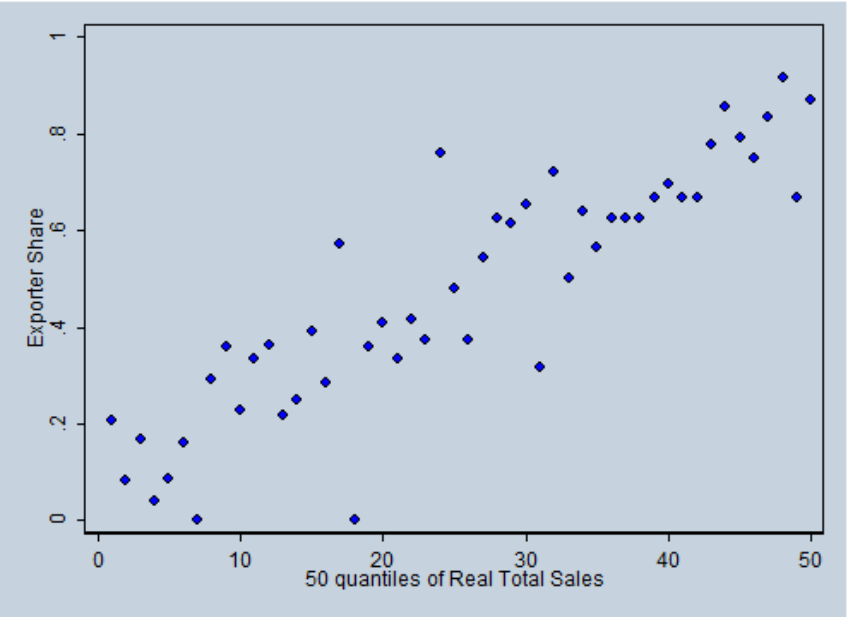
1 Introduction

It is well known how important international trade is to increase growth. Exports have been one of the main factors in the growing process of a number of successful economies throughout the history (Maddison, 2005). That is why, it is so important the presence of exporters in countries and to understand the export process firms face. However, during several years economists have explained the origins of international trade at aggregate level, using the concept of comparative advantage, increasing returns to scale, and consumer love of variety, but they ignored the role of firms or paid little attention to them.

During the 1990s, the availability of data at firm level moved the trade theory into a different direction and researchers started being conscious of the fact that firms would not be a trivial factor in the export process. It has to be mentioned Bernard and Jensen (1999), who analyze a panel of manufacturing firms in the United States; and Pavcnik (2002), who studies the effect on firms after the commercial liberalization of Chile. In this literature, a single attribute is considered the only determinant of firms' ability to successfully carry out business, both domestically and abroad. Often, this attribute is modeled as productivity, where a firm is more productive than other if it produces more at a lower cost (for example, Arkolakis 2010) or as the ability to produce quality with low variable costs (for example, Verhoogen 2008). In both cases, the attribute is assumed to be monotonically related to firms' revenue (a common measure of firm size) and export status. In this way, they predict a threshold firm size above which all firms export and below which none does. These models with a single attribute are able to explain a number of facts empirically observed. For instance, exporters are likely to be larger than non-exporters, they are also more productive, pay higher wages, and are more capital and skilled labor intensive. To isolate size from productivity as the main factor of the exporter premia, researchers have applied the intuitive approach of estimating conditional exporter premia (CEPs) by controlling for size in regressions (For example, Bernard and Jensen, 1995). Interestingly, such regressions showed that actually in some industries there are firms of a larger size that are not able to export, while some smaller firms can sell their product in foreign markets. Therefore, it is not possible to interpret such evidence of conditional exporter premia by using single-attribute models because these models can explain why exporters are systematically different from non-exporters but they cannot explain why those differences persist after controlling for firm size. In consequence, two different conclusions may arise: either there is no reason to believe that smaller firms are less productive or although there is a positive relationship between productivity and size, smaller firms should have other attributes, which would give them a compensating advantage over larger ones. This might suggest that firms are not so different before exporting but conditional on making the decision of exporting, they must modify their internal operation in order to improve their performance in other aspects apart from strict productivity.

Figure 1 shows the share of exporters in a pooled data-base of firms in Argentina in 2006, 2010 and 2017 against fifty quantiles of Real Total Sales of each firm. In this case, if we consider productivity as a residual, we expect that firms with larger real sales would be more productive, given the amount of factors employed. Thus, Figure 1 shows that there is a positive relationship between exporter status and firm size (or productivity) as the earlier papers claim, although not all the firms of a given size are able to export. In Figure 1 we observe bigger firms that are not exporting while smaller firms are exporters, suggesting that there are additional forces behind apart from strict productivity. The aim of this paper is to study such forces.

Figure 1: Relationship between Share of Exporters and Total Real Sales.



The figure plots the fraction of exporters by 50 Real Total Sales quantiles in the pooled data-set. First, I have sorted the firms according to their Real Total Sales. Each firm is assigned to one of 50 size quantiles. Then, Exporter Share for each quantile is obtained by dividing the number of exporters in that quantile by the number of establishments in that quantile. For example, in the 20 quantile, 40% of the firms assigned to that quantile are exporters.

This paper presents a theoretical model, where firms are different in two distinct attributes: productivity in cost(φ) and productivity in management practices (ζ). The importance of management practices has been emphasized both in the IO literature (e.g. Shaked and Sutton, 1983) and in the trade literature (Artopoulos, Friel and Hallak, 2013). The IO literature recognizes that not all firms are equally effective in carrying out such practices. Furthermore, the trade literature (as we discussed above) emphasizes that while some firms base their exporting success on increasing their productivity in costs, others can export based on efficient management strategies. Particularly, in this model, productivity both in cost and management practices determine firm size (revenue). Additionally, since there are different combinations of both attributes that can result in the same profit value, the firms more productive in cost will not necessarily be the only exporters, because the exporter status will also depend on the levels of management chosen by firms. However, the model shows that exporters own higher productivity in management levels than domestic firms. As firms have to overcome additional costs to the ones related to the production of the product and management, which are trade costs, the optimization problem for management decisions presents a new restriction, then. Therefore, the model is not able to determine if exporters own a higher level of management. This makes sense since there could be exporters with a high level of productivity in cost but with deficient management skills, and vice versa.

On the empirical side, this study has made use of the Enterprise Survey of the World Bank to measure both productivity and management practices. The paper follows four empirical methodologies to obtain productivity levels for every firm, which are the most common approaches: Olley and Pakes (1996); Caves, Christensen and Diewert (1982); labor productivity as the product per worker; and labor productivity as average wages of full-time employees. Then, a *management index* is specified as a summary measure of a set of management practices made by firms on their products, developing activities and commercialization channels, in order to have a compensating advantage. Different index forms (simple mean, geometric

mean and Principal Component Analysis) are presented to give robustness to the results, and to avoid the fact that they could exclusively depend on the chosen index form. The Enterprise World Survey is a useful source of data since it covers a number of firms that belong to all manufacturing and service sectors at two ISIC digits in the locations of Buenos Aires, Cordoba, Rosario, Mendoza, Chaco and Tucuman for the years of 2006, 2010 and 2017, recently released. With the previous measure, the aim of this paper is to expose evidence on the effect presented by productivity and management practices on the export status for Argentine firms. In addition, the paper shows and quantify the differences between exporter and non-exporters on both attributes (exporter premia). Finally, I analyze such differences between manufacturing and services firms, between firms with more than 100 employees and the rest, the effect of being located in given province, and the evolution of productivity in cost and management over time.

The principal results suggest that both productivity and management practices positively affect the probability of being an exporter, and their effects are very similar in number. Specifically, productivity increases the probability of exporting by 10%, while management contributes by 10%-16%. Thanks to this paper, some particular strategies firms should mainly focus on have been identified. Indeed, I suggest that obtaining ISO certifications, offering training programs to employees and using services or programs to promote exports are important for being an exporter. What is more, there are not statistically significant differences in management strategies among firms located in different provinces. Nevertheless, there is evidence to say that firms located in the considered provinces are less productive than the ones in Buenos Aires, on average. Finally, the estimation suggests that firms with more than 100 employees are better at management strategies, but they are less productive.

The remainder of this paper is organized as follows: Section 2 presents a revision of the standard literature in more detail; Section 3 develops the theoretical framework presented to give rationality to the analysis; Section 4 shows the methodology used to calculate productivity, the management index, and the aggregate empirical model; Section 5 describes the data-base exploited and some descriptive statistics; Section 6 shows the main results. Finally, Section 7 concludes.

2 Literature Review

International trade has always been a concern for economists. In the beginning, they were focused on explaining the causes and the consequences of trade at an aggregate level. Among the causes, it is well known why countries would open their economy to the rest of the world. It was stressed the concept of comparative advantage (e.g. Dornbusch, Fischer and Samuelson, 1977), economies of scale (e.g. Coden, 1970) and love for diversity (e.g. Krugman, 1979). The benefits were widely attributed to gains generated by trade such as improving national productivity and efficiency, smoothing consumption, and improving income distribution. It has to be pointed out that researchers paid little attention to the firms that carry out trade flows; in other words, the previous models assume that all firms are identical in every single aspect.

Since the mid-1990s, with the availability of data at firm level, it was possible to study the factors that determine whether a firm is an exporter or not (exporter status) and the differences between exporter and non-exporter (exporter premia). It should be mentioned Bernard and Jensen (1999) and Pavcnik (2002). Bernard and Jensen (1999) by exploding a database of manufacturing firms in the United States find that exporters are 50%-60% larger than non-exporters (considering total employment and total shipments). Their results are the same for other attributes. Indeed, they find that labor productivity is 12%-24% higher at exporters, while the difference in capital intensity ranges from 7%-22%. According to them, the composition of the workforce differs between the two types of firms: exporters have a 3% larger share of non-production workers in total employment and pay higher wages to both production and non-

production workers. Yet, those patterns do not only belong to developed countries. Pavnik (2002) investigates the effects of trade on plant productivity in the case of Chile. By using a census of Chilenian manufacturing plants and the the methodology of Olley and Pekes (1996) to calculate productivity at firm level (as this paper), Pavnik claims those firms that failed to the Chilenian liberalization during the 1980s and exited the market, were on average about 8% less productive than surviving plants. In addition, the resulted reshuffling of resources from less to more productive producers contributes to aggregate productivity gains, especially for the plants in the export-oriented and import-competing sectors. Specifically, the aggregate productivity grew by 25.4% and 331.97% in the export-oriented and import-competing sectors over seven years, respectively.

The above literature was not able to explain a particular empirical observed fact: in some industries, there are larger firms that remain in the domestic market, while others export their products, and they are often smaller ones. It was because the previous models assume that firms only differ in one dimension or attribute, then it was necessary to consider heterogeneity in multiple aspects to resolve such a puzzle. One example of this is presented in Hallak and Sivadasan (2009, 2013). In their papers, the authors develop a model of trade with quality requirements for exporting, and two dimensions of heterogeneity among firms. In addition to productivity, firms are also heterogeneous in their "caliber" - the ability to produce quality using fewer fixed inputs. Compared to single-attribute models of firm heterogeneity, emphasizing either productivity or the ability to produce quality, their model provides a more nuanced characterization of firms' exporting behavior[1]. In addition, Hallak and Sivadasan's paper explains the empirical fact that firm size is not monotonically related with export status: there are small firms that export and large firms that only operate in the domestic market, in a given industry. Their model also predicts that conditional on size, exporters are expected to sell products of higher quality and at higher prices, pay higher wages and use capital more intensively; the empirical evidence supports their predictions for manufacturing establishment datasets for India, the United States, Chile, and Colombia.

Nevertheless, quality is not the only aspect where firms can differ in. There is a number of other studies (mainly in the management field) that indicates that a variety of aspects exists, where firms can be heterogeneous, apart from the ones previously mentioned -and which are not necessarily related to international trade. For example, Bloom and Van Reenen (2010) suggest that differences in productivity reflect differences in management practices as well. The authors use a huge sample to systematically measure management practices among firms, industries, and countries by using a specific index, which scores many practices. According to their results, there is a variety of attributes where firms can differ in, they also achieve very interesting conclusions: 1) Firms with the best management practices are likely to have a better performance in a wide range of dimensions: they are bigger, more productive, grow faster, and they present higher survival probabilities. 2) A deeper competition in the market tends to promote management practices on average. 3) Multinational firms present a good administration in every country. 4) Exporters are better in management skills than domestic firms, but worse than multinationals. 5) Skill intensive firms (measured by the number of qualified workers) have better management practices, on average. To measure practices, the authors carried out a survey among managers to cover eighteen practices. Then, they define an index, which scores practices from one - the worst practice- up to five - the best practice. In this paper, I follow their methodology by using an index, which seeks to capture several aspects of management as well, although I do not specify an index's forms as restrictive as theirs.

The previous papers are based on the study of existed differences between firms before and after exporting. Nevertheless, a relative new literature suggests that firms have to adopt a series of modifications in their practices during the process of exporting and that there is a

[1] In this case, the paper specifies a much more nuanced empirical model than Hallak and Sivadasan's, by considering other attributes besides productivity and quality requirements.

learning-by-doing process. Bustos (2011) studies the effects of the agreement of free trade between Argentina and Brazil during the 1990s on demand of skilled workers. It is observed a huge increase in relative demand for skilled workers among a panel of Argentine manufacturing firms during the liberalization. Her results are valuable. Firstly, the higher demand is not a consequence of labor reallocation between firms and sectors, but it is because of a higher specialization in skilled workers within firms. Secondly, exporters increased their skill intensification faster than non-exporters. Thirdly, those firms that were specialized in qualified workers also specialized in technology. In short, Bustos observes that a reduction in the Brazilian tariffs led Argentine firms to be more productive by being more skilled labor intensive, although less productive firms reduce such specialization. In addition, Artopoulos, Friel, and Hallak (2013) explore the main factors which allow firms based in developing countries to successfully export to developed ones. Their article describes four cases of study in sectors of differentiated products of Argentina: wines, television programs, motorboats, and wooden furniture. Their findings suggest that in order to export to developed countries, it is necessary to develop a range of management practices (in product, process and commercialization channels), which are very different from those that predominated in domestic markets, as a result of foreign consumers are more exigent than domestic ones. Among three of these cases (wines, television programs, and motorboats), a pioneer started adopting those practices and then, such practices spread around the whole sector. Their results point to the importance of foreign market knowledge, relative to production knowledge as the key constraint to achieve consistent export to developed countries. Finally, it could be mentioned the Rodriguez Chatruc and Soria Genta's work (2010), who find that the forward-looking nature of the firms is essential before exporting. They claim that firms modify their internal operation to improve their performance and be able to face external competition, and according to them, these modifications are not related to hiring more workers.

To my view, the present paper lies in the middle of two huge theoretical bodies. First, the trade literature that stresses that exporters are different from non-exporters in a set of attributes (mainly in productivity), by using data at firm level. Second, the IO literature that remarks that firms are particularly heterogeneous in management practices, and those practices are potentially important for exporting, by using study cases. This paper is situated between such theoretical bodies because its aim is to measure productivity and different management practices relative to product, developing activities and commercialization channels at firm level as different sources of firm heterogeneity at the same time that it recognizes the importance of such attributes to export.

3 Setup of The Model

In this section, a partial equilibrium model to explain how productivity and management practices interact with the export process of firms is presented. The way to treat productivity and management practices is questionable. Some authors consider that management practices are involved into the concept of productivity, and they model management as an additional production factor, by introducing them as a variable into a production function (e.g. Bloom and Van Reenen, 2010). In contrast, there are those who consider that attributes such as product quality are subject to a production decision just like quantity, and assume that the "production" of such attributes are given by a production function with labor, capital and intermediate inputs as production factors (e.g. Hallak and Sivadasan, 2013). I follow the latter theoretical approach. In fact, most of the IO literature considers productivity in cost and in management activities as two different concepts. Strategy and marketing researchers have always distinguished product differentiation, quality leadership and consumer satisfaction from a better performance in cost (productivity) as alternative strategies for achieving a competitive advantage in markets (Porter, 1980; Anderson et. al, 1994). Additionally, management scholars study whether organizational

structure, incentive systems, and contract choices between employers and employees are compatible with presenting a powerful cost leadership in markets. Given this, I consider that modeling productivity in cost and in management practices as two different attributes is pertinent to describe firms' export process. Therefore, the model is characterized by presenting two different *types* of productivity: φ (which allows firms to produce a homogeneous product at a lower cost) and ζ (which allows firms to produce management at a lower cost). Firms combine them to achieve their particular and not repeated variety $q\upsilon$, which will be positioned in domestic and foreign markets. As in love for diversity models, firms will add management to the basic product in order to differentiate theirs from others in a context of monopolistic competition, where consumers always prefer to consume all the available varieties rather than more quantities of some of them. Hence, if firms do not produce management, their final products will be a common variety, which will not be chosen by consumers since they value management and always prefer differentiated products. In addition, since profits will be positively determined by both kinds of productivity, for a given level of φ, the probability of exporting will be increased if firms own a higher level of ζ.

3.1 Demand

The model assumes that a representative consumer's preferences are captured by a C.E.S utility function, augmented to account for management practices.

$$U = \{ \int_{\omega \in \Omega} [q(\omega)\upsilon(\omega)^{\delta}]^{\frac{\sigma-1}{\sigma}} d\omega \}^{\frac{\sigma}{\sigma-1}} \tag{1}$$

Each firm produces only one variety, so ω indexes product varieties as well as firms. The utility function is defined over the continuum of good Ω. This is, Ω is the mass of available goods in the economy. These goods are substitutes, which means the elasticity of substitution between any two goods σ is greater than one. I assume $\upsilon(\omega)$ is a variable that captures a set of management attributes, which are valued by consumers with an intensity of preference given by δ [2]. Specifically, $\upsilon(\omega)$ captures the fact that consumers appreciate whether a product presents higher quality, more innovation, better distribution channels and so on[3]. Following Dixit and Stiglitz (1977), it is possible to consider the set of available "modified" consumed varieties as an aggregate good Q≡U associated with an aggregate price:

$$P = \{ \int_{\omega \in \Omega} [p(\omega)^{1-\sigma} \upsilon(\omega)^{\ \delta(\sigma-1)}] d\omega \}^{\frac{1}{1-\sigma}} \tag{2}$$

The implied optimal consumption and expenditure decisions are:

$$q(\omega) = Q[\frac{p(\omega)}{P}]^{-\sigma} \upsilon(\omega)^{(\sigma-1)\delta} \tag{3}$$

$$r(\omega) = p(\omega)q(\omega) = R[\frac{p(\omega)}{P}]^{1-\sigma} \upsilon(\omega)^{(\sigma-1)\delta} \tag{4}$$

where R=PQ denotes aggregate expenditure. Here, it is shown that the better the management practices, the more quantity is consumed; hence, management is modeled as a demand shifter.

3.2 Production

There is a continuum of firms, and each one chooses to produce a different variety ω. Production requires the use of labor and capital. Labor receives the wage w_L (market-determined).

[2] Note that δ could be different among countries.

[3] In Hallak and Sivadasan (2013)'s model $\upsilon(\omega)$ only represents the quality of the product.

Likewise, capital earns the rental rate w_K (market-determined). In this model, L is considered as the number of average hours worked by employees and K as the net value of capital used by the firm. I assume that in order to produce management υ, a firm needs to pay an average wage $w_L = \upsilon^b$ with $b > 0$ to those employees employed in the management process.

Let's consider the optimization problem firms have. They choose the quantity of variety ω which they will produce and also they need to decide *how much* management they will add to it. Production is given by a constant returns to scale Cobb-Douglas function: $q = \varphi L_q^{\alpha} K_q^{1-\alpha}$. Using this production function and the wage equation given above, the implied cost for producing q is:

$$C_q(\varphi, \upsilon) = q\frac{\gamma}{\varphi}\upsilon^{\beta} \tag{5}$$

where $\gamma = A(w_K)^{1-\alpha}$, $A = \frac{1}{\alpha^{\alpha}(1-\alpha)^{1-\alpha}}$, and $\beta = \alpha b$[4].

Equation (5) shows that in this model higher productivity is modeled as producing a product or variety at a lower marginal cost. Since we are in a monopolistic competition model, each firm faces a residual demand curve with constant elasticity σ, regardless of its productivity. Therefore, each firm has the same mark-up equal to $\frac{\sigma}{\sigma-1}$. This yields the following pricing rule:

$$p_d(\varphi, \upsilon) = \frac{\gamma\upsilon^{\beta}}{\vartheta\varphi} \tag{6}$$

where $\vartheta = \frac{\sigma-1}{\sigma}$. Management is produced using a Cobb-Douglas production function as well, which only requires labor and capital with the same previous exponents but allowing for non-constant returns to scale:$\upsilon = (\zeta L_{\upsilon}^{\alpha} K_{\upsilon}^{1-\alpha})^{\frac{1}{e}}$[5]. In this case, the implied variable cost is:

$$c_{\upsilon}(\varphi, \upsilon) = \frac{\lambda}{\zeta}\upsilon^{\phi}. \tag{7}$$

where $\lambda = A(\underline{w_L})^{\alpha}(w_K)^{1-\alpha}$ and $\phi = e + \alpha b$. The total cost function is:

$$C_{\upsilon}(\varphi, \upsilon) = f + \frac{\lambda}{\zeta}\upsilon^{\phi}. \tag{8}$$

where f>0 is the fixed cost, which is the same for all firms and is expressed in units of labor. Considering the above, firm profit is then[6]:

$$\pi(p(\omega), \upsilon(\omega)) = \frac{1}{\sigma}[\frac{p(\omega)}{P}]^{1-\sigma}\upsilon(\omega)^{\sigma-1} - C_{\upsilon}(\zeta, \upsilon) - f \tag{9}$$

It is remarkable to observe that in this model, the ratio of any two firms' outputs and revenue only depend on the ratio of their productivity and management levels:

$$\frac{q(\varphi_1, \upsilon_1)}{q(\varphi_2, \upsilon_2)} = (\frac{\varphi_1}{\varphi_2})^{\sigma}(\frac{\upsilon_1}{\upsilon_1})^{\sigma(1-\beta)-1} \tag{10}$$

$$\frac{r(\varphi_1, \upsilon_1)}{r(\varphi_2, \upsilon_2)} = (\frac{\varphi_1}{\varphi_2})^{\sigma-1}(\frac{\upsilon_1}{\upsilon_2})^{(\sigma-1)(1-\beta)} \tag{11}$$

A more productive firm (higher φ) will be bigger (larger output and revenues) given the management. However, given the level of productivity, it is not clear, at this point, that better management practices (higher υ) increase firm size, which depends on the assumptions we make. Given the profit function, the optimal management level is given by

$$\upsilon_d(\varphi, \zeta) = [\frac{1-\beta}{\phi}(\frac{\varphi}{\gamma})^{\sigma-1}(\frac{\sigma-1}{\sigma})^{\sigma}\frac{\zeta}{\lambda}RP^{\sigma-1}]^{\frac{1}{\phi'}} \tag{12}$$

[4]I assume that $0 < \beta < 1$.

[5]Thus, $\frac{1}{e} > 1$.

[6]For simplicity, I normalize δ to one.

where $\phi' = \phi-(1-\beta)(\sigma-1)$. We can see that higher levels of φ and ζ are associated with better management practices (higher υ). Using Equation (12), the optimal price can be expressed as:

$$p_d = (\frac{\sigma}{\sigma-1})^{\frac{\phi-\beta(\sigma-1)}{\phi'}}(\frac{\gamma}{\varphi})^{\frac{\phi-(\sigma-1)}{\phi'}}[\frac{1-\beta}{\phi}\frac{\varsigma}{\lambda}EP^{\sigma-1}]^{\frac{\beta}{\phi'}} \tag{13}$$

It is possible to see that conditional on φ, firms with a higher ζ present higher prices because they produce products with better management and thus have a higher marginal cost. On the other hand, the effect of φ on price, given ζ is ambiguous. This is because there are two opposite forces present: a higher φ reduces the marginal cost; but with higher levels of productivity in cost, the firm induces better management and consequently, it raises marginal cost and prices. To determine what effect dominates, we should consider the sign of $\phi-(1-\beta)(\sigma-1)$.

Given such levels of price and management, firm size or revenues can be expressed as a function of φ and ζ:

$$r_d = [\varphi^{\frac{\phi}{\phi'}}\zeta^{\frac{1-\beta}{\phi'}}]^{\sigma-1}H[RP^{\sigma-1}]^{\frac{\phi}{\phi'}} \tag{14}$$

where $H = (\frac{\sigma-1}{\sigma})^{\frac{\phi\sigma-\phi'}{\phi'}}(\frac{1-\beta}{\phi})^{\frac{\phi-\phi'}{\phi'}}(\gamma^{-\phi}\lambda^{1-\beta})^{\frac{1-\sigma}{\phi'}}$. Additionally, by substituting the solution for management into C_υ, it is possible to show that C_υ also depends on φ and ζ. Therefore, profits present the same feature:

$$\pi_d = [\varphi^{\frac{\phi}{\phi'}}\zeta^{\frac{1-\beta}{\phi'}}]^{\sigma-1}J[RP^{\sigma-1}]^{\frac{\phi}{\phi'}} - f \tag{15}$$

where $J = (\frac{\sigma-1}{\sigma})^{\frac{\phi\sigma}{\phi'}}(\frac{1-\beta}{\phi})^{\frac{\phi}{\phi'}}(\frac{\phi'}{\phi-\phi'})(\gamma^{-\phi}\lambda^{1-\beta})^{\frac{1-\sigma}{\phi'}}$.

3.3 Entry and Exit decisions - Solving for the Equilibrium

Now, let's consider the process of entry and exit of firms. First of all, prior to entry, firms are identical. I assume that in order for firms to enter, they have to make an initial investment which takes the form of a fixed cost expressed in units of labor f_e (which is thereafter sunk). Like Melitz (2003)'s model, I assume that there is uncertainty about the levels of φ and ζ that each firm will have. Specifically, after investing f_e, firms "take" their φ levels from a common distribution $g(\varphi)$, which has a positive support over the interval (0,∞) and has a cumulative distribution $G(\varphi)$. Similarly, ζ levels are drawn from a continuous distribution $z(\zeta)$ with a positive support over the interval (0,∞) and with a cumulative distribution function $Z(\zeta)$, I simplify the model by assuming that these distributions are independent across firms. In other words, firms cannot be sure about their own level of productivity in cost and in management until they enter the market by spending the quantity f_e. If, for instance, a firm has a low productivity draw in both attributes, such a firm decides to exit the market and not produce at all. In contrast, if it has sufficient level of both kinds of productivity (or of one type), the firm will produce. In other words, firms produce if and only if they make non-negative profits: $\pi(\varphi,\zeta) \geq 0$. I refer this condition as the *Zero Cut-Off Profit Condition*, which establishes a survival cut-off function for ζ, which depends on φ:

$$\underline{\zeta_d}(\varphi) = [\frac{f}{J}]^{\frac{\phi'}{\phi-\phi'}}\varphi^{\frac{-\phi}{1-\beta}}[RP^{\sigma-1}]^{\frac{-\phi}{\phi-\phi'}} \tag{16}$$

This is a similar function derived by Hallak and Sivadasan in their model. From Equation (16) firms can know the minimum $\underline{\zeta_d}(\varphi)$ for each value of φ so that firms on or above this minimum earn non-negative profits in a given period. Some straightforward algebra shows that Equation (16) defines a continuous function which is monotonically decreasing in (φ).

Next, we should consider the firm's *ex-ante* decision to determine if it incurs the sunk cost of entry. The maximization conditions require that a firm decides whether enter or not by comparing the expected value of entry and the sunk cost f_e. I assume that there is a constant

exogenous probability ρ in every period of a negative shock that would force the firm to exit. We can think of these shocks as events that only affect the productivity in cost[7]. I define $\varphi*$ as the lowest cost productivity at which a firm is able to resist any negative shock and persist in the market[8]. For instance, if a national economic crisis takes place, bigger firms (and thus, more productive), as they usually have more physical capital, they could minimize the effects of an economic downturn more than smaller firms. To put it differently, with such minimum level of productivity, a firm is productive enough to overcome negative shocks, preventing it from exiting the market in every period, at least due to such shocks because $\varphi*$ itself does not assure that the firm will earn non-negative profit, since we should also take into account its productivity in management. Yet, considering the Zero Cut-Off Profit Condition, we can assert that $\pi_d(\varphi*, \underline{\zeta_d}) = 0$. Hence, $\varphi*$ is defining a cut-off value to produce in a given period but also it takes into account the exit probability. Since $G(\varphi)$ and $Z(\zeta)$ are two independent cumulative distribution functions of φ and ζ, respectively, $1 - G(\varphi*)$ determines the probability of having a φ higher than $\varphi*$, and $1 - Z(\underline{\zeta})$ indicates the probability of presenting a ζ higher than $\underline{\zeta}$, the free entry requires:

$$V = \frac{[1 - G(\varphi*)][1 - Z(\underline{\zeta_d})]}{\rho}\overline{\pi}_d = \frac{p_{in}}{\rho}\overline{\pi}_d \geq f_e \tag{17}$$

where $\overline{\pi_d} = \int_{\varphi*}^{\infty}\int_{\underline{\zeta}}^{\infty}\frac{g(\varphi)}{1-G(\varphi*)}\frac{z(\zeta)}{1-Z(\underline{\zeta})}\pi_d(\varphi,\zeta)d\varphi d\zeta$, and $\pi_d(\varphi,\zeta)$ is given by Equation (15). Hence, the firm will invest the entry sunk cost f_e if and only if $V \geq f_e$. I refer this condition as the *Free Entry Condition*. Finally, the equilibrium will be determined by both the Zero Cut-Off Profit Condition (Equation (16)) and the Free Entry Condition (Equation (17)). Note that it is not possible to come with a closed form for the equilibrium, this is because I am considering more than one aspect of heterogeneity among firms, but also I am introducing uncertainty in these aspects and the possibility that a negative shock could be present in any period. Nevertheless, the model shows that the equilibrium will be defined by the cut-off levels $\varphi*_d$ and $\underline{\zeta}_d$ as well as the average profit level $\overline{\pi}$.

3.4 Understanding The Equilibrium

The equilibrium will be characterized by a mass M of firms (and hence M varieties or products) and a bivariate distribution $\mu(\varphi,\zeta)$ of productivity levels over a subset of (0,∞). Since once firms enter the market, each one presents productivity in cost and in management levels (which define its heterogeneity in the equilibrium), there will be an ex-post bivariate distribution of φ and ζ. In other words, once the firms decide to compete and produce, the two productivity parameters no longer belong to independent distributions, but a unique bivariate distribution that characterizes the equilibrium. As such equilibrium is a stationary one, the number of firms M existing in the market remains constant over time. This requires a mass of new entrants M_{new} in every period, so that the number of firms which successfully enter $p_{in}M_{new}$, exactly replaces the number of firms that exit the market because of the negative shocks ρM: $p_{in}M_{new} = \rho M$. In the equilibrium, the aggregate price P defined in (2) is then given by:

$$P = [\int_0^{\infty}\int_0^{\infty} p(\varphi,\zeta)^{1-\sigma}M\mu(\varphi,\zeta)d\varphi d\zeta]^{\frac{1}{1-\sigma}} \tag{18}$$

In order to completely characterized the equilibrium, I should show the relationship between Equation (16) and the average profit level in the economy because I have already demonstrated that the function value depends on such average level. Therefore, I have to show that there is an average profit level for some levels of φ and ζ where firms produce.

[7] This type of process is modeled by Hopenhayn (1992).

[8] Note that, in contrast to Melitz (2003), there will not be a unique $\varphi*$ for all firms because I am modeling firm heterogeneity in more than one dimension.

First, recall that profits depend on φ and ζ (see Equation (15)), so its possible to define a index Φ between them, where $\Phi = [\varphi^{\frac{\phi}{\phi'}} \zeta^{\frac{1-\beta}{\phi'}}]^{\sigma-1}$. Specifically,$\Phi$ is capturing relevant information about the productivity attributes of the firm. Now, revenues and profits can be expressed as a function of Φ:

$$r_d = \Phi H [RP^{\sigma-1}]^{\frac{\phi}{\phi'}} \tag{19}$$

$$\pi_d = \Phi J [RP^{\sigma-1}]^{\frac{\phi}{\phi'}} - f \tag{20}$$

The previous two equations say that combined productivity Φ is a determinant of size and profits. Therefore, firms with the same value of Φ present equal revenue and profits regardless of which combination of φ and ζ generates the value. Since ex-post φ and ζ distribute jointly, there will be also a univariate distribution for Φ, $s(\Phi)$, which has a positive support over the interval (0,∞) and has a cumulative distribution $S(\Phi)$. Likewise, it can be defined a weighted average level of combined productivity over all firms, which will be independent of the number of firms in the equilibrium M. This average level is:

$$\eta = [\int_0^\infty \int_0^\infty \varphi^{\frac{\phi}{\phi'}} \zeta^{\frac{1-\beta}{\phi'}} \mu(\varphi, \zeta) d\varphi d\zeta]^{\sigma-1} \tag{21}$$

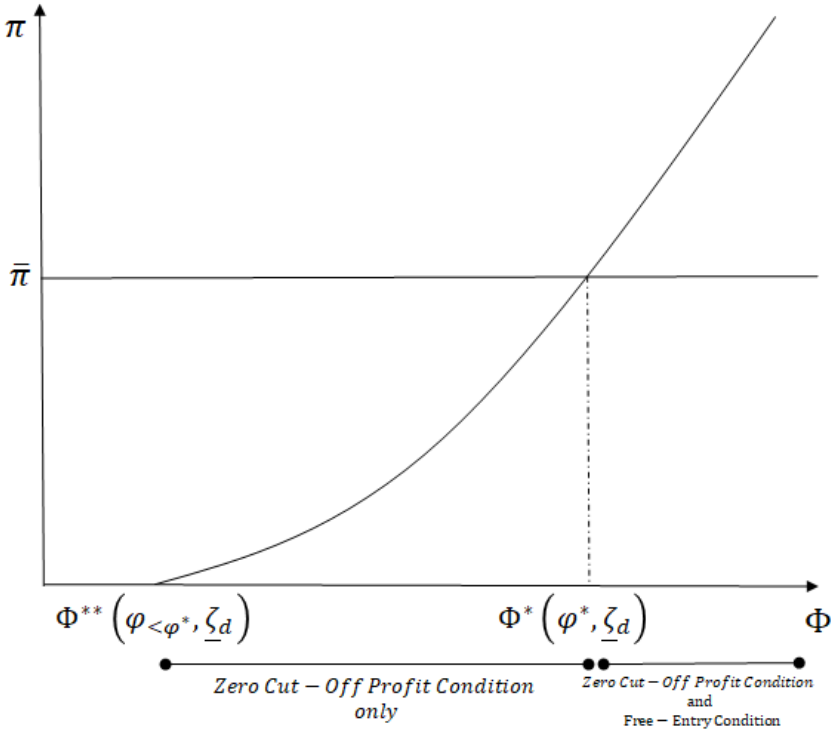
or in terms of Φ:

$$\eta = \int_0^\infty \Phi s(\Phi) d\Phi \tag{22}$$

Given the above, it follows that aggregate revenue and profit levels in the economy can be defined as: $R = Mr(\eta)$ and $\Pi = M\pi(\eta)$, or as:
$R = \int_0^\infty \int_0^\infty r(\varphi, \zeta) M\mu(\varphi, \zeta) d\varphi d\zeta$ and $\Pi = \int_0^\infty \int_0^\infty \pi(\varphi, \zeta) M\mu(\varphi, \zeta) d\varphi d\zeta$. Hence, an industry with M firms with any bivariate distribution $\mu(\varphi, \zeta)$ and with an average level of combined productivity η will produce the same aggregate outcome as an industry with M identical firms sharing the same aggregate productivity η. Additionally, note that $\overline{r} = \frac{R}{M}$ and $\overline{\pi} = \frac{\Pi}{M}$ are both the average revenue and profit per firm as well as the revenue and profit level of the firm with a combined productivity level η. This is, $\overline{r} = r(\eta)$ and $\overline{\pi} = \pi(\eta)$, which will be constant values ex-post entry.

Now, it can be shown the relationship between average profit level $\overline{\pi}$ and combined productivity $\Phi(\varphi, \zeta)$ of each firm. This relationship is shown in Figure 2. Since there is a positive relationship between both measures of productivity and Φ, it follows that π increases with Φ. Also, although profits could be zero for some firms in the equilibrium, the combined productivity never will be zero because of the distribution where it comes from and the fact that every firm takes a positive value of both levels of productivity from g(φ) and z(ζ). We can see that two values of Φ are defined in the equilibrium. First, $\Phi^{**}(\varphi_{<\varphi^*}, \underline{\zeta_d})$ is such that $\pi(\Phi^{**}) = 0$; therefore, all the firms (or some firms at least) with a value of Φ above Φ^{**} will present positive profits in a given period of time. In other words, Φ^{**} is defining the zone where the *Zero Cut-Off Profit Condition* is valid. If we consider that there is not a probability of exit the market in each period, all the firms with a combined productivity above Φ^{**} do not only produce in a given period but also decide to enter the market. However, since negative shocks on productivity in cost exist, firms need values of Φ high enough to overcome such shocks and hence presenting a positive function value, this rule defines $\Phi^*(\varphi*, \underline{\zeta_d})$, above which the *Free Entry Condition* is valid. Since we are considering profits in the cut-off value $\underline{\zeta_d}$, the *Zero Cut-Off Profit Condition* is also valid with $\Phi^*(\varphi*, \underline{\zeta_d})$. Hence, all the firms with a value of Φ above Φ^* enter and produce. As both conditions are satisfied in the interval $[\Phi^*, \infty)$, the equilibrium is defined by Φ^*, then.

Figure 2: Relationship between π and Φ



3.5 The Open Economy Case

In this subsection, the firms' behavior when the economy is opened to the rest of the world (composed of countries whose economies are of the type that was previously modeled) is modeled, by introducing international trade. There is a huge amount of evidence suggesting that those firms that seek to export not only face variable cost (for example, transport costs and tariffs), but also some fixed costs (f_{ex}). In this model, such costs are particularly important as we are considering different trade strategies to place the products in foreign markets (such as R&D investment, workers training, marketing programs, and so on). In addition, since there is a vast body of papers that show a positive causality from productivity to exporter status, it is possible to claim that firms take the decision of exporting after knowing their levels of cost and management productivity. Therefore, I assume that firms will make a fixed investment to export once they know their levels of φ and ζ. As it is usual in trade literature, the model considers that the variable cost takes the "iceberg" form, whereby $\tau > 1$ units of a product must be shipped in order for 1 unit to arrive at the country of destination. To ensure factor price equalization across countries, I follow Melitz (2003) and I assume that the world is comprised of identical countries. Therefore, we can focus only on the firm selection due to productivity differentials (in φ and ζ). Hence, I assume that the country under analysis can trade with $j \geq 1$ other identical countries.

Since we are considering symmetric countries, all of them share the same wage and also share the same aggregate variables. In this case, the domestic price is still given by Equation (13); however, exporter firms will set a higher prices abroad, reflecting the presence of higher marginal costs τ of serving such markets: $p_x(\varphi, \zeta) = \tau p_d(\varphi, \zeta)$. Furthermore, those firms who only serve the domestic market will have the revenue level given by Equation (14); while exporters will earn the following revenue level from foreign markets: $r_x(\varphi, \zeta) = \tau^{1-\sigma} r_d(\varphi, \zeta)$. Since no exporter will produce only for external demand, the overall revenue level for an exporter will be: $r_d(\varphi, \zeta) + j r_x(\varphi, \zeta) = (1 + j\tau^{1-\sigma}) r_d(\varphi, \zeta)$. Notice that if a firm is able to export to any country, for the symmetry assumptions, it will also be able to export to the rest of the world.

As the autarkic case, prior to entering firms have the same uncertainty about their levels

of φ and ζ: firms draw those levels from the independent distributions $g(\varphi)$ and $z(\zeta)$. Also, a probability ρ of a negative shock still exists. Since there is no uncertainty in exporting to foreign markets, the firm is indifferent between paying the one-time investment cost f_{ex} or paying the per period portion $f_x = \rho f_{ex}$. From the symmetric assumption, it is possible to divide the profit into two components: profits that comes from serving the domestic market, and profits from export sales per country:

$$\pi_d(\varphi,\zeta) = \frac{r_d(\varphi,\zeta)}{\sigma} - \frac{\lambda}{\zeta}\upsilon_d(\varphi,\zeta)^{\phi} - f \tag{23}$$

$$\pi_x(\varphi,\zeta) = \frac{r_x(\varphi,\zeta)}{\sigma} - \frac{\lambda}{\zeta}\upsilon_x(\varphi,\zeta)^{\phi} - f_x \tag{24}$$

where the management level for exporters υ_x is given by the following equation:

$$\upsilon_x(\varphi,\zeta) = [\frac{1-\beta}{\phi}(\frac{\varphi}{\gamma})^{\sigma-1}(\frac{\sigma-1}{\sigma})^{\sigma}\frac{\zeta}{\lambda}\tau^{1-\sigma}RP^{\sigma-1}]^{\frac{1}{\phi'}} \tag{25}$$

At this point, we cannot assert that management levels are greater among exporters, which makes sense considering that management levels for exporters, depend on three sources: productivity in cost, productivity in management, and trade costs. We already discussed that both levels of productivities positively affects management performances. On the other hand, trade costs discourage firms to invest in management practices since firms now have to face new costs, besides the costs involved in the production process of quantity and management, which are trade costs. In other words, the optimization problem for management in the export market present an additional restriction than in the domestic one, which is implied by trade costs. Nevertheless, taking into account the new profit equation in the exporting case, the new *Zero Cut-Off Profit Condition* for exporters is:

$$\underline{\zeta_x}(\varphi) = [\frac{f_x}{J}]^{\frac{\phi'}{\phi-\phi'}}\varphi^{\frac{-\phi}{1-\beta}}[\tau^{1-\sigma}RP^{\sigma-1}]^{\frac{-\phi}{\phi-\phi'}} \tag{26}$$

A straightforward algebra shows that this function lies above $\underline{\zeta_d}(\varphi)$. In consequence, exporters face a higher and a more exigent cut-off than domestic firms, in terms of management productivity. This means that although we are not able to say that exporters always have better management practices, we could point out that they are more productive in management than domestic firms, on average.

The profit maximization conditions in open markets say that a firm which produces for its domestic market will export to the rest of the world (to all j countries) if and only if $\pi_x(\varphi,\zeta) \geq 0$. Then, the combined profit can be expressed as: $\pi(\varphi,\zeta) = \pi_d(\varphi,\zeta) + max[0, j\pi_x(\varphi,\zeta)]$. As in the domestic case, there is a $\varphi*$ level so that all the firms with a cost productivity level higher than $\varphi*$ enter the domestic market. Since I assume there is no uncertainty in the export market, firms do not have to own a value higher than $\varphi*$ to overcome new external shocks in foreign markets, because such a level already allows them to overcome the domestic shocks. Therefore, from the point of view of φ, exporters only have to achieve $\varphi*$. Nevertheless, though there is the same φ cut-off for domestic and exporter firms, not every firm that produces for the domestic market, would export because $\underline{\zeta_x} > \underline{\zeta_d}$. Again, the ex-ante probability of a successful entry will be defined as $p_{in} = [1-G(\varphi*)][1-Z(\underline{\zeta_d}]$, while the ex-ante probability of exporting successfully is written as: $p_x = \frac{[1-G(\varphi*)]}{[1-G(\varphi*)]}\frac{[1-Z(\underline{\zeta_x})]}{[1-Z(\underline{\zeta_d}]} = \frac{[1-Z(\underline{\zeta_x})]}{[1-Z(\underline{\zeta_d}]}$. Considering this, the overall average - across all firms- of combined profit $\overline{\pi}$ (earned from domestic and foreign markets) is given by:

$$\overline{\pi} = \frac{\Pi}{M} = \int_{\varphi*}^{\infty}\int_{\underline{\zeta_d}}^{\infty}\pi_d(\varphi,\zeta)\frac{g(\varphi)}{1-G(\varphi*)}\frac{Z(\zeta)}{1-Z(\underline{\zeta_d})}d\varphi d\zeta + \frac{1-Z(\underline{\zeta_x})}{1-Z(\underline{\zeta_d})}j\int_{\varphi_x*}^{\infty}\int_{\underline{\zeta_x}}^{\infty}\pi_x(\varphi,\zeta)\frac{g(\varphi)}{1-G(\varphi_x*)}\frac{Z(\zeta)}{1-Z(\underline{\zeta_x})}d\varphi d\zeta \tag{27}$$

As before, the expected value of the firm will be: $V = p_{in}\frac{\overline{\pi}}{\rho}$. Thus, the Free Entry Condition remains unchanged:

$$V = \frac{[1 - G(\varphi*)][1 - Z(\underline{\zeta}_d)]}{\rho}\overline{\pi} \geq f_e \tag{28}$$

Finally, in this case, the equilibrium will be determined by the two Zero Cut-Off Profit Conditions for domestic and exporters firms (Equation (16) and Equation(26)) and the Free Entry Condition (Equation (28)). Specifically, these conditions will define the levels of $\varphi*, \underline{\zeta}_d, \underline{\zeta}_x$. In turn, they will determine the probabilities p_{in} and p_x, and the overall average profit $\overline{\pi}$.

Overall, this model attempts to characterize the export process firms face, where it assumes that exporter status is determined by two distinct attributes: productivity in cost, and productivity in management, providing three very important conclusions related to such a process. First, the model suggests that exporter firms would have higher productivity in management levels than domestic firms; however, the model explains that exporters would not necessarily own higher levels of productivity in cost. As a result, a second conclusion arises: exporters would not necessarily be those firms with larger sizes. Third, as the management levels of exporters not only depend on both kinds of productivity, but also depend on trade costs, the model is unable to determine whether exporter firms would present better performances at management practices than non-exporters since costs trade lead firms to invest less in management, considering that in order to export, firms need to overcome additional costs to the ones that prevail in the domestic market. Therefore, although exporters could own higher productivity in management levels than domestic firms, it does not mean that their management levels would be also superior. In short, the model shows the possibility that small firms would be able to export if and only if they display good performances at management practices, while larger firms would remains in the domestic markets if they institute inadequate management policies.

4 Empirical Methodology

In this section, I would like to explain the methodology used to identify the empirically observed effects of both productivities in cost and management on exporter status. In addition, I will explore the implications and limitations of it. Subsection 4.1 explores the empirical approaches used to calculate productivity at firm level, in four different ways. Subsection 4.2 explains the methodology to measure management practices on the product, developing activities and commercialization channels. Subsection 4.3 presents the aggregate model to identify the impact of productivity and management practices on exporting.

4.1 Productivity Measures

Productivity in cost at firm level is measured by using four different approaches. First, this analysis applies the Olley and Pakes Approach (1996). In addition, firm productivity is estimated as an index relative to the industry median following Caves, Christensen, and Diewert (1982). Moreover, I consider a measure of labor productivity, based on product per worker. Finally, the last measure is also labor productivity, but this time, using average wages.

Productivity in cost is often defined as a measure of our "ignorance" and is usually estimated as the deviation between observed output and output predicted by a Cobb-Douglas production function estimated by ordinary least squares (OLS). Such estimates, however, may mainly suffer from two biases: simultaneity and selection biases. Olley and Pakes (1996) introduced a semiparametric method that controls for these biases, allowing us to estimate input elasticities rather than setting input elasticities equal to factor shares, which would require the assumption of perfect competition. This needs to be weighed against the assumption that input elasticities are the same across sectors.

Simultaneity arises because when the firm chooses its input levels to maximize profits, it already knows its productivity level (Marschak and Andrews, 1994). As a result of positive productive shocks, firms will increase their use of inputs. Hence, OLS estimation will yield biased parameter estimates because it does not account for the simultaneity between the unobserved productivity shocks and the inputs, which are the independent variables of the regression. A fixed-effect estimator would solve the problem only if we assume that the unobserved firm-specific productivity is time-invariant. It is implausible to make such assumption when we are talking about international trade because if productivity was constant over time, firms would always have the same exporter status whether in the domestic market or in the international one, but this is not the case observing that the activity of exporting is really sporadic among firms[9].

Another issue that needs to be addressed when estimating production function parameters is selection bias. Selection bias results from the relationship between productivity shocks and the probability of exiting the market. If firms' profitability is positively related to their capital stock, then a firm with a larger capital stock is more likely to stay in the market in spite of a low productivity shock than a firm with a smaller capital stock, because the more capital a firm has, the more likely to produce greater future profits the firm is. The negative correlation between capital stock and the probability of exiting for a given productivity shock will cause the coefficient on the capital variable to be biased downward unless we control for this effect. It makes sense to think that this is the case in the dynamics of foreign markets, where exporters are systematically more capital-intensive than non-exporters.

In order to overcome these problems while estimating the production function parameters and firm-level productivity in cost of exporters, I follow the Olley and Pakes Approach (1996). The simultaneity problems are addressed by using investment to proxy for an unobserved time-varying productivity shock, and the selection problems are addressed by using survival probabilities. Specifically, firm f belonging to the industry j in time t will decide to stay in the market ($\Lambda_{fjt} = 1$) or exit the market ($\Lambda_{fjt} = 0$) if its productivity is greater than or less than some threshold subject to the firm's current capital stock per worker and age, k_{fjt} and a_{fjy}. Such exit rule is written as follows:

$$\Lambda_{fjt} = \begin{cases} 1 & \text{if } \eta_{fjt} \geq \underline{\eta_{fjt}}(k_{fjt}, a_{fjt}) \\ 0 & \text{otherwise} \end{cases} \tag{29}$$

It is assumed that the state variable η_{fjt} follows a first-order Markov process.

Olley and Pakes assume that the firm's decision to invest in further capital, i_{fjt}, depends on η_{fjt}, k_{fjt} and a_{fjt}:

They define the investment per worker function Θ such that

$$i_{fjt} = \Theta(\eta_{fjt}, k_{fjt}, a_{fjt}). \tag{30}$$

With this investment decision equation, Olley and Pakes assume that future investment is increasing in the current productivity shock ($\frac{\partial \Theta}{\partial \eta} > 0$), so firms that experience a large positive productivity shock in period t will invest more in period $t + 1$.

Based on these exit and investment decision rules, Olley and Pakes specify a production function (OP) to consistently estimate the parameters. For estimation purposes, they assume Cobb-Douglas technology:

$$y_{fjt,OP} = \alpha + \beta^k k_{fjt} + \beta^h h_{fjt} + \beta^a a_{fjt} + \gamma_j + \theta_t + \xi_{fjt} \tag{31}$$

where y_{fjt} denotes firm f's value added per worker during time t in the industry j, k_{fjt} and h_{fjt} are physical and human capital inputs per worker of firm f, a_{fjt} is the age of firm f, γ_j

[9] Also, there are others methods to solve the simultaneity biases for example, by including instrumental variables (Arellano and Bond, 1991).

and θ_t are vectors of industry and time specific effects, respectively, where the industry specific effect are based on two digit ISIC codes, and ξ_{fjt} represents the error term.

Considering Equation (31) and decomposing the error term ξ_{fjt} into two elements, i.e., $\xi_{fjt} = \eta_{fjt} + \varepsilon_{fjt}$, where η_{fjt} is the productivity shock that is observed by the decision-maker in the firm, and the ε_{fjt} is the true error term. Thus, ε_{fjt} has no effect on the firm's decision, but η_{fjt} is a state variable that does affect the firm's decision-making process. Hence, it is possible to write:

$$y_{fjt,OP} = \alpha + \beta^k k_{fjt} + \beta^h h_{fjt} + \beta^a a_{fjt} + \gamma_j + \theta_t + \eta_{fjt} + \varepsilon_{fjt} \tag{32}$$

The simultaneity problem arises if η_{fjt} is correlated with at least one of the independent variables. To avoid this, Olley and Pakes (1996) propose a two-stage procedure for a consistent estimation of (32) in which they advocate the use of a firm's log investment i_{fjt} to identify the productivity disturbance.

If investments are monotonically increasing in the technology shock for a given amount of capital as we have already assumed from (30), this allows us to identify the unobservable productivity variable as a function of contemporaneous investments, capital, and age. Hence, they define the inverse investment function by Θ^{-1}, so that:

$$\eta_{fjt} = \Theta^{-1}(i_{fjt}, k_{fjt}, a_{fjt}). \tag{33}$$

Thus, it is possible to rewrite (32) as:

$$y_{fjt,OP} = \beta^h h_{fjt} + \gamma_j + \theta_t + m(i_{fjt}, k_{fjt}, a_{fjt}) + \varepsilon_{fjt} \tag{34}$$

Where $m(i_{fjt}, k_{fjt}, a_{fjt}) = \alpha + \beta^k k_{fjt} + \beta^a a_{fjt} + \Theta^{-1}(i_{fjt}, k_{fjt}, a_{fjt})$

And approximate this term by a third order polynomial series in age, capital and investment. In this way, they define:$m(i_{fjt}, k_{fjt}, a_{fjt}) = \pi_0 + \sum_{p=1}^{3}(\pi_p^i i^p + \pi_p^k k^p + \pi_p^a a^p)$. The coefficient estimated for human capital will be consistent because $m(.)$ controls for unobserved productivity, and thus the error term is no longer correlated with the input.

Equation (34) does not identify β^k and β^a, so it is necessary to work even more in order to know the effects of capital and age on the investment decision from their effect on output. Achieving this requires a second step to estimate *survival probabilities*, which in turn allows us to control for selection bias. Recall the exit rule (29), which implies that a firm will choose to stay in the market if its productivity is greater than some threshold, $\underline{\eta_{fjt}}$, that depends on k_{fjt} and a_{fjt}. The probability of survival in period t thus depends on η_{fjt-1} and $\underline{\eta_{fjt-1}}$, and in turn on age, capital, and investment at time $t-1$. Therefore, in this second stage, I estimate the probability of survival by fitting a probit model of Λ_{fjt} on i_{fjt-1}, k_{fjt-1}, and a_{fjt-1}, as well as on their squares and cross products. I call the predicted probabilities from this model $\hat{\rho}_{fjt}$.

In the third step, I fit the following equation by nonlinear least squares:

$$y_{fjt} - \hat{\beta^h} h_{fjt} = \beta^k k_{fjt} + \beta^a a_{fjt} + g(\hat{m_{t-1}} - \beta^k k_{fjt-1} - \beta^a a_{fjt-1}, \hat{\rho}_{fjt}) + \varepsilon_{fjt} \tag{35}$$

where the unknown function g(.) is approximated by a second-order polynomial in $\hat{m_{t-1}} - \beta^k k_{fjt-1} - \beta^a a_{fjt-1}$ and $\hat{\rho}_{fjt}$, and ε_{fjt} is the productivity in cost level for each firm (TFP_{OP}). One can interpret the function g(.) as the inverse of Mills' ratio that is included in two-step sample selection models, but it is complicated by the fact that here the sample selection bias depends on two unknown variables (η_{fjt} and $\underline{\eta_{fjt}}$) rather than just one (the probability of being in the selected sample). It should be pointed out that it is not necessary to correct for sample attrition because I explode databases, which are random samples of firms, guaranteed by the methodology of the Enterprise Surveys. In addition, note that Olley and Pakes restrict capital and lagged capital to have the same coefficient. Since the coefficient of capital enters the regression equation twice, they estimate it by applying a non-linear least squares procedure.

The second measure of productivity is taken from Caves, Christensen, and Diewert (1982). The methodology employs firm-level factor shares of human capital and intermediate inputs to compute input elasticities. To do so, they assume constant returns to scale. In (32), they measure output as sales and explicitly include intermediates inputs on the right-hand side. Sales, intermediate inputs (x), physical and human capital are all measured relative to an industry-level median:

$$TFP_{CCD} = (y_{fjt} - \tilde{y}_{jt}) - s'^{h}_{fjt} \times (h_{fjt} - \tilde{h}_{jt}) - s'^{x}_{fjt} \times (x_{fjt} - \tilde{x}_{jt}) - (1 - s'^{h}_{fjt} - s'^{x}_{fjt}) \times (k_{fjt} - \tilde{k}_{jt}) \quad (36)$$

Where a tilde denotes the industry level median of the variable,$s'^{q}_{fjt} = \frac{s^{q}_{fjt} + \tilde{s}^{q}_{jt}}{2}$, where q=(h,x), s_{fjt} is the firm i-level factor share, and $\tilde{s}_{jt}$ is the industry j-level average factor.

Thirdly, the third measure is labor productivity. As usual, labor productivity is measured as the ratio of firms' sales to human capital. Finally, I also report labor productivity but this time, by using average wage among full-time employees for each firm, which requires to assume perfect competition in factor markets

4.2 Management Index

Differences in management practices have long been popular for business schools, MBAs, and policymakers, but it has been less popular among economists and mainly among academic economists for different reasons. Firstly, much of the management evidence is only based on study cases of a specific firm or of a small group of firms, rather than on systematic empirical data across firms. A second reason why economists have tended to be away from international trade management is the thought that changing management seems to be a relatively straightforward process and the firm itself is a pure calculus machine, where the manager's decisions play no role in guaranteeing the competitiveness and market success of a firm. Thirdly, measuring management practices is a difficult task, because it is necessary to translate qualitative aspects into a useful measure in an objective way.

Quality is something mandatory to have a successful access to external markets and is essential to improve the competitiveness of exporters. The ISO 9001 is not a product standard, but a management system standard to demonstrate firms' ability to consistently provide products and services that meet customer requirements. Although it is true that standards are made on (product, commercial, informatics, administrative) process, its standardization will be directly observed on the product quality which firms are attempting to position in international markets. In particular, several studies based on firm-level surveys in both developed and developing countries (e.g. Weston 1995, Erel and Ghosh 1997, Mersha 1997, Anderson et.al. 1999, Corbet 2005) documented that satisfying international clients' demand is a critical motivation to obtain ISO standards.

Adapting products to foreign demand and international standards requires increasing and improving the actual level of knowledge and innovation of firms. Under such a situation, companies are imposed to carry out research and development activities in all fields and introduce new innovation on their products or production process in order to find out new ideas which could distinguish the firm from others and give it more competitiveness. Indeed, some papers posit that exporters are more likely to innovate than domestic firms (Liu and Buck, 2007.) due to the presence of a learning-by-exporting process. Regarding employees skills, different papers have shown that exporters are larger in employment, more skill-intensive and pay higher wages than non-exporters (Bernard & Jensen, 1995; Bernard et al., 2012). This evidence suggests that exporters all the time are providing their workers with different training programs, which could not be directly related to strict production, to improve workers' skills. This is because in order to export, employees have to acquire new knowledge such as: speaking English or other

languages, new communication software, new sales strategies, and even some first aid and safety knowledge[10], which could have been not necessary for the domestic market[11].

In addition, there is a vast variety of export market entry strategies that firms follow. A market entry strategy maps out how to sell, deliver, and distribute products in another country. The specific method of commercialization determines the majority of the success of an exporter firm. Methods of selling in foreign markets include the following: Direct Exports (the own firm directly sells and delivers products to the client); Indirect Export (firms could choose to indirectly export through an intermediary, such as a trading house, an agent, a representative or foreign distributor); Partnerships and alliances (Partnering and alliancing with a foreign company can provide the expertise, technology, capital or market access that firms might not be able to afford on their own, mainly if they come from developing countries). Market analysis includes finding out what groups of customers (or markets) exist, what their needs are, what groups of customers firms prefer to serve (target markets), what products or services firms might develop to meet their needs, how the customers prefer to use the products and services, what firm's competitors are doing, what pricing firm should use and how the firm should distribute products and services to customers. Marketing is another tool that firms use in order to position and promote products in new markets. Firms have to face two big challenges in such markets: making people know the new product and persuade them to buy and taste it. Moreover, firms participate in different programs to promote their exports, such programs could be introduced by the firm itself or by the national or provincial government. In general, the aim of such programs is to provide firms with different tools in order to make the export process more efficient, and less tedious and risky at the time that products are being presented in new markets throughout fairs and commercial missions.

The second stage of the study is an attempt to measure management practices. The interest here is to achieve a reasonable measure of *international trade* management practices in three broad areas, which are the main factors to have access to international markets according to standard literature: 1) *Product* – how well did firms modify quality and other visible features of their products/services?; 2) *Developing Activities* – did firm adopt different practices in order to improve and increase its innovation (production of knowledge), invest in R& D activities, and to develop new not-production skills of its workers?; 3) *Commercialization Channels* – did firm adapt their ways of selling, delivering and distributing products to the new markets and modify their marketing strategies?. All these categories seek to capture different strategies made by firms that belong to different sectors in a quantitative way and find some patterns among them.

I face a clear limitation here that arises from the fact that I do not have a pertinent micro - database that directly captures international markets practices. In other words, surveys at firm level do not ask about practices made by firms just before exporting or if they carried out a certain modification in their products, developing activities or commercialization in order to export for the first time. Generally, surveys ask about changes in management practices within a specific number of years (three generally); among those years the firm could have exported for the first time, continued exporting, stopped exporting or not exported at all. Nevertheless, this does not seem a problem because as well as firms which never exported seek to start exporting, those that are exporting want to expand their sells all the time by searching new destinations for their production, diversifying products exported or, increasing quantity already exported in regular destinations. New exporters tend to start small and focus on a single, usually neighboring country, once they outlive their entry year, they tend to expand their sales abroad and reach a larger number of destinations (Albornoz et al., 2012; Buono et al., 2014; Lawless, 2009). The occurrence of this process is not guaranteed, though. Both new exporters

[10] For instance, some international quality certification requires safety courses to employees

[11] Some can argue that training programs are directly related to productivity in cost through human capital. However, the sort of training I am considering does not include training to familiarize employees with equipment and machinery on the shop floor, training aimed at familiarizing employees with the establishment's standard operation procedures, or employee orientation at the beginning of an employee's tenure.

and exporters entering new markets exhibit high rates of failure in their exporting activity. Eaton et al. (2008) show that about half of new exporters discontinue their exporting activity within the first year. For Argentine firms, Albornoz et al. (2016) find a survival rate of 31% after two years for exporters — new or old — entering a new export destination. The difference between new exporters and other exporters is the "cut-off" value of costs that need to be overcome to successfully export . The "cut-off" value should be lower for a firm that is already exporting if there is a learning-by-doing process, but it could be higher if the firm wants to arrive at different countries from those where it is already exporting. In short, the point here is that although a firm started exporting some time ago, its regular destinations became its "new domestic market" because the firm knows their main features, and if we assume that it wishes to reach new markets, it should overcome new "cut-off" values, just as it started exporting for the first time.

There are two standard methodologies to measure management practices. First, by constructing an index which should reflect what one attempts to measure. In this case, it is essential to specify different forms of the index for robustness concern, and all of them should reflect the same results, as objective as it can. In other words, the results ought to be independent of the specification. Another methodology commonly used in the analysis of management practices is to not construct a specific measure as an index, but categorical variables that reflect whether the firm presents a determined attribute and then, including all these variables in a regression equation. The obvious advantage of this approach is that it is not necessary to use a measure constructed by the researcher. However, it could be difficult to interpret many variables at the same time if there are a high number of attributes and try to relate all of them to another measure (as in this paper). Taking into account the above, this research follows both methodologies, which provide even more robustness to the results.

Let $Index_{fjt}$ a measure that captures a variety of management practices (in products, developing activities and commercialization channels) made by the firm f of the industry j in the time t. In other words, for the firm f, specifically:

$$Index = M(x_{11}, x_{12}, ..., x_{1n}; x_{21}, x_{22}, ..., x_{2k}; x_{31}, x_{32}, ..., x_{3z}) \tag{37}$$

Where: x_{sm} is a dummy that takes 1 if the firm made the specific practice m in s. This is,x_{sm} is 1, if for example, the firm carried out a certain modification in the quality of the product, or invested in R& D activities or participated in some programs to promote exports. Specifically, the category *Product* presents four variables, *Innovation Activities* ten variables and *Commercialization Channels* four[12].

Since there is not a theory behind which provides intuition about what specification an index should have in order to translate management practices into a comparative number, I present different ways to measure them. First, I specify the following expression:

$$Index_p = \sum_{s=1}^{3} {x_s}^p \tag{38}$$

where x_s is the mean of the category s. When p=1, we have the overall simple mean among all the dummies. The simple mean is always useful and intuitive as a first approach despite the limitations of it. By using this specification, we give the same weight to each category. This implies that having some modifications in products (for example), or in developing activities (for example) is the same in terms of the exporting success and none of them presents more contribution than others in such process. In addition, we can give some different values to p to check robustness. For 0<p<1, firms that show intermediate values in all categories will rank higher than those which have made the majority of their modifications in only some of the categories. The opposite will be true for the case of p>1.

[12]The questions involved are shown in the Appendix.

Secondly, I use the geometric mean among the simple mean of the three categories, with a weight of 1/2 for each one. As it is well known, the geometric mean is useful while making comparisons between groups and does not present some of the limitations of the simple mean. However, by using the geometric mean, we are assuming that every firm should have made at least one modification in each category, making the measure more exigent. Therefore,

$$Index_{gm} = (x_1 \times x_2 \times x_3)^{\frac{1}{6}} \tag{39}$$

Thirdly, there is a vast literature of indexes, which develops the analysis of Principal Component. Principal Component Analysis is a multivariate technique that analyzes a data-set in which observations are described by several inter-correlated quantitative dependent variables. Its goal is to extract the important information from the data-set, to represent it as a subset of new orthogonal variables called principal components, and to display the pattern of similarity of the observations and of the variables as points in a map (Abdi and Williams, 2010). With this new specification, the management index is the weighted average of each category, where the weight is given by the respective component for each category. This is:

$$Index_{pca} = \sum_{s=1}^{3} w_s x_s \tag{40}$$

Where x_s is the mean of the category s and w_s is the respective component.

Finally, it is possible to give no specification at all and include each dummy into the regression. However, as I discussed above, with this strategy it is more difficult to make comparisons and to interpret them together with a measure of productivity. Still, on the positive side, the results are no longer attached to a specific functionality form.

4.3 Empirical Model

Through this paper, I have stressed both productivities in cost and management practices as potential keys to export. Productivity allows firms to overcome the sunk costs associated with trade, gain efficiency to face external competition given by foreign firms from different countries, and survive over time despite the potential entrance of new ones. Management practices, by modifying the quality of products, making the firm more innovative, and by improving the dynamism of commercialization, allow firms to adapt their products to external demand, insert themselves into the mechanism of international trade, and meet quality requirements according to international standards, which are generally more exigent than the domestic ones. In this subsection, I present the last stage of my work, which consists of estimating the relationship between exporter status and the two previous measures: productivity in cost and the management index. If we define *Exporter* as a variable which takes 1 if the firm exports at least in one year and 0 otherwise, I can specify the following model:

$$Exporter_{fjt} = \alpha + \beta log(TFP_{fjt}) + \gamma log(Index_{fjt}) + \delta Z_{fjt} + \epsilon_{fjt} \tag{41}$$

Where TFP_{fjt} is the productivity level of firm f, which belongs to sector j, at time t; $Index_{fjt}$ is the management index of the same firm; Z_{fjt} is a set of fixed effects of time, sector and number of employees; and ϵ_{fjt} is the error term.

5 Data

The primary source of information of the dataset is The Enterprise Survey, a project that is carried out by the World Bank since the 1990s. The Enterprise Surveys, through interviews with top managers of firms from the manufacturing and service sectors, cover a broad range of business environment topics including access to finance, corruption, infrastructure, crime,

competition, and performance measures. In the case of Argentina, the survey was made in 2006, 2010 and 2017, recently released. The whole population of study is the non-agricultural economy. This is: all manufacturing sectors (products of industrial and agricultural origins) classified by the ISIC classification – Revision 3.1: (group D), construction sector (group F), services sector (groups G and H), and transport, storage, and communications sector (group I)[13]. Since commodities represent 28% of the total Argentinian exports to the world[14] and since such products are mainly affected by external factors and they are not subjected to production productivity or management strategies, I consider that excluding firms that only trade commodities does not represent a big issue to the analysis.

The Survey uses standardized survey instruments and a uniform sampling methodology to minimize measurement errors and to yield data that are comparable across economies. In each year, the sample was selected using stratified random sampling. In Argentina, three levels of stratification were used: industry, establishment size, and location. Industry stratification was designed as follows: the whole population was stratified into 5 manufacturing industries, 1 service industry – retail-, and 1 residual sector. Size stratification was defined according to the number of reported permanent full-time workers: micro (less than 5 employees and only for panel firms), small (5 to 19 employees), medium (20 to 99 employees), and large (more than 99 employees). It is appropriate to use full-time workers in this case since seasonal/casual/part-time employment is not a common practice, except in the sectors of construction and agriculture. Regional stratification was specified in five locations (city and the surrounding business area): Buenos Aires, Chaco, Cordoba, Mendoza, Rosario, and Tucuman. It is important to notice that my data-set is divided into two distinct group of firms: those that were interviewed in 2006, 2010, 2017, which I refer as the panel, and those that were interviewed in a number of years equal or less than two.

Before turning to the descriptive statistics, I have to explain some treatment I have given my variables that highly contribute to my work, and reduce some bias on the results. Total annual value added and capital (book value of machinery, vehicles, equipment, land, and buildings) were deflated using price level of output and capital services from The World Penn Table 9.0, respectively and where the base year is 2011. I have to point out that there are some firms, which did not report the book value of their stock of capital in a given year, but they reported their book value in another year (whether the previous or the following one). In this sense, I made the following assumption: the real value of the capital is the same across time for those firms. It is plausible to make such an assumption since the capital is the factor with less mobility in the very short run. In addition, the Survey enables us to obtain an accurate measure of labor services for each firm because the database contains detailed information on the average educational level of the firm's full-time employees and weekly hours worked. Therefore, my measure of labor services is a measure of labor adjusted by human capital[15] . Following Hall and Jones (1999), I specify human capital per worker as:

$$h = e^{\phi(s)} \tag{42}$$

where s is average years of schooling, and the function $\phi(s)$ is a piecewise linear with slope 0.13 if $s \leq 4$, 0.10 if $4 < s \leq 8$, and 0.07 if $8 < s$[16]. According to Hall and Jones, given the production function, perfect competition in factors and products markets implies that the wage of a worker with s years of schooling is proportional to his human capital. Hall and Jones give different returns to different years of schooling because their measure tries to reconcile the log-linearity at the county level with the convexity across countries (or in this case, across firms).

[13] It is important to say that such classification excluded the following sectors: financial intermediation (group J), real estate and renting activities (group K, except sub-sector 72, IT), and all public or utilities-sectors.

[14] According to the National Institute of Statistics and Censuses of Argentina.

[15] Only for Panel Firms.

[16] Specifically, I define: $\phi(s)$=0.13*s if $s \leq 4$,$\phi(s)$=0.13*4 + 0.10*(s-4) if $4 < s \leq 8$, $\phi(s)$=0.13*4 + 0.10*4 + 0.07*(s-8) if $8 < s$.

As in the case of the stock of capital, I assume that the human capital remains the same across time for those firms that did not report their value of human capital stock. Again, it is plausible to make this assumption since I consider human capital as average years of education among employees, which would be constant during short periods of time[17].

Table 1 contains a summary of the principal variables in this work for all firms. As the standard empirical results, exporters present a better performance than non-exporters in a variety of attributes such as sales, number of employees, hours worked, average wage rate, and capital intensity. Additionally, it is valuable to see that exporters are also better than non-exporters at management practices: exporters are more likely to obtain international quality certification, spend on R &D, own patents registered either in Argentina or abroad, offer training programs for their employees, and to use commercialization programs to promote their products in foreign markets. Although the main units of this study are firms and the study is only interested in firms, I consider that it may be valuable to do some inspection within each most representative sector in the sample, this is, those that concentrate the majority of firms. I want to study such sectors separately because firms belonging to them are more likely to dominate the estimations and the results and conclusions would be more applicable to them. Figure 3 presents a summary for Food, Textiles, Garments, Chemicals, Machinery and Equipment and other Manufacturing. In general, the patterns between exporters and non-exporters presented in the whole sample, are also presented in those sectors.

Table 1: Summary Statistics.

	All Firms			Exporters			Non-Exporters		
Description	N	Mean	SD	N	Mean	SD	N	Mean	SD
Log Real Sales	1195	16.70	2.06	580	17.53	1.95	615	15.87	1.80
Log Employees	1195	3.83	1.49	580	4.45	1.46	615	3.23	1.25
Log Hours per week operating	1143	4.09	0.46	553	4.17	0.50	590	4.01	0.39
Log Average Wage Rate	1125	10.52	1.11	551	10.65	1.10	574	10.39	1.12
Log Capital Intensity (capital/labor)	1139	6.07	2.14	565	6.82	2.09	574	5.32	1.91
Internationally Recognized Quality Certification dummy	1195	0.35	0.48	580	0.54	0.50	615	0.17	0.38
Spending on research and development activities dummy	1195	0.29	0.45	580	0.35	0.48	615	0.23	0.42
Patents Registered in Argentina dummy	1195	0.17	0.38	580	0.19	0.40	615	0.16	0.36
Patents Registered abroad dummy	1209	0.05	0.23	586	0.09	0.09	623	0.02	0.14
Formal Training Programs For Workers dummy	1195	0.56	0.50	580	0.67	0.47	615	0.46	0.50
Using Services or Programs To Promote Exports dummy	1195	0.12	0.32	580	0.18	0.39	615	0.05	0.23

[17] The empirical evidence suggests that the average years of schooling all over the world increases one year every decade.

Figure 3: Summary Statistics, by most representative sectors.

Summary Statistics: Food.

Description	All Firms N	All Firms Mean	All Firms SD	Exporters N	Exporters Mean	Exporters SD	Non-Exporters N	Non-Exporters Mean	Non-Exporters SD
Log Real Sales	305	17.19	2.40	150	18.48	2.14	155	15.95	1.95
Log Employees	305	4.15	1.72	150	5.02	1.68	155	3.32	1.28
Log Hours per week operating	302	4.16	0.52	148	4.23	0.56	154	4.09	0.46
Log Average Wage Rate	286	10.60	1.15	141	10.82	1.11	145	10.40	1.16
Log Capital Intensity (capital/labor)	294	6.61	2.40	149	7.69	2.20	145	5.49	2.07
Internationally Recognized Quality Certification dummy	305	0.43	0.50	150	0.65	0.48	155	0.21	0.41
Spending on research and development activities dummy	305	0.25	0.44	150	0.28	0.45	155	0.23	0.42
Patents Registered in Argentina dummy	305	0.16	0.36	150	0.16	0.37	155	0.15	0.36
Patents Registered abroad dummy	305	0.04	0.19	150	0.06	0.24	155	0.01	0.11
Formal Training Programs For Workers dummy	305	0.67	0.47	150	0.76	0.43	155	0.59	0.49
Using Services or Programs To Promote Exports	305	0.10	0.30	150	0.15	0.35	155	0.06	0.23

Summary Statistics: Textiles.

Description	All Firms N	All Firms Mean	All Firms SD	Exporters N	Exporters Mean	Exporters SD	Non-Exporters N	Non-Exporters Mean	Non-Exporters SD
Log Real Sales	132	16.45	1.83	55	17.46	1.46	77	15.73	1.73
Log Employees	132	3.75	1.37	55	4.46	1.27	77	3.25	1.21
Log Hours per week operating	132	4.26	0.52	55	4.42	0.51	77	4.15	0.50
Log Average Wage Rate	124	10.25	0.98	53	10.35	0.84	71	10.18	1.07
Log Capital Intensity (capital/labor)	122	5.90	2.06	53	6.60	2.08	69	5.37	1.90
Internationally Recognized Quality Certification dummy	132	0.19	0.39	55	0.33	0.47	77	0.09	0.29
Spending on research and development activities dummy	132	0.12	0.33	55	0.16	0.37	77	0.09	0.29
Patents Registered in Argentina dummy	132	0.09	0.29	55	0.07	0.26	77	0.10	0.31
Patents Registered abroad dummy	132	0.007	0.09	55	0	0	77	0.01	0.11
Formal Training Programs For Workers dummy	132	0.42	0.50	55	0.60	0.49	77	0.30	0.46
Using Services or Programs To Promote Exports	132	0.05	0.21	55	0.07	0.26	77	0.03	0.16

Summary Statistics: Garments.

Description	All Firms N	All Firms Mean	All Firms SD	Exporters N	Exporters Mean	Exporters SD	Non-Exporters N	Non-Exporters Mean	Non-Exporters SD
Log Real Sales	177	15.88	1.61	42	16.62	1.73	135	15.65	1.51
Log Employees	175	3.44	1.32	42	4.27	1.29	133	3.18	1.22
Log Hours per week operating	176	3.91	0.23	41	3.88	0.20	135	3.91	0.23
Log Average Wage Rate	160	10.09	1.08	41	10.06	1.09	119	10.10	1.09
Log Capital Intensity (capital/labor)	162	5.02	1.75	41	5.68	1.63	121	4.79	1.74
Internationally Recognized Quality Certification dummy	177	0.08	0.28	42	0.17	0.38	135	0.06	0.24
Spending on research and development activities dummy	177	0.18	0.38	42	0.21	0.42	135	0.16	0.37
Patents Registered in Argentina dummy	177	0.16	0.37	42	0.14	0.35	135	0.16	0.37
Patents Registered abroad dummy	177	0.04	0.20	42	0.07	0.26	135	0.03	0.17
Formal Training Programs For Workers dummy	177	0.29	0.45	42	0.38	0.49	135	0.26	0.44
Using Services or Programs To Promote Exports	177	0.10	0.30	42	0.14	0.35	135	0.08	0.27

Summary Statistics: Chemicals.

Description	All Firms N	All Firms Mean	All Firms SD	Exporters N	Exporters Mean	Exporters SD	Non-Exporters N	Non-Exporters Mean	Non-Exporters SD
Log Real Sales	146	17.13	1.79	93	17.68	1.69	53	16.16	1.54
Log Employees	146	3.88	1.44	93	4.39	1.39	53	2.99	1.06
Log Hours per week operating	141	4.12	0.50	90	4.19	0.54	51	3.99	0.39
Log Average Wage Rate	139	10.83	1.56	88	10.88	1.18	51	10.72	1.12
Log Capital Intensity (capital/labor)	145	6.14	1.99	92	6.68	1.93	53	5.21	1.79
Internationally Recognized Quality Certification dummy	146	0.53	0.50	93	0.70	0.46	53	0.25	0.43
Spending on research and development activities dummy	146	0.47	0.50	93	0.51	0.50	53	0.42	0.50
Patents Registered in Argentina dummy	146	0.25	0.43	93	0.26	0.44	53	0.23	0.42
Patents Registered abroad dummy	146	0.12	0.33	93	0.17	0.38	53	0.04	0.19
Formal Training Programs For Workers dummy	146	0.77	0.42	93	0.86	0.35	53	0.60	0.49
Using Services or Programs To Promote Exports	146	0.19	0.40	93	0.26	0.44	53	0.08	0.27

Summary Statistics: Machinery and Equipment.

Description	All Firms N	All Firms Mean	All Firms SD	Exporters N	Exporters Mean	Exporters SD	Non-Exporters N	Non-Exporters Mean	Non-Exporters SD
Log Real Sales	171	16.06	1.78	103	16.67	1.64	68	15.16	1.58
Log Employees	171	3.36	1.27	103	3.74	1.19	68	2.79	1.19
Log Hours per week operating	167	3.95	0.33	101	4.00	0.36	66	3.87	0.27
Log Average Wage Rate	160	10.27	0.94	95	10.34	1.08	65	10.17	0.68
Log Capital Intensity (capital/labor)	162	5.64	1.75	97	6.04	1.70	65	5.03	1.67
Internationally Recognized Quality Certification dummy	171	0.34	0.47	103	0.47	0.50	68	0.15	0.37
Spending on research and development activities dummy	171	0.34	0.47	103	0.35	0.48	68	0.32	0.47
Patents Registered in Argentina dummy	171	0.20	0.40	103	0.19	0.40	68	0.22	0.42
Patents Registered abroad dummy	171	0.06	0.25	103	0.09	0.28	68	0.03	0.17
Formal Training Programs For Workers dummy	171	0.56	0.50	103	0.63	0.48	68	0.44	0.50
Using Services or Programs To Promote Exports	171	0.15	0.35	103	0.19	0.40	68	0.07	0.26

Summary Statistics: Other manufacturing.

Description	All Firms N	All Firms Mean	All Firms SD	Exporters N	Exporters Mean	Exporters SD	Non-Exporters N	Non-Exporters Mean	Non-Exporters SD
Log Real Sales	147	16.76	2.09	93	17.68	1.69	53	16.16	1.54
Log Employees	176	3.88	1.44	93	4.39	1.37	53	2.99	1.06
Log Hours per week operating	141	4.12	0.50	90	4.19	0.54	51	3.98	0.39
Log Average Wage Rate	139	10.83	1.16	88	10.88	1.18	51	10.72	1.12
Log Capital Intensity (capital/labor)	145	6.14	1.99	92	6.68	1.93	53	5.21	1.75
Internationally Recognized Quality Certification dummy	146	0.53	0.50	53	0.25	0.46	53	0.25	0.43
Spending on research and development activities dummy	146	0.47	0.50	93	0.51	0.50	53	0.42	0.50
Patents Registered in Argentina dummy	146	0.25	0.43	93	0.26	0.44	53	0.23	0.42
Patents Registered abroad dummy	146	0.12	0.33	93	0.17	0.38	53	0.04	0.19
Formal Training Programs For Workers dummy	146	0.78	0.42	93	0.86	0.35	53	0.60	0.49
Using Services or Programs To Promote Exports	146	0.19	0.40	93	0.26	0.44	53	0.08	0.27

Table 2 reports the estimation for Real Sales Per Capita (y) by Olley and Pakes Approach. As it is expected, labor negatively affects sales per worker. On the other hand, both age and capital positively contribute to sales per capita , no matter if we control for time, number of employees and sector fixed effects. Figure 4 shows the distribution of productivity (in log) obtained by such approach across all firms, where the majority of the observations are concentrated around the value of 6. It is particularly interesting to see the distribution of productivity in each most representative sector and Figure 5 presents this. What I find is that such distribution is similar across sectors. Nevertheless, the higher values correspond to sectors with the most elaborated products such as Machinery and Equipment, Garments and Other Manufacturing, on average.

Table 2: Regression for Real Total Sales per capita by Olley and Pakes Approach.

VARIABLES	(1) Log_y	(2) Log_y	(3) Log_y
Log_L	0.0309	-0.234***	-0.209**
	(0.0978)	(0.0894)	(0.102)
Age	0.00695***	0.00519***	0.00500***
	(0.00163)	(0.00163)	(0.00143)
Log_k	0.516***	0.399***	0.389***
	(3.28e-06)	(2.49e-06)	(1.10e-06)
Time Fixed Effects	No	Yes	Yes
Number of Employees Fixed Effects	No	Yes	Yes
Sector Fixed Effects	No	No	Yes
Observations	1195	1195	1195
Number of groups	532	532	532

Standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Figure 4: Distribution of TFP by Olley and Pakes Approach across firms.

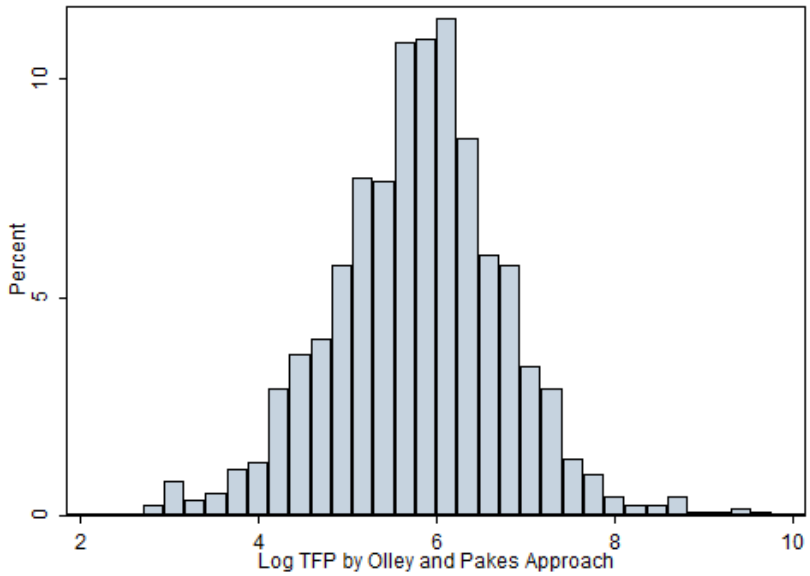
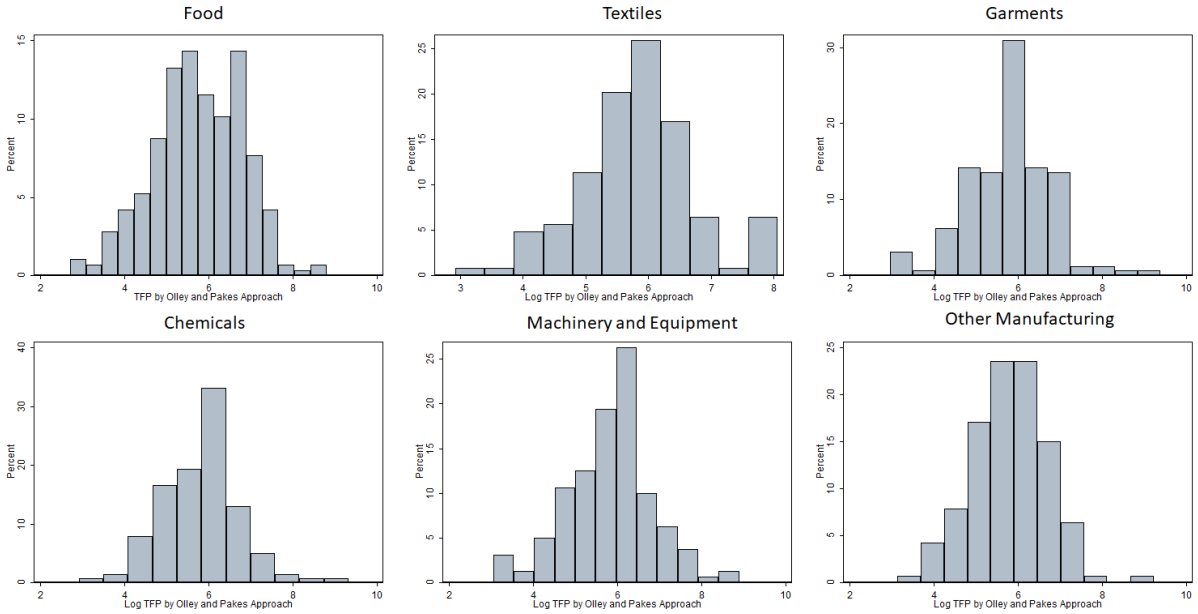


Figure 5: Distribution of TFP by Olley and Pakes Approach across firms, by most representative sectors.



Regarding the management index, which is obtained by Principal Component Analysis, Figure 6 shows its distribution. It is observed that such distribution is a right-skewed one, where the majority of the observations present values around 0 and 0.2. By observing the distribution by sector, it is possible to see that Machinery and Equipment presents a better performance in management practices, according to Figure 7. Figure 8 presents a close examination of the scores obtained by each sector for each category in the index, making a distinction between exporters and non-exporters. It is remarkable the fact that exporters have better management performances than non-exporters, on average. What is more, the performance of each sector is well-balanced among the three categories. In other words, Figure N°8 says that there is no

reason to believe that a given sector would have made more modifications in only one category.

Figure 6: Distribution of The Management Index using Principal Analysis Component across firms.

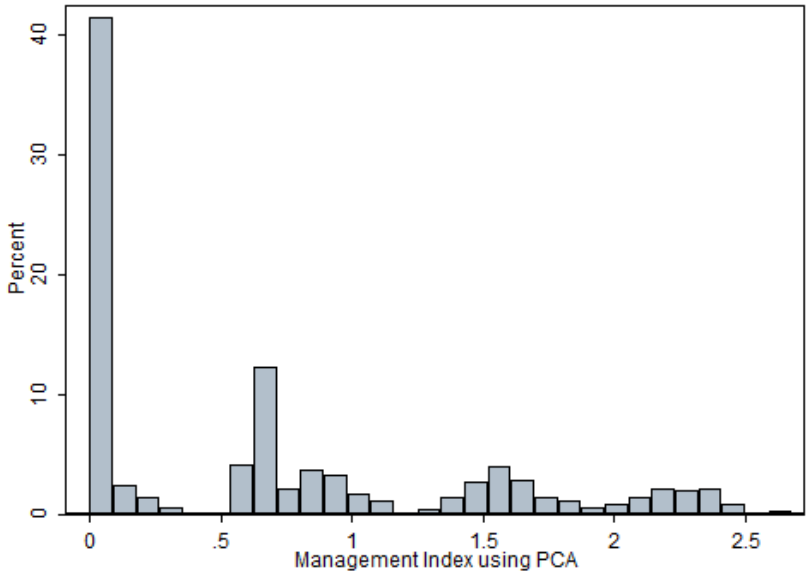


Figure 7: Distribution of The Management Index using Principal Analysis Component across firms, by most representative sectors.

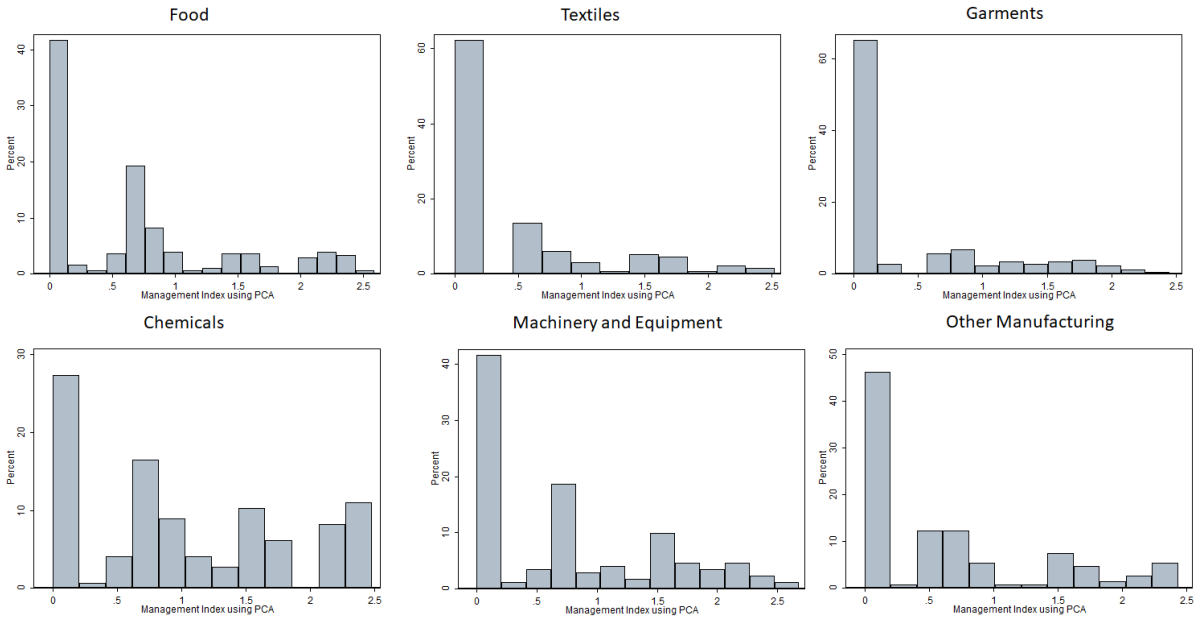


Figure 8: Management Performance of Exporters and Non-Exporters, by most representative sectors

As the model of Section 3 discusses, one could think that there is some "cut-off" value on productivity and on the index above which all firms are exporters, and below which all firms are only domestic. Figure 9 presents the dispersion of both measures across firms, by exporter status. The first thing that should be observed is that there is such a clear "cut-off" value for being an exporter (a value of -0.5 for Log Index and 5 for Log TFP) despite some outliers. Nevertheless, there are a number of firms that exceed such "cut-off" and remain in the domestic market, which means that there are still additional forces behind the exporter process that are not well captured by both measures and prevent firm from exporting, such as commercial restrictions, external impositions, political and economic failures, which are beyond the limitations of this paper. To avoid being unfair with Figure 9, I do the same exercise with the most representative sectors, which is showed in Figure 10. Now, we can see with more clarity that the presented theoretical model fits better in each sector, where the distinction in both attributes between exporter and non-exporters is more evident. However, we can still observe firms that should be exporting according to the model and they are not.

Figure 9: Management Performance and Productivity, between Exporters and Non-Exporters.

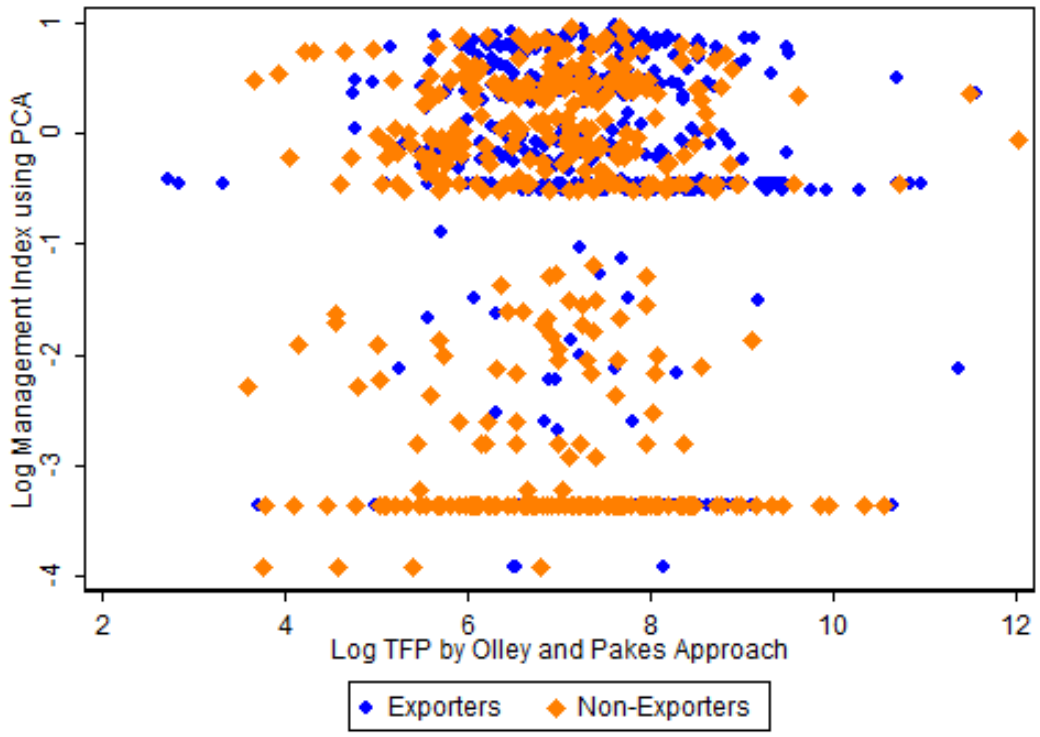
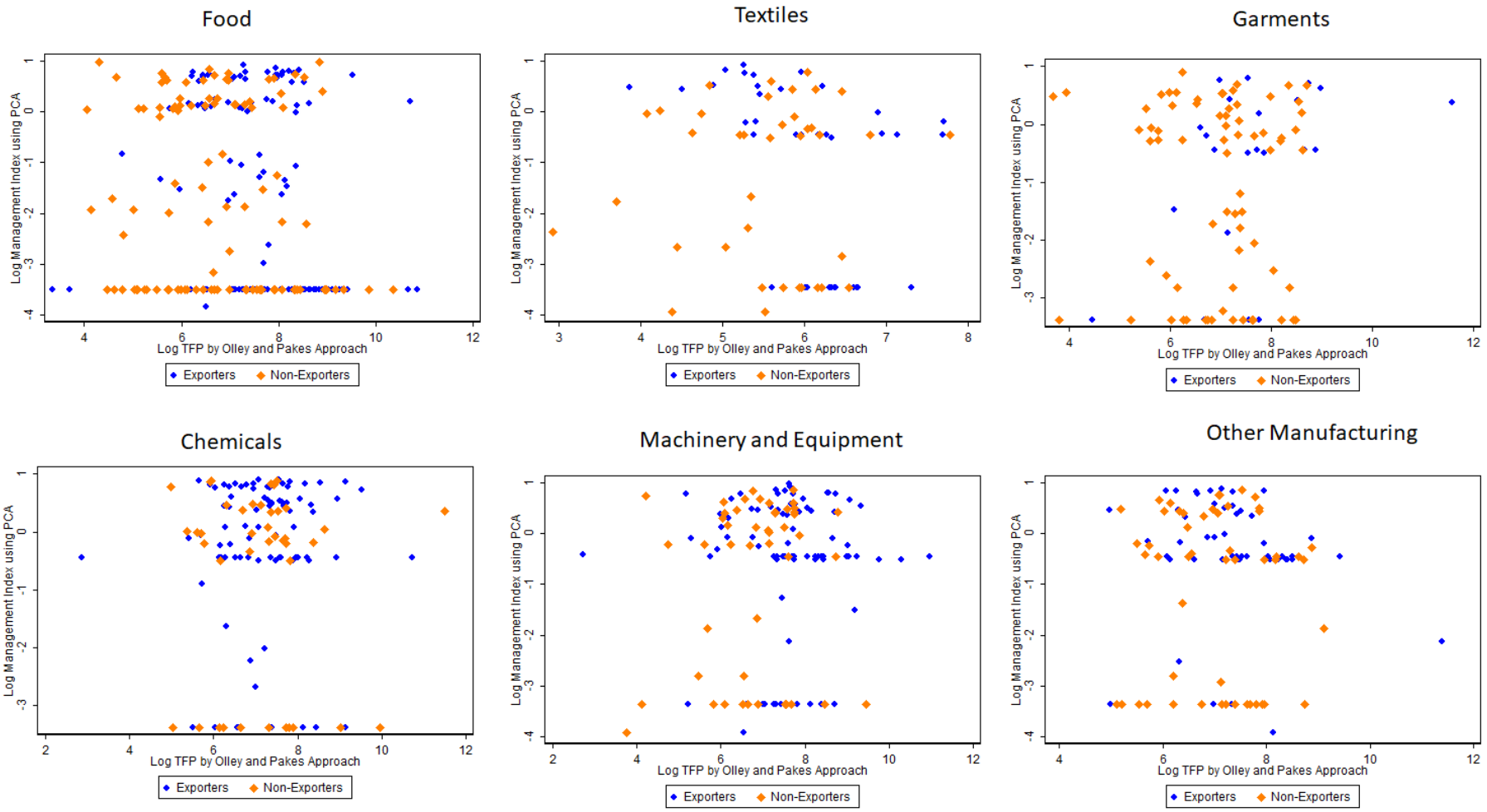


Figure 10: Management Performance and Productivity between Exporters and Non-Exporters, by most representative sectors.



6 Results

In this section, the objective is to not develop a calibration exercise of the presented theoretical model, but to present empirical evidence of how production productivity and management practices (which, in turn, are a function of productivity in management) affect exporter status. Table 3 reports the estimation of Equation (41). Column 1 presents the pure relationship, while Column 2 controls for time and number of employees effects and Column 3 controls for time, number of employees and sector effects. The three columns indicate that both productivity and management practices positively contribute to the probability of being an exporter. Moreover, their contributions are very similar in magnitude. Specifically, the contribution of more productivity increases the probability of being an exporter by 10%, while having better management strategies contributes to the exporter status by 10%-16%. These estimations indicate that firms should focus both on improving their production process and making modifications on their products, developing activities and commercialization channels in order to be an exporter.

Table 3: Contribution of Productivity and Management Practices to Exporter Status

	(1)	(2)	(3)
VARIABLES	Exporter	Exporter	Exporter
Log_TFP	0.108***	0.0955***	0.0938***
	(0.0177)	(0.0202)	(0.0205)
Log_Index	0.106***	0.168***	0.155***
	(0.0171)	(0.0239)	(0.0245)
Manufacturing dummy	0.167	0.00673	0.106
	(0.168)	(0.187)	(0.192)
Time Effects	No	Yes	Yes
Number of Employees Fixed Effects	No	Yes	Yes
Sector Fixed Effects	No	No	Yes
Pseudo R2	0.0624	0.1882	0.2215
Prob $>$ Chi2	0.00	0.00	0.00
Observations	1,183	1,183	1,183

Standard errors in parentheses. Variables normalized by σ.
*** p$<$0.01, ** p$<$0.05, * p$<$0.1

Some can argue that it is possible that collinearity and simultaneity bias are present in the empirical model. A high collinearity could arise from the fact that management practices that a firm can follow, in turn, depend on its productivity. The mechanism whereby productivity can affect the practices is the following: if a firm is more productive in costs, it has some margin to carry out a set of modifications in products, developing activities and commercialization channels since such changes could be expensive and require a previous learning process from the firm. Therefore, only the most productive firms are able to make modifications to their operations. What it is equally true: management practices can affect productivity as well. If a firm for some reason (which could be not necessarily related to its willingness of entering foreign markets) makes a decision and changes some aspect of its operation (maybe the way of presenting its products, the way of organization of its workers, or the way of communicating with their clients), which could not require a high outlay, and then such decision can substantially improve firm's efficiency and reduce production costs, driving more productivity. In this way,

only the firms "pioneers" in management strategies would be the more productive ones. Therefore, if we include both productivity and management practices in a regression, it will affect the variance of the regression coefficient associated with each variable and increase its standard error, affecting the precision of the estimation[18]. Table 4 tests for collinearity between productivity and the management index. Column 1 shows the results from a regression of the Log index on Log productivity, while column 2 presents the reverse relationship. Since the tolerance in both regressions is high (0.9999) and in consequence, the VIF value is around 1, there is no evidence to claim that a high collinearity is affecting the results. Simultaneity is an even more serious concern because in the presence of it the estimators will be biased and inconsistent. Endogeneity could be present in the estimation since it is possible to think that the exposure to foreign competitiveness makes firms to be more productive and to change their management practices in an attempt to survive (learning-by-doing). There is a huge amount of theoretical body that shows that firms that are more productive, once they enter foreign markets, they increase their productivity through efficient reallocations, in this way, they are even more productive than their domestic peers. In other words, firms more productive are always more productive (Melitz, 2003). Moreover, in order to export to almost every developed country, firms should have to present high-quality controls, which are verified for the fact of having achieved international standard certifications. In turn, to certificate such standards, firms should improve some aspects of their internal management activities ex-ante, which should be reflected in the index. Given the above, I consider that previous levels of productivity and having quality certifications are pertinent instruments for productivity and the management index, respectively. Table 5 and Table 6 test for exogeneity in both variables[19] . Wald test, which is shown in the bottom of the tables, indicates that there is no evidence to claim that productivity is causing endogeneity; however, Table 6 shows that the management index is an endogenous variable and the use of an instrument is pertinent, in consequence. Therefore, our hypothesis that exporting improves management performance would be true for Argentinian firms, suggesting the presence of a learning-by-doing process. Additionally, we should observe that once the management index is instrumented by having ISO certifications, its effect on exporter status is higher, which stresses the importance of achieving such quality standards in order to export.

Table 4: Testing for Collinearity between TFP and Index.

	(1)	(2)
VARIABLES	Log_Index	Log_TFP
Log_TFP	0.00638	
	(0.0339)	
Log_Index		0.00613
		(0.0326)
Constant	-0.542***	5.847***
	(0.201)	(0.0364)
R-squared	0.0001	0.0001
Tolerance	0.9999	0.9999
VIF Value	1.0001	1.0001
Observations	1,183	1,183

Standard errors in parentheses. Variables normalized by σ.
*** p<0.01, ** p<0.05, * p<0.1

[18] Nevertheless, the debate about whether multicollinearity is a problem or not is still open.
[19] In this case the test was possible only on panel firms.

Table 5: Testing for Exogeneity in TFP.

VARIABLES	(1) Exporter	(2) Exporter (IV)	(3) Log_TFP	(4) Athrho	(5) Lnsigma
Log_TFP	0.0719**	0.259			
	(0.0307)	(0.227)			
Log_Index	0.137***	0.332**	0.165**		
	(0.0370)	(0.151)	(0.0757)		
Log_TFP$_{t-1}$			0.472***		
			(0.0541)		
Time Fixed Effects	Yes	Yes	Yes		
Number of Employees Fixed Effects	Yes	Yes	Yes		
Sector Fixed Effects	Yes	Yes	Yes		
Constant		-0.249	3.433***	0.00973	-0.324***
		(1.433)	(0.378)	(0.191)	(0.0470)
Wald Test for Exoneity					
Chi2	0.00				
Prob>Chi2	0.9594				
Observations	240	240	240	240	240

Standard errors in parentheses. Variables normalized by σ.
*** p<0.01, ** p<0.05, * p<0.1

Table 6: Testing for Exogeneity in The Index.

VARIABLES	(1) Exporter	(2) Exporter(IV)	(3) Log_Index	(4) Athrho	(5) Lnsigma
Log_Index	0.137***	0.573***			
	(0.0370)	(0.136)			
Log_TFP	0.0719**	0.158**	0.0456		
	(0.0307)	(0.0800)	(0.0313)		
ISO dummy			1.115***		
			(0.0693)		
Constant		1.436**	-2.227***	-0.223**	-0.574***
		(0.577)	(0.207)	(0.106)	(0.0361)
Time Fixed Effects	Yes	Yes	Yes		
Number of Employees Fixed Effects	Yes	Yes	Yes		
Sector Fixed Effects	Yes	Yes	Yes		
Wald Test for Exoneity					
Chi2	4.41				
Prob>Chi2	0.0358				
Observations	492	492	492	492	492

Standard errors in parentheses. Variables normalized by σ.
*** p<0.01, ** p<0.05, * p<0.1

It is possible that the previous results depend on the specific form given to the index, which means that the form is not captured what I really want to capture, and with this, we would misestimate the true effect of management strategies on the exporter status. For this reason, it is possible to not give any specification at all, avoiding the results depend on the form presented by the index. Thus, we can directly include the variables in the regression , and in this case, the coefficients will determine how the categories are related to the fact of being an exporter or not, on average. The disadvantage of this strategy is that it requires a previous selection process in which variables should be included in the regression. In this paper, this is particularly important because I am working with 19 categorical variables, summarized in three categories, which makes difficult to include all of them in one regression. To handle such a problem, we can follow two different strategies (which would not necessarily give the same results). First, we can select some variables of each category, which could reflect the main modifications in the firm's operation, and include them in the regression. However, the problem with this specification is that we could ignore relevant information implied by the rest of the variables that are not included, and this could generate a huge bias on the results. To avoid this, the second methodology is to directly include the mean of each of the three categories in the regression and capture the major information presented in the variables without giving a restrictive form to the relationship among the categories. Table 7 presents both possibilities. Columns 1 and 2 control for selected management practices. It is possible to notice that providing employees with formal non-production training programs and using services or programs to promote exports are important for being an exporter. However, it is remarkable to observe that introducing some modifications in products to improve them (either physical or in composition) or presenting patents (either registered in Argentina or abroad) would not be crucial factors. Regarding spending on R&D activities, we could observe that this variable is significant when we do not make any control; however, it lost its significance when controlling for time and number of employees. Columns 3 and 4 dis-aggregate the index into the three categories. All the three categories are significant on exporter status and all of them present the same significance (which is in line with Figure 8). These results indicate that firms should focus on the three considered areas to have success in the export process.

So far we have focused on the factors that explain the probability of being an exporter; this is what explains the so-called exporter status. The literature of international trade has also been interesting in the differences between exporters and non-exporters, this is the exporter premia. Table 8 presents the results for diverse attributes. Exporters present better management performances than non-exporters and they are also more productive, where the difference is higher in management. Specifically, the results show that exporters are 71% better at management, and they are 60% more productive. Notice that although we were not able to assert that exporter firms are better at management practices than non-exporters from a theoretical point of view, the evidence suggests that we could do so, at least for Argentinian firms. Furthermore, there is clear evidence for claiming that exporters are more likely to modify their products in order to improve them, spend on R &D activities, provide their employees with training programs, and use commercialization services, as we previously discussed in the Data section. The results also show that manufacturing firms are better at management practices than services firms, but there is no statistical difference in productivity levels. Furthermore, it seems like there is not a statically significant difference between different provinces and Buenos Aires in management practices. Nevertheless, there is evidence to say that the firms located in the considered provinces are less productive than the ones in Buenos Aires, on average. The estimation suggests that firms with more than 99 employees (larger firms, according to the World Bank) are better in management strategies, but they are less productive. I would suggest that researchers should be cautious while assuming that there is always a direct relationship between size and productivity, if we consider the number of employees as a measure of firm size, at least for firms located in Argentina. On average, firms presented an increase of 195% in their management

levels between 2006 and 2010, while a management improvement between 2006 and 2017 is not observed. In addition, the results show that Argentinian firms might have suffered a decrease in their productivity levels between 2006 and 2010; nevertheless, there was an increase between 2006 and 2017. Specifically, overall productivity level decreased by 31% between 2006 and 2010, while it increased by 58% between 2006 and 2017.

Table 7: Disaggregating Effects of The Index on Exporter Status.

VARIABLES	(1) Exporter	(2) Exporter	(3) Exporter	(4) Exporter
Log_TFP	0.0978***	0.115***	0.106***	0.107***
	(0.0154)	(0.0172)	(0.0152)	(0.0171)
Improved Products dummy	-0.0630	0.0197		
	(0.0451)	(0.0607)		
Spending on R&D Activities dummy	0.0885*	0.0825		
	(0.0474)	(0.0541)		
Having Patents dummy	-0.0432	-0.0423		
	(0.0456)	(0.0505)		
Formal Training Programs for Workers dummy	0.179***	0.0951***		
	(0.0305)	(0.0352)		
Using Services or Programs to Promote Exports dummy	0.288***	0.334***		
	(0.0449)	(0.0455)		
Product			0.291***	0.322***
			(0.0823)	(0.0939)
Developing			0.434***	0.288**
			(0.121)	(0.134)
Commerce			0.129*	0.271***
			(0.0757)	(0.0972)
Manufacturing dummy	0.221	0.242	0.122	0.139
	(0.142)	(0.150)	(0.163)	(0.169)
Time Fixed Effects	No	Yes	No	Yes
Number of Employees Fixed Effects	No	Yes	No	Yes
Sector Fixed Effects	No	Yes	No	Yes
Pseudo R2	0.0855	0.2100	0.0773	0.2031
Prob > Chi2	0.00	0.00	0.00	0.00
Observations	1,195	1,195	1,195	1,195

Standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Table 8: Results for Exporter Premia.

VARIABLES	(1) Log_Index	(2) Log_TFP	(3) Improved Products dummy	(4) Spending on R&D Activities dummy	(5) Having Patents dummy	(6) Formal Training Program for Workers dummy	(7) Using Services or Programs to Promote Exports dummy
Exporter	0.714***	0.603***	0.0199	0.0721***	-0.00185	0.200***	0.109***
	(0.0820)	(0.0716)	(0.0303)	(0.0275)	(0.0225)	(0.0304)	(0.0181)
Manufacturing dummy	1.340***	-0.450	0.287***	0.212***	0.104	0.0133	0.0224
	(0.385)	(0.373)	(0.0551)	(0.0640)	(0.0659)	(0.167)	(0.0793)
Buenos Aires dummy	-0.142	0.338***	0.459***	0.348***	0.235***	-0.131***	0.151***
	(0.0976)	(0.0954)	(0.0277)	(0.0280)	(0.0253)	(0.0429)	(0.0214)
Larger dummy	0.372***	-0.339***	0.0524	0.0723**	0.0717**	0.230***	-0.00881
	(0.0908)	(0.0894)	(0.0376)	(0.0345)	(0.0294)	(0.0358)	(0.0183)
Year_2010	1.954***	-0.306***				0.286***	
	(0.111)	(0.0975)				(0.0403)	
Year_2017	0.176	0.582***				0.256***	
	(0.150)	(0.126)				(0.0430)	
Constant	-3.717***	7.333***					
	(0.394)	(0.376)					
R-squared Adj/Pseudo R2	0.4208	0.0979	0.1839	0.1428	0.1117	0.1053	0.1297
Observations	1,183	1,195	1,195	1,195	1,195	1,195	1,195

Standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

7 Conclusions

This paper presents both a theoretical and an empirical model to study the effects of productivity and management practices on exporter status. On the theoretical side, a multiple heterogeneity model is developed, in a context of monopolistic competition. There are two attributes where firms can differ in: productivity in cost and productivity in management. The model achieves two conditions (Zero Cut-Off Profit Condition and Free Entry Condition) to determine which firms enter and produce in the domestic market. Later, when the economy is opened to the rest of the world, the model not only indicates which firms enter the domestic market but also which ones export. Since profits depend on both productivity in cost and in management strategies, the most productive firms would not necessarily export. Indeed, if a firm has a lower level of productivity in cost, but it can manage to effectively adapt its product to foreign demand, the model assures that it will has enough compensating advantage to export and face external competition. In consequence, if we assume that there is a direct relationship between productivity in cost and firm size, it is expected that exporters would not only be those firms with larger sizes.

On the empirical side, the study displays several methodologies and specifications to measure productivity in cost and management practices at firm level. Mainly, the paper follows the Olley and Pakes Approach to measure productivity as a residual, dealing with both simultaneity and selection bias by assuming that there is a relationship between productivity and investment, and modeling probability of entering and exiting the domestic market. Regarding management practices, the analysis follows the international trade and the IO literature to consider three broad operational aspects where firms should carry out modifications on to export: product adaptations, developing activities and commercialization channels. As in the productivity calculus, different alternatives to measure management practices at firm level are presented; however, the paper particularly focuses on the Principal Analysis Component Approach. With the two previous measures, we identify the effects of them on exporter status. To do so, the study exploits the waves 2006, 2010 and 2017 of the Enterprise World Survey for Argentina. According to the results, both productivity and management practices positively affect the probability of being an exporter, and their effects are very similar in magnitude. Specifically, productivity increases the probability of exporting by 10%, while management contributes by 10%-16%. What is equally relevant, thanks to this paper, some particular strategies firms should mainly focus on have been identified. Indeed, it is suggested that obtaining ISO certifications, spending on R &D activities, providing employees with formal non-production training programs and using services or programs to promote exports and improve commercialization channels are important for being an exporter. However, it is observed that introducing some modifications in products to improve them (either physical or in composition) or own patents (in Argentina or abroad) would not be crucial factors. What is more, exporters tend to report better attributes, where the difference is higher in management. We have seen that manufacturing firms are better at management practices than services firms. Furthermore, there are not statistically significant differences in management strategies among firms located in different provinces. Nevertheless, there is evidence to say that firms located in the considered provinces are less productive than the ones in Buenos Aires, on average. Finally, the estimation suggests that firms with more than 100 employees are better in management strategies, but they are less productive than the smaller ones.

Isolating "management" productivity from "standard" productivity and considering them as two distinct concepts have potential implications besides predicted exporter status and conditional exporter premia. For example, it could be relevant to explore deeper determinants of measured productivity and study its dynamic over time, how more productivity at firm level could increase country's productivity, and the type of public policies that can promote foreign insertion of domestic firms. Therefore, the existence of firm attributes that matter differently for domes-

tic and export market success should also be considered by international organizations and government agencies involved in exporting promotion and productive development programs. In particular, the results stress the importance of encouraging firms to be more cost-effective, obtain ISO certifications, spend on R &D activities, offer training programs and use services to promote exports as the potential "keys" to export.

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