

Managers' Knowledge and Trade Performance

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ABSTRACT: Knowledge is key to the competitiveness and success of an organization and in particular of a firm. Firms and their managers acquire knowledge via a variety of different channels which are often difficult to track down and quantify. By matching employer-employee data with trade data at the firm level we shed light on the nexus between the export experience acquired by managers in *previous* firms and their *current* firm's trade performance. We consider different margins of firm's trade performance as well as detailed information on the nature of the activities performed by managers in both the previous and the current occupation. Our analysis will draw upon Mion and Opromolla (2014) and will expand the analysis in many interesting ways.

Keywords: Managers, firm performance, job mobility, export experience

JEL classification: M2, L2, F16, J31, J62

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1. Introduction

A growing literature in economics explores how the management of a firm affects its performance. Empirical studies have exploited the increasing availability of information on managerial practices and managers' characteristics to establish a strong connection with firm—as well as a country—productivity; theoretical contributions have analyzed different facets of the firm-manager nexus, including matching, incentive provision, ownership, and, of particular relevance to our analysis, trade.¹

Mion and Opromolla (2014) show that the export experience gained by managers in *previous* firms leads their *current* firm towards higher export performance, and commands a sizable wage premium for the manager; we replicate the analysis in Mion and Opromolla (2014) and expand it in several interesting directions.

We show that export knowledge is decisive when it is *market-specific* or *product-specific*: managers with experience related to markets served by their current firm or to product sold by their current firm receive an even higher wage premium, firms are more likely to enter markets where their managers have experience, exporters are more likely to stay in those markets and they have a significant increase of both the intensive and extensive margins.

Dividing managers in seven sub-categories (i.e. general manager, sales manager etc) to disentangle the effect of a manager type in a specific phase of the exporting process we find that general managers enjoy higher wages, especially if their experience is *market-specific* or *product-specific*; moreover, their experience is extremely valuable to continue exporting in a market but relatively less valuable than that of production, financial and sales managers when the firm wants to enter into a new market - this finding hold both when experience is in a destination market or in a product group. Looking at the export margins, we find that production managers are helpful to increase the number of markets in which the firm is exporting (extensive margin), while sales managers prove to be important to increase the degree of penetration in a market (intensive margin) - both results are conditional of being already an exporter.

We try to provide intuition to explain each finding, but further research is needed to shed light on the mechanisms involved. The management literature offers several case studies consistent with our basic findings, but lacks a systematic and quantitative evaluation.² Indeed, it is reasonable to expect managers to learn valuable skills or information from their previous jobs, it is surprising that managers' export experience

¹Among others, Bertrand and Schoar (2003), Bloom and Van-Reenen (2010), Bloom et al. (2011), and Guiso and Rustichini (2011) on managers and managerial practices; Bandiera et al. (2011), Burkart et al. (2003), and Lazear and Oyer (2007) on matching, incentives, and ownership; Antras and Rossi-Hansberg (2006), and Caliendo and Rossi-Hansberg (2012) on trade.

²See Andersson and Wictor (2003) and Rialp et al. (2005) among others.

is a first-order feature in the data, and that its effect on a firm export performance is at least as strong as that of firm productivity. Our results call for further theoretical work on the connections between trade and the labor market.

Three ingredients make our analysis feasible and robust: reliable data on one country (Portugal) covering the universe of firms and their workers for several years, including rich information on the characteristics of both; the possibility of tracking workers—and in particular managers—as they move from firm to firm (and especially between exporters and non-exporters); a research design that accounts for unobserved heterogeneity, omitted variables, and, more broadly, endogeneity.

In the paper we perform two complementary analyses. First, we estimate a wage equation to identify the existence of a premium for export experience. We control for worker and firm fixed effects, previous firm observables, job-change patterns, as well as worker and current firm time-varying observables. We consider both managers and non-managers with export experience in an export destination or in product group; we conclude that a premium arises for managers only. Export experience for a manager corresponds to a 10.6 percent (2.7 percent) higher wage when not accounting (accounting) for unobserved heterogeneity. Splitting the manager category into 6 subgroups -Skilled Professional, General Manager, Production Manager, Financial Manager, Sales Manager, Other Manager and Non classified manager - we clearly observe that general managers enjoy higher wages both when their experience is specific to a destination market or product group (up to 50 percent higher) or when it is general export experience (up to 30 percent higher)

A potential concern applying to our wage analysis is that export experience might be a proxy for some unobservables: for example, having being employed by an exporter could signal the unobserved ability of a manager. We account for this by means of worker fixed effects if unobserved ability is time-invariant. We also account for time-variant unobserved ability to the extent it is captured by time-varying characteristics of the worker's *previous* firm such as size, productivity and industry. Finally we further strengthen our results by comparing managers that have export experience in at least one of the markets - defined as a destination or a product group - to which their current firm is exporting to those who have experience in other markets. We find the former managers to enjoy an additional wage premium - from 9 to 6 percent without worker fixed effects, from 2.5 to 1 percent when including worker fixed effect - which is hard to square with export experience simply being a proxy for managers' unobserved ability. One limitation of our study, which is common to Mincerian wage analyses, is the issue of selection, i.e., we only observe wages for those employer-employee pairs that are formed. We try to discuss at length the implications of selection, as well as of other forms of biases, for our framework.

In the second part of the paper, we assess whether export experience brought by managers affects a firm's export performance. More specifically, we evaluate a firm's likelihood to enter (or to stay) in a new (current) market - defined as a destination of export or a product exported - as well as a firm's exports conditional on entry (continuation). We account for endogeneity in a variety of ways, including firm-year fixed effects and market-year dummies as well as instrumental variable (results not ready for this version) while getting a very coherent picture. We find that having managers with experience in a specific market increases the probability that the firm enters (stays) in that market; both in the case of entry and stay, the effect of such experience is at least as strong as that of productivity. Destination-specific experience also increases export margins in the case of continuation: extensive margin increases by 16 percent while intensive margin increases by 4 percent. When looking at product-specific experience, we find that export margins increase both in the case of entrants and continuing exporters: precisely extensive margin increases by 19 percent for entrants and by 47 percent for firms continuing to export the same product while intensive margin by 3.6 and 18 percent respectively conditioning on entry and on continuation. Interestingly, we do not find evidence of a strong relationship between export experience not specific to a market and firm trade performance. We then split the managers in 6 sub-groups and perform again the analysis. We have 2 main findings: when experience is specific to a destination, financial managers, production managers and sales managers are relatively more useful to start exporting while general managers prove to be extremely useful to continue exporting in a market. Moreover, if we look at the export margins, we find that conditional on exporting, sales managers can increase intensive margin up to 24 percent while production managers can drive up the extensive margin by 35 percent. Secondly, when experience is in a product group we find again that general managers are useful to continue exporting while sales manager help to start exporting a new product. Conditional on entering a new product market, general managers can improve performance on the extensive margin up to 90 percent, while sales managers are again useful to improve numbers in terms of average export of a given product (intensive margin). Figures for firms that continue exporting in a product market are difficult to interpret and surprisingly too high.

These findings are consistent with the hypothesis that managers transfer valuable export-specific knowledge when moving across firms. Furthermore, such knowledge has a strong market-specific nature, consistently with evidence that export entry costs are mostly country-specific or product-specific (as opposed to global; see Eaton et al. (2011) and Moxnes (2010) among others) and that successful business practices have to

be tailored to the targeted export market (see Artopoulos et al. (2013)).³

There are good reasons to believe there is something special about managers and export. The growing literature looking at the relationship between trade and tasks (Blinder, 2006, Grossman and Rossi-Hansberg, 2008) suggests that the complexity of the tasks involved in the different stages of production process (design, manufacturing of parts, assembly, R&D, marketing, commercialisation, etc.) is key to understand recent trends in international trade. At the same time, Antras and Rossi-Hansberg (2006) explicitly focus on teams of workers and their formation in a globalised economy and highlight the key distinction between managers and non-managers. Managers are different from other workers and likely to be particularly important for trade activity because they are responsible for the most complex tasks within a firm. On the other hand, managers are also different from other workers because they are in charge of marketing and commercialisation activities that are not necessarily more complex like, for example, setting-up distribution channels, finding and establishing relationships with foreign buyers and suppliers. Arkolakis (2010) and Eaton et al. (2012) stress the role of marketing costs in international trade and provide evidence of the importance of the continuous 'search and learning about foreign demand' problem that firms face when selling abroad. At the same time, Araujo et al. (2012) shows the importance of trust-building in repeated interactions between sellers and buyers in an international market.

Our findings have important implications for the empirical trade literature. The empirical literature on the determinants of firm trade behaviour (Bernard et al., 2012) has so far focused on productivity and selection (Bernard and Jensen, 1999, 2004), sunk costs (Das et al., 2007, Impullitti et al., 2012, Roberts and Tybout, 1997), innovation (Bustos, 2011), quality (Iacovone and Javorcik, 2012, Verhoogen, 2008), workforce composition (Muendler and Molina, 2010, Yeaple, 2005), and uncertainty about demand (Arkolakis, 2010, Eaton et al., 2012). It is fair to say that, even when considering all of these dimensions, we are still far from matching the degree of cross-sectional heterogeneity across firms in their export participation and intensity. There are indeed many very productive or skill intensive firms that do not export at all and quite a few very unproductive or low R&D intensive firms that do sell abroad. Our results suggest that export experience brought by managers is key to draw the boundary between exporters and non-exporters as well as to pin down the trade performance of the former. Furthermore, the fact that knowledge can be transferred from one firm to another via the mobility of managers has

³In a recent (September 6th, 2010) Financial Times article, Anthony Pierce, the vice national chairman of the Institute of Export, explains that distribution channels can widely differ from country to country; he makes the example of Polaroid, that, many years ago, after selling successfully its Swingers cameras in the UK through the supermarkets, tried to do the same in France "...but nobody bought them because there nobody went to the supermarket to buy cameras. They went to specialist camera shops." See <http://www.ft.com>.

profound implications for the way we design and estimate models of export participation and in particular for the assumption that decisions to export are independent across firms.

Our paper also contributes to the following literatures. First, our interest in managers as workers who need specific skills and perform difficult tasks relates to the literature on trade and tasks (Blinder, 2006, Grossman and Rossi-Hansberg, 2008). Second, the role played by workers' mobility across firms in our analysis contributes to the recent debate about the channels via which knowledge transfer takes place (Balsvik, 2011, Parrotta and Pozzoli, 2012). Last, but not least, our wage analysis contributes to the literature devoted to explaining the determinants of managers' pay (Gabaix and Landier, 2008, Guadalupe and Wulf, 2008), and to the literature that studies the internal organization of the firm and how this relates to a firm's characteristics such as export status (Caliendo and Rossi-Hansberg, 2012, Caliendo et al., 2012).

The remainder of the paper is organized as follows. Section 2 describes the data. In Section 3 we define some key variables and show some evidence from raw data, and in Sections 4 and 5 we perform the analysis. Section 6 concludes and provides directions for further research.

2. Data

Our analysis relies on information resulting from the merge of two major datasets: a panel dataset on international trade at the firm-country level and a matched employer-employee panel dataset. Trade data come from Statistics Portugal and, besides small adjustments, aggregate to the official total exports and imports of Portugal. We were able to gain access to data from 1995 to 2005 for the purpose of this research. We use data on export transactions only, aggregated at the firm-destination-year level.

Employer-employee data come from *Quadros de Pessoal* (henceforth, QP), a dataset made available by the Ministry of Employment, drawing on a compulsory annual census of all firms in Portugal that employ at least one worker. Currently, the data set collects data on about 350,000 firms and 3 million employees. Reported data cover the firm itself, each of its plants, and each of its workers. Each firm and each worker entering the database are assigned a unique, time-invariant identifying number which we use to follow firms and workers over time. As for the trade data, we were able to gain access to information from 1995 to 2005. We describe the two datasets in more detail in the Appendix.

The two datasets are merged by means of the firm identifier. The combined data allow us to track workers—especially managers—as they move from firm to firm. Knowing each firm's trade status allows for the identification of, in each year, each worker's export experience. Two quite unique features of the data make this feasible: an exhaustive

coverage of firms, their workers, and their trade activity as well as a high degree of reliability. The richness of the data also makes it possible to control for a wealth of both worker and firm characteristics as well as for unobserved heterogeneity by means of various fixed effects.

We perform below two complementary analyses. Because of the requirements imposed by our definitions, both analyses have been performed over the period 1996-2005. In Section 4, we estimate a wage equation to identify the existence of a wage premium for workers'—and in particular for managers'—export experience. In Section 5, we quantify the impact of the presence of managers with export experience on a firm's trade performance, restricting the sample to firms with at least one employed manager.⁴ Section 3 provides raw data evidence that is consistent with the result of both analysis.

In Section 5 we model a firm's entry and continuation into a specific export market and analyze both the probability to start and continue exporting as well as the value of exports - intensive and extensive margin - conditional on entry or continuation. We define a market either as a destination of export or as a product being exported. In the former case, we partition countries into seven groups: Spain (the most frequent destination), other top 5 export destination countries (Italy, UK, France, and Germany), other EU countries, OECD countries not belonging to the EU, countries belonging to the Community of Portuguese Language Countries (CPLP in Portuguese), China, and the rest of the World. In the latter case, we use HS2 (Harmonized system two digit classification number) to define 100 product groups.

Table 1 reports summary statistics, for 2005, of the main worker-level and firm-level—both for the worker's current and previous firm—variables used in our wage estimations and referring to observations for which all covariates are jointly available. The top panel of Table 1 indicates that, in 2005, our sample includes 436,351 workers, with an average (log) hourly wage of 1.35, an average age of 38.2 years, an average education of 7.45 years, and an average firm tenure of 10 years.⁵ The middle panel of Table 1 shows that these workers are employed by 25,681 firms, and reports the average firm (log) size, (log)

⁴The sample of firms is thus different in the two analyses; below we refer to the two sample as "wage sample" and "trade performance sample". The majority of firms in the wage sample lacks a (employed) manager. To identify managers in the data we need the person(s) running the firm to receive a wage: this can be a self-employed owner or a third person employed by the owner(s). Our trade performance analysis is thus representative of larger and more organizationally structured firms. Firms with at least one manager represent (in 2005) 53.6 percent of exporting firms, account for 91.8 percent of exports, and 61.5 percent of employment of the Portuguese manufacturing industry.

⁵Carneiro et al. (2012) find that average (log) hourly earnings (in real Euros) are 1.34 for men and 1.13 for women, in the 1986-2005 period. Workers' tenure and wage are described in the Data Appendix.

Table 1: Selected summary statistics

VARIABLES	Obs	Mean	Std. Dev.	Min	Max
<i>Worker-level</i>					
Hourly wage (log)	436351	1.351304	.5180153	.7556417	3.449478
Age (years)	436351	38.20596	10.69496	16	65
Education (years)	436351	7.448531	3.586035	0	16
Tenure (years)	436351	10.04253	9.276907	0	53
Manager (0/1)	436351	.0672349	.2504286	0	1
<i>Current firm-level</i>					
Firm size (log)	25681	2.33919	1.142223	0	8.190354
Firm productivity (log)	25681	10.48002	.9082075	3.322417	15.92239
Firm age (years)	25681	2.460843	.8163952	0	5.521461
Foreign ownership (0/1)	25681	.0242981	.1539761	0	1
At least one manager (0/1)	25681	.2743273	.4461834	0	1
<i>Previous firm-level</i>					
Firm size	4648	2.166524	1.189571	0	8.778634
Firm productivity	4648	6.770911	5.029213	0	15.38567

productivity, (log) age, and the share of foreign-owned firms (2.4 percent).⁶ Finally, the bottom panel provides the average (log) size and productivity of the 48,318 firms *previously* employing the workers in our sample.

Table 2 shows, for each of the seven manager type and experience in a destination country, the main descriptive figures. Restricting the sample on firms that have a manager (6.7% of the total), 9% report to have a general manager, 22% of the firms (that have a manager) have a manager with export experience and 18% of the firms that have a manager with export experience can benefit from the presence of a manager with matched export experience. Table 3 reports the same figures by manager types with experience in a product.

3. Key definitions and evidence from raw data

In the first part of this Section, we discuss the distinction between managers and non-managers, we present the definition of export experience (and its refinements) and define the export margins (intensive and extensive) while in the second part we present some raw data evidence.

⁶Firm age, size, productivity and foreign-ownership are described in the Data Appendix. Other firm-level variables used in the analysis but not reported in Table 1 are the mean and standard deviation of both age and education of managers, the share of skilled workers, export status, industry-level exports, 2-digit industry dummies, and NUTS3 location dummies. See the Data Appendix for details.

Table 2: Selected summary statistics by manager type with experience in a destination

VARIABLES	Obs	Mean	Std. Dev.	Min	Max
<i>Manager type</i>					
High Skill Prof (0/1)	29338	.5768969	.4940599	0	1
General manager (0/1)	29338	.0941782	.2920815	0	1
Production manager (0/1)	29338	.1471811	.3542924	0	1
Financial manager (0/1)	29338	.0452314	.2078149	0	1
Sales manager (0/1)	29338	.0336424	.1803099	0	1
Other manager (0/1)	29338	.0334379	.1797801	0	1
NC manager (0/1)	29338	.0694321	.2541919	0	1
<i>Manager Type X Export Experience</i>					
Manger X Export Exp. (0/1)	29338	.2287136	.4200116	0	1
High Skill Prof X Export Exp. (0/1)	29338	.1470107	.3541226	0	1
General manager X Export Exp. (0/1)	29338	.0128161	.1124825	0	1
Production manager X Export Exp. (0/1)	29338	.0243711	.1542011	0	1
Financial manager X Export Exp. (0/1)	29338	.0093394	.09619	0	1
Sales manager X Export Exp. (0/1)	29338	.0096803	.0979127	0	1
Other manager (0/1)	29338	.0092713	.0958416	0	1
NC manager (0/1)	29338	.0162247	.1263408	0	1
<i>Manager Type X Matched Export Experience</i>					
Manger X Matched Export Exp. (0/1)	29338	.1785398	.382973	0	1
High Skill Prof X Matched Export Exp. (0/1)	29338	.1204922	.3255418	0	1
General manager X Matched Export Exp. (0/1)	29338	.0060331	.0774399	0	1
Production manager X Matched Export Exp. (0/1)	29338	.0182357	.1338051	0	1
Financial manager X Matched Export Exp. (0/1)	29338	.0065103	.0804249	0	1
Sales manager X Matched Export Exp. (0/1)	29338	.0070216	.0835018	0	1
Other manager X Matched Export Exp. (0/1)	29338	.0078056	.0880052	0	1
NC manager X Matched Export Exp. (0/1)	29338	.0124412	.110846	0	1

3.1 Key definitions

Managers

Throughout our analysis, we distinguish between managers and non-managers. Conceptually, we want to identify a group of workers that is responsible for the main strategic decisions taken within the firm: managers are responsible for high-level tasks including the organization of the firm, strategic planning, and the shaping of technical, scientific and administrative methods or processes. In practice, we refer to a (compulsory) classification of workers, according to eight hierarchical levels, defined by the Portuguese law (Decreto Lei 121/78 of July 2nd 1978). Classification is based on the tasks performed and skill requirements, and each level can be considered as a layer in a hierarchy defined in terms of increasing responsibility and task complexity. We define a manager as a worker belonging to one of the top two hierarchical levels: “Top management” and “Middle management”. We define a non-manager as a worker belonging to lower hierarchical levels.

We then take a deeper look into the professional status of the manager as described in *Quadros de Pessoal* and we split the manager category in 7 sub-groups: Skilled Profes-

Table 3: Selected summary statistics by manager type with experience in a product

VARIABLES	Obs	Mean	Std. Dev.	Min	Max
<i>Manager type</i>					
High Skill Prof (0/1)	29338	.5768969	.4940599	0	1
General manager (0/1)	29338	.0941782	.2920815	0	1
Production manager (0/1)	29338	.1471811	.3542924	0	1
Financial manager (0/1)	29338	.0452314	.2078149	0	1
Sales manager (0/1)	29338	.0336424	.1803099	0	1
Other manager (0/1)	29338	.0334379	.1797801	0	1
NC manager (0/1)	29338	.0694321	.2541919	0	1
<i>Manager Type X Export Experience</i>					
Manger X Export Exp. (0/1)	29338	.2287136	.4200116	0	1
High Skill Prof X Export Exp. (0/1)	29338	.1470107	.3541226	0	1
General manager X Export Exp. (0/1)	29338	.0128161	.1124825	0	1
Production manager X Export Exp. (0/1)	29338	.0243711	.1542011	0	1
Financial manager X Export Exp. (0/1)	29338	.0093394	.09619	0	1
Sales manager X Export Exp. (0/1)	29338	.0096803	.0979127	0	1
Other manager (0/1)	29338	.0092713	.0958416	0	1
NC manager (0/1)	29338	.0162247	.1263408	0	1
<i>Manager Type X Matched Export Experience</i>					
Manger X Matched Export Exp. (0/1)	29338	.1603381	.3669256	0	1
High Skill Prof X Matched Export Exp. (0/1)	29338	.1083578	.310837	0	1
General manager X Matched Export Exp. (0/1)	29338	.0056582	.0750091	0	1
Production manager X Matched Export Exp. (0/1)	29338	.0161224	.1259486	0	1
Financial manager X Matched Export Exp. (0/1)	29338	.0052833	.0724949	0	1
Sales manager X Matched Export Exp. (0/1)	29338	.0062376	.0787334	0	1
Other manager X Matched Export Exp. (0/1)	29338	.0066808	.0814638	0	1
NC manager X Matched Export Exp. (0/1)	29338	.0119981	.1088786	0	1

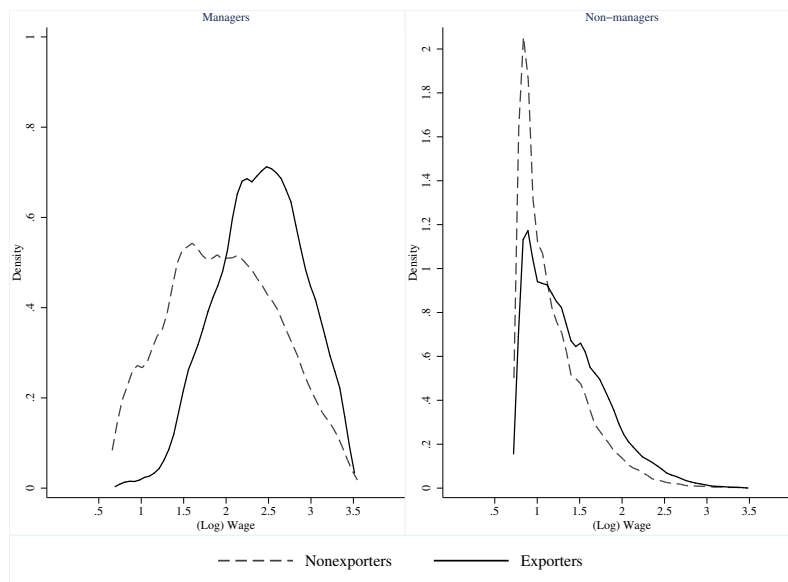
sional, General Manager, Production Manager, Financial Manager, Sales Manager, Other Manager and Non classified manager.

The distinction between managers and non-managers is relevant in light of recent developments in the international trade literature: Antras and Rossi-Hansberg (2006) and Caliendo and Rossi-Hansberg (2012) explicitly focus on the formation of teams of workers in a globalized economy, and emphasize that the key distinction between managers and non-managers is that the former are in charge of complex tasks. Managers are different from other workers because they are responsible for the most complex tasks—those that are crucial for international trade performance—within a firm.

Second, managers are “special” when it comes to doing business in foreign markets because they are in charge of marketing and commercialization activities (which are not necessarily more complex) such as, for example, setting-up distribution channels, finding and establishing relationships with foreign suppliers, setting up marketing ac-

tivities directed at finding and informing new buyers, and building a customer base.⁷ Arkolakis (2010) and Eaton et al. (2012) stress the key role of search and marketing costs in international trade and provide evidence of the importance of the continuous “search and learning about foreign demand” problem that firms face when selling abroad. At the same time, Araujo et al. (2012) show the importance of trust-building in repeated interactions between sellers and buyers in an international market. Dividing managers in sub-categories helps us to disentangle these differentiated effects; in fact, different managerial figures will prove to be more valuable in certain phases of the export activity and to have a specific effect on a specific export margin.

Figure 1: Wage Density for Managers and Non-Managers, by Firm Export Status, 2005



Notes: This Figure shows the kernel density of the (log) hourly wage distribution in 2005 for managers (left panel) and non-managers (right panel), broken down by firm export status (exporters and non-exporters). Statistics refers to observations for which all covariates in the wage regression sample of Section 4 are jointly available. See Section 3.1 for the definition of a manager and the Data Appendix for details on all other variables. The kernel is Epanechnikov and the kernel width is the Stata default one.

Figure 1 provides raw data evidence supporting the idea that the distinction between managers and non-managers is relevant when considering a firm’s trade activity. A large literature tries to identify and explain a wage premium paid by exporting firms (Frias et al., 2009, Munch and Skaksen, 2008, Schank et al., 2007). As shown in Martins and Opromolla (2012), Portugal is not an exception to this robust empirical finding. Figure

⁷It is certainly difficult to draw a straight line between these two dimensions under which managers are different from other workers. Researching the foreign regulatory environment and adapting the product to make sure that it conforms to foreign standards (which includes testing, packaging, and labeling requirements) is a commercialization activity that involves complex tasks. In a similar vein, making sure the product meets the right quality standards for the targeted foreign demand which is, as showed in Iacovone and Javorcik (2012) and Verhoogen (2008), a key element of international success is an example of an activity characterized by both a strong commercial nature and tasks complexity.

1 shows that the exporter wage premium seems to come essentially from managers. More specifically, Figure 1 shows the kernel density of the log hourly wage distribution in our 2005 wage sample, both for managers and non-managers, broken down by firm export status (exporters and non-exporters). The wage density referring to managers employed by exporting firms clearly lies to the right of the one for managers employed by non-exporters. The difference in the average log wage implies a 43.5 percent wage gap. The difference between the densities is much less evident for non-managers: the gap in the average log wages is just 18.9 percent.

Export experience and its refinements

Having good reasons to believe that managers are special when it comes to trading on foreign markets does not mean that managers are all alike. Arguably, the knowledge and skills of a manager (and workers in general) evolve over time depending on the different situations faced along a career. In particular, only some managers have the chance to be involved in export activities. To the extent that experience acquired in exporting firms substantially improves the capacities and skills of a manager it should correspond to a wage premium. Furthermore, such experience is potentially valuable to all firms, but in particular to exporters, who might expect an improvement of their trade performance.

Exploiting the matched employer-employee feature of our dataset, we are able to track workers over time. For each firm-year pair, we can identify the subset of (currently employed) workers that have previously worked in a different firm. Exploiting the trade dataset, we can then single-out those workers that were employed in the past *by an exporting firm*. We define such workers as having export experience.

We stress that a stronger trade performance of firms that employ managers with export experience and an export experience wage premium for managers do not necessarily imply that valuable trade-specific knowledge diffuses through worker mobility. Export experience might be a proxy for some unobservable abilities of the manager and/or features of the previous employer. Furthermore, it does not necessarily entail a substantial set of trade-specific capacities and skills. We deal with these, as well as with other interpretation and endogeneity issues, when performing our econometric analyses in Sections 4 and 5.

To gain further insights we consider in our framework two related refinements of export experience. The first refinement is market specific export experience, where market m is either d (destination) or p (product group). The former (d) refers to one of these markets: Spain (the most frequent destination), other top 5 export destination countries (Italy, UK, France, and Germany), other EU countries, OECD countries not belonging to the EU, countries belonging to the Community of Portuguese Language Countries (CPLP in Portuguese), China, and the rest of the World, while the latter (p)

to one of the 100 product groups defined using HS2 classification. We define a worker as having market d -specific export experience if she has export experience *and* market d was among the destinations served by one of the worker's previous employers during the period of time the worker was employed there. Symmetrically, we define a worker as having product p -specific export experience if she has export experience *and* product p was among the product exported by one of the worker's previous employers during the period of time the worker was employed there. The second refinement is matched export experience. We define a worker as having matched export experience in a destination if she has export experience *and* has market d -specific export experience in at least one of the markets to which the current employing firm is actually exporting. Moreover, a worker can have matched export experience in a product group when she has export experience *and* has product p -specific export experience in at least one of the products the current employing firm is actually exporting.

If specific (or matched) export experience is associated to an even higher wage premium or stronger firm trade performance then it is more likely that valuable export-specific knowledge diffuses through worker mobility; alternative explanations, like vertical-type unobservable managers' ability, are in contrast with a worker's past activities being valued more by some firms (those exporting to some specific markets) and less by others.

The importance of country-specific barriers to trade (e.g. Eaton et al., 2011, Moxnes, 2010, Artopoulos et al., 2013) makes specific and matched export experience two natural refinement of the notion of export experience. We discuss the key insights stemming from such analyses in Section 4.

Export margins

For the trade analysis it is crucial to define the export margins we want to look at. Precisely, with destination specific export experience the intensive margin will be defined as average export in a market group while the extensive margin as number of products per market group. On the other hand, when experience is product specific, the intensive margin will be defined as average export in a product group while the extensive margin as number of markets per product group. Having details on both manager types and export margins we can look at interesting patterns of complementarities between a specific managerial skill (proxied by the manager type) and an export margin in either a destination market or a product market.

3.2 Evidence from raw data

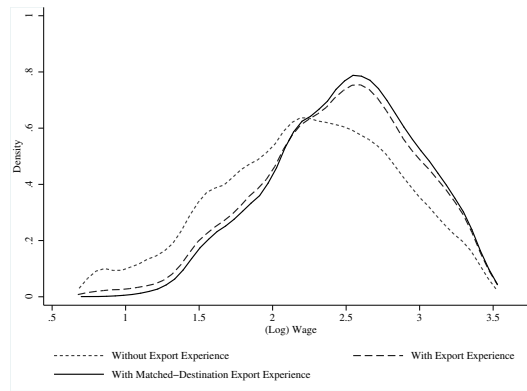
In this sub-section, we provide raw data evidence on the existence of a substantial wage premium for managers with export experience, and on the positive impact of managers

with export experience on a firm's trade performance. These descriptive results are confirmed by the econometric testing of Sections 4 and 5.

Wage premia for export experience

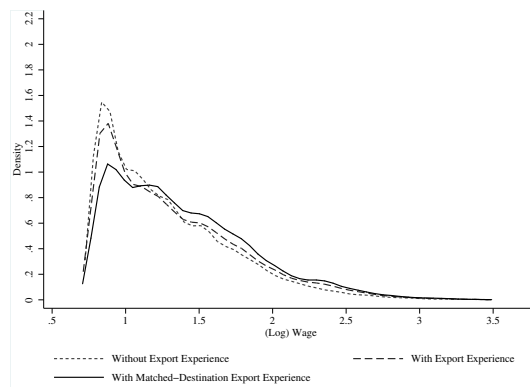
Figure 2 shows the kernel density of the (log) hourly wage in the 2005 wage sample for three categories of managers: those without export experience, those with export experience, and those with matched export experience. Managers with export experience enjoy substantially higher wages with respect to those without such experience: on average, export experience commands a 20.3 percent wage premium; matched export experience commands an even higher premium of 25 percent. Figure 3 provides the same type of information for non-managers; export experience (or matched export experience) is associated to a much less pronounced wage pattern. Non-managers with export experience enjoy a wage premium of about 5 percent, and non-managers with matched export experience receive a premium of 11.8 percent. Very similar pictures are shown in figures 4 and 5 where experience is in a product.

Figure 2: Wage Density for Managers by export experience in a destination and Firm Export Status, 2005



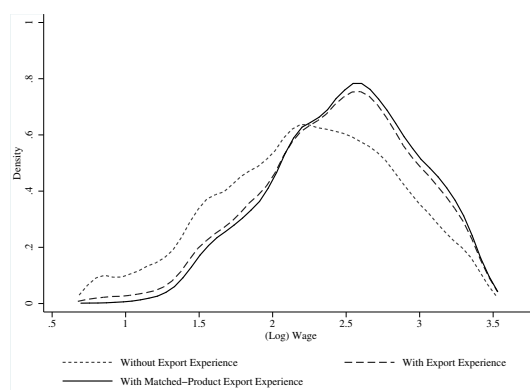
Notes: This Figure shows the kernel density of the (log) hourly wage distribution in 2005 for managers, broken down by degree of export experience. Statistics refers to observations for which all covariates in the wage regression sample of Section 4 are jointly available. See Section 3.1 for the definition of a manager and the export experience (and its refinements) and the Data Appendix for details on all other variables. The kernel is Epanechnikov and the kernel width is the Stata default one.

Figure 3: Wage Density for Non Managers by export experience in a destination and Firm Export Status, 2005



Notes: This Figure shows the kernel density of the (log) hourly wage distribution in 2005 for non-managers, broken down by degree of export experience. Statistics refers to observations for which all covariates in the wage regression sample of Section 4 are jointly available. See Section 3.1 for the definition of a manager and the export experience (and its refinements) and the Data Appendix for details on all other variables. The kernel is Epanechnikov and the kernel width is the Stata default one.

Figure 4: Wage Density for Managers by export experience in a product and Firm Export Status, 2005

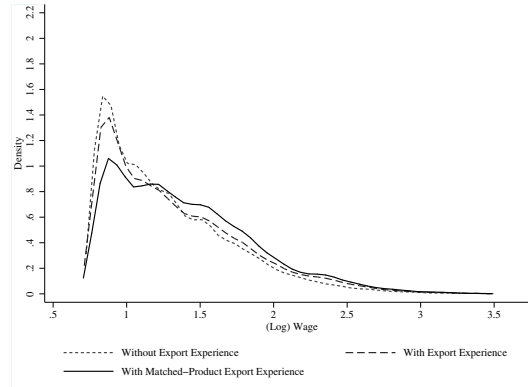


Notes: This Figure shows the kernel density of the (log) hourly wage distribution in 2005 for managers, broken down by degree of export experience. Statistics refers to observations for which all covariates in the wage regression sample of Section 4 are jointly available. See Section 3.1 for the definition of a manager and the export experience (and its refinements) and the Data Appendix for details on all other variables. The kernel is Epanechnikov and the kernel width is the Stata default one.

Figure 6 shows the kernel density of the (log) hourly wage of managers broken down in sub categories of manager types. We clearly notice that - except for general managers whose behaviour will be discussed shortly - high skilled professionals enjoy the lowest wage in the group. General managers, on the other hand, have a double hump curve; this is because, when self reporting the professional status in *Quadros de Pessoal* general managers is presumably the category in which we can find both managers of big firms and owners of very small business activities. However, when performing the econometric analysis we take account of this problem by mean of several controls and fixed effects.

Finally, figures 7 and 8 show the wage densities of managers distinguishing by manager type, export experience and firm export status. It is clear to notice that matched

Figure 5: Wage Density for Non Managers by export experience in a product and Firm Export Status, 2005



Notes: This Figure shows the kernel density of the (log) hourly wage distribution in 2005 for non-managers, broken down by degree of export experience. Statistics refers to observations for which all covariates in the wage regression sample of Section 4 are jointly available. See Section 3.1 for the definition of a manager and the export experience (and its refinements) and the Data Appendix for details on all other variables. The kernel is Epanechnikov and the kernel width is the Stata default one.

export experience guarantees higher wage premiums for all the categories of managers.

Export performance when managers have export experience

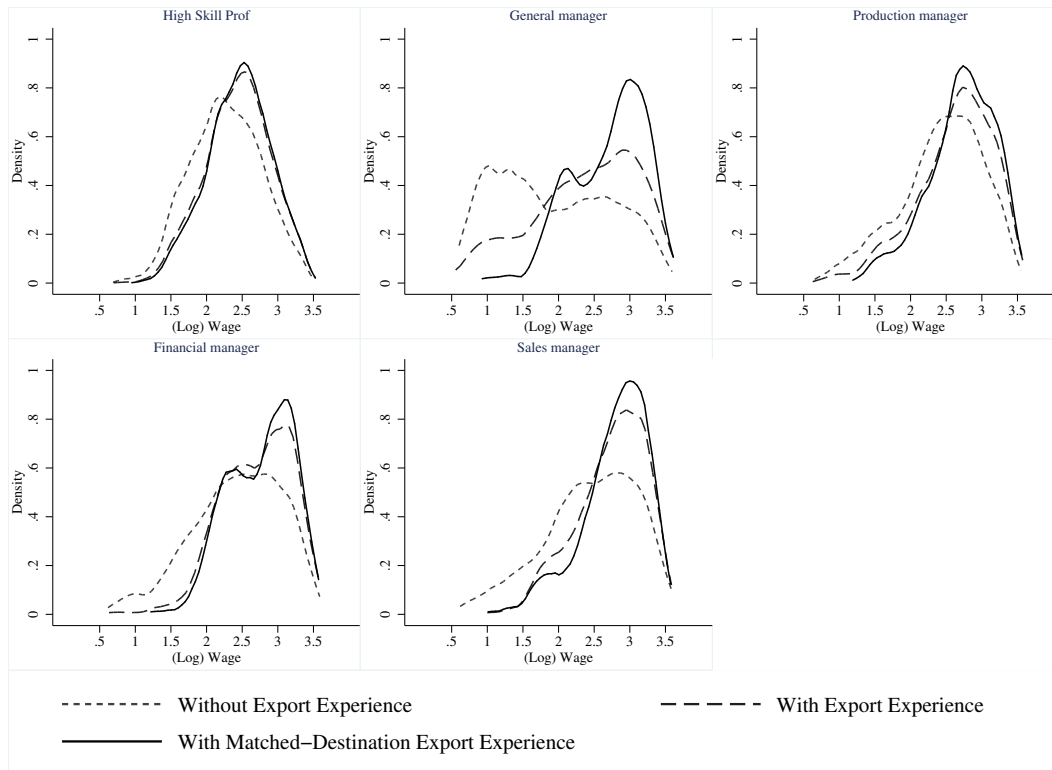
Probability to start and continue exporting. Figure 9 shows entry rates—defined as the ratio between the number of firms entering market m at time t and the number of firms not exporting to market m at time $t - 1$ —for each market in 2005. We consider three categories of firms: those without managers with export experience, those with at least one manager with export experience, and those with at least one manager with specific export experience. Figure 9 shows that, in each of the seven markets, firms with at least one manager with export experience are substantially more likely to enter than firms without managers with export experience. Having managers with specific export experience further boosts entry rates and these are between two to three times higher depending on the specific market. The same pattern holds—though with lower magnitudes—when considering continuation rates (Figure 10).⁸ Managers with export experience—even more those with specific experience—increase the probability of entering or staying in a foreign market. We then show entry rate (Figure 11) and continuation rate (Figure 12) patterns when experience is in a product; we plot the densities of the ratios for firms without managers with export experience, with at least one manager with export experience, and with at least one manager with specific export experience

Figure 6: Wage Density of Managers by Manager type, 2005



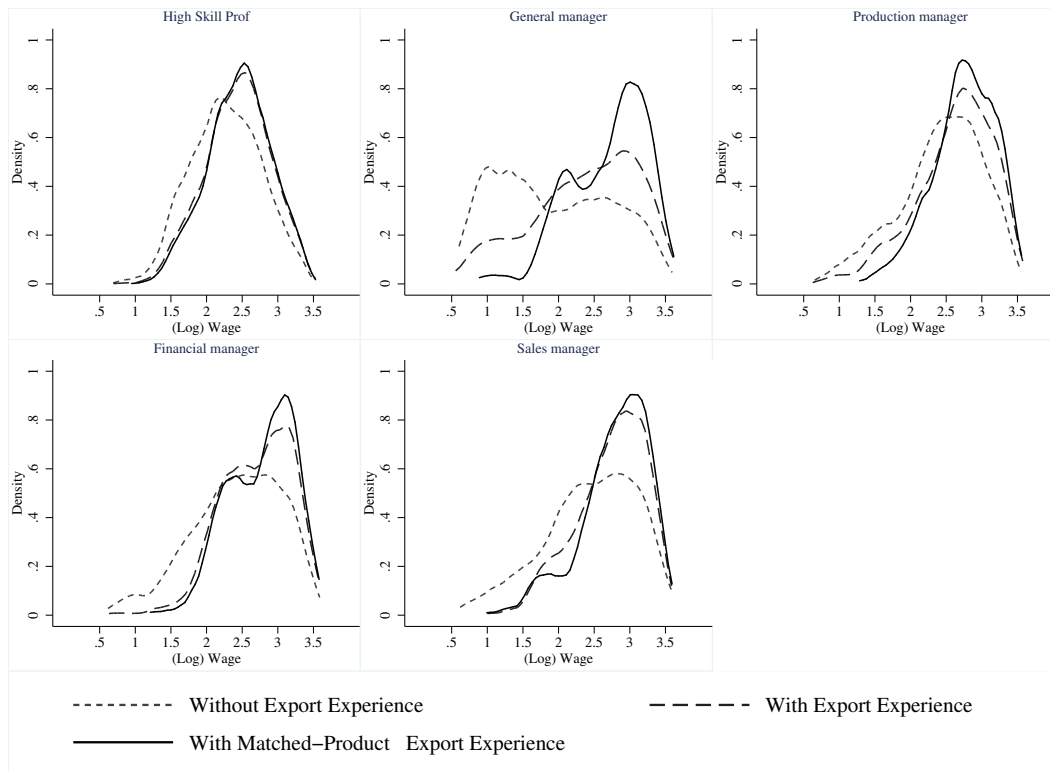
Notes: This Figure shows the kernel density of the (log) hourly wage distribution in 2005 for managers, broken down by manager type. Statistics refers to observations for which all covariates in the wage regression sample of Section 4 are jointly available. See Section 3.1 for the definition of a manager and the export experience (and its refinements) and the Data Appendix for details on all other variables. The kernel is Epanechnikov and the kernel width is the Stata default one.

Figure 7: Wage Density of Managers distinguishing by: Manager type, export experience (in a destination) and Firm Export Status, 2005



Notes: This Figure shows the kernel density of the (log) hourly wage distribution in 2005 for managers, broken down by manager type and degree of export experience. Statistics refers to observations for which all covariates in the wage regression sample of Section 4 are jointly available. See Section 3.1 for the definition of a manager and the export experience (and its refinements) and the Data Appendix for details on all other variables. The kernel is Epanechnikov and the kernel width is the Stata default one.

Figure 8: Wage Density of Managers distinguishing by: Manager type, export experience (in a product) and Firm Export Status, 2005



Notes: This Figure shows the kernel density of the (log) hourly wage distribution in 2005 for managers, broken down by manager type and degree of export experience. Statistics refers to observations for which all covariates in the wage regression sample of Section 4 are jointly available. See Section 3.1 for the definition of a manager and the export experience (and its refinements) and the Data Appendix for details on all other variables. The kernel is Epanechnikov and the kernel width is the Stata default one.

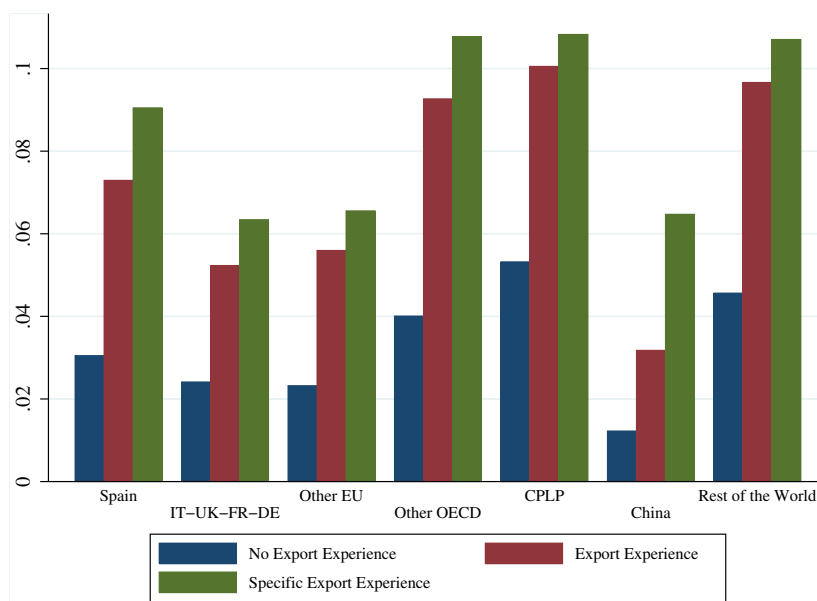
4. Wage analysis

The first step to investigate the relationship between the export experience brought by managers into a firm and its trade performance consists in assessing whether export experience corresponds to a wage premium. Arguably, the knowledge and skills of a manager (and workers in general) evolve over time depending on the different situations faced along a career. In particular, only some managers have the chance to be involved in export activities. To the extent that experience acquired in exporting firms substantially improves the capacities and skills of a manager it should correspond to a wage premium. Furthermore, such experience is potentially valuable to all firms, but in particular to current exporters or to prospective exporters, who might expect an improvement of their trade performance and ultimately be willing to pay a higher premium.

In this Section, we estimate a Mincerian wage equation to show that managers with export experience (as defined in Section 3.1) enjoy a sizeable wage premium. The premium is robust to controlling for worker and firm fixed effects, previous firm observables,

⁸Continuation rates are defined as the share of firms continuing to export to market m at time t among those firms that were already exporting to market m at time $t - 1$

Figure 9: Export Entry Rate, by Firm-type, 2005



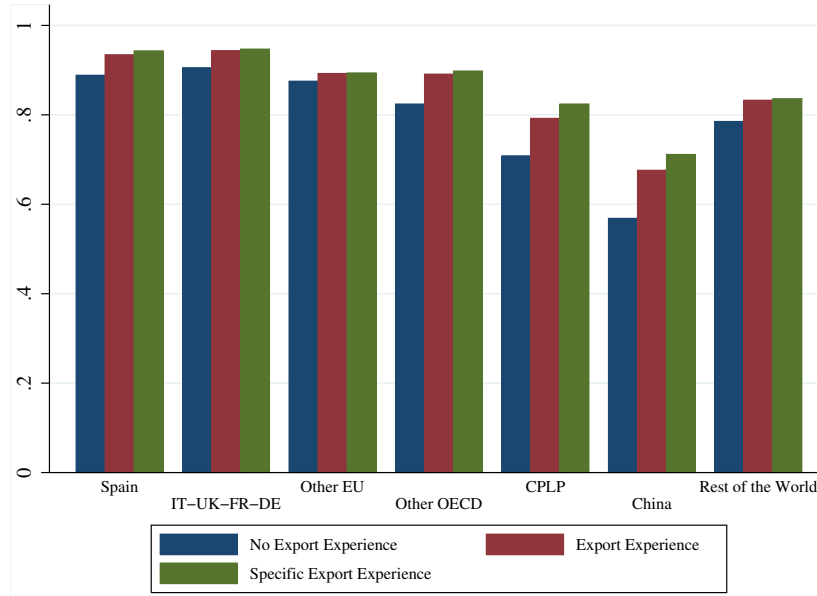
Notes: This Figure shows entry rates, defined as the ratio between the number of firms entering market m at time t and the number of firms not exporting to market m at time $t-1$, for each market in 2005, for three groups of firms: those that have no managers with export experience at time t , those that have at least one manager with export experience at time t , and those that have at least one manager with specific export experience at time t . Statistics refers to observations for which all covariates in the trade performance analysis of Section 5 are jointly available. See Section 3.1 for the definition of a manager and the export experience (and its refinements) and the Data Appendix for details on all other variables. CPLP is the Portuguese acronym for the Community of Portuguese Language Countries.

job-change patterns, as well as a large set of worker and current firm time-varying observables. Moreover, when experience is specific to a market - both destination country or product group - managers with experience in (at least) one of the markets currently "served" by their firm—i.e. *matched* export experience—enjoy an even higher wage premium.⁹ In addition, when we split the manager category into the seven sub-groups we observe that General managers enjoy the highest wage premium. Crucially, we do not find evidence of a wage premium for non-managers, which is the reason why, later on, in the trade performance analysis of Section 5 we focus on managers only.

The existence of a wage premium for managers with export experience is not the end of our quest. There are caveats in our analysis as well as alternative explanations for the existence of a premium that do not involve the transfer of valuable export-specific knowledge by managers. Though, such alternative explanations are at odds with the existence of an additional wage premium for matched export experience. We discuss these issues in more detail later on in this Section; while in Section 5, we provide complementary evidence of the positive impact of managers' export experience by

⁹Countries are partitioned into seven groups: Spain, other top 5 export destination countries, other EU countries, other OECD countries, countries belonging to the Community of Portuguese Language Countries, China, and rest of the World while products are partitioned according to HS2 classification. See Section 3.1 for a discussion of this partition and further details.

Figure 10: Export Continuation Rate, by Firm-type, 2005



Notes: This Figure shows continuation rates, defined as the share of firms continuing to export to market m at time t among those firms that were already exporting to market m at time t , for each market in 2005, for three groups of firms: those that have no managers with export experience at time t , those that have at least one manager with export experience at time t , and those that have at least one manager with specific export experience at time t . Statistics refers to observations for which all covariates in the trade performance analysis of Section 5 are jointly available. See Section 3.1 for the definition of a manager and the export experience (and its refinements) and the Data Appendix for details on all other variables. CPLP is the Portuguese acronym for the Community of Portuguese Language Countries.

analyzing the likelihood of firms to start/continue exporting to a specific market and the value of exports conditional on entry/continuation depending on whether a firm has managers with export experience or not.

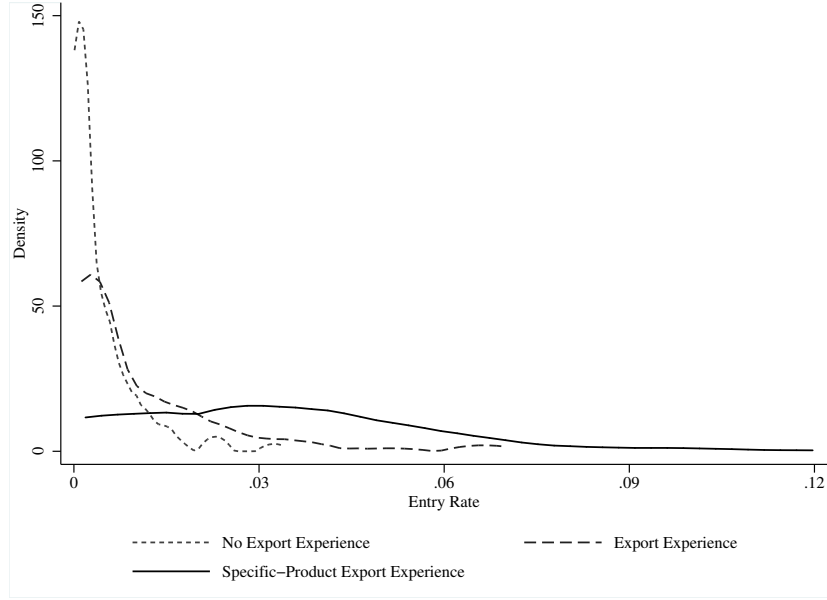
4.1 Econometric model

Workers are indexed by i , current employing firms by f , previous employing firms by p , and time by t . Each worker i is associated at time t to a unique current employing firm f and a unique previous employing firm p .¹⁰

The wage equation we estimate is:

¹⁰When information on the previous firm is not available (e.g. when workers enter the labor market in our time frame or when workers never change firm) we set variables related to the previous firm to zero and add dummies accordingly, i.e., we use the missing-indicator method to deal with such missing data. We consider both manufacturing and non-manufacturing firms in constructing controls related to the previous employing firm.

Figure 11: Export Entry Rate, by Firm-type, 2005



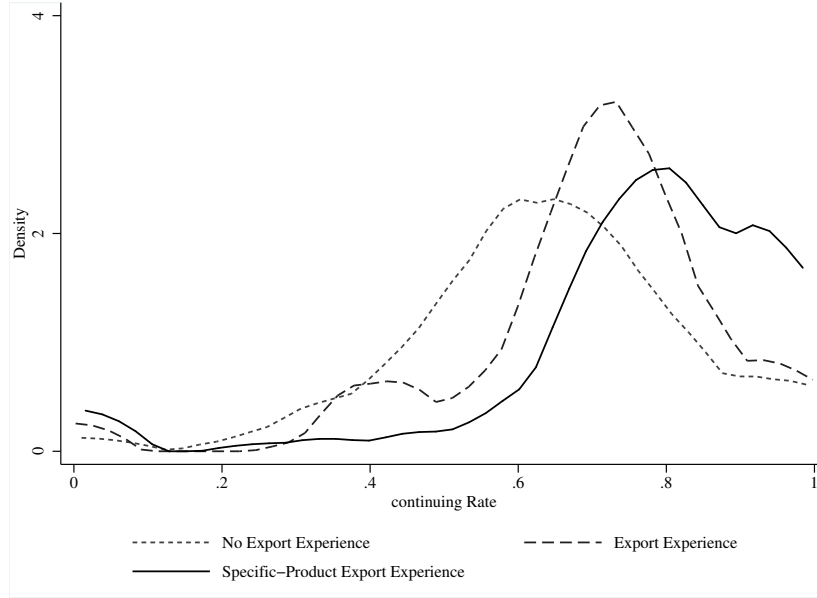
Notes: This Figure shows entry rates, defined as the ratio between the number of firms entering market m at time t and the number of firms not exporting to market m at time $t-1$, for each market in 2005, for three groups of firms: those that have no managers with export experience at time t , those that have at least one manager with export experience at time t , and those that have at least one manager with specific export experience at time t . Statistics refers to observations for which all covariates in the trade performance analysis of Section 5 are jointly available. See Section 3.1 for the definition of a manager and the export experience (and its refinements) and the Data Appendix for details on all other variables. CPLP is the Portuguese acronym for the Community of Portuguese Language Countries.

$$\begin{aligned}
 w_{it} = & \beta_0 + \beta_1 Manager_{it} + \mathbf{Mobility}_{it}' \Gamma_M + (\mathbf{Mobility}_{it} \times Manager_{it})' \Gamma_{Mm} + \\
 & + \beta_2 Experience_{it} + \beta_3 (Experience_{it} \times Manager_{it}) + \\
 & + \beta_4 Matched_Experience_{it} + \beta_5 (Matched_Experience_{it} \times Manager_{it}) + \\
 & + \mathbf{I}_{it}' \Gamma_I + \mathbf{P}_{pt}' \Gamma_P + \mathbf{C}_{ft}' \Gamma_C + \eta_i + \eta_f + \eta_t + \varepsilon_{it},
 \end{aligned} \tag{1}$$

where w_{it} is the (log) hourly wage of worker i in year t , $Manager_{it}$ is a dummy indicating whether worker i is a manager at time t , the vector $\mathbf{Mobility}_{it}$ contains a set of dummies taking value one from the year t a worker changes employer for the 1st, 2nd, ..., time, $Experience_{it}$ and $Matched_Experience_{it}$ are dummies indicating whether worker i has, respectively, export experience and matched export experience at time t , the vector \mathbf{I}_{it} stands for worker i time-varying observables,¹¹ the vectors \mathbf{P}_{pt} and \mathbf{C}_{ft}

¹¹A worker's age, age squared, education, and tenure. See Section 2 and the Data Appendix for further details.

Figure 12: Export Continuation Rate, by Firm-type, 2005



Notes: This Figure shows continuation rates, defined as the share of firms continuing to export to market m at time t among those firms that were already exporting to market m at time t , for each market in 2005, for three groups of firms: those that have no managers with export experience at time t , those that have at least one manager with export experience at time t , and those that have at least one manager with specific export experience at time t . Statistics refers to observations for which all covariates in the trade performance analysis of Section 5 are jointly available. See Section 3.1 for the definition of a manager and the export experience (and its refinements) and the Data Appendix for details on all other variables. CPLP is the Portuguese acronym for the Community of Portuguese Language Countries.

refer to, respectively, the previous and current employing firm observables,¹² η_i (η_f) are individual (firm) fixed effects and η_t are time dummies.

The key parameters in our analysis are $\beta_2 + \beta_3$, i.e., the wage premium corresponding to export experience for a manager, and $\beta_4 + \beta_5$, i.e., the extra premium corresponding to matched export experience for a manager. β_2 and β_4 indicate, respectively, the premium related to export experience and matched export experience for a non-manager. Mobility of workers across firms is needed, according to our definition, to acquire export experience: $Experience_{it}=1$ if worker i has, among his/her previous employers, an exporting firm while $Matched_Experience_{it}=1$ further requires the current employing firm either to be exporting in at least one of the markets to which previous employers were exporting or to be exporting a product that previous employers were exporting. In other words, identification of export experience premia comes from workers moving across firms. To disentangle wage variations due to mobility from those related to export experience we consider the set of dummies $\mathbf{Mobility}_{it}$. We further interact $\mathbf{Mobility}_{it}$ with manager

¹²Previous firm observables are size, productivity, and two dummies indicating whether the current and previous firms belong to the same industry or not. Current firm observables are size, productivity, share of skilled workers, export status, age, foreign ownership, mean and standard deviation of both age and education of managers, and industry-level exports.¹³ In specifications without firm and worker fixed effects we add NUTS3 location and Nace rev.1 2-digit dummies as further controls. See Section 2 and the Data Appendix for further details.

status $Manager_{it}$ to allow mobility to have a differential impact on managers and non-managers.

Mobility $_{it}$, $Experience_{it}$, and $Matched_Experience_{it}$, as well as their interaction with manager status, thus define a difference-in-difference setting with two treatments (acquiring export experience and eventually also matched export experience) and a control group of workers (managers and non-managers) changing employer *without acquiring export experience*.¹⁴

Equation (1) is estimated both without (group A) and with (group B) worker and firm fixed effects. In both cases we consider three specifications: with export experience only (1A and 1B), with both export experience and matched export experience (2A and 2B) with export experience interacted with dummies indicating the number of years elapsed since acquiring experience (3A and 3B - but I still don't have the tables for these). It is important to note that, for specifications belonging to group B, identification of export experience coefficients comes from comparing the same treatment and control groups as in group A. However, only the comparison of wage changes over time between treatment and control groups matter for group B as wage levels are controlled for by worker fixed effects while at the same time firm fixed effects control for average wage differences across firms. The reader will notice that we have twins of tables; that is because we perform the analysis specifying export experience in a destination m or in a product group p . Moreover, we will further increase the level of insight of our analysis by splitting managers in 7 sub groups and performing the above analysis with this specification as well; in this case, the variable $Manager_{it}$ will be replaced by $Manager_type_{it}$.

4.2 Results

In this section we present the results for the Mincerian wage analysis; we consider experience in an export destination and in a product group and we split the manager category in sub categories as defined in section 3.1. Table 4 reports the estimated export experience premia obtained from the different variants of equation (1) when experience is in a destination country (left panel) or in a product group (right panel). In both tables, the dependent variable is a worker's (log) hourly wage in euros.¹⁵ Specifications labelled with (1A) and (2A) include, respectively, export experience only and both export

¹⁴Our regression design is likely to actually underestimate the value of export experience. For example, mobility dummies would absorb some of the effect of the export-related learning to the extent greater knowledge leads managers to receive more job offers and hence move around more.

¹⁵Worker-year covariates include a worker's age, age square, education, and tenure while current firm-time covariates include firm size, productivity, share of skilled workers, export status, age, foreign ownership, mean and standard deviation of both age and education of managers, and industry-level exports. Previous firm-time covariates include firm size, productivity, and two dummies constructed from current and previous employing firms industry affiliations.

experience and matched export experience. Specifications labelled with "B" additionally include worker and firm fixed effects. All specifications include year dummies, and those not including worker and firm fixed effects (labelled with "A") also contain region (NUTS-3) and industry (NACE 2-digits) dummies.

Table 4: Wage regression with experience in a destination (left panel) and product group (right panel)

VARIABLES	Destination				Product Group			
	(1A)	(1B)	(2A)	(2B)	(1A)	(1B)	(2A)	(2B)
Manag. X Export Exp. (0/1)	0.106 ^a (0.004)	0.027 ^a (0.001)	0.043 ^a (0.006)	0.009 (0.007)	0.106 ^a (0.004)	0.027 ^a (0.001)	0.067 ^a (0.005)	0.021 ^a (0.006)
Manag. X Matched Export Exp. (0/1)			0.086 ^a (0.006)	0.024 ^a (0.006)			0.062 ^a (0.005)	0.009 ^c (0.005)
Worker-Year, Current Firm-Year, and Previous Firm-Year controls Worker and Firm FE	X	X X	X	X X	X	X X	X	X X
Observations	4,208,433	4,208,433	4,208,433	4,208,433	4,208,433	4,208,433	4,208,433	4,208,433
R ²	0.601	0.927	0.601	0.927	0.601	0.927	0.601	0.927

Notes: Robust standard errors in parentheses: ^a $p < 0.01$, ^b $p < 0.05$, ^c $p < 0.1$.

Once we have checked that export experience and specific export experience guarantee managers a wage premium we go further and we split managers in sub categories as described in section 3.1.

We find interesting results; indeed, in Tables 5 and ?? we immediately notice that General managers enjoy higher premiums when experience is matched in a destination or in a product groups; the pattern resists to the specification with worker's and firm's fixed effects (column 4).

Tables 4 clearly show that manager enjoy a wage premium when they have export experience (I don't have the table for non manager yet, but I can ensure that they do not benefit from any wage premium even when they have specific export experience) and a even higher premium when experience is specific to a market; moreover, looking at table 5 we notice that General managers are the ones to benefit more from specific export experience enjoying a higher wage premium with respect to all remaining categories¹⁶. In this first part of the analysis we have shown that export experience thus commands a

¹⁶in Appendix we have tables with controls for any single regression

Table 5: Wage regression with experience in a destination(left panel) and product group (right panel) by manager type

VARIABLES	Destination				Product Group			
	(1A)	(1B)	(2A)	(2B)	(1A)	(1B)	(2A)	(2B)
High Skill Prof (HS)	0.101 ^a (0.004)	0.022 ^a (0.001)	0.035 ^a (0.007)	0.019 ^b (0.008)	0.101 ^a (0.004)	0.022 ^a (0.001)	0.054 ^a (0.006)	0.028 ^a (0.007)
General manager (GM)	0.292 ^a (0.017)	0.037 ^a (0.004)	0.056 ^b (0.022)	-0.058 ^a (0.019)	0.292 ^a (0.017)	0.037 ^a (0.004)	0.110 ^a (0.021)	-0.034 ^c (0.018)
Production manager (PM)	0.147 ^a (0.009)	0.042 ^a (0.003)	0.035 ^b (0.016)	-0.000 (0.016)	0.147 ^a (0.009)	0.042 ^a (0.003)	0.032 ^b (0.014)	-0.001 (0.014)
Financial manager (FM)	0.162 ^a (0.012)	0.081 ^a (0.004)	0.032 (0.020)	0.074 ^b (0.030)	0.162 ^a (0.012)	0.081 ^a (0.004)	0.102 ^a (0.018)	0.091 ^a (0.024)
Sales manager (SM)	0.125 ^a (0.014)	0.028 ^a (0.004)	-0.047 ^c (0.025)	0.003 (0.028)	0.125 ^a (0.014)	0.028 ^a (0.004)	0.029 (0.021)	0.025 (0.024)
Other manager (OM)	0.068 ^a (0.014)	0.052 ^a (0.005)	-0.050 ^c (0.029)	0.009 (0.025)	0.068 ^a (0.014)	0.052 ^a (0.005)	-0.033 (0.022)	0.025 (0.021)
NC manager (NCM)	-0.070 ^a (0.011)	-0.013 ^a (0.003)	0.053 ^a (0.020)	-0.007 (0.017)	-0.070 ^a (0.011)	-0.013 ^a (0.003)	0.052 ^a (0.019)	-0.010 (0.015)
HS X Match Export Exp.			0.086 ^a (0.007)	0.007 (0.007)			0.069 ^a (0.006)	-0.005 (0.006)
GM X Match Export Exp.			0.514 ^a (0.028)	0.157 ^a (0.024)			0.444 ^a (0.028)	0.123 ^a (0.024)
PM X Match Export Exp.			0.160 ^a (0.018)	0.056 ^a (0.017)			0.189 ^a (0.016)	0.065 ^a (0.015)
FM X Match Export Exp.			0.186 ^a (0.023)	0.012 (0.033)			0.106 ^a (0.021)	-0.011 (0.027)
SM X Match Export Exp.			0.237 ^a (0.027)	0.032 (0.029)			0.155 ^a (0.024)	0.003 (0.026)
OM X Match Export Exp.			0.150 ^a (0.031)	0.053 ^b (0.026)			0.153 ^a (0.025)	0.040 ^c (0.023)
NCM X Match Export Exp.			-0.151 ^a (0.022)	-0.008 (0.018)			-0.160 ^a (0.022)	-0.004 (0.016)
Worker-Year, Current Firm-Year, and Previous Firm-Year controls	X	X	X	X	X	X	X	X
Worker and Firm FE		X		X		X		X
Observations	4,006,826	4,006,826	4,006,826	4,006,826	4,006,826	4,006,826	4,006,826	4,006,826
R ²	0.603	0.928	0.603	0.929	0.603	0.928	0.603	0.929

Notes: Robust standard errors in parentheses: ^a $p < 0.01$, ^b $p < 0.05$, ^c $p < 0.1$.

wage premium for managers that is robust to the introduction of firm and worker fixed effects; this somehow implies that managers with export experience are better managers and work for better paying firms. However, one might argue that export experience is a proxy for manager's unobserved ability and/or selection into higher paying firms. Export experience is neither a trivial proxy for, as an example, a stronger bargaining position of a manager moving out of a successful/productive firm. To partially rule out the latter possibility, we control, in all specifications, for the size, productivity, and industry affiliation of the manager's previous firm; even if managers that come from more productive firms enjoy higher salaries, export experience premium is robust to these controls¹⁷.

¹⁷We also control for the evolution of the premium over time, but I do not have this results yet

4.3 Endogeneity

Selection. For the estimated premia to have a causal interpretation we need, as is typically the case for Mincerian analyses, matching between firms and workers to be random *conditional* on covariates in (1). We try to mitigate this possibility by introducing a large battery of covariates; in case one might be worried nevertheless, it is crucial to notice that selection would eventually induce a downward bias to our estimations of the wage premia which are thus to be considered as conservative. This is because if matching is not random, but is done once observing the covariates—for example worker’s productivity—that is that firms hire workers with the highest productivity, than an increase in the worker’s wage implies that the unobserved component needs not to be that large for the worker to be chosen; in other words, there is negative correlation between unobservables and covariates conditional on the matching.

Omitted Variables. One caveat potentially applying to our analysis is that export experience might simply be a proxy for some omitted variables. For example, having being employed by an exporter could signal the unobserved ability of a manager if exporters screen workers more effectively (e.g. Helpman et al., 2010, 2012). Another possibility is that workers (previously) employed by exporters could be expected to enjoy stronger wage rises over the course of their career—as would occur, given the (widely documented) productivity advantage of exporters, in the context of strategic wage bargaining and on-the-job search (e.g. Cahuc et al., 2006).¹⁸ We account for these issues in three ways. First, we use worker fixed effects to capture any time-invariant unobserved characteristic of the worker (including ability); second, we use previous firm characteristics (size, productivity, and industry) to control for the fact that some workers are expected to enjoy stronger wage rises over the course of their career; third, we use a refined definition of export experience that is more directly linked to the actual exporting activities undertaken by the worker’s previous firms—i.e. matched export experience.¹⁹ We find it considerably more difficult to argue that matched export experience does not correspond to valuable trade-specific knowledge acquired when working for an exporting firm.

¹⁸In a nutshell, workers employed by more productive firms will, on average, receive better on-the-job offers from other firms.

¹⁹More formally, we assume that conditional on our controls: (a) the unobserved characteristics included in ε_{ift} do not make a worker more likely to be hired by an exporting firm than by a non-exporting firm that is identical in terms of covariates; *and* (b) the unobserved characteristics included in ε_{ift} do not make the firm employing the worker more likely to change export status.

5. Trade performance analysis

As a second (and final) step of our quest, we assess whether export experience brought by managers has an impact on a firm's trade performance. We model a firm's entry and continuation into a specific market and analyze both the probability to start and continue exporting as well as the value of exports, the intensive and the extensive margins conditional on entry/continuation. We control for endogeneity including firm-year fixed effects and market-year dummies.²⁰ Results show that the presence of (at least) one manager with specific export experience (as defined in Section 3.1) positively affects both the probability to start and to continue exporting, with the magnitude being particularly sizeable for the former when export experience is in a destination while it is interestingly big for the latter when a manager has specific experience in a product group; specific export experience also affects exports value and both intensive and extensive margins. Moreover, when we divide managers in sub-groups we find, among other results, that sales managers are useful to improve on the intensive margin conditional on being already an exporter in a destination market; conversely, production managers do well in adapting the product to other destinations, hence expanding on the extensive margin.²¹

These findings, along with the existence of wage premia for managers with export experience—even more for those with matched experience—are consistent with the hypothesis those managers carry valuable export-specific knowledge, and that such knowledge has a very strong market-specific nature. Later on in this Section, we discuss a number of potential caveats applying to our analysis (including reverse causality).

5.1 *Econometric model*

We restrict our analysis to the sample of firms with at least one manager and index firms by f , export markets by m (it can be either d or p depending on the definition of the market, either destination or product group), and time by t .²² At each point in time we observe whether firm f exports (or not) to one of the seven groups of destinations considered in the previous section. We model a firm's entry and continuation into market m and analyze both the probability to start and continue exporting as well as the value of exports conditional on entry/continuation. We now describe the entry model (with the one for continuation being its mirror image).

²⁰An instrumental variable approach is work in progress

²¹We will discuss the results for managers categories extensively

²²Our trade performance analysis is representative of larger and more organizationally structured firms that account for the bulk of trade in Portugal. Firms with at least one manager represent (in 2005) 53.6 percent of exporting firms, account for 91.8 percent of exports, and 61.5 percent of manufacturing employment.

For each firm f and time $t \in [1996, 2005]$, we consider all the markets m to which the firm was *not* exporting in $t - 1$. We construct the binary dependent variable $Entry_{f_{mt}}$ taking value one when firm f starts exporting to market m at time t (and zero otherwise). In each period, each firm decides whether or not to enter into one or more of the destinations in which it was not present in the previous year.²³ We then define the continuous dependent variable $Exports_{f_{mt}}$ equal to (log) exports of firm f to market m at time t . $Exports_{f_{mt}}$ is observed when $Entry_{f_{mt}}=1$.

The following selection model is estimated:

$$\begin{aligned} Entry_{f_{mt}} &= \mathbf{1}_{[Entry_{f_{mt}}^* > 0]}, \\ Entry_{f_{mt}}^* &= \delta_1 + ManExp_{f_{mt}}\beta_1 + \mathbf{Z}'_{1ft}\mathbf{\Gamma}_1 + \eta_{1mt} + \zeta_{1f_{mt}}, \\ Exports_{f_{mt}} &= \delta_2 + ManExp_{f_{mt}}\beta_2 + \mathbf{Z}'_{2ft}\mathbf{\Gamma}_2 + \eta_{2mt} + \zeta_{2f_{mt}}, \end{aligned} \quad (2)$$

where $ManExp_{f_{mt}}$ —our main variable of interest—is a dummy indicating the presence of (at least) one manager with export experience and/or specific export experience, \mathbf{Z}_{1ft} and \mathbf{Z}_{2ft} are two vectors of firm- and time-varying covariates affecting, respectively, entry and exports conditional on entry that are captured with either observables or firm-year fixed effects,²⁴ and η_{1mt} and η_{2mt} are market-year dummies.

We consider separately export experience and specific export experience and estimate one specification of equation (2) for the former—in which we allow for firm fixed effects—and two specifications for the latter—in which we allow for either firm or firm-year fixed effects a. We use market-year dummies in all specifications.

When considering export experience, $ManExp_{f_{mt}}$ is only firm-time varying (i.e. $ManExp_{f_{mt}}=ManExp_{ft}$) and equals one if firm f has at time t at least one manager with export experience (zero otherwise). In this case, we allow for firm fixed effects, i.e. $\zeta_{1f_{mt}}=\eta_{1f} + v_{1f_{mt}}$ and $\zeta_{2f_{mt}}=\eta_{2f} + v_{2f_{mt}}$, and assume that $v_{1f_{mt}}$ and $v_{2f_{mt}}$ are uncorrelated with each other as well as with covariates. Under these conditions, we can separately estimate the selection and outcome equations using the within estimator while clustering standard errors at the firm-level.

When considering *specific* export experience, $ManExp_{f_{mt}}$ is firm-market-time varying and equals one if firm f has at time t at least one manager with market m -specific export

²³In unreported analyses, available upon request, we have experimented with more stringent definitions of new and continuing exporters in a given market, based on firm activity in both $t - 1$ and in $t - 2$ (as in Eaton et al., 2008), finding very similar results.

²⁴Observables are firm size, productivity, share of skilled workers, age, foreign ownership, mean and standard deviation of both age and education of its managers, mean and standard deviation of the worker fixed effects corresponding to its managers and coming from the wage analysis (specification 1B), and industry-level exports. See Section 2 and the Data Appendix for further details.

experience (zero otherwise). In this case, we can be more general and allow for firm-year fixed effects while getting rid of the redundant firm-time observables: we consider $\zeta_{1fmt} = \eta_{1ft} + v_{1fmt}$ and $\zeta_{2fmt} = \eta_{2ft} + v_{2fmt}$, and assume v_{1fmt} and v_{2fmt} are uncorrelated with each other as well as with covariates. We use again the within estimator for both the selection and outcome equations and cluster standard errors at the firm-level.

Three comments are in order. First, the identifying variation for export experience is provided by its changes over time within a firm. In the case of specific export experience and firm fixed effects, identification also comes from variation in the market dimension, still within a firm. When considering specific experience and *firm-year* fixed effects identification comes from the within-firm market variation only meaning that, for example, when analyzing the probability to start exporting we draw on firms entering in at least two markets in the same year (one market for which the firm has a manager with specific export experience and one for which it has not) to identify β_1 .

Second, the selection equation corresponds to a linear probability model. Such a model has a number of advantages over non-linear alternatives but also a number of caveats when dealing with fixed effects (Wooldridge, 2002); estimations of a fixed effects Logit model (not shown) qualitatively confirm linear probability model results.

Third, imposing that v_{1fmt} and v_{2fmt} are uncorrelated with each other amounts to assuming that, once firm-time and market-time covariates and/or unobservables are controlled for, selection is no longer an issue. This is consistent with the literature on trade and firm heterogeneity (pioneered by Bernard and Jensen, 1999), which relies on firm-time determinants (productivity, size, past export status, skill intensity, R&D intensity) and market-time determinants (distance and other proxies for trade costs, market size, other market characteristics like the quality of institutions) to model a firm's export behavior across time and markets. At the end of this section, we provide further insights about the issue of selection as well as a possible way forward.

Finally, all right-hand side variables (including $ManExp_{fmt}$ and the other dummies) have been divided by their respective standard deviation to provide a comparable metric. For example, a coefficient of $0.0x$ for firm size in the selection equation indicates that a one standard deviation increase in firm size roughly increases the probability of entry by x percent. Coefficients are thus comparable, in terms of how much variation in the probability of entry (or continuation) or in the value of exports is induced, across covariates and specifications.

5.2 Results

Tables 6 and 7 report estimates, for the core covariates' coefficients, both for our analysis of a firm's probability to entry (left panel) and to continue (right panel) exporting to

a specific market. Besides our main variables of interest (i.e. the presence of at least one manager with export experience or with specific export experience), we report coefficients for firm size and productivity, given their widely-documented importance in the trade literature (Bernard and Jensen, 2004). All the other controls are displayed in Tables in the Appendix.

Table 6: Trade Performance with experience is in a destination

VARIABLES	Prob. Start Exporting			Prob. Continue Exporting		
	(1)	(2)	(3)	(4)	(5)	(6)
Presence of Managers with Export Experience						
Manag. w/ Exp. (0/1)	0.001 (0.001)			-0.001 (0.002)		
Manag. w/ Spec. Exp. (0/1)		0.012 ^a (0.001)	0.016 ^a (0.001)		0.006 ^a (0.002)	0.016 ^a (0.004)
Selected Controls						
Firm Size	0.025 ^a (0.005)	0.023 ^a (0.005)		0.099 ^a (0.010)	0.098 ^a (0.010)	
Firm Productivity	0.005 ^a (0.002)	0.005 ^a (0.002)		0.009 ^a (0.003)	0.009 ^a (0.003)	
Firm-Year Controls	X	X		X	X	
Destination-Year Dummies	X	X	X	X	X	X
Firm FE	X	X		X	X	
Firm-Year FE			X			X
Observations	195,012	195,012	195,012	60,775	60,775	60,775
R ²	0.025	0.026	0.027	0.058	0.058	0.062
Number of empresa	11,317	11,317	11,317	5,305	5,305	5,305
Number of firm_time			36,140			18,849

Notes: Robust standard errors in parentheses: ^a $p < 0.01$, ^b $p < 0.05$, ^c $p < 0.1$.

Columns 1 of Tables 6 and 7 indicate that the presence of managers with export experience does not significantly affect the probability to start exporting to a specific market. On the other hand, columns 2 point to a positive and significant impact of managers with *specific* export experience; this is confirmed when using firm-year fixed effects. Similar conclusions hold for the probability to continue exporting (columns 4 to 6 in both tables): only the presence of managers with *specific* export experience has a positive and significant effect.

These results suggest that export experience improves a firm's trade performance only if it has particular features, namely market specificity. Moreover, by distinguishing between export experience in a destination or in a product group, we notice that the

Table 7: Trade Performance with experience is in a product group

VARIABLES	Prob. Start Exporting			Prob. Continue Exporting		
	(1)	(2)	(3)	(4)	(5)	(6)
Presence of Managers with Export Experience						
Manag. w/ Exp. (0/1)	0.000 ^a (0.000)			0.003 ^c (0.002)		
Manag. w/ Spec. Exp. (0/1)		0.005 ^a (0.000)	0.005 ^a (0.000)		0.053 ^a (0.002)	0.078 ^a (0.002)
Selected Controls						
Firm Size (log)	0.004 ^a (0.000)	0.003 ^a (0.000)		0.078 ^a (0.002)	0.067 ^a (0.002)	
Firm Productivity (log)	0.001 ^a (0.000)	0.001 ^a (0.000)		0.007 ^a (0.002)	0.006 ^a (0.002)	
Firm-Year Controls	X	X		X	X	
Destination-Year Dummies	X	X	X	X	X	X
Firm FE	X	X		X	X	
Firm-Year FE			X			X
Observations	3,558,550	3,558,550	3,558,550	59,009	59,009	59,009
R ²	0.032	0.035	0.052	0.219	0.226	0.400
N	3.559e+06	3.559e+06	3.559e+06	59009	59009	59009

Notes: Robust standard errors in parentheses: ^a $p < 0.01$, ^b $p < 0.05$, ^c $p < 0.1$.

former proves to be relatively more valuable for a firm that wants to penetrate a new market, while the latter is more effective if a firm continues exporting the same product. The idea is that export experience corresponds to a broad capacity of a manager to affect a firm's performance (R&D, organizational practices, business links, etc.) leading to higher expected profits for the firm and to a wage premium for the manager. When the experience of a manager matches the market-specific export activity of a firm, it boosts trade performance which turns into additional profits for the firm and an even higher wage for the manager.

Tables 6 and 7 delivers another important message: the impact of specific export experience is sizeable with respect to the impact of firm size and productivity—the focus of recent trade literature. Comparing the coefficient of $ManExp_{f_{mt}}$ with the ones of firm size and productivity shows that the presence of managers with specific export experience affects entry more than firm productivity and it has a very similar impact of firm size.

We then look at export margins as defined in section 3.1 both with experience in a destination (8 and 9) and in product group (10 and 11). When managers have experience in a destination, their presence does not significantly affect initial export values in a new market. Second, specific export experience positively affects the export margins—especially the intensive margin (column 5C of table 8)—of those firms that are already in

Table 8: Trade Performance margins with experience in a destination (1/2)

VARIABLES	Cond. Start Exporting								
	(1A) ln Ex	(1B) Int	(1C) Ext	(2A) ln Ex	(2B) Int	(2C) Ext	(3A) ln Ex	(3B) Int	(3C) Ext
Mng. Exp	0.011 (0.042)	-0.024 (0.015)	0.035 (0.039)						
Mng. Spec. Exp				0.034 (0.038)	-0.011 (0.013)	0.045 (0.035)	-0.013 (0.099)	-0.012 (0.030)	-0.000 (0.092)
	Selected Controls								
Firm Size	0.138 (0.132)	0.056 (0.047)	0.082 (0.126)	0.133 (0.132)	0.054 (0.047)	0.079 (0.127)			
Firm Productivity	0.015 (0.049)	0.003 (0.017)	0.013 (0.045)	0.015 (0.049)	0.003 (0.017)	0.012 (0.045)			
Firm-Year Controls	X	X	X	X	X	X			
Dest-Year Dummies	X	X	X	X	X	X	X	X	X
Firm FE	X	X	X	X	X	X			
Firm-Year FE							X	X	X
Observations	9,839	9,839	9,839	9,839	9,839	9,839	9,839	9,839	9,839
R^2	0.097	0.029	0.110	0.097	0.029	0.110	0.106	0.042	0.115
Number of empresa	4,211	4,211	4,211	4,211	4,211	4,211			
Number of firm_time							7,693	7,693	7,693

Notes: Robust standard errors in parentheses: ^a $p < 0.01$, ^b $p < 0.05$, ^c $p < 0.1$.

Table 9: Trade Performance margins with experience in a destination (2/2)

VARIABLES	Cond. Continuing Exporting								
	(4A) ln Ex	(4B) Int	(4C) Ext	(5A) ln Ex	(5B) Int	(5C) Ext	(6A) ln Ex	(6B) Int	(6C) Ext
Mng. Exp	0.016 (0.012)	0.006 (0.006)	0.010 (0.011)						
Mng. Spec. Exp				0.072 ^a (0.014)	0.017 ^a (0.006)	0.055 ^a (0.012)	0.203 ^a (0.040)	0.041 ^b (0.017)	0.162 ^a (0.033)
	Selected Controls								
Firm Size	0.681 ^a (0.049)	0.192 ^a (0.024)	0.488 ^a (0.045)	0.669 ^a (0.049)	0.190 ^a (0.024)	0.479 ^a (0.045)			
Firm Productivity	0.109 ^a (0.022)	0.022 ^a (0.007)	0.087 ^a (0.018)	0.106 ^a (0.022)	0.021 ^a (0.007)	0.085 ^a (0.018)			
Firm-Year Controls	X	X	X	X	X	X			
Dest-Year Dummies	X	X	X	X	X	X	X	X	X
Firm FE	X	X	X	X	X	X			
Firm-Year FE							X	X	X
Observations	52,452	52,452	52,452	52,452	52,452	52,452	52,452	52,452	52,452
R^2	0.205	0.045	0.248	0.206	0.045	0.248	0.223	0.049	0.273
Number of empresa	4,514	4,514	4,514	4,514	4,514	4,514			
Number of firm_time							17,019	17,019	17,019

Notes: Robust standard errors in parentheses: ^a $p < 0.01$, ^b $p < 0.05$, ^c $p < 0.1$.

the market; in the most conservative specification in which we account for unobservables by means of workers fixed effects, a one standard deviation increase corresponds to 20 percent (column 6A) increase in the value of exports, a 4 percent (column 6B) increase in the penetration in a market (intensive margin) and 16 percent increase in the number of market in which the firm is exporting (column 6C). These magnitudes are higher or similar to that of productivity.

When we define a market as a product group, we interestingly find that specific export experience turns to be valuable in the initial phase of exporting as well. In fact, a manager with specific export experience leads a 22 percent higher exports, a 3.6 percent increase in intensive margin and a 18.7 percent increase in extensive margin (in the specification with worker fixed effects—columns 3A to 3C of table 10). When we look at firms that are already in the market (11), we find striking results: a manager with specific export experience increases the exports of a firm by 64.6 percentage points, contributing to a 17.7 percent increase in the market penetration and a 47 percent increase in the extensive margin (columns 6A to 6C).

Few considerations are in order: first, it seems that specific export experience in a destination is relatively more valuable when a firm wants to start exporting in a certain market (6), but does not influence the value of exports conditional on entry (8). A possible explanation is that a manager with specific export experience might help a firm overcome market-specific *sunk* costs of entry (e.g. technical standards, packaging requirements or preferences, links to distributors, marketing strategies) without significantly reducing *marginal* costs or enhancing *marginal* revenues. By the same token, one might also conjecture that the presence of managers with specific export experience affects the marginal revenue and/or marginal cost of firms wishing to continue exporting to a specific market leading to the higher export values we observe. Second, looking at export experience in a product group we observe a more clear pattern: it is clearly more valuable when a firm wants to continue exporting in a given market (both in terms of probability and export margins) but it turns to be valuable for entrants as well.

Table 10: Trade Performance margins with experience in product groups (1/2)

VARIABLES	Cond. Start Exporting								
	(1A) ln Ex	(1B) Int	(1C) Ext	(2A) ln Ex	(2B) Int	(2C) Ext	(3A) ln Ex	(3B) Int	(3C) Ext
Manag. Exp.	-0.002 (0.015)	0.000 (0.002)	-0.003 (0.014)						
Manag. Spec. Exp.				0.175 ^a (0.014)	0.026 ^a (0.002)	0.149 ^a (0.014)	0.223 ^a (0.011)	0.036 ^a (0.002)	0.187 ^a (0.010)
Firm Size	-0.206 ^a (0.017)	0.011 ^a (0.003)	-0.217 ^a (0.016)	-0.242 ^a (0.017)	0.006 ^b (0.003)	-0.248 ^a (0.016)			
Firm Productivity	-0.062 ^a (0.016)	-0.004 ^c (0.002)	-0.058 ^a (0.015)	-0.068 ^a (0.016)	-0.005 ^b (0.002)	-0.063 ^a (0.015)			
Firm-Year Controls	X	X	X	X	X	X			
Dest-Year Dummies	X	X	X	X	X	X	X	X	X
Firm FE	X	X	X	X	X	X			
Firm-Year FE							X	X	X
Observations	20,907	20,907	20,907	20,907	20,907	20,907	20,907	20,907	20,907
R ²	0.451	0.311	0.463	0.453	0.313	0.464	0.655	0.558	0.662

Notes: Robust standard errors in parentheses: ^a $p < 0.01$, ^b $p < 0.05$, ^c $p < 0.1$.

Table 11: Trade Performance margins with experience in product groups (2/2)

VARIABLES	Cond. Continue Exporting								
	(4A) ln Ex	(4B) Int	(4C) Ext	(5A) ln Ex	(5B) Int	(5C) Ext	(6A) ln Ex	(6B) Int	(6C) Ext
Manag. Exp.	-0.003 (0.014)	0.002 (0.004)	-0.004 (0.011)						
Manag. Spec. Exp.				0.341 ^a (0.013)	0.096 ^a (0.004)	0.245 ^a (0.011)	0.646 ^a (0.012)	0.177 ^a (0.004)	0.470 ^a (0.010)
Firm Size	0.260 ^a (0.016)	0.158 ^a (0.005)	0.102 ^a (0.013)	0.185 ^a (0.015)	0.137 ^a (0.005)	0.048 ^a (0.013)			
Productivity	0.095 ^a (0.015)	0.015 ^a (0.004)	0.080 ^a (0.012)	0.084 ^a (0.015)	0.013 ^a (0.004)	0.072 ^a (0.012)			
Firm-Year Controls	X	X	X	X	X	X			
Dest-Year Dummies	X	X	X	X	X	X	X	X	X
Firm FE	X	X	X	X	X	X			
Observations	40,839	40,839	40,839	40,839	40,839	40,839	40,839	40,839	40,839
R ²	0.467	0.489	0.486	0.471	0.493	0.489	0.555	0.584	0.577

Notes: Robust standard errors in parentheses: ^a $p < 0.01$, ^b $p < 0.05$, ^c $p < 0.1$.

5.3 Results: managers' sub categories

It is interesting to look at results with managers' categories; in fact, looking at tables 12 (table 13 in the appendix shows the same regression when market is defined as a product group) we notice that general export experience doesn't increase the firm's probability to start or to continue exporting in a market, while specific experience does.

Production managers turn to be the most valuable *asset* when a firm wants to start to exporting in a certain destination, probably because they lead the firm to higher productivity and to faster adaptation of a product for the foreign market. General managers play a crucial role to continue exporting in a destination whence financial managers are useful to enter a new export destination market; the latter can be explained by the fact that exports are capital intensive. In fact, starting from the finding that export activity is extremely intensive in capital, the presence of a financial manager can help to gather financial resources to start exporting in a new destination market.

When looking at export margins, it is interesting to notice that specific experience in a product group (see tables 16 and 17) is valuable to increase export margins of both those firms that start exporting in a new market and for those that continue exporting (across all managers' types) while it is not the case when experience is in a destination (14 and 15); in fact, in the latter case, having any manager with specific experience helps only those firms that were already exporting in a market. Magnitude are very high, especially when looking at tables 16 and 17 where experience is in a product group; general managers are extremely valuable to increase the value of export and the extensive margin (columns 3A and 3C of table 16 and columns 6A and 6C of table 17) both for entrants and for firms continuing to export. Moreover, sales managers are very helpful to increase the extensive margin of firms already exporting in a market (both with experience in a destination and in a product group), while production managers with specific experience in a product are valuable to increase the intensive margin.

However, a clearer picture in which we are able to distinguish each manager's impact on the firm trade performance comes when we look at tables with experience defined in a destination (tables 14 and 15); in fact, general managers are valuable to increase the value of export and the penetration in a market —intensive margin (column 6A and 6B of table 15)—for firms continuing to export while production managers and sales managers outperform respectively in the extensive margin (the former) and intensive margin (the latter). These results seem to be coherent with the picture given by the selection model and with intuition according to which production managers would be useful to reduce production costs of product already exported in a market and eventually tailor them to other markets by enlarging varieties produced and exported; on the other hand, sales managers would probably understand better the demand structure of a certain market

and work on advertisement campaigns to increase the penetration of that market.²⁵

Table 12: Trade Performance by manager type with experience in a destination

VARIABLES	Prob. Start Exporting			Prob. Continue Exporting		
	(1)	(2)	(3)	(4)	(5)	(6)
High skill prof.	0.005 (0.004)			-0.004 (0.005)		
General manager	0.004 (0.008)			0.006 (0.012)		
Production manager	0.006 (0.006)			0.012 ^c (0.006)		
Financial manager	0.012 (0.008)			-0.007 (0.010)		
Sales manager	0.001 (0.008)			0.006 (0.009)		
Other manager	0.001 (0.010)			-0.012 (0.011)		
NC manager	-0.004 (0.008)			0.001 (0.008)		
High skill prof. X Spec Exp.		0.037 ^a (0.004)	0.055 ^a (0.005)		0.010 ^c (0.005)	0.031 ^a (0.012)
General manager X Spec Exp.		0.034 ^a (0.010)	0.039 ^a (0.011)		0.016 (0.013)	0.076 ^b (0.035)
Production manager X Spec Exp.		0.036 ^a (0.007)	0.058 ^a (0.008)		0.016 ^b (0.007)	0.030 (0.018)
Financial manager X Spec Exp.		0.041 ^a (0.010)	0.042 ^a (0.012)		0.007 (0.011)	0.055 ^b (0.022)
Sales manager X Spec Exp.		0.037 ^a (0.012)	0.051 ^a (0.015)		0.014 (0.009)	0.023 (0.022)
Other manager X Spec Exp.		0.009 (0.012)	0.022 (0.016)		-0.009 (0.011)	0.023 (0.024)
NC manager X Spec Exp.		0.025 ^b (0.011)	0.038 ^a (0.012)		0.008 (0.009)	0.011 (0.022)
Firm-Year Controls	X	X		X	X	
Destination-Year Dummies	X	X	X	X	X	X
Firm FE	X	X		X	X	
Firm-Year FE			X			X
Observations	195,012	195,012	195,012	60,775	60,775	60,775
R ²	0.025	0.027	0.028	0.058	0.058	0.062
Number of empresa	11,317	11,317		5,305	5,305	
N	195012	195012	195012	60775	60775	60775
Number of firm_time			36,140			18,849

Notes: Experience is in Destination

5.4 Endogeneity

Reverse causality. Does a firm hire managers with export experience to improve its trade performance or does the firm receive a positive shock and/or improve its trade

²⁵Next steps will include analysis of complementarity or substitutability between manager categories

Table 13: Trade Performance by manager type with experience in a product group

VARIABLES	Prob. Start Exporting			Prob. Continue Exporting		
	(1)	(2)	(3)	(4)	(5)	(6)
General manager	0.003 ^a (0.000)			-0.012 (0.011)		
Production manager	0.001 ^a (0.000)			-0.007 (0.006)		
Financial manager	-0.000 (0.000)			-0.017 ^b (0.008)		
Sales manager	0.000 (0.000)			0.002 (0.008)		
General manager X Spec Exp.		0.022 ^a (0.001)	0.022 ^a (0.001)		0.110 ^a (0.014)	0.170 ^a (0.012)
Production manager X Spec Exp.		0.026 ^a (0.001)	0.027 ^a (0.001)		0.105 ^a (0.009)	0.144 ^a (0.007)
Financial manager X Spec Exp.		0.022 ^a (0.001)	0.023 ^a (0.001)		0.080 ^a (0.012)	0.108 ^a (0.010)
Sales manager X Spec Exp.		0.035 ^a (0.001)	0.037 ^a (0.001)		0.075 ^a (0.012)	0.102 ^a (0.010)
Firm-Year Controls	X	X		X	X	
Destination-Year Dummies	X	X	X	X	X	X
Firm FE	X	X		X	X	
Firm-Year FE			X			X
Observations	3,558,550	3,545,634	3,545,634	59,009	58,857	58,857
R ²	0.032	0.036	0.053	0.219	0.227	0.403
N	3.559e+06	3.546e+06	3.546e+06	59009	58857	58857

Notes: Experience is in a Product

performance by other means and then hires managers with export experience? In other words, how important is the issue of reversed causality in our analysis?

First, it is important to consider that, as established in Section 4, managers with export experience cost more and the more so if they have an export experience matching the market portfolio of a firm. Therefore, such managers should in all likelihood improve firm performance in some dimensions and in particular export performance in a specific market. Whether the magnitudes we get here are lower or higher than the causal effect can certainly be debated.

Second, it is important to note that the “other means” a firm can exploit to improve its trade performance are, based on the international trade literature (Bernard et al., 2012), firm-time specific (e.g. productivity, skill intensity, R&D intensity, quality). To the extent that positive and negative shocks affecting firm trade performance are also firm-time specific—though arbitrarily correlated with the presence of managers with specific export experience—both such shocks and the other activities a firm can implement are fully controlled for in our specification with firm-year fixed effects.²⁶

Selection. The value of exports is observed only if a firm starts or continues to export to a market. We cope with the issue of firm selection into a market by using firm-year fixed effects and market-year dummies; most of the determinants of export entry emphasized

²⁶We are planning to consider an IV approach, but we do not have results yet

by the trade literature are either at the firm-time or market-time level. A more recent strand of the literature, including Morales et al. (2012), is exploring other determinants of firm export behavior which are truly firm-time-market specific and are related to a firm's past activity in "related" markets. We could certainly incorporate such determinants in our analysis to better address selection but, so far, it is not clear whether they provide valid exclusion restriction, i.e. whether they affect entry and/or continuation but not the value of exports.

Table 14: Trade Performance margins with experience in a destination by manager type (1/2)

VARIABLES	Cond. Start Exporting								
	(1A) ln Ex	(1B) Int	(1C) Ext	(2A) ln Ex	(2B) Int	(2C) Ext	(3A) ln Ex	(3B) Int	(3C) Ext
GenMng.	-0.114 (0.236)	-0.102 (0.087)	-0.013 (0.211)						
ProdMng.	0.167 (0.146)	0.012 (0.049)	0.155 (0.133)						
FinMng.	0.059 (0.226)	0.020 (0.061)	0.040 (0.205)						
SalesMng.	0.507 ^b (0.207)	0.049 (0.082)	0.459 ^b (0.185)						
GenMng.X SpeEXP				0.115 (0.301)	-0.039 (0.086)	0.154 (0.275)	2.030 (1.412)	0.493 ^c (0.256)	1.537 (1.320)
ProdMng.X SpeEXP				0.077 (0.155)	-0.018 (0.049)	0.096 (0.142)	-0.045 (0.426)	-0.075 (0.138)	0.030 (0.392)
FinMng.X SpeEXP				-0.031 (0.270)	0.042 (0.074)	-0.074 (0.244)	-0.754 (0.545)	-0.104 (0.163)	-0.650 (0.479)
SaleMng.X SpeEXP				0.419 ^c (0.214)	0.032 (0.093)	0.387 ^b (0.195)	-0.778 (0.677)	0.286 (0.240)	-1.064 ^b (0.521)
Firm-Year Controls	X	X	X	X	X	X			
Dest-Year Dummies	X	X	X	X	X	X	X	X	X
Firm FE	X	X	X	X	X	X			
Firm-Year FE							X	X	X
Observations	9,839	9,839	9,839	9,839	9,839	9,839	9,839	9,839	9,839
R ²	0.103	0.031	0.115	0.102	0.031	0.114	0.110	0.045	0.120
Number of empresa	4,211	4,211	4,211	4,211	4,211	4,211			
Number of firm_time							7,693	7,693	7,693

Notes: Experience is in a Destination

Table 15: Trade Performance margins with experience in a destination by manager type (2/2)

VARIABLES	Cond. Continue Exporting								
	(4A) ln Ex	(4B) Int	(4C) Ext	(5A) ln Ex	(5B) Int	(5C) Ext	(6A) ln Ex	(6B) Int	(6C) Ext
GenMng.	0.033 (0.061)	0.125 ^a (0.032)	-0.092 (0.059)						
ProdMng.	0.045 (0.031)	0.032 ^b (0.016)	0.013 (0.030)						
FinMng.	0.036 (0.047)	0.007 (0.026)	0.029 (0.045)						
SalesMng.	0.029 (0.043)	0.025 (0.024)	0.004 (0.041)						
GenMng.X SpeEXP				0.104 (0.071)	0.152 ^a (0.036)	-0.048 (0.066)	0.419 ^c (0.233)	0.231 ^b (0.117)	0.187 (0.185)
ProdMng.X SpeEXP				0.136 ^a (0.038)	0.063 ^a (0.020)	0.073 ^b (0.034)	0.467 ^a (0.146)	0.117 ^c (0.068)	0.350 ^a (0.113)
FinMng.X SpeEXP				0.059 (0.069)	0.000 (0.033)	0.058 (0.056)	0.146 (0.225)	0.010 (0.088)	0.136 (0.170)
SaleMng.X SpeEXP				0.159 ^a (0.061)	0.074 ^a (0.028)	0.085 (0.054)	0.541 ^a (0.185)	0.238 ^a (0.090)	0.303 ^b (0.152)
Firm-Year Controls	X	X	X	X	X	X			
Dest-Year Dummies	X	X	X	X	X	X	X	X	X
Firm FE	X	X	X	X	X	X			
Firm-Year FE							X	X	X
Observations	52,452	52,452	52,452	52,452	52,452	52,452	52,452	52,452	52,452
R ²	0.206	0.046	0.248	0.206	0.047	0.249	0.224	0.051	0.273
Number of empresa	4,514	4,514	4,514	4,514	4,514	4,514			
Number of firm_time							17,019	17,019	17,019

Notes: Experience is in a Destination

6. Conclusion

We construct a unique dataset for Portugal by merging two sources: a matched employer-employee dataset covering virtually the entire population of firms and their workers, and a dataset on the universe of firm trade transactions. The combined dataset allows us to finely measure firm trade performance and workers' wages as well as to draw a sharp portrait of workers' mobility across firms. The paper shows that the export experience gained by managers in *previous* firms leads their *current* firm towards higher export performance, and commands a sizeable wage premium for the manager. Moreover, we perform the analysis defining *specific* export experience in a destination market or in a product group; we find that *specific* experience is generally more valuable for the firm both in term of increasing the probability to start or continue exporting in a market and in terms of improving export margins. Moreover, managers with *specific* export experience enjoy higher premiums.

We finally look at managers sub categories and we find that general managers enjoy higher premiums (if looking at specific experience in a destination and in a product group) but they also prove to be extremely valuable for the firm to improve trade performance. Indeed, they lead to an increase in firm's exports of 137% when they have *specific* experience in a product group and they work in a firm that is already exporting

Table 16: Trade Performance margins with experience in a product groups by manager type (1/2)

VARIABLES	Cond. Start Exporting								
	(1A) ln Ex	(1B) Int	(1C) Ext	(2A) ln Ex	(2B) Int	(2C) Ext	(3A) ln Ex	(3B) Int	(3C) Ext
GenMng.	-0.175 ^b (0.083)	0.012 (0.012)	-0.187 ^b (0.079)						
ProdMng.	-0.042 (0.052)	0.000 (0.008)	-0.042 (0.050)						
FinMng.	-0.136 ^b (0.064)	0.000 (0.010)	-0.136 ^b (0.062)						
SalesMng.	-0.136 ^b (0.067)	-0.017 ^c (0.010)	-0.119 ^c (0.064)						
GenMng.X SpeEXP				0.628 ^a (0.144)	0.102 ^a (0.022)	0.525 ^a (0.138)	1.052 ^a (0.111)	0.141 ^a (0.017)	0.911 ^a (0.106)
ProdMng.X SpeEXP				0.483 ^a (0.084)	0.075 ^a (0.013)	0.408 ^a (0.081)	0.529 ^a (0.066)	0.077 ^a (0.010)	0.453 ^a (0.063)
FinMng.X SpeEXP				-0.133 (0.116)	0.019 (0.017)	-0.152 (0.111)	0.111 (0.090)	0.028 ^b (0.014)	0.083 (0.087)
SaleMng.X SpeEXP				0.332 ^a (0.114)	0.062 ^a (0.017)	0.270 ^b (0.110)	0.465 ^a (0.088)	0.104 ^a (0.013)	0.362 ^a (0.085)
Firm-Year Controls	X	X	X	X	X	X			
Dest-Year Dummies	X	X	X	X	X	X	X	X	X
Firm FE	X	X	X	X	X	X			
Firm-Year FE							X	X	X
Observations	20,907	20,907	20,907	20,843	20,843	20,843	20,843	20,843	20,843
R ²	0.452	0.311	0.463	0.455	0.316	0.465	0.655	0.559	0.662

Notes: Experience is in a Product

in that market. Sales managers and production managers are extremely valuable as well for extensive margin (the former) and intensive margin (the latter).

The close connection between having a manager with specific export experience, the trade performance of the firm employing that manager and the existence of a higher wage premium for the most valuable managers further strengthen our analysis and partially rules out problems of selection and endogeneity.

This paper depicts the directions for further research. First, we would like to design a theoretical setting to test our hypotheses; in fact a model would allow us to give theoretical foundation and help to understand the mechanisms at play. Secondly, we would like to investigate the channels: does a general manager with *specific* experience reduces costs of entry in a new market or he reduces costs of production of a product that has to be exported into that market? Or does he adjust the product to fit the market demand (as in Artopoulos et al. (2013))? We already provide some answers to these questions by clearly disentangling managers skills and market specific competencies and connecting them to the trade performance of firms, but we need further research to clarify these issues.

Table 17: Trade Performance margins with experience in a product groups by manager type (2/2)

VARIABLES	(4A) ln Ex	(4B) Int	(4C) Ext	(5A) ln Ex	(5B) Int	(5C) Ext	(6A) ln Ex	(6B) Int	(6C) Ext
GenMng.	-0.096 (0.080)	0.037 (0.023)	-0.133 ^b (0.064)						
ProdMng.	0.073 (0.048)	0.005 (0.014)	0.068 ^c (0.039)						
FinMng.	-0.027 (0.061)	0.020 (0.018)	-0.047 (0.049)						
Sales mng.	-0.300 ^a (0.061)	-0.042 ^b (0.018)	-0.258 ^a (0.049)						
GenMng.X SpeEXP				0.579 ^a (0.099)	0.248 ^a (0.029)	0.331 ^a (0.080)	1.376 ^a (0.086)	0.474 ^a (0.025)	0.902 ^a (0.069)
ProdMng.X SpeEXP				0.641 ^a (0.061)	0.215 ^a (0.018)	0.426 ^a (0.049)	1.144 ^a (0.054)	0.442 ^a (0.015)	0.701 ^a (0.043)
FinMng.X SpeEXP				0.552 ^a (0.084)	0.184 ^a (0.024)	0.368 ^a (0.068)	0.926 ^a (0.075)	0.286 ^a (0.021)	0.640 ^a (0.060)
SaleMng.X SpeEXP				0.555 ^a (0.085)	0.188 ^a (0.025)	0.366 ^a (0.068)	1.133 ^a (0.074)	0.327 ^a (0.021)	0.806 ^a (0.059)
Firm-Year Controls	X	X	X	X	X	X			
Dest-Year Dummies	X	X	X	X	X	X	X	X	X
Firm FE	X	X	X	X	X	X			
Firm-Year FE							X	X	X
Observations	40,839	40,839	40,839	40,739	40,739	40,739	40,739	40,739	40,739
R ²	0.467	0.489	0.486	0.474	0.496	0.491	0.559	0.589	0.580

Notes: Experience is in a Product

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Appendix - Data description

A-1. Trade data

Statistics Portugal collects data on export and import transactions by firms that are located in Portugal on a monthly basis. These data include the value and quantity of internationally traded goods (i) between Portugal and other Member States of the EU (intra-EU trade) and (ii) by Portugal with non-EU countries (extra-EU trade). Data on extra-EU trade are collected from customs declarations, while data on intra-EU trade are collected through the Intrastat system, which, in 1993, replaced customs declarations as the source of trade statistics within the EU.²⁷ The same information is used for official statistics and, besides small adjustments, the merchandise trade transactions in our dataset aggregate to the official total exports and imports of Portugal. Each transaction record includes, among other information, the firm's tax identifier, an eight-digit Combined Nomenclature product code, the destination/origin country, the value of the transaction in euros, the quantity (in kilos and, in some case, additional product-specific measuring units) of transacted goods, and the relevant international commercial term (FOB, CIF, FAS, etc.).²⁸ We were able to gain access to data from 1995 to 2005 for the purpose of this research. We use data on export transactions only, aggregated at the firm-destination-year level.

²⁷Statistics on trade between the Member States of the European Union are based on a European Parliament and Council Regulation (EC) No 638/2004 of 31 March 2004 and on the implementing Commission Regulation (EC) No 1982/2004 of 18 November 2004 which lay down or supplement the rules on methodology, thresholds and specific movements and one amending Commission regulation ((EC) No 1915/2005 on simplified quantity reporting). The Community's basic customs legislation is contained in the Customs Code (Council Regulation (EEC) No 2913/92) and the Code's implementing provisions (Commission Regulation (EEC) No 2454/93). See http://europa.eu/legislation_summaries/internal_market/single_market_for_goods/free_movement_goods_general_framework/l11011a_en.htm for an overview of the Intrastat system and http://ec.europa.eu/taxation_customs/customs/procedural_aspects/index_en.htm for details on procedural aspects related to extra-EU trade.

²⁸In the case of intra-EU trade, firms have the option of "adding up" multiple transactions only when they refer to the same month, product, destination/origin country, Portuguese region and port/airport where the transaction originates/starts, international commercial term, type of transaction (sale, resale,...etc.), and transportation mode. In the case of intra-EU trade, firms are required to provide information on their trade transactions if the volume of exports or imports in the current year or in the previous year or two years before was higher than 60,000 euros and 85,000 euros respectively. More information can be found at: <http://webinq.ine.pt/public/files/inqueritos/pubintrastat.aspx?Id=168>.

A-2. Matched employer-employee data

The second main data source, *Quadros de Pessoal*, is a longitudinal dataset matching virtually all firms and workers based in Portugal.²⁹ Currently, the data set collects data on about 350,000 firms and 3 million employees. As for the trade data, we were able to gain access to information from 1995 to 2005.³⁰ The data are made available by the Ministry of Employment, drawing on a compulsory annual census of all firms in Portugal that employ at least one worker. Each year, every firm with wage earners is legally obliged to fill in a standardized questionnaire. Reported data cover the firm itself, each of its plants, and each of its workers. Variables available in the dataset include the firm's location, industry, total employment, sales, ownership structure (equity breakdown among domestic private, public or foreign), and legal setting. The worker-level data cover information on all personnel working for the reporting firms in a reference week. They include information on gender, age, occupation, schooling, hiring date, earnings, hours worked (normal and overtime), etc. The information on earnings includes the base wage (gross pay for normal hours of work), seniority-indexed components of pay, other regularly paid components, overtime work, and irregularly paid components.³¹ It does not include employers' contributions to social security.

Each firm entering the database is assigned a unique, time-invariant identifying number which we use to follow it over time. The Ministry of Employment implements several checks to ensure that a firm that has already reported to the database is not assigned a different identification number. Similarly, each worker also has a unique identifier, based on a worker's social security number, allowing us to follow individuals over time. The administrative nature of the data and their public availability at the workplace—as required by the law—imply a high degree of coverage and reliability. The public availability requirement facilitates the work of the services of the Ministry of Employment that monitor the compliance of firms with the law (e.g., illegal work).

A-3. Combined dataset and data processing

The two datasets are merged by means of the firm identifier. As in Cardoso and Portugal (2005), we account for sectoral and geographical specificities of Portugal by restricting the sample to include only firms based in continental Portugal while excluding agriculture and fishery (Nace rev.1, 2-digit industries 1, 2, and 5) as well as minor service

²⁹Public administration and non-market services are excluded. *Quadros de Pessoal* has been used by, amongst others, Cabral and Mata (2003) to study the evolution of the firm size distribution; by Blanchard and Portugal (2001) to compare the U.S. and Portuguese labor markets in terms of unemployment duration and worker flows; by Cardoso and Portugal (2005) to study the determinants of both the contractual wage and the wage cushion (difference between contractual and actual wages); by Carneiro et al. (2012) who, in a related study, analyze how wages of newly hired workers and of existing employees react differently to the business cycle; by Martins (2009) to study the effect of employment protection on worker flows and firm performance. See these papers also for a description of the peculiar features of the Portuguese labor market.

³⁰Information for the year 2001 is only partly available due to issues arisen in the collection of the data. In the Data Appendix we provide details on how we deal with this missing data problem in our analysis.

³¹It is well known that employer-reported wage information is subject to less measurement error than worker-reported data. Furthermore, the *Quadros de Pessoal* registry is routinely used by the inspectors of the Ministry of Employment to monitor whether the firm wage policy complies with the law.

activities and extra-territorial activities (Nace rev.1, 2-digit industries 95, 96, 97, and 99). Concerning workers, we consider only single-job, full-time workers between 16 and 65 years old, and working between 25 and 80 hours (base plus overtime) per week. Our analysis focuses on manufacturing firms only (Nace rev.1 codes 15 to 37) because of the closer relationship between the export of goods and the industrial activity of the firm. Even though we focus on manufacturing firms we use data *both* on manufacturing and non-manufacturing firms to build some of our variables, including export experience as well as the Nace rev.1 2-digit code, size, and productivity of the previous employing firm.

Each worker in *Quadros de Pessoal* (QP) has a unique identifier based on her social security number. We drop from the sample a minority of workers with an invalid social security number and with multiple jobs. If a worker is employed in a particular year, we observe the corresponding firm identifier for that year. Since worker-level variables are missing in 2001, we assign a firm to workers in 2001 in the following way: if a worker is employed by firm A in 2002 and the year in which the worker had been hired (by firm A) is before 2001 or is 2001, then we assign the worker to firm A in 2001 as well; for all other workers, we repeat the procedure using 2003. In case neither 2002 nor 2003 allow us to assign a firm to a worker in 2001, we leave the information as missing.

All the information in QP is collected during the month of November of each year. Worker-level variables (not available in 2001) refer to October of the same year. Firm-level variables refer to the current calendar year (except firm total sales that refer to the previous calendar year).

The location of the firm is measured according to the NUTS 3 regional disaggregation. We keep only NACE rev.1 2-digits industries between 10 and 95 (excluding agriculture, fishery, other minor industries and extra-territorial activities). Results shown in the paper refer to the manufacturing firms only (NACE 15 to 37).

In the trade dataset, we restrict the sample to transactions registered as sales as opposed to returns, transfers of goods without transfer of ownership, and work done.

To control for outliers, we apply a trimming based on the hourly wage and eliminate 0.5 percent of the observations on both extremes of the distribution. We thank Anabela Carneiro for providing us with the conversion table between education categories (as defined in QP) and number of years of schooling.

A-4. Definitions

Some concepts are recurring in the explanation of a majority of the tables and figures. We define them here.

Firm-level variables

Firm Age Firm age at time t is equal to the difference between t and the year (minus one) the firm was created. The year the firm was created is replaced to missing whenever it is earlier than 1600.

Firm Export Status We divide firms into new, never, continuing, exiting and other exporters. Firm f at time t is a new exporter if the firm exports in t but not in $t - 1$. If the opposite happens, the firm is an exiting exporter at time t . If the firm exports both

in $t - 1$ and in t it is a continuing exporter in t . If the firm does not export neither in $t - 1$ nor in t then it is a never exporter in t . If the firm is not observed in $t - 1$ then we classify it as other exporter in t . Never exporter is the reference category in the wage analysis.

Firm Productivity Firm (apparent labor) productivity at time t is equal to the (log) ratio between total sales (sales in the domestic market plus exports) and the number of all workers employed by the firm as resulting from the firm record.

Firm Size Firm size at time t is equal to the number of all workers employed by the firm as resulting from the firm record.

Foreign Ownership A firm is defined as foreign-owned if 50 percent or more of its equity is owned by a non-resident.

Industry-level Exports They are obtained aggregating HS6 codes export data from the BACI dataset provided by CEPII (Centre d'Etude Prospectives et d'Informations Internationales) and represent (log) aggregate exports of Portugal of products belonging to Nace rev.1 2-digit industries.

Share of Skilled Workers Share of firm's workers with 12 or more years of education.

Worker-level variables

Hourly Wage (Log) hourly wage is computed adding base and overtime wages plus regular benefits (at the month-level) and dividing by the number of regular and overtime hours worked in the reference week multiplied by 4.3. We apply a trimming of the top and bottom 0.5 per cent. Regular and overtime hours worked are set to (i) missing if (individually) greater than 480 per month, (ii) to zero if negative.

Hiring Date The year the worker was hired in the firm is a variable that is directly registered in QP. Since there are few instances when the hiring date changes from year to year for the same worker-firm spell, we create a robust version of the hiring date computed using the mode for each firm-worker spell. If there is a tie, we take the minimum year in the spell.

Tenure This variable is measured as the difference between the current year and the hiring date.

Country-groups

We partition export destinations into seven groups: Spain, other top 5 export destination countries (Italy, UK, France, and Germany), other EU countries (Austria, Belgium or Luxembourg, Denmark, Finland, Greece, Ireland, Netherlands, Sweden), OECD countries not belonging to the EU (USA, Australia, Canada, Switzerland, Czech Republic, Hungary, Iceland, Japan, South Korea, Mexico, Norway, New Zealand, Poland, Slovakia, Turkey), countries belonging to the Community of Portuguese Language Countries (CPLP in Portuguese—Angola, Brazil, Cape Verde, Guinea-Bissau, Mozambique, Sao Tome and Principe, and Timor-Leste), China, and the rest of the World. We adopted this partition because of the following reasons. First, Portugal is an economy deeply rooted into the European market. EU countries are special and we further divide them into top 5 destinations (based on the number of Portuguese exporting firms, as well as total exports, in 2005) and other EU countries. The strong cultural ties and proximity to Spain also require attention which is why we separately

consider Spain. Exports to OECD as compared to non-OECD countries are likely to be different in terms of both exported products and quality range. At the same time, China and countries sharing language ties with Portugal are also likely to be characterized by different exports patterns.

Product-groups

We use Harmonized System classification (HS codes) to divide products into 100 two-digit categories ranging from live animals to works of arts, collectors' pieces and antiques. The Harmonized system is the most reliable and systematic way to classify products into sub-categories and it allow us to track products traded across countries. All existing products can be classified into the HS classification and under the HS convention, contracting parties have to base their tariff schedules on the HS nomenclature, although parties can set their own rates of duty.

A-5. High-dimensional fixed effects

All specifications in the paper are estimated with OLS. With large data sets, estimation of a linear regression model with two high-dimensional fixed effects poses some computational challenges (Abowd et al., 1999). However, the exact least-square solution to this problem can be found using an algorithm, based on the "zigzag" or full Gauss-Seidel algorithm, proposed by Guimarães and Portugal (2010). We use, for our estimations, the Stata user-written routine `reg2hdfe` implementing Guimarães and Portugal (2010)'s algorithm; this routine has also been used in Carneiro et al. (2012), and Martins and Oromolla (2012). The main advantage of this routine is the ability to fit linear regression models with two or more high-dimensional fixed effects under minimal memory requirements. Moreover, the routine provides standard errors correctly adjusted for the presence of the fixed effects. We apply the `reg2hdfe` routine setting the convergence criterion for the iteration method to 0.001. As we are not interested in worker and/or firm fixed effects per se, we keep all observations for which covariates are available and not the largest connected group.