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ABSTRACT

Globalization and Firm Performance*

Using a new panel dataset of about 140 thousand Portuguese firms during 2006-2019, we measure the effects of globalization on firm-level performance along four dimensions: ownership of capital, employment of foreign-seasoned managers, and participation in export and import markets. Once at least one of these channels is active, firms are larger, less leveraged, employ better qualified workers, and pay higher hourly wages. We also uncover a pecking order of effects, with export-market participation having generally larger positive effects on productivity and negative effects on unit labor costs. All four channels interact, sometimes complementing, sometimes substituting one another. For instance, foreign ownership boosts exports at the extensive margin while being an importer and/or having a foreign-experienced manager help at the intensive margin; conversely, the marginal productivity gains of foreign-ownership are greatly reduced when the firm is already an exporter. Breaking down the effects of each channel by firm size, we show that smaller firms stand the most to gain from export market participation and foreign-ownership.

JEL Classification: D22, D24, F23, G34, J3, L20, M10

Keywords: foreign direct investment, entrepreneurship, trade, productivity, wages, labor costs, leverage, firm size distribution

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1 Introduction

The ascent of global trade and financial integration in recent decades has ignited a growing academic literature on whether and how the globalization of firms' operations has affected their performance. Various metrics of performance including profitability, productivity, size growth, and wages have been examined as well as the mechanisms through which such improvements (if any) materialize (see De Loecker and Goldberg, 2014, for a review and further references). In principle, one should expect that higher exposure to competitive world markets - with a greater mass of firms competing in each market segment - would tend to improve firm performance (see Wagner, 2007, for an extensive review on the association between exports and productivity). Analogously, one might reasonably expect that greater access to capital by foreign firms (notably through Foreign Direct Investment, FDI), would also improve performance.

Yet, existing empirical research has shown mixed evidence. Earlier studies uncover positive effects on profitability but the effects of foreign ownership has been shown to be context-dependent. For instance, Guadalupe et al (2012) find that the effects of foreign ownership on the total factor productivity of Spanish firms has been significant, whereas Chari, Chen and Dominguez (2012), analyzing the effects of foreign acquisition of US firms by emerging investors find that profitability rises but sales and employment decline, likely reflecting post-acquisition restructuring. Using a broad sample of Italian firms, Bentivogli and Mirenda (2017) find positive effects on profitability and size, but those are limited to service firms, which are more protected from the international competition; they also find that such effects are dependent on the origin of the foreign capital - in particular take-over from tax-haven countries yields no performance gains. Also making use of data from Italy, but focusing instead on outward FDI, Borin and Mancini (2016) find that firms that acquire foreign business tend to grow faster, become more profitable, more productive and pay higher wages, but also that these effects are very heterogeneous, depending on the country of destination of the investment and the sector in which the firm operates. Using a wider dataset spanning several EU countries, Bruno and Cipolina (2018) find FDI effects on performance that are mostly positive but small in magnitude. This result echoes that of Fons-Rosen et al (2021) for a sample of eight EU countries, who find small positive effects on productivity that are gradual and significant only after four years of acquisition - and even then, only when the acquisition takes the form of majority ownership.

A more specific channel through which foreign participation may affect performance is through management decision-making and implementation of exporting strategies (Gomez-Mejia, 1988). Firms with internationally experienced managers are better able to develop expectations and build assumptions about the potential problems and op-

portunities associated with foreign markets (Reid, 1981; Stucki, 2016). However, differences in management practices between foreign and domestic firms might hamper the ability of domestic firms to incorporate the knowledge and skills gained by employees in foreign firms (Sofka et al., 2014; Distel et al., 2022).

As with foreign ownership, productivity gains from “learning by exporting” are not plainly acknowledged as a stylized fact. The main challenge in any attempt to measure productivity gains for firms that start to export has to do with the self-selection problem that more productive firms are also the ones more likely to export. Indeed, a large share of the variation in entry (in foreign markets) across firms is due to unobserved characteristics (Eaton et al., 2008). Further, entry costs such as research into foreign markets, the construction of sales networks, and past success are large determinants of firms’ exports (Bernard and Jensen 2004). In short, larger and more productive firms tend to export more, all else constant. This is consistent with theoretical models as in Melitz (2003) and Helpman et al. (2004), and empirical evidence elsewhere (see for example Farinas and Martín-Marcos 2007 or Todo 2011). Yet, once an effort is made to control for such a by-directional causality, García et. al. (2012), Berthou et al. (2015), Munch and Schaur (2018) show that exports boost productivity. In a similar vein, Nazar and Saleem (2009) find that management orientation toward exports aids performance, while Bastos and da Silva (2010) show that export market participation also increases the quality of goods produced – an often overlooked aspect of standard productivity measurement.

Considerably less discussed but no less relevant is the effect of access to import markets on these various performance metrics. For instance, importing intermediate inputs of higher quality can lead to an increase in firms’ productivity (Bas and Strauss-Khan 2014) and help firms to participate in export markets (Hummels et al. 2001; Yi 2003; Strauss-Khan 2004). Bas and Strauss-Khan (2015) find empirical evidence that firms exploit trade liberalization to upgrade the quality of their inputs and consequently improve the quality of their exported products. Similarly, to foreign ownership and export market participation, evidence of self-selection into import markets has been documented by Farinas and Martín-Marcos (2010).

This paper contributes to the extant literature on three fronts. First, and unlike previous papers, we jointly examine the effects of the various globalization channels – namely foreign ownership, export- and import-market participation, as well as previous foreign-management experience – on performance. On the one hand, this allows us to establish a pecking order of their importance, if any, which has implications for the policy debate on “how to globalize”. For instance, it might be more efficient for policymakers to stimulate globalization via incentives to boost exports vs. incentives to attract FDI

or to create incentives for bringing in managers with international experience. On the other hand, jointly examining the various globalization channels in the same model allows us to assess the extent to which these different channels complement or substitute one another.

The second contribution lies in pursuing these questions using a rich dataset comprising about 140 thousand Portuguese firms. Our dataset is not only cross-sectionally broader (and thus more macro-economically representative) than those used in previous studies but also has a sizable time dimension spanning 14 years, from 2006 to 2019. Such a time coverage allows us to study the effects of globalization on firm performance across the globalization cycle by contrasting the globalization peak of 2006-07 with the de-globalization spell of 2008-12, and its subsequent turn-around until the Covid pandemic crisis. Because these swings have been particularly pronounced in Portugal, our dataset provides a very interesting laboratory to study the effects of globalization on firm performance.

Third, we also consider variables not typically featured in previous studies but which are also of broad interest to policy, such as the role of human capital (as per employees' education levels and managers' experience), leverage (debt/assets ratio), and the ratio of value added to sales as indicative of internal resource usage.

The main results are as follows. First, firms that are foreign-owned and/or that have managers with previous foreign-firm experience, and/or that export and import more than 5% of their sales, tend to be significantly larger, more productive, less leveraged, and remunerate better their employees. Critically, we show that these differences are not due to self-selection: that is, even allowing for the likelihood that foreign investors and managers cherry-pick larger and more productive firms, we still find strong effects.

Second, such performance-improvement effects – and more notably for labor productivity (value added/employment) and unit labor costs (wage to productivity) – are stronger for exposure to export markets. While we estimate a productivity improvement of about 3% in the firm that is an importer or is foreign-owned (averaged across specifications), being an exporter (again defined as exporting more than 5% of sales over the years) boosts productivity by about 5%. With the gains in wages of foreign-ownership and export participation being similar but exporting yielding higher productivity gains, it follows that being a systematic exporter is associated with reduced unit labor costs.

Third, all forms of globalization show significant (economically and statistically) negative effects on leverage and positive effects on labor quality (proxied by the wage rate and educational attainment of the average employee). This suggests that the internationalization of a firm reduces financial risk and helps raise a country's educational

level, or at least increases competition for skilled labor in the domestic economy.

Fourth, we identify complementarities between the four different channels of globalization but also some substitution regarding their effects on performance. In particular, we show that being foreign-owned, having managers with foreign experience, or being an importer boost the extensive margins of exports, whereas only the latter two channels help on the intensive margin. On the other hand, if the firm is already an exporter, making it foreign-owned reduces the marginal effect of being an exporter on performance; that is, there are decreasing marginal gains of adding such an extra globalization channel.

Finally, breaking down the effects by firm-size bins, we find that firms in the first quartile of the size distribution stand the most to gain from foreign-ownership, becoming an exporter, and/or having a foreign-seasoned manager.

The remaining of the paper is divided as follows. Section 2 discusses the construction of the dataset whereas its main descriptive features regarding the breakdown between more vs. less globalized firms and between sizes categories are presented in Section 3. Section 4 discusses the econometric approach, which is followed by the presentation of regression results in Section 5. Section 6 concludes with a summary of the findings and policy implications.

2 Dataset

Our dataset includes data from the Integrated Business Accounts Systems (*SCIE* – *Sistema de Contas Integradas das Empresas*) which contains firm-level administrative data, including balance sheet and other accounting data, information on turnover, value-added, labor costs, total costs, leverage, debt, total assets, number of employees, the value of exports and imports and the share of equity owned by foreign holders. These data are available on a yearly basis for the population of firms in the private sector, from 2006 to 2019 (about 400 thousand firms per year). We merge it with data from *Firm's Personnel Records* (*QP* – *Quadros de Pessoal*) which is a linked employer-employee dataset, available between 1985 and 2019, gathered through a mandatory annual survey. It provides data on all workers in all Portuguese non-financial firms (excluding the public sector) with at least one wage earner (about three million workers per year).

The merged dataset includes information on workers' formal education, age, gender, occupation, monthly wage, hours of work (regular and overtime), and the type of labor contract. We then calculate productivity as the ratio of value-added to employment (number of workers). We define firms as exporters (or importers) in a given year if their

ratio of exports (or imports) to sales is at least 5% that year and the average ratio over the sample period is at least 2%.¹

Firms are considered foreign-owned if the share of equity owned by foreign holders is at least 50% - a standard threshold used in the literature. We consider a worker a manager if her professional occupation according to the *Portuguese Classification of Occupations 2010* falls into one of the following categories: firm managing director, director of administrative and commercial services, director of production and specialized services.² Using information from the *Firm's Personnel records*, we track the path of each manager and create a dummy variable to identify firms with managers with previous experience in foreign-owned firms. We group sectors by the Portuguese industry classification which is harmonized with the NACE Rev.2 convention at the first level, and regions by NUTS II.

Firms are classified according to their size as per the European Commission (EC) recommendation 2003/361. Because this is a pan-European classification, and thus invariant to country size, it can bias the respective size-bin distribution for a small country like Portugal toward larger participation of micro firms in the size-distribution spectrum – an issue to which we shall return later in the paper. All variables measured in monetary units were deflated using *Statistics Portugal's* official year-end consumer price deflator and transformed in logs, except for the ratios (value-added to sales, total firm wages to productivity, and exports to sales).

Lastly, all continuous variables were winsorized at the 1% and 99% levels to control for outliers. Excluding one-person enterprises and considering only firms with non-missing observations in the set of observables of interest led to a dataset with 2,035,644 data points, and an average of 145,403 firms per year.

3 Descriptive Statistics

Table 1 compares the main characteristics of the average firm with those of internationalized firms – defined as those that are foreign-owned, and/or have managers with previ-

¹An alternative criterion used by the Bank of Portugal (Statistical Bulletin No.10, June 2015) is to classify a firm as an exporter if the ratio of exports to turnover is at least 50% or, alternatively is at least 10% and the value of exports exceeds 150000 euros. This criterion would classify as exporters about 8% of the firms in our dataset, while our criterion yields approximately 10% of the firms. So, our criterion is slightly more lenient than that of the Bank of Portugal but is more stringent to that found in other papers that classify as an exporter any firm that exports part of their sales or turn-over at any given year. As shown in the next section (see Figure 2A), the 5% export/sale ratio appears to be a critical threshold in the firm size distribution.

²This classification is integrated in the latest International Standard Classification of Occupations (ISCO/2008).

ous foreign-firm experience, and/or export and import more than our chosen threshold.³ The internationalized firm tends to be larger, more productive, remunerate better its employees, use more skilled labor, and be less leveraged. Foreign-owned firms have, on average, 7.7 times the turnover, generate 6 times the value-added, and employ 4.4 times more, being 2.4 times more productive when compared with the average firm. They also tend to remunerate 2.1 times better and their average employee education is 30% higher. Moreover, foreign-owned firms are 4 to 5 times more likely to engage in international trade via exports and imports and they export/import more both in absolute terms and relative to sales or value-added.

Being an exporter or an importer is also associated with superior performance on a range of indicators. They generate around 3 times the value-added and turnover, are 50% more productive, have 2.6 and 2.2 times more employees, pay 30% higher wages (80% relative to productivity), are 4 and 4.7 times more likely to be foreign-owned and 2.3 times more likely to have a manager with previous experience in foreign-owned firms. The positive unconditional correlation between foreign trade engagement and firm size and productivity is in line with earlier cross-country evidence, including for Portugal (Bernard and Jensen, 1999; De Loeker, 2007; Berthou et al. 2015; Guimarães, 2020; and other references therein).

Table 1: Differences in Mean for Selected Indicators Across Firm Groups

Variable (Measurement Unit)	Ratio to average								
	Average per firm	Foreign	Exporter	Importer	Micro	Small	Medium	Large	
GVA (1000 €/year)	291	6.0	2.9	2.7	0.3	1.6	7.4	15.9	
Sales (1000 €/year)	1283	7.7	3.1	3.3	0.2	1.3	8.2	24.6	
GVA / Sales	0.39	0.9	0.9	0.7	1.0	1.0	0.9	0.6	
Productivity (1000€/worker/year)	22	2.4	1.5	1.5	0.9	1.2	1.9	2.7	
Number of employees	11.9	4.4	2.6	2.2	0.4	1.6	6.0	15.0	
Firm Age (years)	15.5	1.2	1.1	1.2	0.9	1.2	1.5	1.8	
Employees' Schooling	9.5	1.3	1.0	1.1	1.0	1.0	1.0	1.1	
Hourly Wage (€)	5.1	2.1	1.3	1.3	0.9	1.1	1.5	1.9	
Wages/Productivity	1.0	0.9	0.8	0.9	1.1	0.9	0.8	0.7	
Export Value (1000 €)	166.5	10.0	8.9	5.3	0.1	1.3	10.9	22.7	
Import Value (1000 €)	162.4	14.8	5.0	7.6	0.1	1.3	10.3	25.4	
		Share in total Firms							
Exporter Status	10.3%	4.2	9.7	3.4	0.6	1.8	3.5	3.6	
Importer Status	12.0%	4.7	3.4	8.4	0.7	1.5	2.9	3.6	
Foreign Ownership	2.0%	49.4	4.2	4.7	0.3	1.6	6.3	13.7	
Manager w/F. Exp	3.6%	7.4	2.3	2.3	0.7	1.2	4.1	10.5	

Notes. The first column of the table shows in its upper part, averages over the entire 2006-2019 period per firm. The lower part shows the proportion of firms that are exporters, importers, foreign-owned and have a manager with previous experience in foreign-owned firms in the overall sample. The remaining columns show the ratio of the respective category means to the average shown in the first column. *Source:* own computations using data from QP and SCIE.

As we will discuss in the next section, however, these prima-facie associations do not necessarily imply causality, among other things because of self-selection – *i.e.*, firms that are more productive are more prone to become foreign-owned and firms that are

³Further descriptive statistics are presented in the Appendix, Table A.1.

more productive also tend to export and import more. Indeed, as we shall show, the seemingly higher productivity associated with foreign-ownership becomes less significant once we control for other determinants of productivity and the timing of the acquisition, perhaps because foreign investors cherry-pick domestic firms, targeting the ones with higher productivity (Guadalupe *et al.*, 2012, Bastos *et al.*, 2018, and Fons-Rosen *et al.*, 2021). Regarding the positive correlation between size, productivity and the exporter status, the reverse causality running from size and productivity to being an exporter is consistent with the Melitz (2003) and the Helpman *et al.* (2004) models, which postulate that firms can only become exporters once they overcome some productivity/size threshold that lowers sufficiently the fixed cost (per unit of produce) of becoming an exporter.

Another salient feature of our dataset is a large number of micro-sized firms (as per the pan-european guideline of size definition in EC 2003/361). These represent more than 70% of all firms in our sample, albeit accounting for less than 20% of the total turnover and less than 30% of all employment – see Figure 1A. Echoing the descriptive statistics of Table 1, Figure 1B shows that foreign-owned and exporting/importing firms are larger, which in turn may explain why the average foreign-owned (exporting/importing) firm has performance indicators more aligned with those of larger firms.

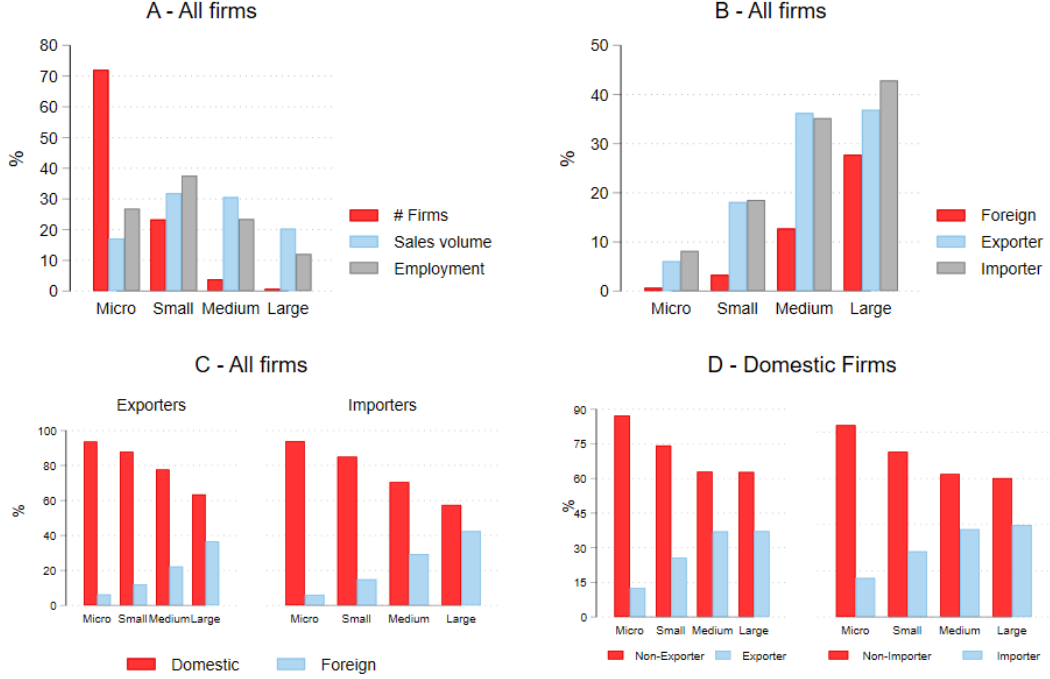
Moreover, we also find evidence that size – as a short-hand for all performance indicators – may explain some of the correlation between foreign ownership and participation in international trade. Exporter and importer firms are more abundant within medium-large firms (Figure 1B and Figure 1D), and exporter/importer firms that are also foreign-owned are also more abundant within these size categories (Figure 1C).

The association between being larger and exporting more is further reinforced by the path of the blue line depicted in Figure 2a, which shows that the top 10% of the size distribution of our data accounts for about 85% of total exports. The red bars in Figure 2a in turn show that the share of foreign-owned firms in our data reaches its top (about 13%) precisely in that top decile of the cumulative size distribution (as measured by the value of sales). Further, Figure 2B shows that the steep rise in the same blue line toward the end of the size (sale) distribution is associated with a higher ratio of export to sales. In short, very large firms export far more per unit of sales (17% on average) than other firms.

4 Econometric approach

For the reasons alluded to above, disentangling the association between firm performance and internationalization – via foreign ownership, foreign management or direct

Figure 1: Distributions across size categories by firm status

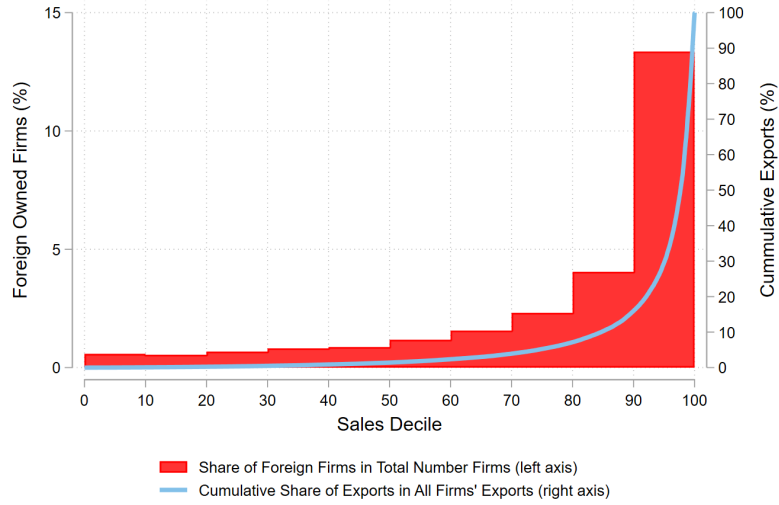


Notes. Panel A shows the distribution of the total number of firms, sales volume and employment across size categories in the overall sample. Panel B shows the percentage of firms that are foreign-owned, exporters and imports within each size category. Panel C shows the percentage of foreign-owned/domestic firms within each size category for the subsets of exporter (left) and importer (right) firms. Panel D shows the percentage of exporter/non-exporter and importer/non-importer firms per size category of the subset of domestic firms. The size classification follows the EU recommendation 2003/361. *Source:* authors' own computations using data from QP and SCIE.

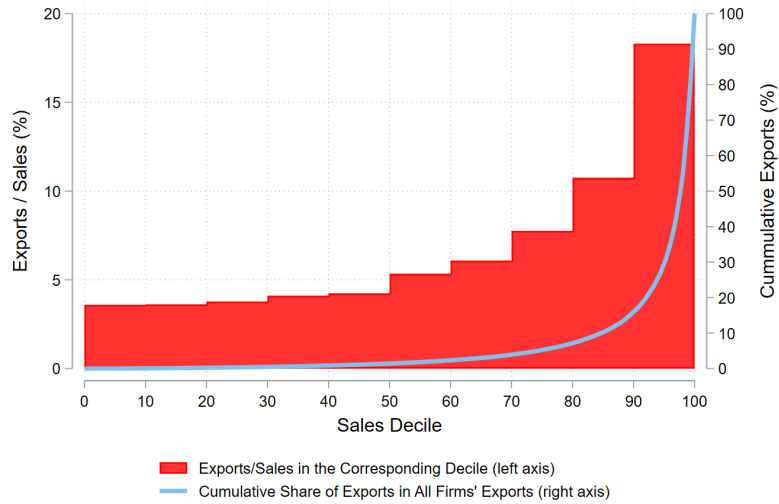
participation in foreign markets – can be sensitive to the timing of events and control for many possible intervening variables. So, proper model specification is critical. Given that existing theories offer incomplete and sometimes conflicting guidance on what variables matter, the way they interact, and the existence of lagged effects, it is therefore sensible to start from a fairly general specification which includes individual and joint effects, allowing also for possible lags:

$$\begin{aligned}
 y_{i,t} = & \beta_F Foreign_{i,t-1} + \beta_{FM} FManager_{i,t-1} + \beta_E Exp_{t-1} + \beta_I Imp_{i,t-1} + \\
 & \rho y_{i,t-1} + \gamma_{FExp} Foreign_{i,t-1} \times Exp_{i,t-1} + \gamma_{FImp} Foreign_{i,t-1} \times Imp_{i,t-1} + \\
 & \gamma_{ExpImp} Exp_{i,t-1} \times Imp_{i,t-1} + \gamma_{FExpImp} Foreign_{i,t-1} \times Exp_{i,t-1} \times Imp_{i,t-1} + \\
 & \phi_i + \lambda_t + \varepsilon_{i,t} \quad (1)
 \end{aligned}$$

Figure 2: Cumulative exports and share of foreign-owned firms by sales decile



(a) Share of foreign-owned firms in the total number of firms in red bars (measured by the left axis) and the cumulative share of exports in all firms' exports in the blue line (measured by the secondary axis), by sales decile. Source: own computations using data from QP and SCIE.



(b) Average exports per unit of sales in the corresponding sales decile in red bars (measured by the left axis) and the cumulative share of exports in all firms' exports in the blue line (measured by the secondary axis), by sales decile. Source: own computations using data from QP and SCIE.

where $y_{i,t}$ is the level of some outcome variable regarding firm i at time t , $Foreign_{i,t-1}$, $FManager_{i,t-1}$, $Exp_{i,t-1}$ and $Imp_{i,t-1}$ are dummy variables that flag if the firm was foreign-owned, had a manager with previous experience in foreign-owned firms, was an exporter and was an importer in the previous year respectively. We lag our independent variables of interest by one year to mitigate the problem of reverse causality running from the dependent to the independent variables. The natural assumption here is

that it takes at least one year for the effects of foreign ownership and foreign market participation to affect the dependent variable. The presence of the lagged dependent variable in our empirical model allows for the possibility of more protracted effects.

If anything for comparability with previous studies, we start with the standard firm (ϕ_i) and year (λ_t) fixed effects (FE) specification, setting the auto-regressive term to zero, i.e., making $\rho = 0$. The year FE is especially important in the present context as our dataset spans a period of a deep recession (2010-13) followed by a marked recovery of the Portuguese economy (2014-19) which entailed common changes across firms due to the macro business cycle. Firm fixed effects are in turn critical to mitigating the so-called “selection biases” due to cherry-picking of higher performance firms by foreign investors for reasons that we do not have information on – for example, the firm’s initial productivity, whether it has some form of pre-existing contact network or location that allows it to tap more easily foreign markets, or have some special acquaintance with foreign investors that make it more likely to be acquired or become a major exporter or importer. Ignoring those unobserved characteristics could bias our estimates toward finding an unwarranted causality between globalization and performance.⁴

Despite the many advantages of the standard FE specification, it is nevertheless important to take time-varying features into proper account, particularly because of the non-negligible time dimension of our panels. This is not solved by simply lagging our independent variables by one year in the standard FE model. After all, foreign ownership and foreign market participation may be themselves determined by the evolution of the firm characteristics in previous years. We address this shortfall of the FE model using two other alternative econometric approaches.

A way to control time variations in the decision to become foreign-owned, to hire a manager with foreign experience, and/or to become an exporter or an importer, is to allow $\rho \neq 0$ in our econometric specification. In this case, the estimates β ’s represent the short-term effects of a change in status in the respective independent variable. The respective long-run effect is computed by dividing the β by $(1 - \rho)$, where ρ is the estimated coefficient on $y_{i,t-1}$. By including the lag of the dependent variable in our regression, any changes already taking place in the firm prior to the change of status

⁴However, it is important to note that the FE specification captures only within firm changes, so it has the drawback of neglecting cross-firm differences. This can lead to an underestimation of the effect of being foreign-owned or being more foreign-trade engaged. To see this, consider two initially identical firms except that firm A is foreign owned and firm B is not. Assume that firm A’s productivity increases at a faster rate than that of firm B. The FE model will discard these firms, since there was no change in their ownership status, and miss to account the fact that firm A’s productivity would end-up increasing more as result of being foreign owned. Yet, the FE specification has the advantage of capturing both unobserved and observed static heterogeneity which are deemed to be determinants of foreign acquisition and participation in foreign markets.

should be – at least partially - absorbed by the coefficient of the lagged dependent variable thus mitigating the problem of selection on time-varying features.

However, the combination of a first-order lagged dependent variable specification with firm FE is affected by the Nickell Bias. In our case, however, since the time dimension of our panel is not too low ($T=13$) this bias should not be particularly pronounced, but still not entirely absent. The presence of a lagged dependent variable also creates a bias in the presence of coefficient heterogeneity across firms, as discussed in Pesaran and Smith (1995). This is because if betas are systematically heterogeneous across firms, imposing commonality of betas, leads the deviations between the firm-specific “true” beta being absorbed by the regression residual which in turn will be correlated with $y_{i,t-1}$ for the firm question, leading to inconsistent estimation of the betas.

An alternative and increasingly popular approach to the problem of time-varying selection bias is the so-called propensity-score weighting approach (see Guadalupe et al., 2012, for an implementation of this approach in a related study using Spain’s micro-data). The idea is that for each year, firm characteristics summarized by a set of observables (here to be defined as productivity, sales, sales growth, average wage, total assets, assets per worker, the ratio of debt to assets, average employee education) and a time trend (for all firms specific to the sector wherein the firm operates) are used to estimate a theoretical probability of a change of status (to foreign-owned, having a foreign-experienced manager and start participating in export/import markets) which is the so-called propensity-score (\hat{p}). Each treated observation is assigned the weight of $1/\hat{p}$ in the year of treatment and each control observation is assigned the weight of $1/(1 - \hat{p})$. For the case of control firms, the weights are summed at the firm level to obtain each firm’s weight (Lechner 1999). This essentially weighs down observations that correspond to the foreign acquisition of “superstar firms”, as well as those observations higher-performing firms that become exporters/importers and that are more successful in attracting foreign-seasoned managers. To make this propensity score approach operational in our sample, we drop all sectors for which we observe less than 25 acquisitions; the sample is also restricted to contain only firms that start as domestic and remove those that revert the foreign acquisition at any point in time. So we are left with firms that started as domestic and remained domestic throughout (a subset of control observations) and firms that were acquired and remained foreign until our last year of observation (a subset of treated observations). We also impose the common support option and winsorize the propensity score estimates at 99% to avoid the over-representation of a few control observations. Within each sector, for each firm-year pair, we estimate the probability of a status change using a Probit model based on a set of firm observable characteristics before the potential change. The estimated probability

for each firm-year pair is our propensity score.

Naturally, this procedure is as good as our choice of controls that make foreign acquisition, foreign management experience, or becoming a foreign trader, a random intervention capable of explaining size or performance. Else we cannot fully eliminate the self-selection bias that this approach purports to address. Further, the approach suffers from the limitation that it disregards the transitions of foreign firms to domestic ownership.

In a nutshell, all these distinct econometric approaches have advantages and disadvantages relative to one another. So, the strength of our results will largely hinge on the consistency of results across these distinct approaches. We discuss such results next.

5 Results

5.1 Effect on firm size

We first look at the effects of our four globalization channels on firm size. We measure the latter by either (the logs of) sales, employment, total assets and value-added. The thrust of the results is the same, so, to save on space, we opted to only report the regression results for sales. The results for columns 1 to 3 in Table 2 show that foreign ownership increases sales by around 10%. The effect is even larger for the other three channels of globalization, with having a foreign-experienced manager, being an exporter or importer having the largest individual effect on size at 14.4%, 13.4% and 12.7%, respectively.

Column or “Model” 4 allows for interactions between being foreign-owned and being an exporter or an importer, i.e., we allow the gammas in the econometric specification of equation (1) in the previous section to be different from zero.⁵ The negative sign and significance of γ_{FExp} points to a decreasing marginal return of becoming an exporter when the firm is already foreign-owned or, alternatively, becoming foreign-owned when the firm is already an exporter, in the latter the overall effect on size being down to about 2% ($=0.133-0.114$).

However, we do not find such attenuation when a foreign firm becomes an importer, as $\gamma_{FImp} = -0.012$ with a t-statistic of 0.9. Yet, with $\gamma_{ExpImp} = 0.02$ ($t = 2.85$), the effect on size of becoming an importer when the firm was already an exporter is boosted from 13.3% to 15.3%, underscoring the size benefits of becoming a two-way trader. Column or “model” 5 adds a lagged dependent variable implying that the longer-run effects

⁵Interaction terms involving foreign managerial experience were considered and not reported for the sake of concision since they were all insignificant.

Table 2: Estimated effects of globalization on the absolute value of sales

Ln Sales	FE (1)	FE (2)	FE (3)	FE (4)	FE (5)	PS weight (6)
Lag foreign	0.111*** (0.015)	0.101*** (0.015)	0.094*** (0.015)	0.144*** (0.018)	0.031*** (0.010)	0.136*** (0.020)
Lag Manager F. Experience		0.150*** (0.006)	0.144*** (0.006)	0.144*** (0.006)	0.048*** (0.004)	0.171*** (0.009)
Lag exporter			0.134*** (0.004)	0.133*** (0.005)	0.036*** (0.003)	0.149*** (0.006)
Lag importer			0.127*** (0.004)	0.122*** (0.004)	0.042*** (0.002)	0.136*** (0.005)
Lag foreign x Lag exporter				-0.114*** (0.026)	-0.044*** (0.015)	
Lag foreign x Lag importer				-0.012 (0.017)	-0.008 (0.009)	
Lag exporter x Lag importer				0.020*** (0.007)	0.008** (0.004)	
Lag foreign x Lag exporter x Lag importer				0.014 (0.027)	0.007 (0.016)	
Lag Ln Sales					0.549*** (0.002)	
Observations	1652373	1650607	1650607	1650607	1650607	1491113
R-sq.	.048	.05	.057	.057	.38	.038

Notes. Robust standard errors in parenthesis (clustered at the firm level). Significance levels: *, 10 %; **, 5 %; ***, 1 %. All regressions include firm, sector, region and year fixed effects. Foreign, Manager F. Experience, Exporter and Importer are indicator variables that equal one if the firm has at least 50% foreign ownership, has a manager with previous experience in foreign owned firms, exports and imports at least 5% of sales in consecutive years. Ln Sales, is the natural logarithm of real sales. 'F.' stands for foreign. *Source:* own computations using data from QP and SCIE.

need to be calculated by dividing the respective coefficient by $1 - \rho$. So, the long-run sole effect on firms' size of becoming foreign-owned is 7% [=0.031/(1-0.54)], with that of having a foreign-seasoned manager or being an exporter or importer slightly higher at around 8%. So, once again, either of the four globalization channels by themselves alone improves size. Also, as in model 4, we have considerable attenuation when the firm is also an exporter. In fact, the net effect on the size of an exporting firm of it becoming foreign is insignificant. As we shall discuss later, this may be because of strong collinearity in the data between being foreign-owned and being an exporter, which may make it difficult to separate individual effects of the two variables. Also worth noting is the fact that an autoregressive coefficient of around 0.5 implies a half-life of the effects of 1.2 years ($=-\ln(2)/\ln(0.549)$), so that the full-fledged effects work themselves out well within three years.

Finally, model 6 in Table 2 presents the propensity score regression. It points towards even larger effects after controlling for selection on time-varying unobservables with

propensity score weighting. The effect of foreign ownership on size is 13%, managerial experience is 17% exporting about 15% and importing around 13.5%.

To summarize, exposure to all four channels or modes of globalization tends to increase firm size in a significant way. In the case of export and import market participation, the effects add up. In the case of foreign ownership and export market participation, the gains of one channel are attenuated by the other and an interpretation is that having taken the step to be an exporter or foreign-owned, there is a smaller gain size-wise to be both foreign and exporter. As we shall see later, this may well be because foreign ownership itself boosts exports while being an exporter boosts the likelihood of being acquired by foreigners; so it can be difficult to disentangle the two effects econometrically.

5.2 Effect on firm performance

An important indicator of the economic contribution of a firm is how much value it adds to inputs when producing a given unit of output. It is thus important to look not only at total sales or other indicators related to size, but also at the ratio of gross value-added (GVA) per unit of sales. One might conjecture that foreign and exporting firms tend to display lower value-added as they tend to be more reliant on imported intermediate goods. Models 1 to 3 in the first three columns of Table 3 tend to reject that conjecture: foreign ownership and being an exporter do not significantly lower GVA/sales. Subsequent specification 4 shows a negative effect from foreign ownership but at 0.8%, so relatively small. Importantly, when the firm also becomes an exporter, in addition to being foreign-owned, the net effect is positive (2.7 % - 0.8 %) and statistically significant.

Yet, for nationally-owned and non-exporter firms, being an importer is significantly associated with lower GVA/Sales, with the estimated effect being around 1.2%. This is not surprising since importing firms by definition tend to rely more heavily on imported inputs and in addition to being sometimes mere intermediaries, re-selling imports to other local firms. This effect is exacerbated when the firm is also foreign-owned and an exporter.

Turning to labor productivity, all models in Table 4 indicate gains associated with foreign ownership in the order of 2% to 5%, with the propensity score approach approaching statistical significance only at 10%. Looking at column 4, being an exporter yields a higher gain (almost 6 %), but being an exporter and foreign-owned lowers this effect by 3.7 percentage points (pp). Being an importer yields a lower gain than being either foreigner or an exporter, and being an exporter and importer at the same time

Table 3: Estimated effects of globalization on GVA/Sales

GVA / Sales	FE (1)	FE (2)	FE (3)	FE (4)	FE (5)	PS weight (6)
Lag foreign	-0.005 (0.003)	-0.004 (0.003)	-0.004 (0.003)	-0.008* (0.004)	-0.007** (0.003)	-0.008** (0.004)
Lag Manager F. Experience		-0.002* (0.001)	-0.002 (0.001)	-0.002 (0.001)	-0.001 (0.001)	0.001 (0.002)
Lag exporter			-0.001 (0.001)	0.000 (0.001)	-0.000 (0.001)	-0.000 (0.001)
Lag importer			-0.014*** (0.001)	-0.012*** (0.001)	-0.008*** (0.001)	-0.013*** (0.001)
Lag foreign x Lag exporter				0.027*** (0.006)	0.017*** (0.005)	
Lag foreign x Lag importer				-0.006 (0.004)	-0.004 (0.003)	
Lag exporter x Lag importer				-0.004*** (0.001)	-0.003*** (0.001)	
Lag foreign x Lag exporter x Lag importer				-0.017*** (0.006)	-0.011** (0.005)	
Lag GVA/Sales					0.244*** (0.002)	
Observations	1652373	1650607	1650607	1650607	1650607	1491113
R-sq.	.0074	.0074	.008	.0081	.068	.0084

Notes. Robust standard errors in parenthesis (clustered at the firm level). Significance levels: *, 10 %; **, 5 %; ***, 1 %. All regressions include firm, sector, region and year fixed effects. Foreign, Manager F. Experience, Exporter and Importer are indicator variables that equal one if the firm has at least 50% foreign ownership, has a manager with previous experience in foreign owned firms, exports and imports at least 5% of sales in consecutive years. GVA/Sales is the ratio of the firms' value added to sales. *Source:* own computations using data from QP and SCIE.

lowers that gain further. The propensity score type estimates, column 6, corroborate these effects on exporters and importers. In contrast with the results on size (sales), having a foreign-seasoned manager does not boost the productivity of the firm.

Table 5 shows that being globalized increases wages. Being foreign owned and exporter increases wages by about 2%, which is twice as high as being an importer or having a foreign-seasoned manager. Given that wage gains are similar to productivity gains in foreign firms, the ratio of the wage rate to labor productivity (sometimes called unit labor costs) is essentially unaffected by foreign ownership or by having a foreign-seasoned manager. In contrast, because exporting increases productivity by more than it increases the wage rate, Table 6 shows that being an exporter lowers unit labor costs and the effect is relatively large (about 4 %). The results are corroborated, by both the AR(1) model and the propensity score regressions. Importing firms also display a lower wage rate relative to productivity, but the magnitude is considerably lower than for exporters. In short, foreign trade exposure – both on the exporting and

Table 4: Estimated Effects of Globalization on Labor Productivity

Ln productivity	FE (1)	FE (2)	FE (3)	FE (4)	FE(5)	PS weight (6)
Lag foreign	0.025** (0.012)	0.024** (0.012)	0.023* (0.012)	0.047*** (0.015)	0.030** (0.013)	0.021 (0.014)
Lag Manager F. Experience		-0.001 (0.005)	-0.003 (0.005)	-0.003 (0.005)	-0.003 (0.004)	-0.013** (0.007)
Lag exporter			0.051*** (0.003)	0.057*** (0.004)	0.041*** (0.003)	0.055*** (0.004)
Lag importer			0.023*** (0.003)	0.027*** (0.004)	0.020*** (0.003)	0.024*** (0.005)
Lag foreign x Lag exporter				-0.037** (0.017)	-0.034** (0.015)	
Lag foreign x Lag importer				-0.016 (0.014)	-0.012 (0.012)	
Lag exporter x Lag importer				-0.012** (0.005)	-0.010** (0.005)	
Lag foreign x Lag exporter x Lag importer				-0.005 (0.020)	0.000 (0.018)	
Lag Ln productivity					0.189*** (0.002)	
Observations	1652373	1650607	1650607	1650607	1650607	1491113
R-sq.	.024	.024	.024	.024	.061	.023

Notes. Robust standard errors in parenthesis (clustered at the firm level). Significance levels: *, 10 %; **, 5 %; ***, 1 %. All regressions include firm, sector, region and year fixed effects. Foreign, Manager F. Experience, Exporter and Importer are indicator variables that equal one if the firm has at least 50% foreign ownership, has a manager with previous experience in foreign owned firms, exports and imports at least 5% of sales in consecutive years. Ln productivity is the natural logarithm of labor productivity defined as the ratio between the firm's value added and number of workers. *Source:* own computations using data from QP and SCIE.

importing sides - raises wage rates as well as productivity but lowers unit labor costs (wage/productivity).

We now turn to two other effects of globalization that have been less studied. Bastos et al. (2018) show that foreign acquisition leads firms to re-structure, specifically by increasing the number of hierarchical layers within the firm – i.e. leading to higher intra-firm specialization of tasks and management. Our dataset has information to explore a related development – namely, the extent to which firms' internationalization leads the firm to improve the human capital of its labor input. We do that by evaluating the effects of globalization on the average educational level of employees (as measured by number of years or schooling).

Results reported in Table 7 show that having a manager with previous experience in foreign-owned firms is key to increasing the average educational attainment of employees and the estimated magnitude is comparatively large (15% of an extra year). Second

Table 5: Estimated effects of globalization on wage rates

Ln avg. wage	FE (1)	FE (2)	FE (3)	FE (4)	FE (5)	PS weight (6)
Lag foreign	0.017*** (0.005)	0.016*** (0.005)	0.015*** (0.005)	0.022*** (0.006)	0.015*** (0.005)	0.004 (0.007)
Lag Manager F. Experience		0.010*** (0.002)	0.010*** (0.002)	0.010*** (0.002)	0.004*** (0.002)	0.014*** (0.003)
Lag exporter			0.018*** (0.001)	0.021*** (0.001)	0.014*** (0.001)	0.025*** (0.002)
Lag importer			0.007*** (0.001)	0.010*** (0.001)	0.007*** (0.001)	0.012*** (0.002)
Lag foreign x Lag exporter				-0.009 (0.009)	-0.008 (0.007)	
Lag foreign x Lag importer				-0.012* (0.006)	-0.008 (0.005)	
Lag exporter x Lag importer				-0.007*** (0.002)	-0.005*** (0.002)	
Lag foreign x Lag exporter x Lag importer				0.012 (0.010)	0.013 (0.008)	
Lag Ln avg. Wage					0.256*** (0.002)	
Observations	1652373	1650607	1650607	1650607	1650607	1491113
R-sq.	.15	.15	.15	.15	.2	.17

Notes. Robust standard errors in parenthesis (clustered at the firm level). Significance levels: *, 10 %; **, 5 %; ***, 1 %. All regressions include firm, sector, region and year fixed effects. Foreign, Manager F. Experience, Exporter and Importer are indicator variables that equal one if the firm has at least 50% foreign ownership, has a manager with previous experience in foreign owned firms, exports and imports at least 5% of sales in consecutive years. Ln avg. Wage is the natural logarithm of employees average hourly wage. *Source:* own computations using data from QP and SCIE.

to that comes the effect of foreign ownership, followed by participation in export and import markets. Tempering some of the results of the FE specifications, model 4 suggests that the export status effects are less precisely estimated once we control for the lagged dependent variable. Nevertheless, the substantive results are similar across the different estimators and specifications presented in Table 7.

The other less-studied effect of globalization that our dataset allows us to examine pertains to the effects of the four different modes of globalization on firm leverage (as usual, measured as the ratio of debt to assets). A well-documented fact is that higher leverage and related constraints on further borrowing tend to decrease firms' productivity and growth (see for example Manaresi and Pierri, 2017). Arguably more than any other performance indicator considered thus far, leverage is a forward-looking indicator of the firm's capacity to invest and grow, and is known to have been a critical hindrance to the survival of many firms – most notably to small firms in Portugal and much of southern Europe during the financial crisis of 2008-2012 (Kalemli-Ozcan et

Table 6: Estimated effects of globalization on unit labor costs

Wages/ Productivity	FE (1)	FE (2)	FE (3)	FE (4)	FE (5)	PS weight (6)
Lag foreign	0.001 (0.018)	0.001 (0.018)	0.002 (0.018)	-0.006 (0.023)	-0.001 (0.022)	-0.012 (0.019)
Lag Manager F. Experience		0.005 (0.007)	0.006 (0.007)	0.006 (0.007)	0.006 (0.007)	0.017** (0.009)
Lag exporter			-0.041*** (0.004)	-0.042*** (0.005)	-0.036*** (0.005)	-0.027*** (0.006)
Lag importer			-0.011** (0.004)	-0.011** (0.005)	-0.009* (0.005)	0.006 (0.007)
Lag foreign x Lag exporter				0.009 (0.027)	0.012 (0.025)	
Lag foreign x Lag importer				-0.008 (0.022)	-0.008 (0.021)	
Lag exporter x Lag importer				-0.001 (0.007)	-0.000 (0.007)	
Lag foreign x Lag exporter x Lag importer				0.031 (0.031)	0.026 (0.029)	
Lag Wage/Productivity					0.089*** (0.003)	
Observations	1652360	1650594	1650594	1650594	1650584	1491106
R-sq.	.017	.017	.017	.017	.025	.017

Notes. Robust standard errors in parenthesis (clustered at the firm level). Significance levels: *, 10 %; **, 5 %; ***, 1 %. All regressions include firm, sector, region and year fixed effects. Foreign, Manager F. Experience, Exporter and Importer are indicator variables that equal one if the firm has at least 50% foreign ownership, has a manager with previous experience in foreign owned firms, exports and imports at least 5% of sales in consecutive years. Wage/Productivity is the ratio of the total wage bill relative to value added. *Source:* own computations using data from QP and SCIE.

al., 2018). At a more macro level, this inquiry is also relevant to the policy debate highlighting the need to promote foreign-ownership and FDI as an alternative and less risky form of external financing.⁶

Table 8 shows that foreign ownership is associated with a decrease in the ratio of Debt-to-Assets of more than 4% across specifications. We find similar effects in relative magnitude for the participation in export markets. The managerial and importer effects are also negative and statistically significant, yet with generally less than half the magnitude of the former. Our findings are therefore overwhelmingly supportive of the role of globalization – through all its distinct channels – in reducing firm leverage. To the extent that high leverage exacerbates financial constraints and those inhibit firm investment and productivity growth (Moll, 2014; Duval et al, 2017), globalization therefore also has a positive effect on firm performance by lowering leverage.

⁶See Catão and Milesi Ferretii (2014) for macroeconomic evidence on foreign debt leverage and crisis risk

Table 7: Estimated effects of globalization on employee education

Avg. Schooling	FE (1)	FE (2)	FE (3)	FE (4)	FE (5)	PS weight (6)
Lag foreign	0.056** (0.027)	0.047* (0.027)	0.046* (0.027)	0.094*** (0.035)	0.039* (0.021)	0.065** (0.030)
Lag Manager F. Experience		0.153*** (0.011)	0.152*** (0.011)	0.152*** (0.011)	0.027*** (0.007)	0.179*** (0.018)
Lag exporter			0.015** (0.007)	0.011 (0.008)	0.009 (0.005)	0.013 (0.011)
Lag importer			0.024*** (0.007)	0.022*** (0.008)	0.010** (0.005)	0.026*** (0.011)
Lag foreign x Lag exporter				-0.053 (0.037)	-0.034 (0.023)	
Lag foreign x Lag importer				-0.074** (0.029)	-0.035* (0.018)	
Lag exporter x Lag importer				0.017 (0.012)	0.012 (0.007)	
Lag foreign x Lag exporter x Lag importer				0.033 (0.041)	0.033 (0.025)	
Lag Education (Avg.)					0.507*** (0.002)	
Observations	1652373	1650607	1650607	1650607	1650607	1491113
R-sq.	0.098	0.098	0.099	0.099	0.34	0.12

Notes. Robust standard errors in parenthesis (clustered at the firm level). Significance levels: *, 10 %; **, 5 %; ***, 1 %. All regressions include firm, sector, region and year fixed effects. Foreign, Manager F. Experience, Exporter and Importer are indicator variables that equal one if the firm has at least 50% foreign ownership, has a manager with previous experience in foreign owned firms, exports and imports at least 5% of sales in consecutive years. Education (Avg.) is the employee average years of schooling. *Source:* own computations using data from QP and SCIE.

5.3 Effects on the intensive and extensive margins

The above results show that the effects of foreign ownership and participation in export markets on performance are generally significant across specifications than those of foreign managerial experience and of being an importer, with being an exporter having an edge in some cases over foreign ownership. However, one important dimension to be evaluated is the existence of potential spillovers from foreign ownership and managerial experience on trade engagement. We examine that on two fronts. First, we consider being an exporter or importer as a categorical variable (=1 when the firm is an exporter or importer and zero otherwise); these will be on the left-hand side of what we call regressions that determine the so-called extensive margin of participation in foreign goods markets. Needless to say, the estimation data is then restricted to firms that enter our sample as non-exporters (or non-importers). The second front focuses instead on the ratio of export (or import) over sales and, in that case, spans all firms. We call that our intensive-margin regressions.

Table 8: Estimated effects of globalization on Leverage

Debt/Assets	FE (1)	FE(2)	FE (3)	FE (4)	FE (5)	PS weight (6)
Lag foreign	-0.047*** (0.010)	-0.046*** (0.010)	-0.044*** (0.010)	-0.048*** (0.013)	-0.010 (0.008)	-0.051*** (0.012)
Lag Manager F. Experience		-0.015*** (0.005)	-0.013*** (0.005)	-0.013*** (0.005)	-0.003 (0.003)	-0.016*** (0.007)
Lag exporter			-0.047*** (0.003)	-0.046*** (0.003)	-0.018*** (0.002)	-0.049*** (0.003)
Lag importer			-0.019*** (0.002)	-0.017*** (0.003)	-0.004*** (0.001)	-0.034*** (0.004)
Lag foreign x Lag exporter				0.008 (0.016)	0.008 (0.009)	
Lag foreign x Lag importer				-0.019* (0.012)	-0.012* (0.007)	
Lag exporter x Lag importer				-0.007* (0.004)	-0.004** (0.002)	
Lag foreign x Lag exporter x Lag importer				0.035* (0.018)	0.016 (0.010)	
Lag Debt/Assets					0.672*** (0.003)	
Observations	1651579	1649813	1649813	1649813	1649783	1490905
R-sq.	0.0064	0.0064	0.0068	0.0068	0.42	0.0038

Notes. Robust standard errors in parenthesis (clustered at the firm level). Significance levels: *, 10 %; **, 5 %; ***, 1 %. All regressions include firm, sector, region and year fixed effects. Foreign, Manager F. Experience, Exporter and Importer are indicator variables that equal one if the firm has at least 50% foreign ownership, has a manager with previous experience in foreign owned firms, exports and imports at least 5% of sales in consecutive years. Debt/Assets is the ratio between the book value of the firms' total debt and assets. *Source:* own computations using data from QP and SCIE.

In Table 9 we present the results on the extensive margin. Taking as the dependent variable an indicator of the exporter status, we estimate in columns 1 to 4, as well as in column 6, linear probability models. Since this solution faces the usual criticism of using a linear model for a categorical outcome, we report in column 5 the estimates of a non-linear specification in the form of a Probit model.

The Probit specification is not compatible with firm fixed effects. As such, we report a pooled regression controlling for observable fixed characteristics, namely sector, year and region dummies. Acknowledging that the Probit does not solve the endogeneity (selection bias) problem discussed earlier, the fact that its results are similar to those of the linear specification strengthens our inferences.⁷

In all specifications presented in Table 9 foreign ownership emerges as a major booster to becoming an exporter. Importing is also shown to increase the probability of ex-

⁷We also tested alternative versions of this specification with the inclusion of quasi-fixed-effects such as the initial (or lagged) productivity and found similar estimates to the ones reported in Table 9.

porting by 5 pp in the linear model, but rising to nearly 10 pp in the Probit. The managerial effect is positive and around 3 pp. The marginal effect of 0.075 reported for the interaction term in the Probit specification also indicates that an importing firm that becomes foreign-owned becomes 7.5 pp more likely to become an exporter too – a sizable effect.

Table 9: Estimated effects of globalization on exports at the extensive margin

Exporter	FE (1)	FE (2)	FE (3)	FE (4)	Probit (5)	PS weight (6)
Lag foreign	0.039*** (0.011)	0.036*** (0.011)	0.034*** (0.011)	0.018* (0.011)	0.040*** (0.002)	0.075*** (0.013)
Lag Manager F. Experience		0.032*** (0.004)	0.031*** (0.004)	0.030*** (0.004)	0.022*** (0.001)	0.033*** (0.004)
Lag importer			0.053*** (0.002)	0.051*** (0.003)	0.099*** (0.001)	0.089*** (0.004)
Lag foreign x Lag importer				0.037*** (0.012)	0.075*** (0.003)	
Observations	1205739	1204552	1204552	1204552	1129128	1096085
R-sq.	0.028	0.028	0.032	0.032		0.029

Notes. Robust standard errors in parenthesis (clustered at the firm level). Significance levels: *, 10 %; **, 5 %; ***, 1 %. All regressions include sector, region and year fixed effects. Columns 1-4 and 6 include firm fixed effects. Column 5 (Probit) reports average marginal effects. The reported interaction term in this model is the estimated marginal effect of becoming foreign owned in importing firms. Foreign, Manager F. Experience, Exporter and Importer are indicator variables that equal one if the firm has at least 50% foreign ownership, has a manager with previous experience in foreign owned firms, exports and imports at least 5% of sales in consecutive years. *Source:* own computations using data from QP and SCIE.

Finally, we consider the effects on the intensive margin of exports by focusing on the ratio of exports to sales as our dependent variable. Our approach is still benchmarked by the fixed effects specification and the propensity score weighted regression. However, we must highlight that those linear models on this type of dependent variable that take many zeros - the majority of firms in our sample do not export in any year - will potentially underestimate the effect of the variables of interest.

Table 10 shows an increase in exports relative to sales associated with foreign ownership surprisingly insignificant. In contrast, the estimated effect of foreign managerial experience and being an importer matter with a marginal effect of around 1 pp. So, the results in Tables 9 and 10 indicate that foreign ownership enhances the chances of becoming an exporter but not that of allocating more of a firm's sales to export markets when the firm is already a systematic exporter.

Tables 11 and 12 reproduce the results of the decision to become an importer and of importing more as a percentage of sales. In this case, foreign ownership matters in both

Table 10: Estimated effects of globalization on exports at the intensive margin

Exports/Sales	FE (1)	FE (2)	FE (3)	FE (4)	FE (5)	PS weight (6)
Lag foreign	-0.001 (0.007)	-0.002 (0.007)	-0.003 (0.007)	0.002 (0.009)	-0.001 (0.008)	-0.004 (0.009)
Lag Manager F. Experience		0.019*** (0.004)	0.018*** (0.004)	0.018*** (0.004)	0.014*** (0.003)	0.013*** (0.005)
Lag importer				0.018*** (0.003)	0.012*** (0.002)	0.034*** (0.005)
Lag foreign x Lag importer				-0.007 (0.009)	0.001 (0.007)	
Lag Exports/Sales					0.409*** (0.005)	
Observations	179787	179713	179713	179713	179713	158585
R-sq.	0.012	0.013	0.013	0.013	0.13	0.012

Notes. Robust standard errors in parenthesis (clustered at the firm level). Significance levels: *, 10 %; **, 5 %; ***, 1 %. All regressions include firm, sector, region and year fixed effects. Column 6 reports marginal effects. Foreign, Manager F. Experience, Importer are indicator variables that equal one if the firm has at least 50% foreign ownership, has a manager with previous experience in foreign owned firms and imports at least 5% of sales in consecutive years. Exports/Sales is the ratio between the firms' real exports and sales. *Source:* own computations using data from QP and SCIE.

the extensive and intensive margins and so does having foreign-experienced managers. Being an exporter also greatly increases the chances of becoming an importer. This is consistent with what is documented in Amador et al. (2019) that export firms are frequently “two-way traders”, i.e., both export and import a non-trivial amount of their sales and consumed inputs, respectively, and that such two-way traders are typically larger, older, more productive and more profitable relative to the average firm.

5.4 Size heterogeneity

We now ask whether the effects of globalization on productivity performance and wages differ greatly across firms of very distinct sizes. This is an issue of particular relevance – from both a theoretical and policy standpoint – in countries which, like Portugal, are populated by a high number of micro and small firms (relative to country size), many of which deemed to have low productivity and pay low wages relative to main trading partners.

Table 1 already indicated that foreign-owned and firms that engage in international trade tend to be larger than the average firm in our dataset, and also show performance figures more aligned with those of larger firms. In this subsection, we evaluate how the effects of internationalization differ according to the firm's size conditional on the

Table 11: Estimated effects of globalization on imports at the extensive margin

Importer	FE (1)	FE (2)	FE (3)	FE (4)	Probit (5)	PS weight (6)
Lag foreign	0.063*** (0.013)	0.060*** (0.013)	0.057*** (0.012)	0.018 (0.013)	0.104*** (0.003)	0.035** (0.014)
Lag Manager F. Experience		0.032*** (0.004)	0.030*** (0.004)	0.029*** (0.004)	0.029*** (0.001)	0.036*** (0.004)
Lag exporter			0.075*** (0.003)	0.071*** (0.003)	0.104*** (0.001)	0.091*** (0.004)
Lag foreign x Lag exporter				0.107*** (0.018)	0.157*** (0.003)	
Observations	1170467	1169359	1169359	1169359	1097210	1063988
R-sq.	0.024	0.025	0.031	0.031		0.01

Notes. Robust standard errors in parenthesis (clustered at the firm level). Significance levels: *, 10 %; **, 5 %; ***, 1 %. All regressions include sector, region and year-fixed effects. Columns 1-4 and 6 include firm fixed effects. Column 5 (Probit) reports average marginal effects. The reported interaction term in this model is the average marginal effect of foreign ownership in exporting firms. Foreign, Manager F. Experience, Exporter and Importer are indicator variables that equal one if the firm has at least 50% foreign ownership, has a manager with previous experience in foreign-owned firms, exports and imports at least 5% of sales in consecutive years. *Source:* own computations using data from QP and SCIE.

variables included in previous regressions. We do so by running a set of regressions based on equation (1) in Section 4, which now include the lag of the firm’s dimension interacted with other relevant control variables. In what follows, we define size by placing the firm in the respective sales quartile bin.⁸ The estimates presented in Figures 3 to 6 show the respective point estimates and 95% confidence intervals thereof based on the more complete static fixed-effects specification.

Figure 3 shows that the effect of foreign ownership on (log) productivity decreases monotonically with the firm’s initial size and becomes statistically insignificant in the top quartile of sales. The confidence bands around the point estimates also highlight the fact that the effect of foreign ownership is very heterogeneous across firms within the same initial size category. We find that the effect of foreign managerial experience on firms’ productivity is particularly relevant for firms in the bottom quartile of sales, even if smaller on average than that of foreign ownership.⁹

⁸This is arguably a more suitable way of defining size in our Portuguese dataset, in comparison with using other international criteria based on the number of employees or sales turnover for economies that are much larger than that of Portugal. As noted earlier, such international criteria (such as the EC 2003/361) are likely to bias the distribution towards a larger mass of firms in the micro/small size bin.

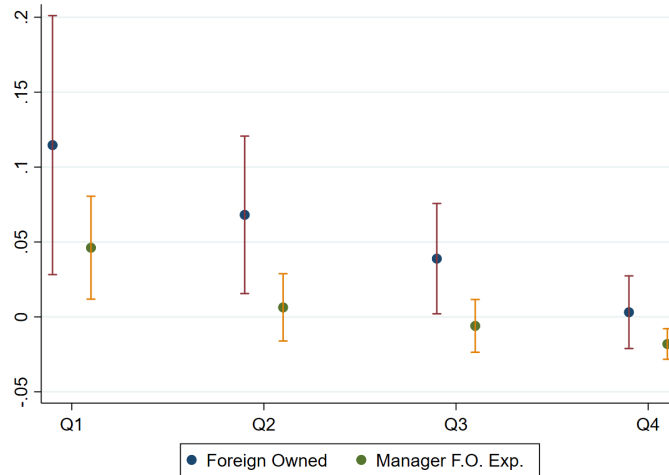
⁹One caveat that is in order is that the number of firms that start exporting is considerably larger (5x) than the number of firms that become foreign-owned. This implies that the effect of foreign-ownership transitions is estimated with less statistical power.”

Table 12: Estimated effects of globalization on imports at the intensive margin

Imports/Sales	FE (1)	FE (2)	FE (3)	FE (4)	FE (5)	PS weight (6)
Lag foreign	0.011** (0.005)	0.011** (0.005)	0.011** (0.005)	0.013** (0.006)	0.007 (0.005)	0.012** (0.006)
Lag Manager F. Experience		0.008*** (0.002)	0.008*** (0.002)	0.008*** (0.002)	0.006*** (0.002)	0.002 (0.003)
Lag exporter			0.001 (0.002)	0.001 (0.002)	0.002 (0.002)	-0.001 (0.003)
Lag foreign x Lag exporter				-0.004 (0.006)	-0.002 (0.005)	
Lag Imports/Sales					0.302*** (0.005)	
Observations	209877	209717	209717	209717	209717	185205
R-sq.	0.016	0.016	0.016	0.016	0.075	0.013

Notes. Robust standard errors in parenthesis (clustered at the firm level). Significance levels: *, 10 %; **, 5 %; ***, 1 %. All regressions include firm, sector, region and year fixed effects. Column 6 reports marginal effects. Foreign, Manager F. Experience, Exporter are indicator variables that equal one if the firm has at least 50% foreign ownership, has a manager with previous experience in foreign owned firms and exports at least 5% of sales in consecutive years. Imports/Sales is the ratio between the firms' real imports and sales. *Source:* own computations using data from QP and SCIE.

Figure 3: Effect of foreign ownership and management on log productivity per initial sales quartile

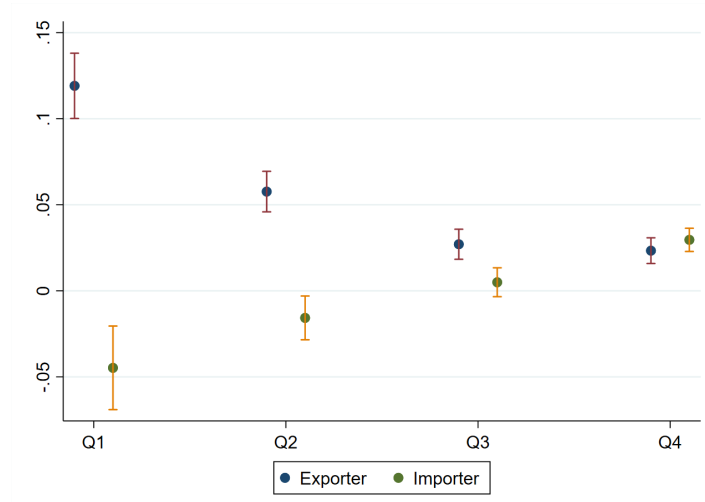


Notes. 'Q' stands for sales quartile. The dots are the point estimates associated with the interaction. Vertical lines represent the 95% confidence intervals. *Source:* Own computations using data from QP and SCIE.

As for trade market participation, Figure 4 corroborates the finding that being an exporter has a significant impact on productivity, particularly for firms in the bottom half of the sales distribution. Being an importer, however, detracts from productivity

among smaller firms (i.e., in the first quartile of sales).

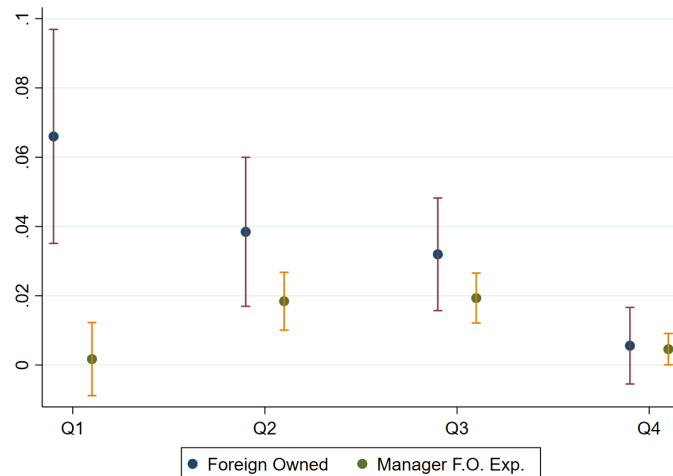
Figure 4: Effect of export and import market participation on log productivity per initial sales quartile



Notes. ‘Q’ stands for sales quartile. The dots are the point estimates associated with the interaction. Vertical lines represent the 95% confidence intervals. *Source:* Own computations using data from QP and SCIE.

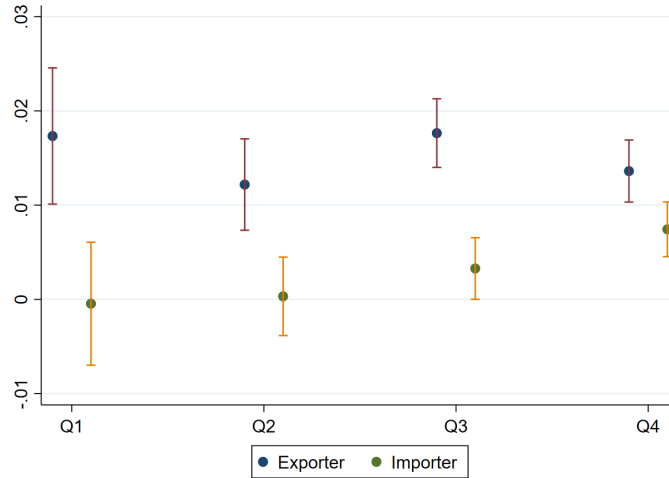
Figures 5 and 6 present the estimates for the average wage regressions. We also observe that the effects of being foreign-owned and/or an exporter on wages are stronger for smaller firms, particularly for those in the first quartile.

Figure 5: Effect of foreign ownership and management on average wage per initial sales quartile



Notes. ‘Q’ stands for sales quartile. The dots are the point estimates associated with the interaction. Vertical lines represent the 95% confidence intervals. *Source:* Own computations using data from QP and SCIE.

Figure 6: Effect of export and import market participation on average wage per initial sales quartile



Notes. ‘Q’ stands for sales quartile. The dots are the point estimates associated with the interaction. Vertical lines represent the 95% confidence intervals. *Source:* Own computations using data from QP and SCIE.

6 Conclusions

All the four key channels of globalization we examined increase firm size, lower leverage and raise wages. The effects on firm size – measured by absolute sale levels – are particularly strong at around 10 to 14% (depending on the specification). Positive effects on labor productivity accrue mostly from foreign ownership and export market participation, with import market participation coming third and having a foreign-seasoned manager having an insignificant effect. In particular, export participation also raises labor productivity relative to wages, thereby lowering unit labor costs. Our analysis thus identify a pecking order among distinct globalization channels regarding productivity and cost effects. Effects on leverage are comparable, however, between being an exporter and foreign-owned, whereas foreign-firm management experience has its strongest bearing on the average educational attainment of employees – an interesting and novel result in the literature, to the best of our knowledge.

We also highlight some important synergies and complementary effects between the distinct globalization channels, but also some substitution between them. Regarding positive synergies, we find that foreign ownership enhances the chances of becoming an exporter (i.e. an extensive margin effect) but not allocating more of a firm’s sales to export markets (i.e. an intensive margin effect) once the first step is already taken. Yet, being an importer (and thus a two-way trader) and having a foreign-seasoned manager do help on the intensive margin – a clear instance that the effects of the different globalization channels complement one another. On the other hand, the effects of

foreign ownership on performance are significantly attenuated if the firm is already a systematic exporter, or vice-versa. This indicates that the major leap forward is taken when the firm becomes first globalized through one channel – the marginal performance gain of entering (or nurturing) another globalization channel then becomes smaller, albeit the overall effect is still amplified by adding the extra channel.

Finally, we find that firms in the first quartile of the size distribution (roughly spanning micro and small firms) are the ones that gain the most in terms of the effects of globalization on performance, particularly regarding productivity and wages.

The evidence in this paper has a number of salient policy implications. Besides reinforcing the results of an earlier literature showing that globalization helps firm performance overall, the existence of a pecking order between the distinct channels for each performance variable suggests that policy makers should prioritize some channels relative to others when designing pro-globalization policies in a context of economic or political constraints to globalize fully at once. For instance, if the more immediate policy goal is to boost productivity and reduce unit labor costs, it would be more efficient to stimulate globalization via incentives to boost exports, as opposed to incentives to attract foreign direct investment or incentives to attract foreign managers. If on the other hand, a main macroeconomic goal is to tilt the composition of a country’s external liabilities toward FDI and increase firm size, then policies to incentive foreign ownership have then a greater edge; or if a main goal is to maximize human capital and wages, then attracting foreign- or foreign-seasonal managerial talent – for example via more liberal immigration policies to the highly-skilled – should be a priority. In short, once the policy maker picks his/her more immediate objective, our results shed light on the most effective way to go about it. Finally, our results also highlight considerable heterogeneity of the globalization effects on performance across firm sizes, indicating that smaller firms typically gain the most from globalization, specially when they move to become systematic exporters or become foreign-owned. This result is of particular relevance to countries like Portugal which are populated by a high number of micro and small firms (even if measured relative to country size) that remain highly leveraged and with sub-par productivity performance.

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Appendix

Table A.1: Descriptive statistics of the main variables

Variable	Mean	SD	Min	P10	P25	P50	P75	P90	Max
GVA (1000 €)	291	721	2	20	40	85	209	575	5316
Sales (thousands)	1283	4449	13	58	111	251	701	2164	45587
GVA / Sales	0.39	0.22	0.03	0.12	0.21	0.35	0.53	0.72	0.97
Productivity (1000 €)	21.9	19.2	0.5	6.6	11.0	16.6	26.1	41.3	123.4
Number of workers	11.8	26.3	1.0	2.0	3.0	5.0	10.0	22.0	254.0
Age (years)	15.5	13.1	1.0	3.0	6.0	12.0	21.0	31.0	522.0
Avg. Education (years)	9.5	3.0	0.0	5.9	7.3	9.0	11.8	13.8	20.0
Avg. Hourly Wage (€)	5.1	2.5	2.3	3.1	3.6	4.3	5.6	7.7	20.5
Wages / Productivity	1.01	1.08	0.16	0.45	0.62	0.80	0.96	1.43	8.65
Exports (1000 €)	167	986	0	0	0	0	0	92	10656
Imports (1000 €)	162	962	0	0	0	0	2	103	10598
Exporter	0.10		0						1
Importer	0.12		0						1
Foreign	0.02		0						1
Manager F. Owned Exp	0.04		0						1

Notes. P10 stands for percentile 10; likewise for the other percentiles. *Source:* own computations using data from QP and SCIE.