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Markup premium of Portuguese exporters

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Abstract
In this article, we estimate the markup premium of exporting firms for Portugal over the period 2010-2019. We include evidence not only for the Manufacturing sector but also for the Non-Manufacturing sector that is generally not available. We find that exporting firms have a positive, sizeable, and statistically significant markup premium compared to their non-exporting counterparts, both in the Manufacturing and Non-Manufacturing sectors. We also show that upon entry into export markets, markups also depict a positive and statistically significant increase in both of these sectors. (JEL: L22, D22, F14)

Keywords: Lerner index, Firm-level data, exports, imports.

1. Introduction

How firms set markups has been a question of interest among economists for many decades. One dimension of study of this question, both theoretically and empirically, is the extent to which participation in international trade, and in particular, the export status of the firm, is associated with changes in firm-level markups. This question is particularly relevant from a policy perspective since there are firms and sectors increasingly engaged in international trade, particularly in export markets.

In this article, we contribute to this line of research by providing empirical evidence on the markup premium of exporting firms using representative data for Portugal (excluding the financial sector) over the period 2010-2019, including evidence for the Manufacturing and Non-Manufacturing sectors. Evidence for this last sector is generally unavailable due to lack of data. However, this sector is increasingly relevant to aggregate value-added and employment, thus its exclusion yields a potential partial view of the aggregate economy. To include the Non-Manufacturing sector and rely on the universe of firms, we use information from accounting data to obtain a proxy for the markup at the firm level.

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The degree of price-setting power of a firm can in some settings be captured by the markup, which corresponds by definition to the ratio of the output price charged by the firm to the corresponding marginal cost. Despite the significant and known challenges measuring this ratio, there is ample empirical evidence suggesting that firms operate in imperfectly competitive markets so that prices rise above marginal costs and markups exceed one. This result appears consistently in this strand of the literature using data for several countries, time periods, and alternative estimation methods, either from a supply (e.g., Hall (1988), Roeger (1995), De Loecker and Warzynski (2012)) or demand side approaches (Bresnahan (1989), Berry *et al.* (1995)). In a standard benchmark case of a static perspective, the presence of imperfect competition reduces welfare since prices are higher and output is lower compared to the perfectly competitive case. However, the link between imperfect competition and welfare tends to be, in general, more complex in richer models. At the same time, international trade can also shape firm markups.

It is well documented that exporting firms tend to be different from non-exporting firms in several dimensions, such as size, wages, and productivity (Wagner (2007)). In fact, exporting firms are often labeled in the literature as "the happy few" given the favorable comparison in terms of these dimensions to non-exporting firms (Mayer and Ottaviano (2008)). The same seems to hold with respect to markups.

Several theoretical international trade models predict a positive markup premium for exporting firms which is defined in general as the difference in log markups between exporting and non-exporting firms. Standard models of international trade such as Bernard *et al.* (2003) and Melitz (2003) incorporate heterogeneous agents in terms of their productivity. In their models, productivity plays a crucial role in the decision to export, predicting that only the most productive firms export. This is known as the self-selection hypothesis according to which only the most productive firms are able to pay the fixed cost of exporting, which can be rationalized, for instance, by the fact that firms need to learn about foreign laws and establish foreign trade links. The presence of such a fixed cost induces a positive correlation between exports and productivity corroborated by a large set of empirical studies (e.g. Bernard and Jensen (1999), Clerides *et al.* (1998), Aw *et al.* (2000)).[1] Later richer models, such as Melitz and Ottaviano (2008), that allow for endogenous markups, also emphasize the self-selection of firms into export markets, delivering a consistent prediction in terms of the positive relation between productivity and export status.[2] Such a framework also yields a theoretical prediction in terms of markups. In particular, given productivity differences exporting firms are expected to charge higher markups.

Aiming to test this prediction, De Loecker and Warzynski (2012) point to a markup premium of exporters of around 7.8 percent for the Slovenian manufacturing sector. They find also a positive and sizeable markup increase associated with export market

1. Evidence on the reverse link where firms become more productive after starting to export is more muted (see for instance Bernard *et al.* (2012), Syverson (2011)).

2. They develop a model of monopolist competition with firm heterogeneity with respect to productivity differences and allow for endogenous markups by resorting to a linear demand system with horizontal product differentiation. Markups react to market size and its integration through trade.

entry. These results provide empirical evidence that is consistent with these model predictions. Additional work relying on more granular data, in particular, at the product level shows that the export destination characteristics can matter as well. In particular, Kilinç (2019) and Bellone *et al.* (2016) find that markups of products exported to larger destination markets tend to be lower. More recently, some authors gathered evidence for specific industries such as, for instance, Jafari *et al.* (2022), that look at this relation for the French food processing industry. They show that higher markups tend to increase the probability that a firm enters export markets or increase its export intensity. Upon entry into export markets, markups increase in that period and the next two subsequent years. Overall, their findings are consistent with the self-selection effect of exporting firms.

Recent work shows also that the export markup premium tends to be compressed or even disappear by adding a control for the import status of the firm. For instance, Hornok and Muraközy (2019) reach this conclusion using data for Hungary from 1995-2003 for the Manufacturing sector. Similarly, other authors do not find a positive markup premium of exporting firms. For example, Garcia-Marin and Voigtländer (2019) report that marginal costs tend to fall with entry into export markets, but markups tend to remain stable by looking at data from the Chilean, Colombian, and Mexican manufacturing sectors. They argue that exporting firms face an increase in their efficiency in production. However, these gains are reflected in a reduction of output prices so that markups remain unchanged.

Evidence directly related to the link between export market participation and markups in the Manufacturing and Non-Manufacturing sectors is virtually undocumented for Portugal. There are few studies on markups for Portugal which focus on different dimensions such as: tradable and non-tradable sector differences (Amador and Soares (2017)), provide evidence on the incompleteness of the Single Market integration (Soares (2020)), discuss its cyclical properties (Santos *et al.* (2022)) or document a negative trend in the aggregate markup (De Loecker and Eeckhout (2018)).

Our findings point to a positive markup premium for exporting firms. We find that over the 2010-2019 period, exporting firms in Portugal have, on average, a higher markup compared to non-exporting firms both in the Manufacturing and Non-Manufacturing sectors. The coefficient for the export status dummy variable is positive, sizeable, and statistically significant. In terms of magnitude and depending on the specification, exporting firms have a 1.2-1.3 percent higher markup in the Manufacturing sector and 2.6-2.7 percent higher in the Non-Manufacturing sector in the most saturated specifications. Once we further include the import status of the firm, the markup export premium is still positive, economically relevant, and statistically significant. The magnitude of the effect is also not substantially changed, particularly in more saturated specifications. In addition, we further estimate how this effect varies across narrowly defined industries. We find that the export status tends to correlate positively with markups across firms, but the size of this effect is heterogeneous across industries and sectors. The markup premium can be sizeable and reach figures above 8 percent, for instance, in industries such as "Information and communication". In addition, we find a statistically significant increase in markups associated with entry into export markets in both Manufacturing and Non-Manufacturing sectors.

This article is organized as follows. Section 2 describes the data and section 3 provides some descriptive statistics. Section 4 describes the empirical framework to investigate the relation of interest, and the next section presents our main findings. At last, section 6 presents some concluding remarks.

2. Data and variable definition

We use balance sheet and profit and loss account data for Portugal collected jointly by the Ministry of Finance, Ministry of Justice, Statistics Portugal, and Banco de Portugal under the database named *Informação Empresarial Simplificada* (IES). The introduction of this survey aimed to implement a unified reporting system to several authorities to comply with legal, fiscal, and statistical requirements.

In this article, we use annual data for the period 2010 to 2019 [3] for the Portuguese non-financial sector gathered in the latter survey.[4] One interesting feature of this dataset is that it covers the universe of non-financial firms operating in Portugal, which includes around 350,000 firms per year. This feature arises from the fact that the survey is mandatory by nature. Another interesting feature of this survey is that it also includes additional information that is not generally collected. Besides information on the number of workers of each firm, it includes also detailed information on exporting and importing activities. In particular, for each firm and year, we observe nominal exports and imports grouped into goods and services. At odds with most product trade datasets, export/import values in this survey are not subject to reporting thresholds. Hence, we can include firms that export/import lower figures, which allows us to avoid potential selection concerns associated with the exclusion of these firms.

One of the challenges of this estimation is that the markup at the firm level is, in general, not observed since output prices tend not to be available and marginal costs are not registered in the data. The markup for firm i and year t (μ_{it}) is the ratio of the output price charged by the firm to the corresponding marginal cost. This ratio captures the gap between the output price and the corresponding marginal cost. As this gap increases, a firm may in some settings gain higher price-setting power in output markets. In contrast, when prices match exactly marginal costs, the markup translates into a perfectly competitive setting and becomes equal to one in such a case.

3. We use the panel data of Central Balance Sheet Database available at Banco de Portugal Microdata Research Laboratory (BPLIM) from the June 2021 extraction (Central Balance Sheet Harmonized Panel. Extraction: June 2021. Version: V1. BANCO DE PORTUGAL. Dataset. https://doi.org/10.17900/CB.CBHP.Jun2021.V1).

4. The year 2020 is available, but it is affected by the Covid-19 pandemic, which could potentially affect our findings given the magnitude of the shock. It is beyond the scope of this article to study Covid-19-related effects, hence this year was not taken into account. Note also that data for the earlier period between 2006 and 2009 is available. However, the accounting system is not fully comparable with the one started in 2010, as a result of the implementation of the International Accounting Standards. In addition, this earlier sample includes also the period of the international and financial crisis which occurred mainly during 2008 and 2009, and was characterized by a collapse in international trade. For these reasons, we focus the analysis on the 2010-2019 period.

We compute the markup as $(1/(1-pcm_{it}))$ where pcm_{it} is the Lerner index, defined as the firm's revenues from goods and services deducted from the corresponding labour costs (including social security contributions) and intermediate expenses, expressed as a ratio to their revenues. Intermediate expenses correspond to the sum of external supplies and the cost of goods sold.

We define an export dummy variable that assumes the value of one when a firm exports more than 40.000 Euro in year t and, zero otherwise. In addition, we also adopt a consistent criterium in terms of the import threshold to define the import dummy variable. The threshold imposed at 40.000 Euro aims at dismissing the effect of either exports or imports that are extremely low.

We perform a standard data cleaning exercise to ensure that our results are robust to the presence of potential outliers, reporting errors, or unreasonable observations.

First, we exclude all firms that report missing, negative or null information for key variables such as labour costs, revenues, intermediate input expenses, employment, gross value added, firm location and its age. In addition, we exclude observations outside the 0.5^{th} and 99.5^{th} percentiles for the Manufacturing and Non-Manufacturing sectors in the distribution of key variables such as the markup, labour productivity, mean wages, and capital intensity, all considered in log terms. We also exclude observations outside the same percentiles for intermediate input expenses, labour costs, and stock of capital measured as a share on total revenues.

Second, we exclude firms that were subject to significant events that substantially changed the structure and/or activity of the firm, associated for instance to mergers and acquisitions, and keep firms that were considered active according to the information available in the survey which includes firms that for instance are not facing a liquidation process. In addition, we drop sectors based on the NACE Rev. 2 classification at 2 digit level, for which there are less than 50 observations per year. We keep firms that have at least two observations over the sample period.

Finally, we remove some sectors given the reduced number of observations, specific nature, and/or low gross value-added contribution to aggregate GDP. In particular, we exclude "Agriculture, forestry, and fishing"; "Mining and quarrying"; "Public administration and defence; compulsory social security"; "Education"; "Human health and social work activities"; "Arts, entertainment and recreation"; "Other service activities"; "Activities of households as employers; undifferentiated goods- and services-producing activities of households for own use" and "Activities of extraterritorial organizations and bodies"; "Manufacture of tobacco products"; "Manufacture of coke and refined petroleum products" and "Electricity, gas, steam and air conditioning supply". We aim to focus on the non-financial sector and hence exclude firms in the "Financial and Insurance activities" sector. To ensure consistency with National Accounts, we also exclude firms registered in Madeira free trade zone that have a beneficial tax treatment. We exclude firms in "Accommodation and food service activities" since measurement issues associated, particularly with export and import records, can be potentially exacerbated.

3. Descriptive evidence

After the cleaning procedure detailed above, the final dataset includes more than 140,000 firms per year over the period 2010-2019. It covers a total number of observations above 1,480,000 comprising more than 240,000 distinct firms. Table 1 shows some descriptive evidence for key variables.

	Non-Manufacturing Mean/SD	Manufacturing Mean/SD
Revenues (ln)	12.210	12.731
	(1.510)	(1.589)
Fixed capital stock (ln)	9.788	10.864
	(2.124)	(2.269)
Number of workers (ln)	1.283	2.084
	(1.048)	(1.236)
Labour productivity (ln)	9.660	9.610
	(0.817)	(0.677)
Mean wages (ln)	9.411	9.413
	(0.507)	(0.403)
Export to revenues ratio	0.484	0.485
	(0.362)	(0.328)
Import to revenues ratio	0.343	0.218
	(0.245)	(0.182)
Observations	1,214,547	266,916

TABLE 1. Descriptive statistics of key variables
Notes: SD stands for standard deviation.

We report some additional descriptive statistics concerning export and import market participation in Portugal from 2010 to 2019. In particular, we are interested in understanding what share of firms engage in international trade through exports or imports. We also provide evidence concerning the intensity of the export participation for exporting firms, which we measure as the ratio of nominal exports of a firm to its total revenues. While Non-Manufacturing industries tend to be assumed as mainly domestic, recent technological progress could have potentially shifted their nature in this dimension. For this reason, we report separate figures for the Manufacturing and Non-Manufacturing sectors.

Figure 1 reports the evolution of the share of firms participating in international trade through exports and also imports in these two sectors. We find that, over this period, more than 25 percent of the firms export in the Manufacturing sector, while in the Non-Manufacturing sector, this proportion is below 10 percent. In terms of imports, around 20 percent of the firms import in the Manufacturing sector but, in the Non-Manufacturing sector around 10 percent of the firms import. These results suggest that participation in international trade, through either exports or imports, is not a frequent activity, and more so in the Non-Manufacturing sector which is in line with findings for other countries and time periods.

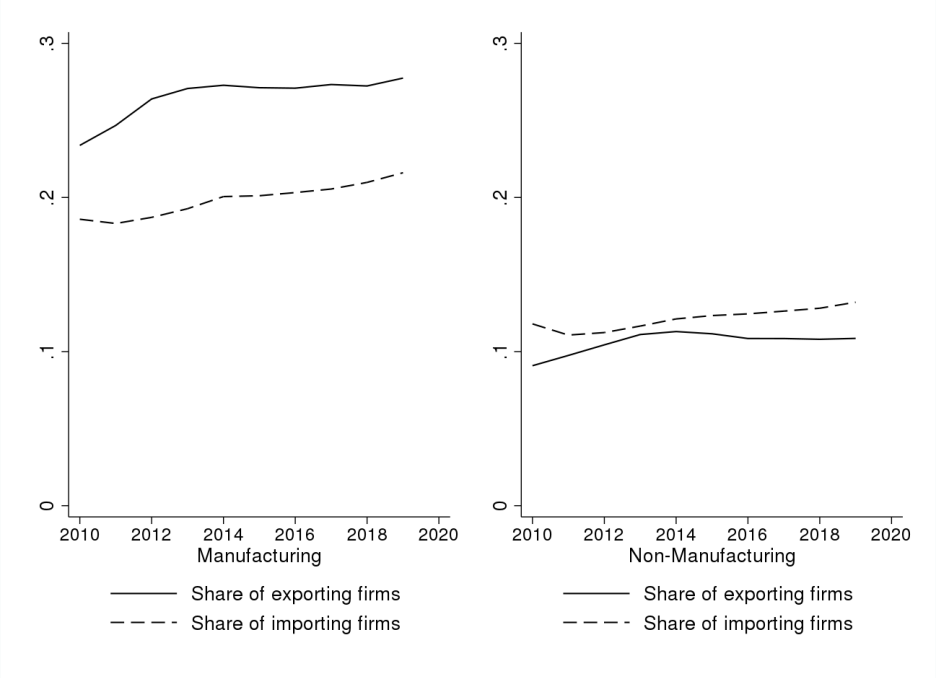

FIGURE 1: Share of firms participating in international trade

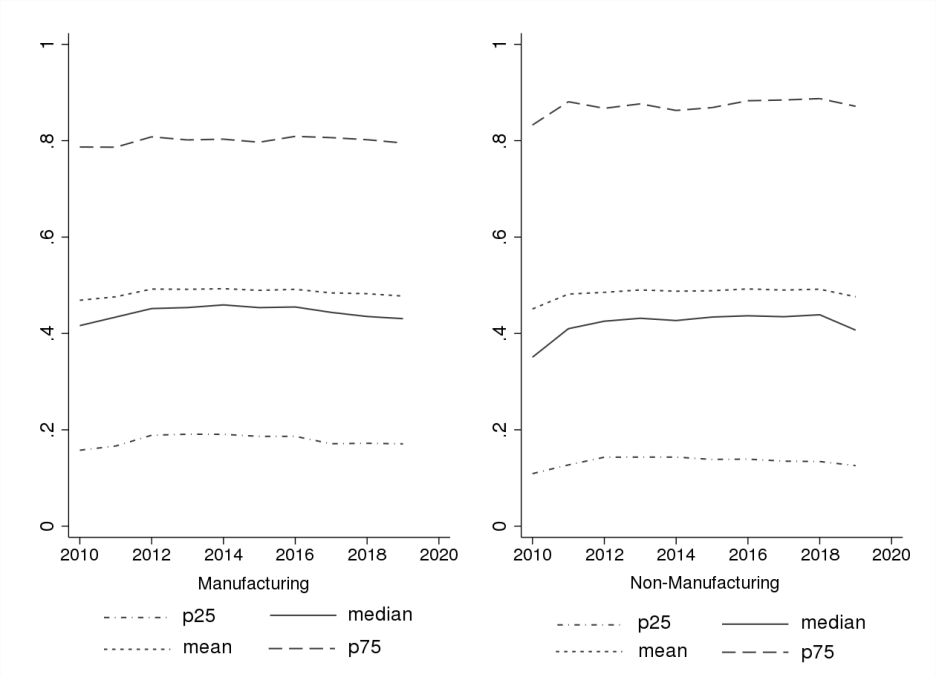

FIGURE 2: Export intensity

Notes: The export intensity of a firm corresponds to the ratio of nominal exports to its total revenues.

Figure 2 depicts the evolution of export intensity percentiles for exporting firms. The export intensity of a firm is the ratio of nominal exports to its turnover. We find that participation in international trade is not only a rare activity but also that firms are heterogeneous in their intensity of participation in export markets, which holds also

in both Manufacturing and Non-Manufacturing sectors. The 25th percentile is below 20 percent, suggesting that one out of four firms has a very low intensity of participation in export markets in both of these sectors. At the same time, firms in the 75th percentile depict export intensity figures around 80 percent of their revenues in the Manufacturing sector and above 80 percent in the Non-Manufacturing sector.

We report also some descriptive statistics for more narrowly defined industries within the Manufacturing and Non-Manufacturing to uncover potential heterogeneity within each of these sectors. Figures 3 and 4 show the share of exporting firms across more narrowly defined industries in the Manufacturing and Non-Manufacturing sectors, respectively. We report this share for the first and last year of our sample which are 2010 and 2019, respectively.

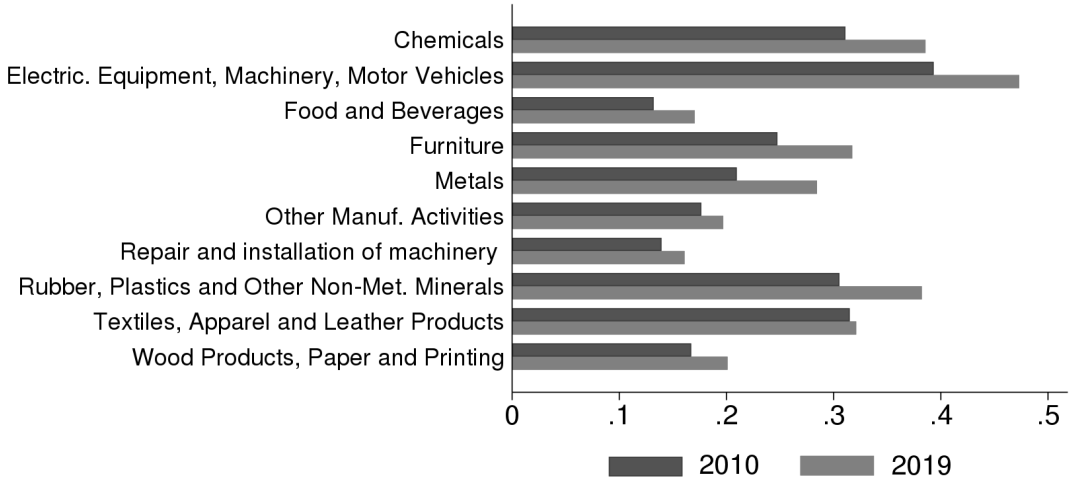

FIGURE 3: Share of exporters at the industry-level in the Manufacturing sector

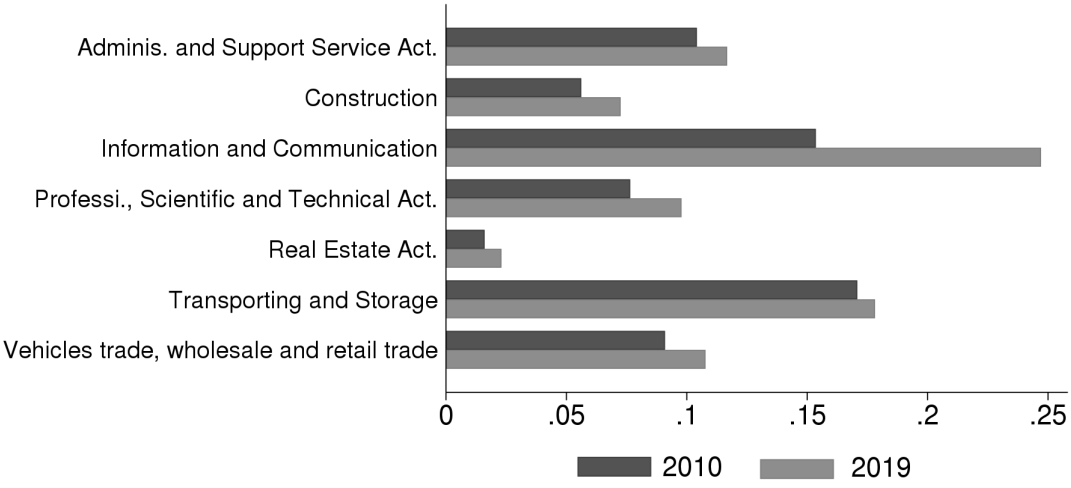

FIGURE 4: Share of exporters at the industry-level in the Non-Manufacturing sector

We find that the share of exporting firms has increased in most of the industries in the Manufacturing sector even though there is substantial heterogeneity across these industries.

In "Electric. Equipment, Machinery, Motor Vehicles", "Chemicals" "Furniture", and "Textiles, Apparel and Leather Products" more than 30 percent of firms participate in export markets. In contrast, "Food and Beverages" and also "Repair and installation of machinery" less than 20 percent of firms are exporters. In the Non-Manufacturing sector, a lower proportion of firms tends to participate in export markets. Nevertheless, this share increased in these industries, particularly in "Information and communication". In most industries, less than 1 out of 10 firms are exporters but in "Information and communication" and "Transporting and storage" more than 15 percent of firms are exporters.

In addition, we also show in Figures 5 and 6 the distribution of export intensities for the same two years across this narrower sectoral definition for the Manufacturing and Non-Manufacturing sectors.

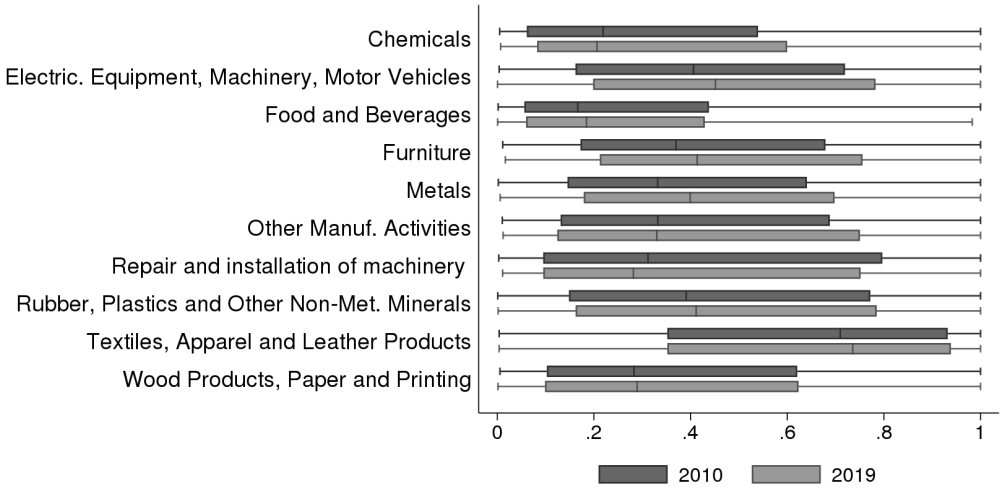

FIGURE 5: Distribution of export intensity at the industry level - Manufacturing sector

Notes: The export intensity of a firm corresponds to the ratio of nominal exports to its total revenues.

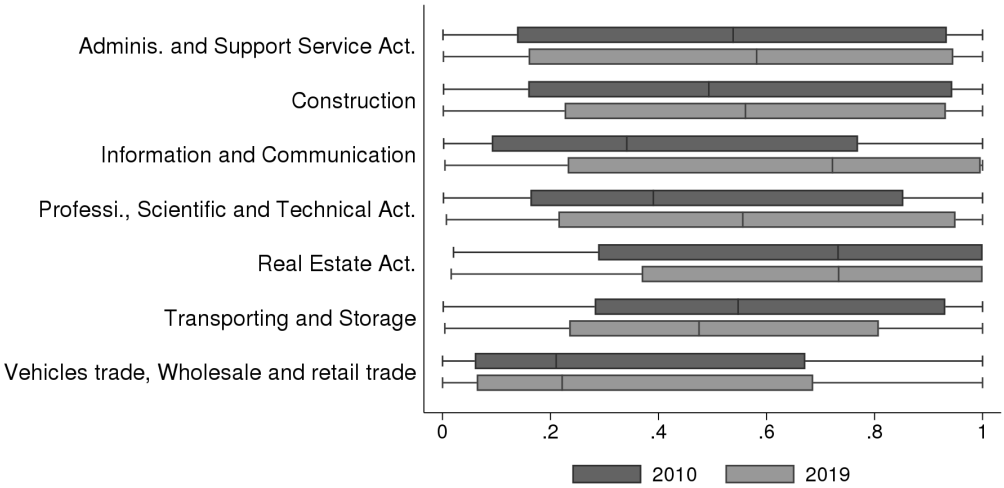

FIGURE 6: Distribution of export intensity at the industry level - Non-Manufacturing sector
Notes:The export intensity of a firm corresponds to the ratio of nominal exports to its total revenues.

As above, we consider a conditional distribution of export intensities by including exporting firms as defined above. These figures illustrate that even within narrowly defined industries export intensities vary markedly across firms in the Manufacturing and Non-Manufacturing sectors. The median export intensity in "Food and Beverages" is below 20 percent, while in "Textiles, Apparel and Leather Products" it reaches more than 70 percent of firm revenues. In the Non-Manufacturing sector, the median export intensity is around 20 percent in "Vehicle trade, wholesale and retail trade". In contrast, the median intensity is particularly high in "Real estate activities" where it reaches 70 percent. In "Information and communication" we find a sharp increase in the median export intensity, which was below 40 percent in 2010 and reached figures around 70 percent in 2019.

A well-known stylized fact is that exporters tend to be, on average, larger and more productive than non-exporting firms. In addition, they seem to pay higher average wages and also charge higher markups which is the main focus of this article. Figures 7 and 8 show the distribution for the year 2019 of each of these variables for both exporting and non-exporting firms, while distinguishing between Manufacturing and Non-manufacturing sectors. We use the number of workers and labour productivity as proxy variables for firm size and productivity, respectively. The distribution of firm markups, size, mean wages, and also labour productivity tends to present higher density in higher values for each of these variables compared to non-exporting firms which are in line with the model predictions highlighted above.

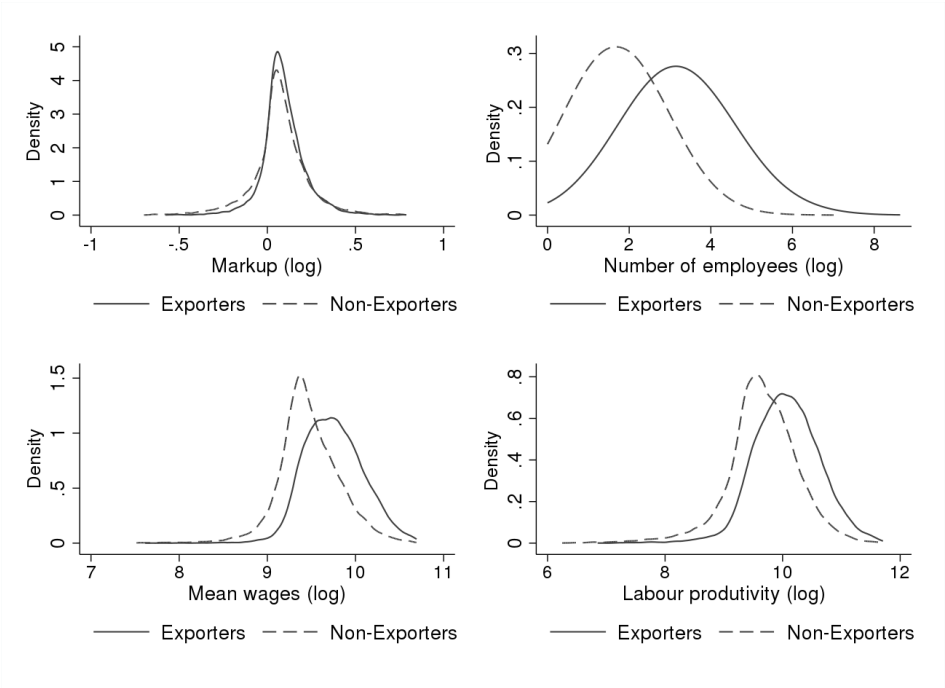

FIGURE 7: Manufacturing sector: Distribution of key variables in 2019

Notes: The bandwidth is greater in the variable number of employees in order to obtain a smoother density curve.

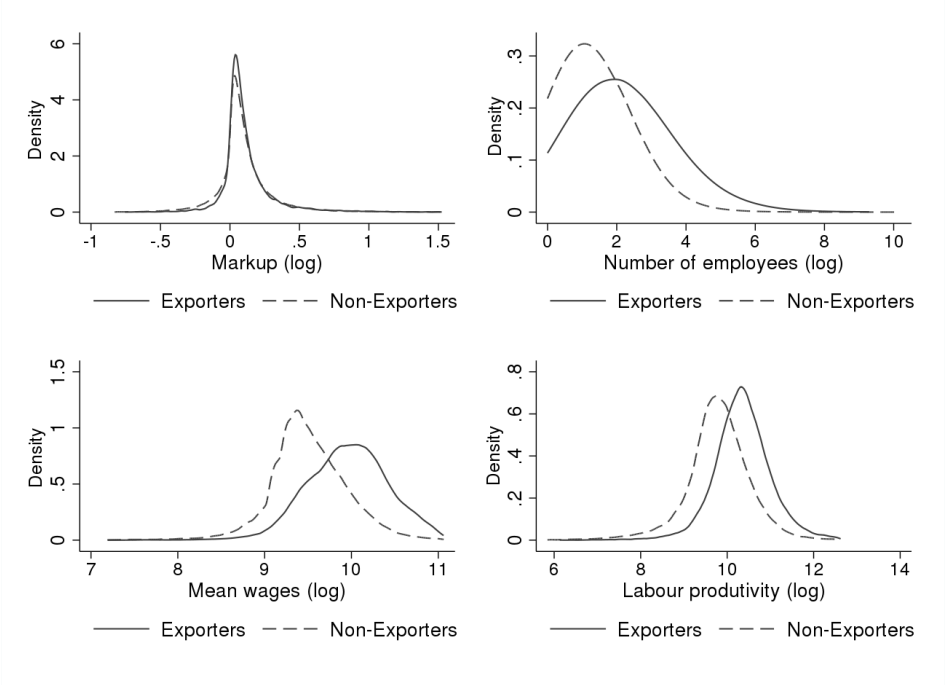

FIGURE 8: Non-Manufacturing sector: Distribution of key variables in 2019

Notes: The bandwidth is greater in the variable number of employees in order to obtain a smoother density curve.

4. Empirical framework: Markups and exporters

Our aim is to estimate the markup premium of exporters by comparing the markup of exporting and non-exporting firms. In addition, we also investigate if markups increase when firms start to export. Below, we lay out our empirical estimation strategy.

4.1. Markup premia of exporting firms

In order to estimate the markup premium of exporting firms, we adopt the following empirical specification as suggested by De Loecker and Warzynski (2012):

$$ln(\mu_{it}) = \alpha_0 + \alpha_1 dexp_{it} + \alpha_2 X_{it} + \gamma_s * \gamma_t + \varepsilon_{it} \quad (1)$$

where $ln(\mu_{it})$ is the markup of firm i in year t in log terms, γ_t and γ_s are year and sector fixed effects. $dexp_{it}$ is a dummy variable that takes the value 1 if the firm is an exporter and 0 otherwise. ε_{it} is an error term. We include an interaction between sector and time-fixed effects which absorbs aggregate shocks, business cycle fluctuations, and sectoral shocks, including specific trends that could be present. We define sectors at 3 digit level in NACE Rev.2. Furthermore, we include a set of control variables summarized in X_{it} that aim at capturing potential remaining confounding variables in the relation of interest. In particular, we include labour and stock of capital in logs in order to capture both size effects and capital intensity. We also extend this set of covariates to include the import status of the firm, to understand the extent to which the results change when taking into account the import decision of the firm. The dependent variable is considered in log terms given the substantial variation of this variable across firms in the economy as consistently adopted in this literature. Standard errors are clustered at the firm level.

This specification includes a rich fixed effect structure, along with a set of covariates that aims at capturing confounding effects in the relation of interest. However, this specification does not allow a causal interpretation of this relation.

The coefficient of interest is α_1, which quantifies to what extent exporters have a higher markup compared to their non-exporting peers. Note that we are not interested in the level of the markup but rather its variation associated with the export status of a firm. In particular, α_1 captures the percentage markup premium of exporters. We can obtain the level markup difference of exporting firms compared to non-exporting firms by computing α_1*exp(α_0) following De Loecker and Warzynski (2012).

We estimate this regression separately for the Manufacturing and Non-manufacturing sectors. In addition, we investigate the presence of potential heterogeneity across different industries that could be underlying these estimates. Hence, we also estimate this relation across narrowly defined industries to identify whether this effect varies in this dimension in these two sectors.

4.2. Markups and export market entry

We adopt the following specification to estimate the percentage change of the markup for firms that start exporting while identifying the effect of the remaining types of exporters in line with the suggestion by De Loecker and Warzynski (2012):

$$\begin{aligned} ln(\mu_{it}) = \alpha_0 + \alpha_{11} dexp\_entry_{it} + \alpha_{12} dexp\_exit_{it} + \\ \alpha_{13} dexp\_stay_{it} + \alpha_2 X_{it} + \gamma_s * \gamma_t + \varepsilon_{it} \end{aligned} \tag{2}$$

where γ_t and γ_s are year and sector fixed effects. $ln(\mu_{it})$ is the markup of firm i, in year t in log terms. ε_{it} is an error term. Standard errors are clustered at the firm level. In this equation, we identify three types of exporters. Export entry dummy variable ($dexp\_entry_{it}$) assumes the value one if a firm that was not considered an exporter in the previous period but is considered an exporter in the current period and, zero otherwise. Exiters ($dexp\_exit_{it}$) is a dummy variable that assumes the value one if a firm classified as an exporter in the current period but does not in the following period and, zero otherwise. Finally, stay exporters ($dexp\_stay_{it}$) is a dummy variable that takes the value one if the firm is classified as an exporter in at least two periods and zero otherwise. As above, we consider the markup in log terms and include the same covariates summarized in X_{it}. In addition, we keep the same fixed effect structure as mentioned above. Our main variable of interest is the coefficient of the variable $dexp\_entry_{it}$.

5. Results

In this section, we report the results obtained using the empirical specifications in equations (1) and (2) to identify, respectively, the markup premia of exporting firms and the markup change upon entry into export markets for the Manufacturing and Non-manufacturing sectors. In addition, we estimate the export markup premium across narrowly defined industries to uncover potential heterogeneity in this relation across them.

5.1. Export markup premia

Table 2 reports the coefficient associated with the export dummy, which captures the percentage markup premium between exporting and non-exporting firms according to the equation (1) for the Manufacturing sector. To ensure that our results are robust to the set of fixed effects and control variables, we experiment with different specifications. In all the specifications, we maintain the controls for the number of workers and stock of capital, both in log terms. In the first column, we report the results from a specification that further includes year-fixed effects. In the second, we add sectoral fixed effects and in the third we introduce an interaction variable between sectoral and year fixed effects. In the fourth column, we further include the import status of the firm as an

additional control variable. In the last column, we further extend the set of control variables to include also firms' age, in log terms, and also firm location fixed effects. This extended set of control variables aims at ensuring that our results still hold, even when considering other potential confounding variables.

	(1)	(2)	(3)	(4)	(5)
d_exp	0.0186***	0.0133***	0.0130***	0.0134***	0.0117***
	(0.00117)	(0.00120)	(0.00120)	(0.00123)	(0.00120)
Obs.	266,916	266,916	266,916	266,916	266,916
Year FE	YES	YES	NO	NO	NO
Sector FE	NO	YES	NO	NO	NO
Year*Sector FE	NO	NO	YES	YES	YES
Import Dummy	NO	NO	NO	YES	YES
Other controls	YES	YES	YES	YES	YES
Extended controls	NO	NO	NO	NO	YES

TABLE 2. Exporting premia - Manufacturing sector

Notes: *** p<0.01, ** p<0.05, * p<0.1. Firm cluster robust standard errors in parentheses. d_exp is a dummy variable that is one if a firm is an exporter and zero otherwise. Other controls are size measured by the number of workers and stock of capital both in log terms. The extended set of control variables are firms' age, in log terms, and also firm location fixed effects.

Table 3 shows the results obtained from the same exercise but now focused on the Non-Manufacturing sector. We find that the markup premium of exporters is positive and statistically significant for the Manufacturing and Non-Manufacturing sectors.[5]

	(1)	(2)	(3)	(4)	(5)
d_exp	0.0323***	0.0262***	0.0263***	0.0267***	0.0273***
	(0.000959)	(0.000935)	(0.000936)	(0.000979)	(0.000982)
Obs.	1,214,547	1,214,547	1,214,547	1,214,547	1,214,547
Year FE	YES	YES	NO	NO	NO
Sector FE	NO	YES	NO	NO	NO
Year*Sector FE	NO	NO	YES	YES	YES
Import Dummy	NO	NO	NO	YES	YES
Other controls	YES	YES	YES	YES	YES
Extended controls	NO	NO	NO	NO	YES

TABLE 3. Exporting premia - Non-Manufacturing sector

Notes:*** p<0.01, ** p<0.05, * p<0.1. Firm cluster robust standard errors in parentheses. d_exp is a dummy variable that is one if a firm is an exporter and zero otherwise. Other controls are size measured by the number of workers and stock of capital both in log terms. The extended set of control variables are firms' age, in log terms, and also firm location dummy variables.

Once we control for the import status of the firm, the coefficient on the export dummy is still positive and statistically significant. This result holds both in the Manufacturing and Non-Manufacturing sectors. In terms of the magnitude of the effect and depending on the specification, the percentage increase in markups associated with exporting is around 1.2-1.3 percent for the Manufacturing sector and 2.6-2.7 percent for the Non-Manufacturing sector in the more saturated specifications.[6]

5. Our findings remain qualitatively unchanged when experimenting with some more and less restrictive definitions of exporting and importing firms.

6. In terms of the corresponding level markup premium of exporting firms compared to their non-exporting counterparts, the results are around 0.01 and 0.03 for Manufacturing and Non-Manufacturing, in

These findings corroborate the prediction of models of international trade as discussed above, which emphasize the self-selection effect of exporters and predict a positive markup premium as discussed above not only for the Manufacturing sector but also the Non-Manufacturing.[7]

This strand of the literature finds in several cases a positive markup premium for exporting firms. However, the magnitude of this effect varies substantially across countries, depending on the sample period and data collection features. In addition, in contrast with our dataset, most datasets have a size threshold above which firms are required to report information based, for instance, on size and/or exporting/importing values. Hence, the magnitudes reported in this article are not directly comparable. For instance, De Loecker and Warzynski (2012) use data for the Slovenian Manufacturing sector between 1994 and 2000 and find an export markup premium of around 7.8 percent. Using data for France for the period 1995 to 2007, Guillou and Nesta (2015) estimate a higher premium of around 11.8 percent. Closer to the results reported in this article, Jafari *et al.* (2022) shows a markup premium of exporters of around 2.0 to 2.2 percent for the French food processing industry and Hornok and Muraközy (2019) find that exporting firms charge 3.7 percent higher markup, without a control for the import status of the firm. In their case, the markup premium of exporting firms disappears once they add a control variable for the import status of the firm. They use detailed trade data for Hungary over the period 1995-2003.

One should also note that the coefficients shown above relate to averages across industries within the Manufacturing and Non-Manufacturing sectors. To uncover the potential presence of heterogeneous effects within these two sectors, we also run a consistent specification at the industry level for the Manufacturing and Non-Manufacturing sectors using the specification associated with column 5, which is the most saturated.

Figures 9 and 10 report the estimates of this exercise conducted at the industry level, within both the Manufacturing and Non-Manufacturing sectors with corresponding confidence levels. We find that in the Manufacturing sector, the markup premium of exporters is highest in industries classified in "Furniture" (NACE Rev. 2 - 31) which reaches a markup premium of exporting firms of around 5 percent and also "Chemicals" (NACE Rev. 2-20) and "Rubber, Plastics, and Other Non-Met. Minerals" (NACE Rev. 2- 22-23) which depict values around 3 percent. In the Non-Manufacturing sector, the industries with the highest markup premium are: "Information and communication" (NACE Rev. 2- 58-63), "Professional, scientific and technical activities" (NACE Rev. 2-69-75); "Construction" (NACE Rev. 2- 41-43). Exporting firms have, in this case, a

the most saturated specification. As a robustness exercise, we adopt also a specification that uses revenue weights where firms have different weights according to their revenues. The results obtained under such a specification are qualitatively unchanged compared to the ones reported in this article.

7. Besides the efficiency channel suggested by theoretical models, there are other possible alternative effects that could be at play related, for instance, to different demand elasticities and consumer valuation in export markets (De Loecker and Warzynski (2012)).

markup that is higher than their non-exporting firms above 8, 7 and close to 5 percent, respectively.

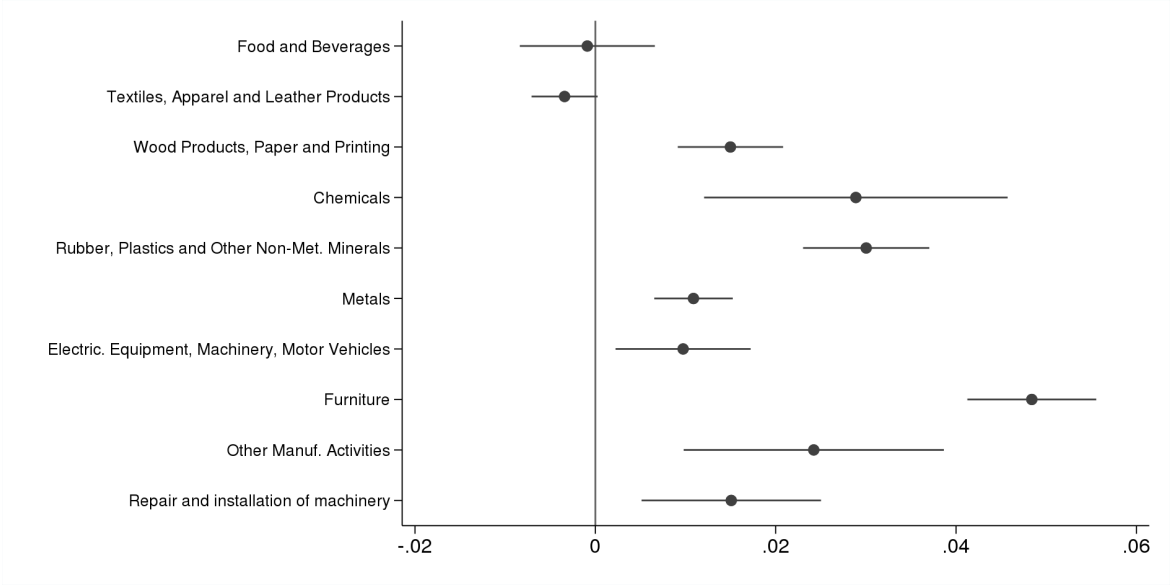

FIGURE 9: Industry export markup premia and confidence intervals in the Manufacturing sector

Notes: The confidence interval uses a 10 per cent significance level.

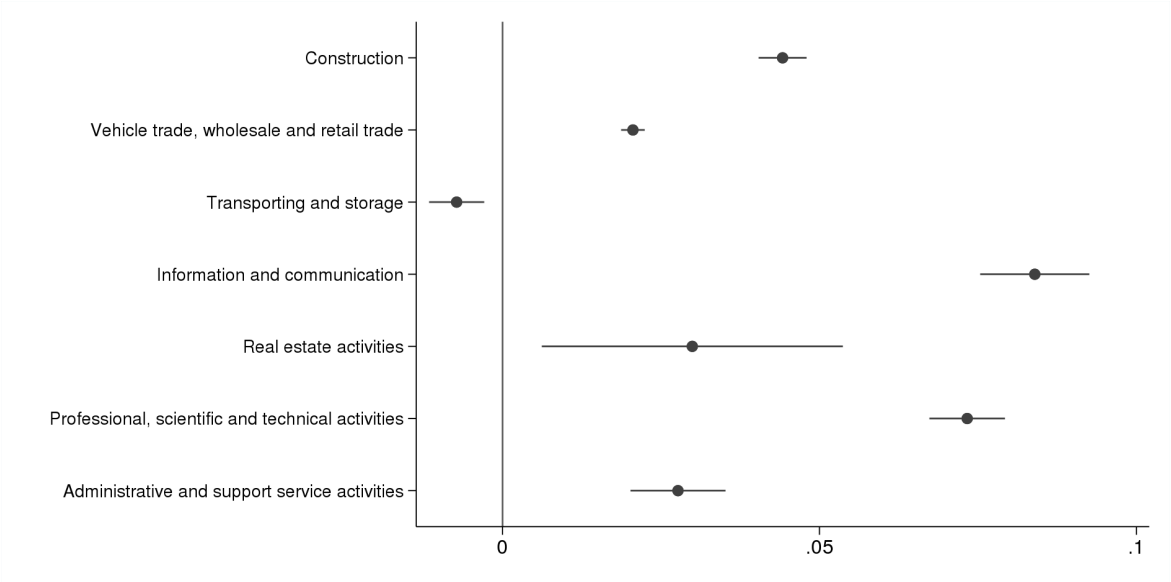

FIGURE 10: Industry export markup premia and confidence intervals in the Non-Manufacturing sector

Notes: The confidence interval uses a 10 per cent significance level.

5.2. *Entry in export markets*

Table 4 reports the coefficient for the export dummy entry variable for the Manufacturing sector according to equation (2), which captures the average percent difference in markups between firms who are not exporting, and firms in their first year of exporting.

	(1)	(2)	(3)	(4)	(5)
d_entry	0.0226***	0.0200***	0.0204***	0.0206***	0.0178***
	(0.00169)	(0.00168)	(0.00169)	(0.00169)	(0.00169)
Obs.	188,360	188,360	188,360	188,360	188,360
Year FE	YES	YES	NO	NO	NO
Sector FE	NO	YES	NO	NO	NO
Year*Sector FE	NO	NO	YES	YES	YES
Import Dummy	NO	NO	NO	YES	YES
Other controls	YES	YES	YES	YES	YES
Extended controls	NO	NO	NO	NO	YES

TABLE 4. Export entry and markups - Manufacturing sector

Notes: *** p<0.01, ** p<0.05, * p<0.1. Firm cluster robust standard errors in parentheses. Other controls are size measured by the number of workers and stock of capital both in log terms. The extended control variables are firms' age, in log terms, and also firm location fixed effects.

As above, we experiment with different empirical specifications regarding the fixed effect structure and control variables to ensure that our findings are robust to this choice. In all the specifications, we keep the stock of capital and the number of workers both in log terms as control variables. We consider a specification that further adds year fixed effects in column 1 of this table, we further add sectoral fixed effects in column 2, and last, we consider a full interaction between year and sectoral fixed effects reported in column 3. In the next column, we report the results from a specification that also includes a control for the import status of the firm. In the last column of the table, we further expand the set of control variables by including also firm's age, in log terms, and firm location fixed effects. Table 5 shows a similar exercise but we focus instead on the Non-Manufacturing sector.[8]

	(1)	(2)	(3)	(4)	(5)
d_entry	0.0316***	0.0272***	0.0272***	0.0275***	0.0269***
	(0.00138)	(0.00133)	(0.00134)	(0.00134)	(0.00134)
Obs.	809,161	809,161	809,161	809,161	809,161
Year FE	YES	YES	NO	NO	NO
Sector FE	NO	YES	NO	NO	NO
Year*Sector FE	NO	NO	YES	YES	YES
Import Dummy	NO	NO	NO	YES	YES
Other controls	YES	YES	YES	YES	YES
Extended controls	NO	NO	NO	NO	YES

TABLE 5. Export entry and markups- Non-Manufacturing sector

Notes:*** p<0.01, ** p<0.05, * p<0.1. Firm cluster robust standard errors in parentheses. Other controls are size measured by the number of workers and stock of capital both in log terms. The extended control variables are firms' age, in log terms, and also firm location fixed effects.

8. The number of observations differs from Tables 2 and 3, respectively since the panel of firms is not fully balanced. For instance, the export entry dummy variable can only be computed for firms that are observed both in years t-1 and t.

We find that the coefficient for the entry dummy variable in export markets is positive and highly statistically significant in both Manufacturing and Non-Manufacturing sectors. These results are in line with findings reported by De Loecker and Warzynski (2012) but they contrast with the ones reported by Garcia-Marin and Voigtländer (2019) for the Manufacturing sector. Entry in export markets is associated with higher markups and this effect is around 1.8-2.3 percent in the Manufacturing sector and around 2.7-3.2 percent in the Non-Manufacturing, depending on the empirical specification.[9] When we add the import status of the firm as an additional control variable, the markup premium upon entry into export markets remains positive, highly significant and the magnitude of this coefficient is not substantially changed in both of these sectors. These figures are in line with De Loecker and Warzynski (2012) which point to markup gains of 4-5 percent upon entry into export markets.

6. Conclusion

In this article, we gather empirical evidence on the markup premium of exporting firms for the Portuguese economy over the period 2010-2019. According to standard models of international trade, only the most efficient producers are able to export and charge also higher markups. Consistent with this model prediction, we find a positive, sizeable, and statistically significant markup premium for exporting firms. We include evidence for Manufacturing and Non-Manufacturing sectors by using a rich panel data on the universe of non-financial firms. Empirical evidence for this last sector is generally not available. Using this data, we show that exporting firms have a markup that is around 1.2%-1.3% and 2.6%-2.7% higher than non-exporting firms in the Manufacturing and Non-manufacturing sectors, respectively, in the most saturated specifications. However, there is substantial heterogeneity across sectors and industries in the size of this effect, which can reach magnitudes above 8 percent in industries such as "Information and communication". In addition, we show that markups increase upon entry into export markets. The coefficient on the export dummy entry variable is positive, sizeable, and statistically significant for the Manufacturing and Non-Manufacturing sectors.

Future research would be relevant, for instance, in establishing causal evidence between participation in export markets and markups and also provide robustness of these results using a structural framework to estimate the markup.

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