

# **Exports and imports effect on performance - A study on Portuguese firms**

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## **Industrial Engineering and Management**

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## Declaration

I declare that this document is an original work of my own authorship and that it fulfills all the requirements of the Code of Conduct and Good Practices of the Universidade de Lisboa.



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## Resumo

As exportações e importações, particularmente em Portugal, têm vindo a crescer, resultando em um aumento significativo nas trocas comerciais com vários países ao longo dos anos. No entanto, observa-se que esse crescimento não implica que as exportações e importações sejam benéficas para as empresas, nem garante que as empresas envolvidas nestas atividades internacionais demonstrem uma performance superior

Além disso, existem pouco estudos sobre o desempenho das empresas em Portugal, com grande parte dos estudos existentes focados em tipos específicos de empresas, muitas vezes concentrando-se apenas em empresas de grandes dimensões . Adicionalmente, existem poucos estudos abrangentes que examinem os vários mercados para os quais as empresas podem exportar ou importar seus bens e serviços. Assim, o objetivo principal desta dissertação é analisar o impacto das exportações e importações em Portugal, determinando que tipos de empresas beneficiam mais da exportação ou importação. Esta tese pretende avaliar também o desempenho das empresas com base nos mercados de exportação e importação. Para fazer isso, a base de dados do Sistema de Contas Integradas das Empresas e a base de dados dos Quadros de Pessoal serão utilizadas, utilizando modelos econométricos, nomeadamente OLS e efeitos fixos, utilizando como indicadores de desempenho das empresas, o valor de vendas por empregado e a taxa de crescimento das empresas Assim, o objetivo principal desta tese é avaliar quais empresas em Portugal apresentam uma maior desempenho tendo em conta a sua relação com importações ou exportações. Este estudo demonstra que as empresas importadoras ou exportadoras apresentam um valor mais elevado de vendas por empregado e de crescimento, para todo o tipo de empresas (Produtos e serviços) e tendo em conta os diferentes mercados (UE e extra- UE)

**Palavras-chave:** Exportadores; Importadores; Mercado de Exportações; Mercado de Importações; Serviços; Produtos; Desempenho das empresas;





## Abstract

Exports and imports, particularly in Portugal, have been on the rise, leading to a significant increase in commercial exchanges with various countries over the years. However, it should be noted that this growth does not necessarily imply that exports and imports are universally beneficial for firms, nor does it guarantee that companies engaged in such activities exhibit superior performance.

Furthermore, there is a scarcity of studies on the performance of companies in Portugal, with much of the existing research focusing on specific types of enterprises, often concentrating solely on larger corporations. Additionally, there is a lack of comprehensive studies that examine the various markets to which companies can export or import their goods and services. Therefore, to bridge this gap, the primary objective of this dissertation is to analyze the effect of exports and imports on Portuguese firms, determining which types of companies benefit the most from exporting or importing. The study also aims to evaluate companies based on their export and import markets. To achieve these objectives, the research will utilize the Sistema de Contas Integradas das empresas database and Quadros de Pessoal, employing econometric models using ordinary least squares and fixed effects methods, to the value of sales per employee and the growth rate of the firms as our performance measures. The ultimate goal is to ascertain which companies in Portugal demonstrate superior performance in this context. This study seems to demonstrate evidence that importing or exporting companies exhibit higher sales per employee and higher growth, encompassing all types of firms (services and products) and considering export and import markets (EU and non-EU).

**Keywords:** Exporters; Importers; Export Market; Import Market; Services; Goods; Firm Performance;



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# Acronomys

CAE	Classificação da Atividade Económica
EBITDA	Earnings before Interest, Taxes, Depreciation and Amortization
EU	European Union
FD	Fixed Effects
INE	Instituto Nacional de Estatística
ISIC	International Standard Industry Classification of All Economic Activities
IT	Information Technology
LP	Labour Productivity
OLS	Ordinary Least Squares
PLS	Partial Least Squares
QP	Quadros de Pessoal
R&D	Reserarch and Development
ROA	Return on Assets
ROE	Return on Equity
ROS	Return on Sales
SCIE	Sistema de Contas Integradas das Empresas
TFP	Total Factor Productivity
UK	United Kingdom
US	United States



# Chapter 1

## Introduction

In literature, numerous studies are about the performance of firms with a focus on their distinctive characteristics (Bhagat and Bolton (2008), Ni and Kurita (2020), Wei et al. (2023) , Rao and Vinod (2023)). These features include export-import activities, company size, workforce composition, and various other parameters.

Many of these studies tend to concentrate on specific characteristics, delving into the impact of exports or imports on firm performance, as well as the effects of company size or workforce composition (Contractor et al. (2003), Lawless (2009), Kox and Rojas-Romagosa (2010), Wagner (2012)). However, comprehensive studies that integrate all these aspects together are relatively uncommon, particularly concerning Portuguese firms.

The impact of exports is frequently evaluated primarily within the context of manufacturing companies, with limited inclusion of the services sector in such analyses. However, it is evident that over the years, the services sector has been growing in size and significance within the Portuguese business landscape, with a growing dominance of the services sector (MNE, 2021)

Despite the considerable differences in characteristics between services and manufacturing, which can limit their tradability (Sorbe et al., 2018), Portugal has experienced a consistent and continuous rise in service exports over the years.

In addition to this focus on manufacturers, most existing studies concentrate on larger companies, with a limited number of studies on micro-enterprises, which are the most common type of companies in Portugal. According to data from PORDATA, in 2021, 99.9% of companies were SMEs (Small and Medium-sized Enterprises), while only 0.1% were large companies. Since SMEs represent the overwhelming majority of businesses in Portugal, there is a growing need and interest in analyzing these types of companies (PORDATA, 2021c).

Analyzing the impact of exports on Portuguese firms becomes even more critical when we consider that Portugal's trade balance reached positive values in 2012 and maintained this positive trend until 2019. However, it is essential to note that while increased exports may suggest favorable conditions for businesses, it does not necessarily mean that exporting companies are the ones with the best overall performance PORDATA (2021a) .

Firstly, the fact that the trade balance started to show positive values does not necessarily imply an increase in the value of exports, it could have resulted from a decrease in the value of imports. However, the value of imports also increased, indicating that indeed, exports experienced an increase in intensity.

However, this positive trend in the trade balance does not necessarily imply that increased exports mean that exporters firms' performance is better. For some firms, this increase in exports may have been a necessary condition for their survival. The economic crisis at the end of the 2000s and the beginning of the 2010s, coupled with the intervention of Troika <sup>1</sup> in Portugal, constrained domestic consumption and the purchasing power of the Portuguese population. This may have caused some companies to explore other markets in order to survive. Continuing to analyze this aspect of exports in relation to the trade balance, we can observe that service-oriented companies largely drove the positive trade balance from 2012 to 2019. The trade balance for goods never reached positive values, whereas the trade balance for services consistently showed positive figures, with a continuous and stable increase, except for a decline in 2020(PORDATA, 2021b).

The existence of studies, especially those analyzing the Portuguese market, is also very limited to only certain types of companies. Studies that analyze companies engaging in more than one activity, such as providing services while also selling products, are quite rare. Additionally, in many studies, the classification of a company is based solely on its CAE (economic activity classification). While the CAE provides essential information, it can be limiting as a company may have more than one CAE. Moreover, a company might have a CAE that suggests that it primarily provides services, but it could also engage in the sale of products.

Some existing studies also focus primarily on the role of exports, overlooking or not analyzing the role of different export markets (Esteve-Pérez et al. (2008), Vogel and Wagner (2010), Máñez-Castillejo et al. (2010)) . Given that Portugal is a member of the European Union, it makes sense to examine whether there are any differences between exporting to the European Union market compared to the non-EU market or exporting to both.

It is important to distinguish between the EU market and the non-EU market, due to legal and fiscal issues. The European Union allows for the free movement of goods, which has a significant impact on the export process and on the decision of exporting.

This work was motivated by the limited number of studies on the performance of Portuguese firms and the effects of exports and imports.

Thus, this thesis aims to conduct a literature review on the performance of companies and their characteristics, analyze the data in the SCIE (Sistema de Contas Integradas das Empresas) database, and characterize companies in Portugal. The main purpose is to ascertain the actual effect of a company being an exporter or importer and to understand the role of different markets. Furthermore, the study will examine whether there are any benefits to a company with more than one type of business export and how the various types of companies interact with different markets.

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<sup>1</sup>Comprising the European Commission, the International Monetary Fund (IMF), and the European Central Bank (ECB), the Troika imposed stringent austerity measures and structural reforms on Portugal in exchange for financial assistance, aiming to stabilize the economy and restore investor confidence.

# Chapter 2

## Literature Review

In this chapter, the distinctions between products and services will be highlighted, the goal is to examine the existing studies in the literature and evaluate the impact of international diversification, as well as exports and imports, on firm performance. Additionally, other factors influencing firm performance will be considered, along with a characterization of Portuguese companies.

### 2.1 Service-oriented Firms and Product-oriented Firms

Vargo and Lusch (2004) argued that providing precise definitions for goods and services is challenging, and the distinctions between their features can be misleading. The definitions often rely on the viewpoint taken, whether from a consumer-centric, marketing, or manufacturing perspective. Despite the complexities associated with defining services, some scholars, like Kotler, (2000, p.200), propose a comprehensive explanation. They describe services as "any act or performance that one party can offer to another, which is essentially intangible and does not result in the ownership of anything."

According to Zeithaml et al. (2010), the characteristics of services are intangibility, inseparability (production and consumption happen simultaneously), variability, and perishability. These characteristics have some implications that may cause differences in the posture of the companies according to their main type of economic activity. It is harder to demonstrate the quality and what is the service itself, causing the need to use additional resources to show the customer something tangible. It requires a lot more effort and resources to provide the service always with the same quality and characteristics. Unlike goods/products, services can not be stored, implying that the fluctuations in demand have a higher impact. Services sometimes require greater interaction with clients, leading to a closer relationship when compared to the case of manufacturers (Miles, 2008).

Another characteristic of services is heterogeneity and uniqueness. Unlike products, services often involve a closer link between production and consumption, occasionally leading to highly personalized services tailored to specific clients or situations. Consequently, altering the type of services offered proves more challenging for companies compared to the adaptability of manufacturers in changing their product offerings

Another important characteristic to consider when comparing the service industry with the product industry is the lower protection of intellectual property. Due to less regulation in intellectual property laws, services are more easily imitated and utilized by other service providers. Additionally, people play a crucial role in service companies, particularly their skills and knowledge, as human capital has a significant role in creating value in services, responsible for their evolution and quality (Hipp and Grupp, 2005).

## 2.2 Exports and International Diversification and the impact on firm performance

### 2.2.1 Product-oriented Firms

Some authors defend that the relationship between performance and international diversification is linear. Delios and Beamish (1999) states that International diversification is positively related to firm performance when analyzing a database of 399 Japanese manufacturing firms and selecting the Partial Least Squares method (PLS), using as the dependent variable the corporate performance, which is a compilation of three performance measures: return on assets, return on equity, and return on sales computed as a five-year average (1991-1995). The industry profitability was also taken into account by using the ratios: operating income to sales, profit to sales, net income to sales, and industry ROE. Another control variable was the R&D intensity (R&D expenditures/firm's total sales) The Product diversification was classified by analyzing the three-digit SIC (Standard Industrial Classification).

According to Nachum (2004), international diversification is positively associated with performance but is influenced by the geographic region. This study was produced using a sample of 345 firms from developing countries. The firms analyzed in this study had to meet the following criteria: Have their headquarters in a developing country and no more than 90% of their revenues could be originated by the national market. The performance was measured by the ratio of profits to sales. The Index for diversification was calculated as follows:

$$PDI = 1 - \sum S^2_i \quad (2.1)$$

$$GDI = 1 - \sum S^2_m \quad (2.2)$$

where  $S^2_i$  is the value of the  $i^{th}$  product in the total value of sales of the firm, and the  $S^2_m$  is the share of the firm in the market  $m$ . In this study the industrial characteristics of the firms were also taken into account, by using the two-digit SIC code, as well as the firm size measured by total revenues and the firm growth measure the average annual growth of sales over the past five years.

Other authors, for example Lu and Beamish (2004) using a sample of 1489 Japanese firms concluded that the relationship between international diversification and performance is a S-shaped relationship. Moreover, the firms that have overall higher gains from international diversification are the ones that invest in intangible assets. For low and high levels of geographical diversification, the increase in

geographical diversification is associated with negative firm performance. However for a moderate level of internationalization, the more geographic diversification the higher the performance. In this study, the dependent variable was corporate performance and was constructed by using accounting-based (ROA) and market-based performance measures (Tobin's Q ratio). This ratio is obtained by dividing the market value of assets by the replacement value of the assets. In order to measure internationalization, the number of overseas subsidiaries was divided by the maximum number of subsidiaries in our sample. The R&D intensity (R&D expenditures/the sales) and firm size (logarithm of net sales), as well as the debt-to-equity ratio, were used as control variables. To measure product diversification, the Herfindahl measure was used, the same as the one used by Nachum (2004) .

With a different perspective, Thomas and Eden (2004) suggest a non-linear three-stage sigmoid relationship between international diversification and firm performance. In the first steps of internationalization, there is a positive impact on performance. However, in time, the costs associated with this internalization may be higher than the benefits. Nonetheless, the author considers that the long-term expected market returns indicate a positive performance, and long-run returns are much larger than the short-time returns. In order to analyze this performance the variables return on assets, return on equity, excess market value, and average market value were used. In order to analyze the multi-nationality, the foreign sales ratio, the foreign assets ratio, and the number of countries were taken into account. The control variables used were: the firm's technological intensity (R&D expenditures/sales ), general administrative expenses divided by total sales, the ratio of administrative costs to total sales, and the firm size (log of total assets), the debt-equity ratio, and the industrial effects (based on the primary SIC).

Using a database containing information on small and medium-sized manufacturing companies in Spain, Cassiman et al. (2010) found that the relationship established in the literature between higher productivity of exporting firms may be linked to the firm's innovation decisions, particularly process innovation. They suggested that this might be one of the reasons why non-exporting small firms start to export. They hypothesized that exporting firms tend to be more productive, but it is their higher productivity that leads to a greater tendency to become exporters. Two alternative but non-exclusive hypotheses can explain this increase in productivity in exporting firms.

According to Bernard and Wagner (1997) and Bernard and Jensen (1999), one of these hypotheses is related to the natural selection of firms that initiate their export process. The reason behind this hypothesis is that there are additional costs associated with exporting products to other countries, including transportation costs and costs associated with skilled labor to manage external markets. These costs represent an entry barrier that less productive firms may not be able to overcome. Additionally, a firm's desire to begin exporting can lead to an improvement in the company's performance. The second theory identifies the role of learning by exporting. The interaction with international buyers and other competitors can lead to an improvement in the company's productivity. Additionally, these firms, when entering the export market, are typically subjected to greater competition and have a greater need for rapid improvement compared to firms facing less competition that operates solely in the domestic market.

Wagner (2007) attempted to verify these two theories. Despite the author's acknowledgement that

there may be some variables conditioning the results of the study, he found that indeed, on average, exporting firms are more productive and that the more productive firms self-select themselves into the export market. However, he did not find evidence that exporting improves productivity. Girma et al. (2004) also found that, in their analysis of UK firms, on average, exporting firms are more productive and that exporting firms self-select themselves into the export market. However, the authors also discovered that the act of exporting may lead to an increase in productivity. This conclusion aligns with the earlier study, and the authors suggest that this finding could be related to the country context. For instance, the US market is larger and more competitive, with more firms closer to the technological frontier. As a result, the potential learning benefits from exporting are likely to be less significant for UK firms.

### **2.2.2 Services- oriented Firms**

The previous studies are all based on the internalization and exportation of manufactures, the following ones are related to the international diversification and exportation of service firms.

As specified by Capar and Kotabe (2003) regarding a sample of 81 German firms, the relationship between multi-nationality and performance differs between services firms and manufacturing firms specifically, a reduced performance is achieved until a certain point, due to diseconomies of scale. At higher levels of multi-nationality, performance increases possibly because of the benefits of the economy of scope, more than the effects of the economy of scales. Overall this article suggests that there is a U-shaped curvilinear relationship between international diversification and the performance of Service firms. The study was conducted by using a dataset with only service firms that belong to one of the four service industries: retail/wholesale, utility, information technology (IT) service, and tourism which have more than 70% of sales provided from one single business. The performance measure used was Return on Sales, and the control variables were the firm size, measured by the number of employees, and the industry effects controlled by the SIC code.

In the study conducted by Contractor et al. (2003) the performance measure used was the return on global total sales, and the principal explanatory variable was a three-component index for the degree of internationalization, formed by the ratio of foreign sales/total sales, the ratio of number of foreign employees by the total of employees, and the ratio of the number of foreign offices and the total number of offices. The control variables used were the firm size (measured by the natural logarithm of total employees), the sub-sector effects (segmenting the sample into knowledge-based and capital-intensive service sectors), and a dummy that takes the value of 1 if the company was U.S based. The service firms presented a Sigmoid (S-shaped) relationship between International Diversification and performance in knowledge-based service firms. In the initial phase of firms' internationalization, the costs of learning about the different countries and the inexperience of cultural and foreign markets, as well as, the insufficient scale of global operations and the overall liability of foreignness may cause a decrease in performance. In a more advanced phase, it is possible to 'overinternationalize' and harm performance because the final expansion can happen into peripheral or smaller markets and the costs related to coordination and governance increase more than the revenues resulting from the growth.



Using data from France, Germany, and the United Kingdom, Temouri et al. (2013) compared the service sector firms that export with the firms that only serve the national market. It was concluded that the service firms exporters, in the three countries, tend to be more productive and pay higher wages. However, when the profitability of these firms is analyzed the German exporter services firms are normally lower than firms that only operate in the national market. Nevertheless in France and in the UK the profitability of the service firms is higher for the ones that operate/export outside of the country. Regarding productivity, the study does not show any conclusive and significant remarks about this relationship. Due to the different conclusions about the profitability depending on the countries analyzed, it is not possible to have clear empirical evidence of the effect of exports on service firms. The intensity of firms' export activities was measured by the export intensity, defined as the percentage of exports in total turnover. The profitability was measured by the rate of profit. The rate of profit is measured by

$$\text{rate of profit} = \frac{\text{gross value added} - \text{gross wages}}{\text{total sales}} \quad (2.3)$$

The control variables include the logarithm number of employees and a full set of interaction terms of year and economic activity

Regarding data from Germany. Vogel (2011) verify that there is a similarity between manufacturers exporters and export service firms, the size of the enterprise in terms of turnover and the number of employed persons is larger than the non-exporting firms. According to this study, in the service sector as well as the manufacturers, the firms that export are more productive and pay higher average wages. However, there are some differences between the manufacturing sector and the service sector. It seems that the service sector presents lower turnover profitability. When the unobserved and time-invariant characteristics are controlled, there are no significant differences between exporters and non-exporters regarding productivity and profitability. To analyze the performance of the firms, there were considered the following variables: turnover profitability, the logarithm of the number of employed persons, average wage, turnover per employed person, and value-added per employee, being all these values used in 2003 prices. The control variables include terms of year and economic activity,

Lööf (2010) analyzed the Swedish firms and noticed that the persistence of exporting between manufacturing firms and service firms is different. The percentage of service firms that exported one year and exported the next year is smaller than the manufacturer firms in the same situation. There was some evidence that the export productivity premium is bigger for service firms than for manufacturers. One of the dependent variables that had been used is a binary, which assumes the value of 1 if the firm was an export. In another model it was used the log of labor productivity and in another, the Productivity growth. The control variables used include the number of employees, type of ownership structure, and geographical location (outside or inside metropolitan areas).

By using a dataset of service companies in the UK, Breinlich and Criscuolo (2011) found that, on average, similarly to product companies, service firms engaged in import, export, or both activities exhibited higher levels of productivity than those without any international trade. The authors also observed that, on average, service exporters alone were more productive than product exporters alone. Addition-

ally, service firms that exported but did not import services tended to be more productive than those solely importing services. In the service sector, the study also identified that the import and export of services were highly concentrated among a limited number of firms, which typically traded with numerous countries and various types of services. Moreover, it was found that more productive companies tended to have trade relations with more countries and a greater variety of services.

### **2.2.3 Export destination and performance of firms**

There is some literature studying the effect of the export market and the performance of the exporters. The majority of them agree that the firms that export to a high number of markets, tend to be more productive than the ones that export to fewer countries. And the companies that export to more developed countries and economies also tend to be more productive.

By using a Portuguese sample of exporting firms, Bastos and Silva (2010) concluded that the firms that tend to export more products and to more markets are the higher-productivity ones. There is a reduction in the levels of exportation to more distant countries, caused by the reduction of the number of exporting firms and exported categories for those countries. Nevertheless, the unit value increases with the distance. According to this study, if the distance to a market is two times bigger, the export unit values increase by 11.9 %. The unit value is significantly higher when the exportation occurs to landlocked countries, concluding that the export unit values increase with trade barriers, in congruence with the size of the destination market and the income per worker of the importing country.

Wagner (2004) concluded that from the German firms used in the dataset, the more productive ones (measured by the total sales in constant prices divided by the average of employees in that year) were the ones that sell outside of the euro-zone followed by the firms that export to the euro-zone and the less productive ones were the firms that only sell their products in Germany. According to the authors, these findings follow the hypothesis that the export markets outside the euro-zone require more investment due to the higher entry costs and only the more productive companies are able to finance this investment.

According to Muûls and Pisu (2009), the number of trading firms is negatively related to the increase in the number of countries that these companies trade with, and the same happens with the product level. The majority of trade companies only export to a small number of countries. This indicates that the fixed costs of imports and exports are related to each new market and each new product.

The previous studies core focus was more on the effect of exporting on productivity. The study done by Fryges and Wagner (2010) had its focus on profitability and they concluded that the exporters have a statistically significant, but small, positive profitability differential compared to non-exporters. Contrary to the conclusions of the studies about productivity there is no evidence that only the most profitable firms enter the export market. The firms that present a higher profitability ratio are the ones that generate 49% of their total sale from exports and the firms that present a higher export-sales ratio have a zero effect on the profitability. The firms are considered exporters in a year if at least one of its establishment report a positive amount of sales to a customer in a foreign country or to a German export trading company. The rate of profit of a firm is computed as a rate of return, defined by the gross firm surplus divided by total

sales minus the net change of inventories. The differences in the capital intensity were also taken into account by including a set of industry dummy variables. The control variables used were the firm size (measured by the number of employees and their squared value) and the share of employees in R&D

Numerous conditions and variables can impact a firm's performance. Even when examining the influence of exports and imports, specific characteristics of firms can significantly affect their decision to engage in international trade. Wagner (2012) observed a positive relationship between exports and firm size, potentially linked to the benefits of economies of scale and greater access to financing for supporting the fixed costs of exporting. The author also found that firms with export activities tend to have, on average, a higher percentage of highly skilled employees.

## **2.3 Importers and two-way traders and the performance of firms**

Vogel and Wagner (2010) analyzed the German companies and verified that there was a positive relationship between importing and productivity, confirming the hypothesis that there is a selection of enterprises that enter the import market. However, their data was not able to verify the positive effects on productivity due to the learning-by-importing. Between the firms that import and the firms that do not trade internationally, there are unconditional productivity differentials. The two-way traders have the highest premia and after that the firms that only export and the firms that only import are the ones with small estimated premia.

Complementing the previous results Serti et al. (2010) in a study that used the database of Italian manufacturers, observed that when a coefficient for the importer was added the coefficient for exporters would drop significantly and would be lower than the importer's coefficient. This may indicate that the import side is plausibly the main driver of the higher premia found when only considering the export side. But overall the premia for the two-way trades is much higher than the ones for only exporters or importers. The control variables for this study were the number of employees, the wages of their employees, and a dummy related to foreign ownership.

In the study done by Silva et al. (2013), using data from Portuguese manufacturers the results discussed before confirmed to the Portuguese firms, that the performance of two-way traders is better than one-way traders. However on the contrary of Vogel and Wagner (2010). The performance of importers is better than the exporters. Furthermore, the author also notices that the exporters that only sell to European countries are the least efficient ones, suggesting that firms tend to export to countries where the productivity level is lower than their own. On the other side, the firms that import from European countries have a better performance. This is possibly to be explained by the fact that these importations are mostly high-tech goods and merchandise which require the firms to be already productive in order to take benefits from this shopping. The performance was measured using the firms' labor productivity (LP), total factors productivity TFP, sales, capital intensity or number of employees and controlling for the sector in which the firm is operating, a dummy variable for the existence of foreign capital share, other for the existence of workers in R&D activities and other for the different years.

Sjöholm (1999) found that, when examining manufacturers in Indonesia, in addition to the benefi-

cial effects of exports, firms that engaged in imports also exhibited higher productivity. Kasahara and Lapham (2013) found, through an analysis of a group of Chilean manufacturers, that both importation and exportation have a positive effect on firms' productivity, with productivity being higher on average for firms that both imported and exported. With similar findings, a study conducted by Sharma and Mishra (2015) on a sample of Indian manufacturers revealed that in addition to exports, firms that engage in imports exhibit higher productivity on average. Moreover, there is a possibility that more productive firms are the ones initiating the importation process.

Castellani et al. (2010) in their study of manufacturing firms in Italy using pooled OLS and fixed effects regressions, found that firms with different levels of exposure to international trade demonstrated varying levels of performance. Specifically, it was observed that companies highly engaged in international activities, both importing and exporting, exhibited better performance. Nevertheless, the study also noted that firms exclusively involved in imports generally outperformed those solely focused on exports.

## **2.4 Other aspects influencing firm performance**

Several other factors need to be considered that can affect firm performance. One important factor is the qualification of employees. According to Agiomirgianakis et al. (2011), firms that invest in a higher number of employees with higher levels of education demonstrate higher levels of productivity and profitability. This also increases the likelihood of engaging in innovative activities and a greater propensity for research. However, these conclusions were only applicable to firms in more competitive industries.

The relationship between a more qualified workforce and improved firm performance has been a widely debated topic over the years. According to Layard (1971), education is an investment in knowledge that consequently leads to increased productivity in the workplace. One of the earliest studies conducted to analyze the impact of worker education on firm performance found that companies with more educated employees experienced faster progress and increased productivity compared to those with a lower level of employee education (Becker, 1962).

Recent studies confirm this positive relationship between worker education and firm performance. According to Psacharopoulos and Patrinos (2004), employees with higher levels of education, possessing more specialized knowledge, perform better when undertaking complex tasks, and have better communication and decision-making abilities, ultimately contributing to improved firm performance.

Regarding firm size, there is no consensus on the effect of firm size on firm performance. Some studies indicate a positive effect between firm size and profitability, such as Papadogonas (2007), who analyzed manufacturing companies and found a positive relationship between increased firm size and profitability. However, Majumdar (1997) found that larger firms had higher profitability but lower productivity.

Lee (2009) found that firm size plays a crucial role in analyzing firm profitability; however, the study revealed that this relationship was not linear, implying that profitability gains are more limited for larger

firms.

In line with Dhawan (2001), smaller firms are on average more productive than larger firms, and this relationship holds when considering different units of measurement. However, this study also found that despite smaller firms having higher average productivity, they face a greater risk of failure.

Diaz and Sanchez (2008), analyzing manufacturing firms in Spain, arrived at a similar conclusion, stating that small and medium-sized enterprises are more efficient than big firms. According to the author, this situation can be explained by the complexity of larger firms in terms of organization and managerial control. Additionally, less productive small firms tend to have a higher tendency to exit the market.

Coad et al. (2013) found that when analyzing a set of Spanish manufacturers, older companies tend to have higher productivity, higher profits, and a larger size. The author further suggests that older companies are better able to convert sales increases into enhanced profitability and productivity. However, older companies exhibit lower levels of growth.

## **2.5 Performance and characteristics of Portuguese firms**

There are some differences between the different types of firms existent in Portugal. The rate of firm growth is not the same for all regions, suggesting that there are some characteristics of the region like the local competition and the labor characteristics that affect the growth of the firms. There is evidence that in some districts firms had different probabilities of achieving a particular growth rate, causing some firms to grow slower than others (Barbosa and Eiriz, 2011).

Portugal had a slowdown of productivity and was diverging from most countries of the EU which have a productivity-positive growth rate (Nunes et al., 2020). A study elaborated by the Bank of Portugal proves the stagnation of productivity between the years 2008 and 2017 to more than two-thirds of firms in the Portuguese economy. Still in this study productivity is linked with firm size, there is a positive relationship between size and productivity. Martins (2016) also analyzed the Portuguese firms and presented the same conclusion related to the firm size and verified that the annual average gross wage growth rate is positively related to productivity as well as financial health and innovation.

Thus, in general, we can ascertain that the articles in the literature indicate that exporting firms are often more productive, possibly due to self-selection and learning effects, while the effects of exporting on productivity remain a subject of debate. Additionally, importing firms demonstrate enhanced productivity. Some studies point to a positive relationship between the number of markets traded with and firm productivity. This demonstrates the complexity of the relationship between international trade and firm performance. However, these dynamics can vary based on the type of economic activity and region under consideration.

## Chapter 3

# Data and Research Methodology

In this chapter, the data will be described, and the models and methods used will be explained, along with the definition of the variables to be employed in this study.

### 3.1 Datasets

#### 3.1.1 Sistema de Contas Integradas das Empresas (SCIE)

The data used in order to evaluate and analyze the performance of the Portuguese firms was the Portuguese dataset - Sistema de Contas Integradas das Empresas (SCIE). The SCIE allows a deep characterization of the Portuguese business sector, collecting economic and financial information relating to companies producing goods and services that are economically active in the given period of analysis.

The population of this dataset included all the enterprises in Portugal, including companies, individual entrepreneurs, and self-employed. Excluded from the scope are financial and insurance companies, and entities that are not market-oriented, namely the central and local public administration units.

In this dataset the individual entrepreneurs and self-employed are classified as "Empresas individuais" and the remaining entities are classified as "Sociedades". The information included in this dataset comes from the aggregating declaration of declarative information, both at the accounting, tax, and statistical level IES - (Informação Empresarial Simplificada), and from the Portuguese Tax Authority.

The validation of the data includes in the first phase, the comparison between the data reported and the data from the year before, in order to assure the temporal consistency of the information. Besides that, there is special attention to some variables that may suffer alterations such as the legal form, staff level, and performed activities. If it is necessary there is the possibility to contact the firm and obtain complementary information. This control has more focus on the firms of bigger dimensions, which have a more significant impact on the results (INE, 2012).

### **3.1.2 Quadros de Pessoal (QP)**

The SCIE database ensures the anonymity and confidentiality of the companies involved by assigning a fictitious identification number to each business, safeguarding their direct identifiers. This approach maintains the integrity and privacy of the companies while enabling seamless integration with the Quadros de Pessoal dataset.

The QP dataset, a mandatory annual survey overseen by the Portuguese Ministry of Labour and Social Security, focuses on all private sector enterprises with at least one salaried employee, excluding the military, public administration, and self-employed individuals. Through the QP, a comprehensive matched employer-employee dataset is created, providing crucial insights into the firm, establishment, and employee profiles.

Within the QP dataset, information related to a firm's age, workforce size, industry classification, and other key factors is readily available. Furthermore, the QP dataset allows for the tracking of employees, providing essential details such as education levels, wages, hours worked, and occupational roles, thus offering a comprehensive understanding of the workforce dynamics within the Portuguese business landscape.

### **3.1.3 Working sample**

The period under consideration for this study spans from 2010 to 2020, as the database provides comprehensive and relevant information within this timeframe. The decision to start the analysis in 2010 was primarily due to the absence of critical variables in the database before that year.

The analysis only focuses on the "Sociedades" category within the database, excluding the Self-employed individuals. The exclusion of this category is attributed to the limited availability of some variables necessary for conducting an analysis of their performance. However, the category of "Sociedades" encompasses micro and small firms, including those with only one employee, ensuring a representative and inclusive evaluation of various business sizes and types in our dataset.

Due to the structure of the QP dataset, some data manipulation was necessary to align it with the format of the main dataset, SCIE. The QP dataset comprises individual observations for each employee within a company for each year. To avoid a substantial computational burden in handling a large number of employee-level observations, the employee data was aggregated, doing some averages, to focus on overall firm characteristics.

To extract the necessary information, the QP dataset was handled separately, allowing for specific calculations to be conducted. Several key metrics were derived, including average hourly wages, the proportion of workers with higher education, the percentage of male employees, the average age and tenure, and the percentage of workers in managerial positions. Once these calculations were completed for each firm by year, the datasets were combined to create a comprehensive and detailed dataset for further analysis.

### 3.1.4 Variables

With the information and variables available in the QP and SCIE datasets, a comprehensive set of explanatory variables related to company characteristics can be identified. These variables will be integrated into the regressions designed to evaluate company performance. Table 3.1 presents the variables employed in the data analysis and in the models.

Table 3.1: Explanatory variables used in the regression models

Variable	Type	Description
Firm Type	Categorical – 5 categories	% of the sales volume in product sales
Exporter	Categorical – Binary	If the firm is considered an exporter
Importer	Categorical – Binary	If the firm is considered an importer
Export Market	Categorical – 6 categories	Market to which firm export
Import Market	Categorical – 6 categories	Market to which firm export
Firm Size	Categorical – 3 categories	Classification of firms according to their size
Age Log	Continuous	Logarithm of firm age
Employees Education	Categorical – 4 categories	% of workers in the firm with a university degree

#### Firm Type

The variable firm type facilitates the classification of the company based on its principal type of business, distinguishing between service-oriented companies and those primarily involved in the sale or trade of products. This classification is established considering the ratio of turnover derived from product sales to the total turnover. Table 3.2 provides an overview of the company categorization based on their primary orientation.

Table 3.2: Classification of Firm Type

Firm Type	Conditions
0	0% of the turnover in product sales.
1	Between 1% and 20% of the turnover in product sales
2	Between 21% and 79% of the turnover in product sales
3	Between 80% and 99% of the turnover in product sales
4	100% of the turnover in product sales.

This categorization enables the consideration of the distinctive attributes of product sales and service provision. The classification includes companies exclusively dedicated to service provision (type 0), those primarily but not exclusively engaged in service provision (type 1), and diversified companies with substantial levels of both product sales and service provision (type 2). Additionally, it encompasses companies exclusively involved in product sales (type 4) and those primarily, but not exclusively, focused on product sales (type 3).

Other intervals were considered for each category, and it was observed that there was no significant change in the results or the distribution of the categories.



## **Exporter**

To classify a company as an exporter, the criteria employed are based on the guidelines established by the Bank of Portugal, used by Gouveia and Correia (2015) Gonçalves and Martins (2016). A firm is considered an exporter if the firm fulfills one of the following criteria.

1. At least 50% of annual turnover is from exports of goods and services.
2. At least 10% of annual turnover due to exports and its value overpasses 150.000€.

The aim of applying these criteria is to prevent companies with minimal export activity from being classified as exporters, thus minimizing the possibility of errors in the model. Misidentifying a company as an exporter in cases where the export activity is minimal can lead to distortions in the evaluation of the actual impact of exporting. The second criterion ensures that companies with a low percentage of their overall turnover attributed to exports, but with a significant volume of exports overall, are not inadvertently excluded from the analysis.

## **Importer**

The classification of a company as an importer, similar to the definition of exporter, is based on meeting at least one of the following criteria:

1. At least 50% of annual purchasing and services supply is from an outside market.
2. At least 10% of annual purchasing and services supplying services is from an outside market. and its value surpasses 150.000€.

## **Export Market**

To analyze exports based on the markets to which companies export, the Export Market variable was defined in table 3.3. It is important to distinguish companies that exclusively export to one market from those that export to more than one market.

Due to the information available in our database, we can only identify two types of markets: the EU market (community market), which represents exports to countries belonging to the European Union market, and the non-EU market (extra community market), which represents exports to countries that do not belong to the European Union market.

Moreover, it is crucial to differentiate the intensity of exports to the different markets. Considering a company that exports 5% to the EU market and 95% to the non-EU market to have the same export characteristics as a company that exports 40% to the EU market and 60% to the non-EU market would be incorrect.

The purpose of this classification is to distinguish companies that exclusively export to the non-EU market from those that solely export to the EU market, as well as those that predominantly (but not exclusively) export to the extra-EU market and those that predominantly (but not exclusively) export to

Table 3.3: Classification of Export Market

Export Market	Conditions
0	Firm is not an exporter
1	100% of the export turnover is from the non-EU market. (0% of the export turnover is from the EU market)
2	Between 70% - 99% of the export turnover is from the non-EU market (Between 1% - 30% of the export turnover is from the EU market)
3	Between 31% - 69% of the export turnover is from the non-EU market (Between 31% - 69% of the export turnover is from the EU market)
4	Between 1% - 30% of the export turnover is from the non-EU market (Between 70 % - 99% of the export turnover is from the EU market)
5	0% of the export turnover is from the non-EU market (100 % of the export turnover is from the EU market.)

the EU market, and finally, those that have significant export levels to both markets. Thus, the following classification was created:

### Import Market

Regarding the import market, a similar procedure was followed, resulting in the following classification in table 3.4:

Table 3.4: Classification of Import Market

Import Market	Conditions
0	Firm is not an importer
1	100% of the imports are from the non-EU market (0% of the imports are from the EU market)
2	Between 70% - 99% of the imports are from the non-EU market (1% - 30% of the imports are from the EU market)
3	Between 31% - 69% of the export turnover is from the non-EU market (31% - 69% of the imports are from the EU market)
4	Between 1% - 30% of the imports are from the non-EU market (70% - 99% of the imports are from the EU market)
5	0% of the imports are from the non-EU market (100% of the imports are from the EU market)

### Firm Size

To categorize companies based on their size, the firm size definitions recommended by *Eurostat* were applied, according to the "Recommendation of the European Commission 2003/361/EC of 6 May 2003".

These criteria consider the number of employees and the turnover. A company is classified as a micro firm if it has less than 10 employees and its annual turnover does not exceed 2 million euros. A small firm is one that employs between 11 and 50 people, and its annual turnover does not exceed 10 million euros. A medium-sized enterprise employs between 51 and 250 people, with an annual turnover not exceeding 50 million euros. Big firms are those that exceed 250 employees or have a turnover exceeding 50 million euros.

Due to the limited number of medium and big enterprises in Portugal, it was decided not to make this distinction and to group together the companies classified as medium and big.

## Employees Education

The variable Workers education defined in the table 3.5, serves as an indicator of the presence of labor with university studies within the workforce.

Table 3.5: Classification of Employees Education

Employees Education	Conditions
0	0% of the employees have university studies
1	Between 1% and 30% of the employees have university studies
2	Between 31% and 70% of the employees have university studies
3	More than 71% of the employees have university studies

This classification aims to categorize companies into the following groups: companies that do not have any employees with a university education, companies with some employees with a university education (less than 30%), companies where the percentage of people with a higher education degree is significant (between 30% and 70%), and finally, companies where almost all employees (more than 70%) have a university degree.

## Control Variables

There are a few more variables that are included in the models, and some of them are continuous variables. They will be defined in this part. One of the variables included in the models is the Log age, which is the logarithm of the company's age in the year of the data under analysis.

Another variable included in our models that serves as a control variable is related to the CAE of the companies and refers to the sector where a firm performs its economic activity. CAE is the Portuguese equivalent to the International Standard of Industry Classification (ISIC).

In the database, the CAE code is present, but due to the extensive range of CAE codes, the approach adopted involved categorizing companies based on broader CAE categories. This process entailed isolating the first two digits of the CAE code and subsequently grouping them by letters. This classification scheme allows us to discern the general sector in which each company operates, with companies being classified according to their CAE codes and assigned a letter from A to S. The categories T and U were included in the classification, even though companies falling under T, U, and O are not present in our database.

Another variable included in the analysis is the region in which the company is based. The companies are distributed across the following regions: North, Algarve, Center, Metropolitan Area of Lisbon, Alentejo, Azores, and Madeira.

## Dependent Variables

In the analysis, various dependent variables were taken into account based on an extensive review of existing literature and the variables employed in prior studies. However, certain variables utilized in these studies were excluded due to the lack of data required for their computation within our database. Examples include return on equity (ROE), return on investment (ROI), and return on assets (ROA). Thus, the variables considered for use were the Return on Sales (ROS), the Earnings Before Interest, Taxes, Depreciation, and Amortization (EBITDA) per employee, the Sales per employee, and the growth rate.

The formulas for calculating these variables are presented in the table 3.6

Table 3.6: Dependent Variables Definition

ROS	EBITDA / Turnover
EBITDA per employee (€)	EBITDA / Number of employees
Sales per employee (€)	Turnover / Number of employees
Growth rate (%)	100 x (turnover of year t - turnover of year t-1)/ turnover of year t-1

## 3.2 Methodology

The following definitions and explanations are in accordance with the book Wooldridge (2012)

### 3.2.1 Multiple Regression Model

This type of model allows for analyzing the impact of one variable while taking into account the effects of other variables, enabling a better *ceteris paribus* analysis. It helps control for other factors that also affect the dependent variable. This type of model is particularly important when dealing with non-experimental data and can be expressed as follows:

$$y = \beta_0 + \beta_1 x_1 + \dots + \beta_k x_k + u \quad (3.1)$$

$\beta_0$  corresponds to the intercept,  $\beta_k$  corresponds to the parameter associated with  $x_k$ , and  $u$  represents the error term, which accounts for other factors not included in the equation but that affect  $y$ . To obtain the coefficients/parameters, the ordinary least squares method is applied. The estimators  $B_0$ ,  $B_1$  and so on, are chosen simultaneously to minimize the sum of squared residuals:

$$\min \sum_{i=1}^n \left( y_i - \hat{\beta}_0 - \hat{\beta}_1 x_{i1} - \dots - \hat{\beta}_k x_{ik} \right)^2 \quad (3.2)$$

where  $n$  represents the total number of observations, and  $i$  corresponds to the observation number, resulting in the following regression line:

$$\hat{y} = \hat{\beta}_0 + \hat{\beta}_1 x_1 + \dots + \hat{\beta}_k x_k$$

These parameters are estimated based on the sample data in order to satisfy the following conditions:

The residuals (the differences between the observed and predicted values) are approximately zero, indicating that the model fits the data well. The sample correlation between each independent variable and the residuals equals zero, suggesting that there is no linear relationship between the independent variables and the unexplained variation in the dependent variable.

With these estimators in hand, we can now analyze and comprehend their role in an econometric model. The intercept, represented by  $\hat{\beta}_0$  signifies a scenario in which all explanatory variables are set to zero. While this scenario may not always be practically meaningful, it serves as a reference point for making predictions about the dependent variable.

The estimators associated with the explanatory variables offer a partial effects interpretation, or in simpler terms, a ceteris paribus explanation. For instance, the coefficient on  $x_i$ , denoted as  $\hat{\beta}_i$ , quantifies the impact on  $\hat{y}$  resulting from a one-unit increase in  $x_i$ , assuming that all other  $k$  independent variables remain constant.

To compare which of the models fits our data better and which one is more representative of our samples, we can rely on various statistics that allow us to assess how well the linear regression aligns with our data.

The R-squared ( $R^2$ ) measures the proportion of variance in the dependent variable that can be explained by the independent variables included in the model. The R-squared value can vary between 0 and 1, where 0 indicates that our model cannot explain any variance, and 1 indicates a perfect fit, where the model can explain all the variation.

However, this measure may not be suitable for all models, as the R-squared value generally increases with the introduction of new independent variables, even if they are not meaningful for the model in question. Therefore, it is important to also consider the adjusted R-squared, also known as  $R^2$  adjusted.

The adjusted R-squared takes into account the number of independent variables in the model, thereby addressing the issue of overfitting. It penalizes models that include irrelevant or redundant variables, providing a more accurate measure of how well the independent variables explain the variance in the dependent variable while accounting for the complexity of the model. The  $R^2$  adjusted can be calculated as:

$$R^2 = 1 - (1 - R^2) \cdot \frac{n - 1}{n - k - 1} \tag{3.3}$$

Here,  $n$  represents the number of observations, and  $k$  corresponds to the number of independent variables in the model.

The R-squared provides a simple measure of how well the model fits the data, while the adjusted R-squared is particularly useful when comparing models with a different number of predictors. A higher value of adjusted R-squared indicates a better balance between model fit and simplicity, helping to avoid

overfitting by penalizing the inclusion of irrelevant or redundant variables

### 3.2.2 Fixed Effects

One of the existing methods for estimating and accounting for unobserved effects in panel data is the fixed effects method.

This method allows us to take into account the individual characteristics of each firm, possibly enabling a more precise analysis.

To see how this method works, let's consider a model that has only one independent variable, meaning it has only one explanatory variable. So, for each firm  $i$ , it is observed:

$$y_{it} = \beta_1 x_{it} + a_i + u_{it}, \quad t = 1, 2, \dots, T \quad (3.4)$$

Taking the average over the years, we obtain for each company  $i$ :

$$\bar{y}_i = \beta_1 \bar{x}_i + a_i + \bar{u}_i \quad (3.5)$$

These averages are calculated as follows, using the dependent variable as an example:

$$\bar{y}_i = \frac{1}{T} \sum_{t=1}^T y_{it} \quad (3.6)$$

If we subtract equations 3.4 and 3.5 for each  $t$  (year), and since  $a_i$  is constant over time, we obtain the following:

$$y_{it} - \bar{y}_i = \beta_1 (x_{it} - \bar{x}_i) + u_{it} - \bar{u}_i, \quad t = 1, 2, \dots, T \quad (3.7)$$

or

$$\ddot{y}_{it} = \beta_1 \ddot{x}_{it} + \ddot{u}_{it}, \quad t = 1, 2, \dots, T \quad (3.8)$$

Once the unobserved effect,  $a_i$ , has been removed, it is possible to use pooled OLS, following the OLS assumptions. Adding more explanatory variables is straightforward, and the equation looks like this:

$$\ddot{y}_{it} = \beta_1 \ddot{x}_{it1} + \beta_2 \ddot{x}_{it2} + \dots + \beta_k \ddot{x}_{itk} + \ddot{u}_{it}, \quad t = 1, 2, \dots, T \quad (3.9)$$

Then we apply time-demeaning to each explanatory variable and then we perform a pooled OLS regression using these time-demeaned variables. However, one of the disadvantages of this model is that if one of the explanatory variables is constant for all companies, this method eliminates that variable. This limitation makes it impossible to include variables that represent characteristics of companies that do not change over time. Although it's not impossible to include these time-constant variables in a model using fixed effects. It is possible to introduce these variables by interacting them with other variables,

such as year dummies. However, this interaction only allows you to analyze how that variable differs by year relative to the base period, rather than assessing the specific impact of that variable in a particular time period.

# Chapter 4

## Descriptive Analysis

To conduct a comprehensive analysis of the Portuguese business landscape, data from SCIE dataset will be analyzed. This in-depth assessment will analyze various aspects, including an exploration of company sizes, market engagements, and firm types. By meticulously scrutinizing these elements, valuable insights into the operational dynamics and performance trends within the Portuguese business can be taken into account.

### 4.1 Explanatory Variables

According to our sample, as depicted in Figure 4.1, the vast majority of companies in Portugal presented in the dataset are micro firms, accounting for approximately four-fifths of the total number of firms. Small enterprises make up about 17% of the total. Larger companies (medium and big firms), on the other hand, constitute a marginal percentage in Portugal, representing 4% of the total companies in the dataset.

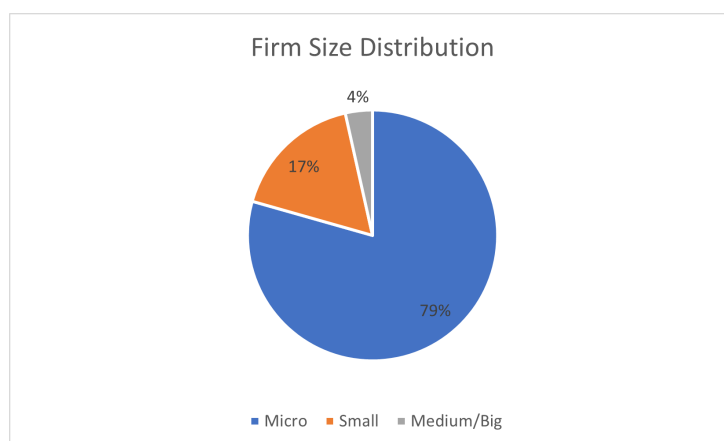


Figure 4.1: Firm size distribution

There has not been a significant variation in the size distribution of companies over the years, with the percentage of each type of firm remaining relatively constant throughout the years. There is only a slight increase in the percentage of micro firms and a very slight decrease in the percentage of small



firms. However, despite the balanced percentages, there was a decrease in the absolute number of firms between 2011 and 2014.<sup>1</sup>

Despite the much larger quantity of micro and small enterprises, the medium and big firms, despite the small number of existing ones, are responsible for a substantial percentage of the total business volume within our database, as shown in figure 4.2.

Big and medium firms account for approximately 70% of the total business volume, followed by small firms at about 18% and micro firms represent only 12% of the total business volume.

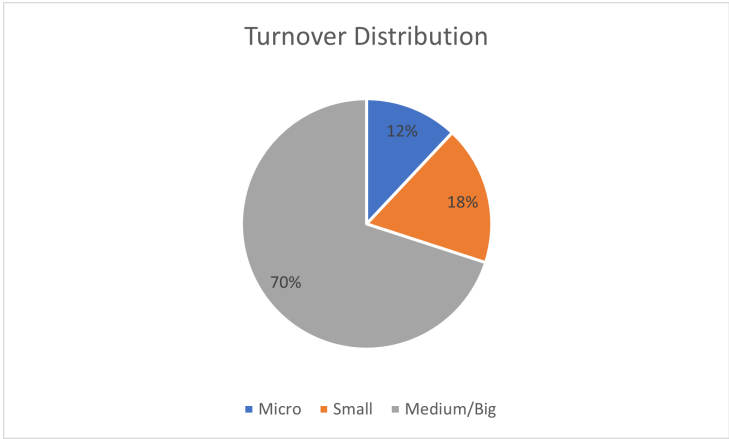


Figure 4.2: Turnover distribution by firm size

Concerning the classification of companies based on their type, figure 4.3, the percentage of companies of type 0 experienced an increase during the examined period within the database. This particular category of company represented 40% of the sample in 2010 and 45% in 2020. In contrast, a decline was noted in the proportion of companies exclusively dedicated to product sales (type 4). Specifically, the percentage of this type of company decreased from 24% in 2010 to 19% in 2020. Companies of other types exhibited consistent values over the years.

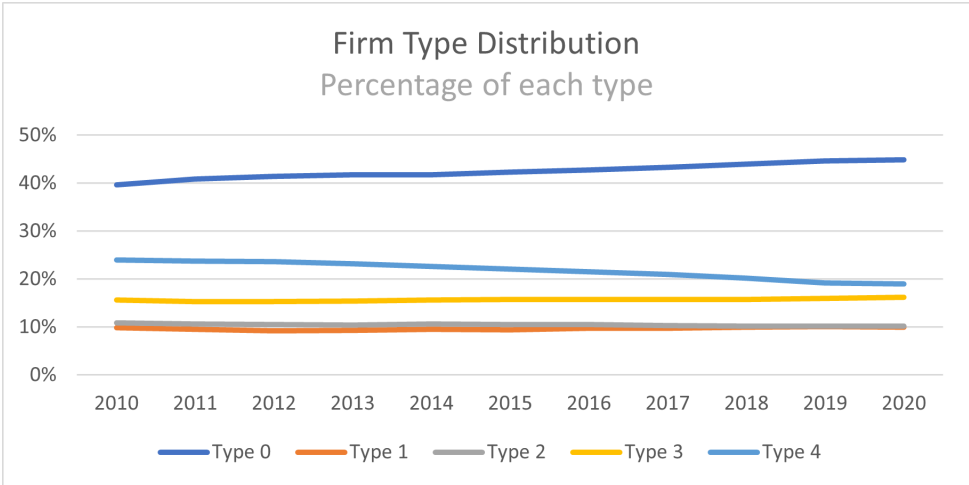


Figure 4.3: Evolution of the number of firms of each type over the years

Concerning the distribution of sizes based on the categorization of companies, it was found (table

<sup>1</sup>See Figure A.1, in Appendix, for more detail

4.1) that does not exist a big difference in company size based on type. Companies exclusively dedicated to providing services (type 0) exhibit identical percentages of micro, small, and medium/big companies when compared to companies exclusively devoted to product sales (type 4). Companies primarily focused on product sales, though not exclusively (type 3), demonstrate a relatively higher proportion of both big and small firms.

Regarding the distribution of turnover based on the type of companies, differences among the various types of companies are observed in table 4.1. Companies exclusively devoted to providing services or solely engaged in product sales display a similar percentage of turnover, approximately 18% for service companies and 19% for product companies. Despite the number of type 4 companies being roughly half of type 0 companies, their turnovers are similar.

The companies that hold the largest share of the turnover are those primarily dedicated to product sales (type 3), yet not exclusively, constituting almost half of the total turnover (48%) of all companies, despite representing only 16% of the total number of companies. On the other side, the companies with the smallest turnover, at approximately 5%, are type 2 companies that exhibit significant values for both product sales and service provision. The percentages displayed no significant fluctuations throughout the years under analysis.

Table 4.1: Distribution of firm size and percentage of turnover by firm type

Firm Type	Firm Size			% of the Turnover
	Micro	Small	Medium	
Type 0	84%	14%	2%	18%
Type 1	72%	23%	5%	10%
Type 2	81%	16%	2%	5%
Type 3	65%	27%	8%	48%
Type 4	83%	14%	2%	19%

On average, approximately 7.7% of the companies within our database are categorized as exporters. The value of exports is roughly 18.9% of the total turnover. Similarly, for imports, approximately 7% of the companies in our database are identified as importers, with imports constituting around 24% of the purchases and services acquired by these companies.

Between 2010 and 2014, there was an increase of about 5% in the volume of exports. In 2010, exports accounted for 14.8% of the turnover, while in 2014, this figure rose to 20.1%. Alongside this growth, there was also a rise in the number of exporting companies, from 6.1% in 2010 to 8.1% in 2015. From 2015 onward, both the percentage of turnover derived from exports and the number of exporting companies stabilized (Table 4.2).

Concerning imports, Table 4.2, a similar trend was observed, with the percentage of imports increasing from 22.6% to 25.6% of the total volume of purchases, and the number of importers increasing from 6.7% to 7.1% .

Table 4.2: Evolution of importers and exporters over the years

Year	% of exports volume to turnover	% of number of exporters	% of importers value to purchases	% of number of importers
2010	14.8%	6.1%	22.6%	6.7%
2011	16.7%	6.9%	23.2%	6.6%
2012	19.0%	7.4%	23.8%	6.6%
2013	20.0%	7.9%	25.4%	6.9%
2014	20.1%	8.1%	25.6%	7.1%
2015	19.9%	8.1%	25.8%	7.1%
2016	18.9%	8.1%	23.6%	7.2%
2017	20.0%	8.1%	24.4%	7.3%
2018	19.9%	8.1%	24.7%	7.4%
2019	19.9%	8.1%	24.7%	7.4%
2020	18.9%	7.9%	24.5%	7.3%

When evaluating the ratio of export volume to total revenue within each type of company as shown in figure 4.4 and the percentage of exporters within each firm type, figure 4.5, it was observed that companies exclusively dedicated to product trade (type 4) exhibit the highest percentage of exports, representing 23% of their revenue, despite only 6.4% of these companies being categorized as exporters. Type 3 companies demonstrate an export percentage of 19.7% of their turnover, with 14.3% of them engaging in exports.

Conversely, companies of type 0, exclusively focused on services, demonstrate the second lowest export value percentage (14.2%), with approximately 6.8% of such companies being exporters. Finally, companies of type 2, involved in both product and service provision, show the lowest percentage of export value, at 13.5%, with 5.9% of these companies classified as exporters. There has been a gradual and general increase in the ratio of exports to turnover and the percentage of exporting companies across all types over the years. The increase in the number of exporters and export volume was distributed similarly across the different types of companies.<sup>2</sup>

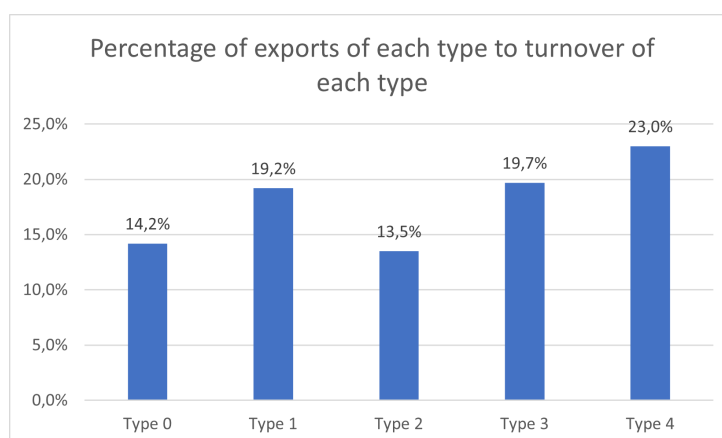


Figure 4.4: Percentage of the exports to turnover of each type

<sup>2</sup>See Table A.2 in the appendix for more details.

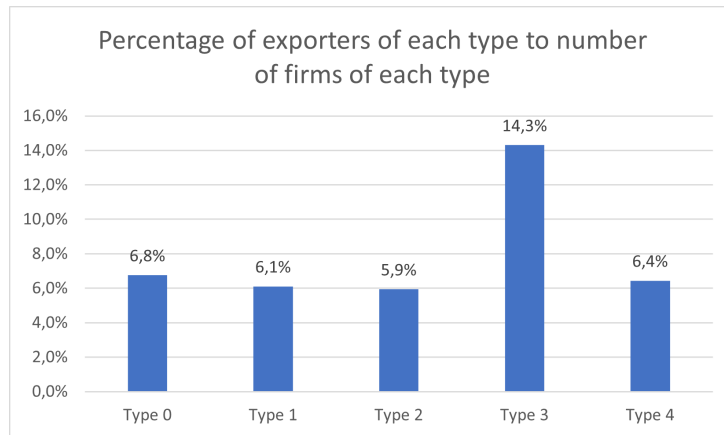


Figure 4.5: Percentage of the number of exporters by firm type

Upon analyzing the exporters based on their size, as depicted in figure 4.6 and 4.7, distinct differences become apparent between companies of different sizes. Micro enterprises, having 4.6% firms engage in exports, contributing approximately 5.6% of their total revenue in exports. In contrast, small-sized companies have an average of 16.1% of exporters, contributing around 12.1% of their total revenue from exports. Medium and big companies exhibit the highest percentage of exporters, with approximately 38,5% of these companies classified as exporters. For big companies, exports account for 22,9% of their total revenue.

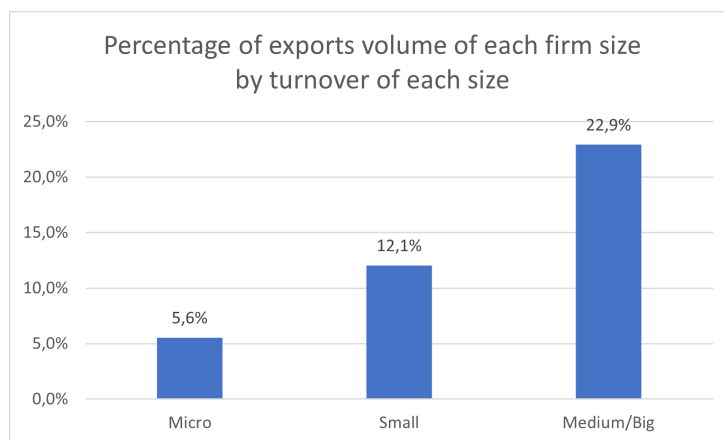


Figure 4.6: Percentage of exports volume to turnover by firm size

Over the years, there was an increase in the percentage of exporters among medium and big companies, rising from approximately 32.5% in 2010 to 38.9% in 2020, peaking at 41.3% in 2015. Small companies also witnessed an increase, with the percentage of exporters rising from 12.6% in 2010 to 15.3% in 2020, reaching a maximum of 17.5% in 2014. However, micro-enterprises experienced only a marginal increase in the number of exporters. The same trend was observed in the value of exports, with medium and big enterprises leading the way, followed by small companies, and finally, micro-enterprises.<sup>3</sup>

<sup>3</sup>See Table A.3 in the appendix for more details

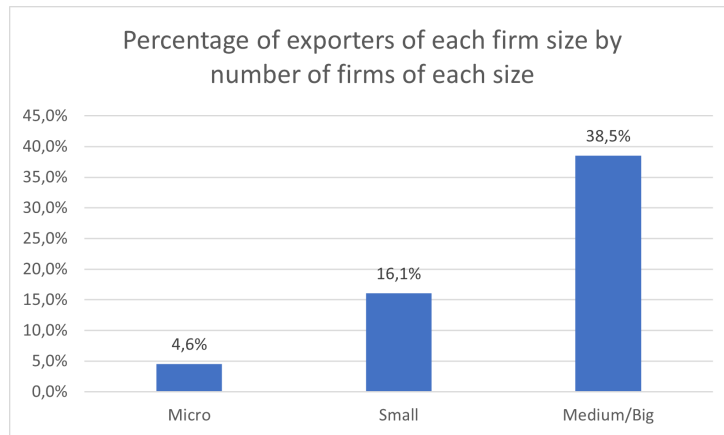


Figure 4.7: Percentage of exporters by firm size

Examining the export market, figure 4.8, the majority of exporting companies, approximately 44.2%, exclusively export to the European market. An additional 22.9% of exporting companies primarily focus on the European market but also engage in some level of exports to markets outside the EU. Approximately 12.8% of exporting companies exclusively export to non-EU markets, while 10.3% primarily target non-EU markets, with up to 20% of their export volume directed to the EU market. A smaller proportion of exporting firms, roughly 10.3%, export significantly to both the European and non-EU markets.

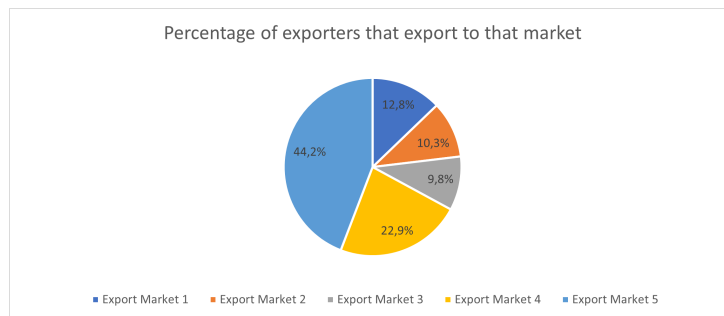


Figure 4.8: Distribution of exporters by export market

Between 2010 and 2014, as shown in figure 4.9 there was an increase in the number of companies exclusively exporting to non-EU markets, rising from 12.4% to approximately 14%, and companies primarily but not exclusively exporting to this market, increasing from 9.2% to 12.3%. There was also an increase in companies exporting significantly to both markets, from 8.4% to 10%. On the other hand, companies exclusively targeting the EU market experienced a decline, dropping from 48% in 2010 to 42.3% in 2014. However, the trend reversed after 2015, and the values approached those of 2010.

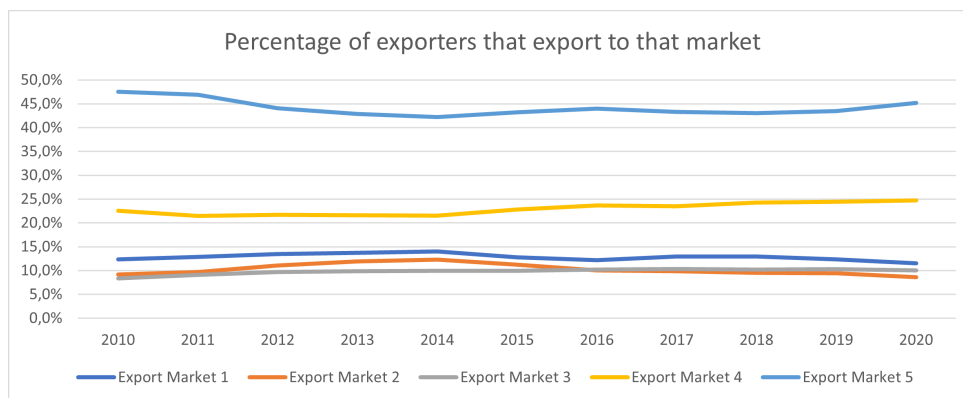


Figure 4.9: Evolution of the percentage of exporters that export to that Export market

Reviewing the volume of exports, as demonstrated in table 4.3, it was observed that the proportion of exports to the non-EU market, relative to the total volume of exports, underwent fluctuations. In 2010, 31.6% of the export value was directed towards the non-EU market, with the remaining 68.4% allocated to the EU market. This percentage experienced an upward trend, peaking at 36.5% in 2014. However, subsequently, a decline was witnessed, with this percentage dropping to 25.5% in 2020.

Table 4.3: Evolution of the percentage of exports volume to the non-EU market

Year	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
% of exporters volume to the non-EU-Market	31.6%	31.9%	34.8%	37.0%	36.5%	33.5%	29.6%	28.2%	29.3%	27.7%	25.5%

Analyzing the percentage of firms that export to the different markets, by considering the type of company, table 4.4, specific patterns emerge. About 60% of exporters of service-oriented companies exclusively export to the EU market, while approximately 15% of them exclusively export to the non-EU market. In contrast, among exporter companies exclusively dedicated to product sales, 39.9% of them export exclusively to the EU market, and 13.6% export exclusively to the non-EU market.

Companies classified as type 2, which deal with both products and services, demonstrate the highest percentage of exclusive exports to the non-EU market, with 16.7% of the exporters of these firm type only exporting to the non-EU market and 13.5% predominantly exporting to this market. Additionally, type 3 companies have the highest percentage of exporters to both markets, with around 15.1% of these export-oriented companies exporting significantly to both the EU and non-EU markets.

Table 4.4: Percentage of exporters that export to each export market by firm type

Firm Type	Export Market 1	Export Market 2	Export Market 3	Export Market 4	Export Market 5
0	15.4%	6.6%	6.5%	11.1%	60.4%
1	13.7%	9.8%	7.3%	17.5%	51.7%
2	16.7%	13.5%	10.2%	20.9%	38.8%
3	7.7%	14.6%	15.1%	37.4%	25.1%
4	13.6%	9.4%	9.3%	27.8%	39.9%

Analyzing the export market concerning the size of companies, as depicted in table 4.5, reveals

behavioral differences. Among micro-enterprises engaged in export, 19.6% of them exclusively export to the non-EU market. In contrast, among medium and big enterprises involved in export, only 3.7% exclusively export to the non-EU market. A significant portion of medium and big enterprises involved in export primarily, but not exclusively, export to the non-EU market, comprising approximately 46.4% of this group.

Moreover, micro-exporting companies tend to display a more singular focus, with 76% of these companies exclusively exporting to a single market. Conversely, medium and big enterprises tend to export to more than one market. Specifically, only 25% of big enterprises that engage in export do so exclusively to one market, compared to 48% in the case of small enterprises.

Table 4.5: Percentage of exporters that export to each export market by firm size

Firm Size	Export Market 1	Export Market 2	Export Market 3	Export Market 4	Export Market 5
Micro	19.6%	7.8%	6.0%	11.0%	55.6%
Small	8.3%	12.9%	11.5%	27.4%	39.9%
Medium/Big	3.7%	11.6%	16.8%	46.4%	21.5%

When examining imports by company type (figure 4.10 and 4.11), type 3 companies, stand out with the highest percentage of importers, accounting for 18.8% of the number of these type of firms. They also contribute to 19.4% of the total purchases and services rendered through imports. On the other hand, type 1 companies, largely involved in services but not exclusively, boast the most substantial import volume in relation to their purchases and services, with imports making up around 26.7% of their purchases.

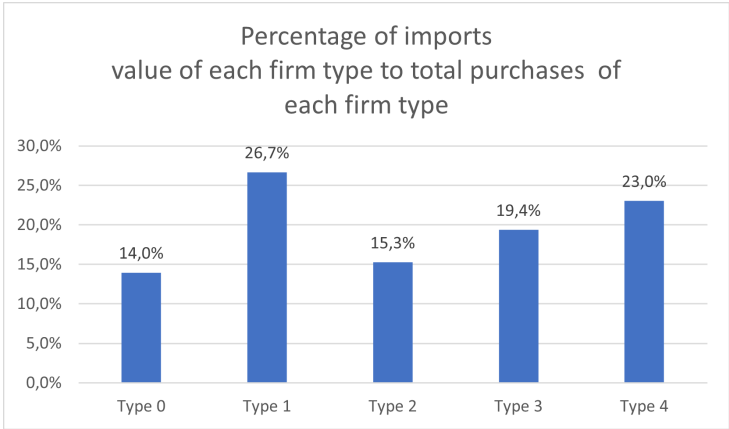


Figure 4.10: Percentage of the imports value to purchases of each type

However, the number of importing companies of this type remains limited at just 3%. Type 0 companies exhibit the lowest percentage of imports concerning their purchases and services, with 14% of their purchases being imports, and a mere 2.3% of these companies engaging in importation. Companies balancing both service provision and product sales (type 2) show a moderately low import rate, with 15.3% of their purchases being imports, and 5.1% of them being importers. Throughout the years under scrutiny, there has been a noticeable trend of an increase in the percentage of import values for all types

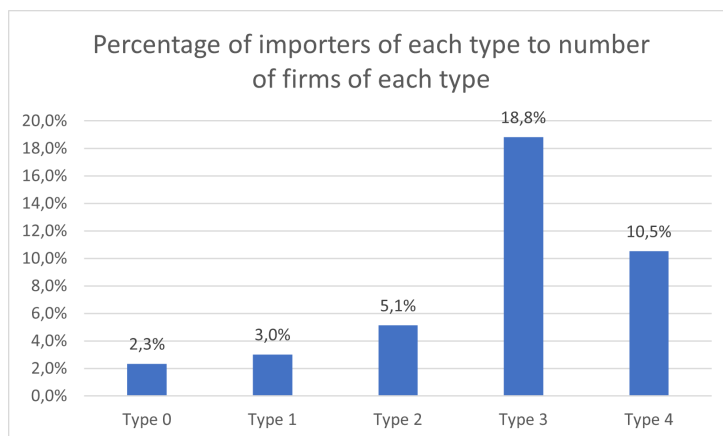


Figure 4.11: Percentage of the number of importers by number of firms by firm type

of companies.<sup>4</sup>

Based on the analysis depicted in figure 4.12 and 4.13, micro-enterprises exhibit the lowest import values, with an average of only 6.9% of their purchases and services constituting imports, and 3.8% of micro-enterprises engaged in import activities. These values experience a substantial increase for small firms, with approximately 15.7% of their purchases being imports, and approximately 15.4% of these enterprises actively participating in importation. In contrast, medium and big enterprises demonstrate the highest import rates, with 29.2% of their purchases being imports, and 41% of these enterprises are considered importers.

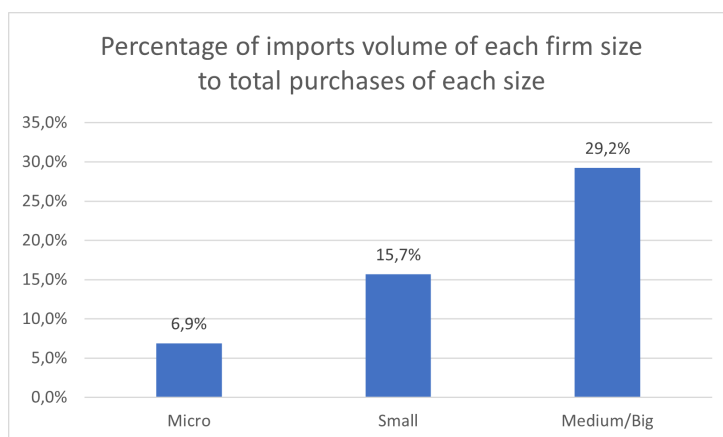


Figure 4.12: Percentage of imports volume to purchases by firm size

Over the years, there was an upward trend in the percentage of import volume and the number of importers across companies of all sizes, with the most significant increase observed in medium and big firms.<sup>5</sup>

<sup>4</sup>See Table A.4 in the appendix for more details

<sup>5</sup>See table A.5 in appendix for more details



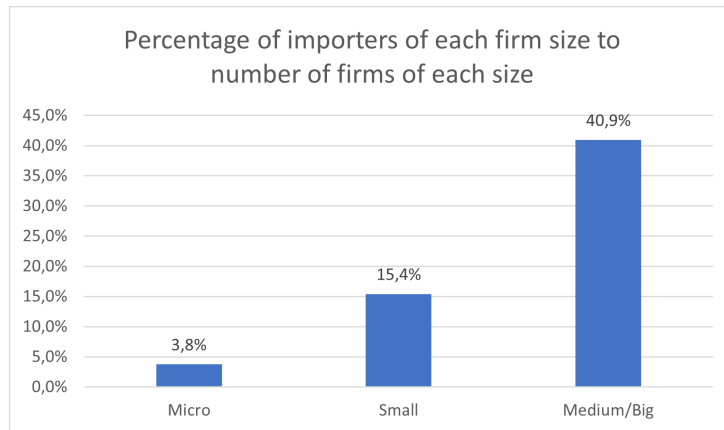


Figure 4.13: Percentage of importers to number of firms by firm size

Regarding the market of imports, as illustrated in figure 4.14, about 1.9% of importers exclusively engage in importing goods and services solely from the non-EU market, with a slightly higher percentage of approximately 6.2% predominantly but not exclusively conducting imports from the non-EU market. In contrast, the majority of importers (53.1%) exclusively carry out imports from the EU market, with an additional 30% predominantly but not exclusively conducting imports from the EU market. A smaller proportion, approximately 8.6% of importing companies, significantly rely on importing goods and services from both the EU and non-EU markets.

On average, approximately 80% of the import volume is from the EU market, while the remaining 20% are sourced from the non-EU market. This value has been stable over the years.

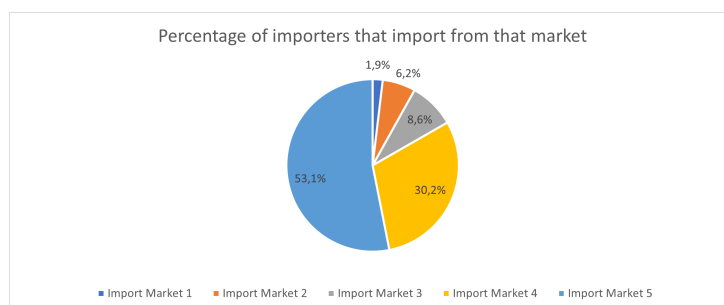


Figure 4.14: Distribution of importers by import market

The analysis of the distribution of markets in accordance with the type of company, as indicated in table 4.6, reveals no significant distinctions. However, the importers of type 0 and type 4, display a relatively higher percentage of companies that solely conduct imports from one market. For instance, 3.3% of importers from service-oriented companies (type 0) are involved in exclusive imports from the non-EU market, while 2.38% of importing companies dealing with products (type 4) engage in exclusive imports from the non-EU market.

Analyzing the import markets based on company sizes, presented in table 4.7. Approximately 3.27% of the micro importer firms exclusively conduct imports from the non-EU market, whereas only 0.69% of medium and big-sized importers exclusively engage in imports from this market. However, it is also evident that micro-importing companies demonstrate the highest percentage of companies that exclusively

Table 4.6: Percentage of importers that import from each import market by type

Firm Type	Import Market 1	Import Market 2	Import Market 3	Import Market 4	Import Market 5
0	3.3%	6.6%	7.8%	19.6%	62.6%
1	2.4%	8.5%	8.6%	29.4%	51.1%
2	2.3%	5.9%	7.3%	33.7%	50.7%
3	0.9%	6.0%	10.1%	38.7%	44.3%
4	2.4%	6.2%	7.3%	23.2%	61.0%

import from the EU market (around 65%), whereas this percentage drops to 30.3% for larger companies. This trend suggests that smaller-sized companies tend to concentrate on imports from just one market, whereas larger-sized companies tend to engage in imports from both markets.

Table 4.7: Percentage of importers that import from each import market by firm size

Firm Size	Import Market 1	Import Market 2	Import Market 3	Import Market 4	Import Market 5
Micro	3.3%	6.1%	6.4%	18.7%	65.5%
Small	1.0%	5.9%	9.0%	32.8%	51.4%
Medium/Big	0.7%	7.1%	12.7%	49.2%	30.3%

## 4.2 Dependent Variables

An assessment of the variables under consideration for integration into the econometric models will be conducted. This evaluation aims to verify the suitability of these variables for the models.

Starting the analysis with the return on sales (ROS) variable, as depicted in table 4.8, the average return on sales for all companies stands at a negative level, approximately -0.1% across all the documented years in the database. Upon reviewing the percentiles, more than 25% of the sample demonstrates a negative ROS, while only 1% exhibits an ROS higher than 0.85% and another 1% showcases an ROS lower than -3.12%.

These negative values may be to potential accounting discrepancies and may not accurately reflect the performance of the companies. It should be noted that while this approach is commonly employed, the Earnings Before Interest, Taxes, Depreciation, and Amortization (EBITDA) value present in the database may not be the most suitable choice, indicating a potential need for adjustments in the calculation methodology. Nevertheless, a more comprehensive exploration of the ROS concerning the companies within the database will be made.

A distinction in the mean ROS is observable across various company sizes. Micro companies exhibit an average ROS of -0.11, small companies record -0.03, while medium to big companies demonstrate 0.00. Distinguishing patterns are also noticeable based on the company type. Companies classified as type 0 (services) and type 3 (predominantly products) present an average ROS of 0.00, whereas type 1 companies exhibit -0.01 and type 2 companies record -0.03. Type 4 companies (products) showcase the lowest ROS, with a value of -0.43.

Moreover, there is a contrast in the ROS between exporting and non-exporting companies, as indi-

Table 4.8: Return on Sales (ROS) by firm size and firm type

Overall	Firm Size			Firm Type				
	Micro	Small	Medium/Big	Type 0	Type 1	Type 2	Type 3	Type 4
-0.10	-0.11	-0.03	0.00	0.00	-0.01	-0.03	0.00	-0.43

cated in table 4.9. Exporting companies display an average ROS of -0.66, while non-exporting companies maintain a mean ROS of -0.05. A similar trend is observed for importers with importing companies demonstrating an average ROS of -0.18 in comparison to a mean ROS of -0.09 for non-importing companies.

Table 4.9: Return on sales of exporters and importers

Exporters	Non-exporters	Importers	Non-Importers
-0.05	-0.66	-0.09	-0.18

Considering that the variable EBITDA per employee employs the same variable as its numerator, and in light of the limitations previously identified, is provided a broad overview to elucidate why it is not an optimal variable for inclusion in our models. Despite the mean being positive, 25% of the companies display an EBITDA per employee value lower than -445 €, with approximately 5% of the companies showcasing a value below -11 304 €. Merely 50% companies exhibit an EBITDA per employee value surpassing 2 552 €.

Regarding the variable sales per employee, there is a consistency in the progression of this value over the years. From 2010 to 2014, there was an increase in the sales per employee, followed by a slight decline in 2015, and subsequently, another rise until 2019.<sup>6</sup>

When considering company sizes, notable distinctions become apparent. Micro companies exhibit an average sales per employee of 65 917€, whereas small companies showcase a value of 133 988€. Comparatively, medium and big companies demonstrate a value that is approximately 10 times greater than micro companies and 5 times higher than small companies (table 4.10). In terms of company types, companies classified as type 3 manifest the highest value of sales per employee, with an average of approximately 207 384€ per employee. This higher value might be related to the fact that type 3 companies tend to have a greater proportion of big companies within their category. Companies of type 4 exhibit sales per employee of approximately 128 411€. Conversely, type 0 firms show an average sales per employee of 57 747€, with type 1 companies displaying the lowest value of sales per employee, 53 729€. Companies with substantial levels of both product and service sales (type 2) present an intermediary value of 86 397€.

Table 4.10: Sales per employee by firm type and firm size

Overall	Firm Size			Firm Type				
	Micro	Small	Medium/Big	Type 0	Type 1	Type 2	Type 3	Type 4
99 052 €	65 917 €	133 988 €	683 810 €	57 747 €	53 729 €	86 397 €	207 384 €	128 411 €

Regarding exporters, as delineated in table 4.11, a disparity is also noticed. On average, a company engaged in exports demonstrates a sales per employee value of approximately 203 317€, while a

<sup>6</sup>See table A.6 in appendix for more details

company not involved in exports presents an average value of 90 315€.

In terms of the market to which exporters export, companies exporting primarily to the non-EU market but not exclusively exhibit the highest sales per employee value, 289 949€, followed by companies with significant sales to both markets, 252 567€. Companies exporting primarily but not exclusively to the EU market demonstrate a similar value, 249 300€, trailed by companies exporting exclusively to the non-EU market, 209 263€. Finally, companies exclusively exporting to the EU market showcase a value of approximately 147 006€.

Table 4.11: Sales per employee by Export Market

Non-exporters	Exporters	Export Market 1	Export Market 2	Export Market 3	Export Market 4	Export Market 5
90 315 €	203 317 €	209 263 €	289 949 €	252 567 €	249 300 €	147 006 €

Concerning imports, table 4.12, some similarities with exports emerge, as companies engaging in import activities demonstrate an average sales per employee value of 203 317€, while those not involved in importation exhibit a value approximately 3.5 times lower, at 90 315€.

With regard to markets, companies importing primarily but not exclusively from the non-EU market present the highest sales per employee value, 573 611€, followed by those exclusively importing from the non-EU market, recording 491 860€. Those with significant import levels from both markets demonstrate a value of 352 707€, while companies importing primarily or exclusively from the EU market exhibit similar values of around 262 000€.

Table 4.12: Sales per employee by import market

Non-Importers	Importers	Import Market 1	Import Market 2	Import Market 3	Import Market 4	Import Market 5
84 299 €	292 777 €	491 860 €	573 611 €	352 707 €	262 675 €	261 928 €

Based on the data presented in table 4.13, there are similar growth values across different company sizes, with medium and big companies demonstrating marginally higher growth rates. In terms of company types, types 0, 1, and 2 exhibit comparable growth rates, approximately around 38-39%, while types 4 and 5 indicate higher growth rates, approximately 58%.

Table 4.13: Growth rate by firm size and firm type

Overall	Firm Size			Firm Type				
	Micro	Small	Medium/Big	Type 0	Type 1	Type 2	Type 3	Type 4
46.1%	45.8%	47.0%	47.6%	38.3%	39.9%	38.7%	57.6%	58.9%

A disparity in growth rates is observed between exporting and non-exporting companies, table 4.14, with exporting companies displaying an average growth of 78.3%, compared to 43.3% for non-exporting firms. Conversely, the variance in growth rates between importers and non-importers is relatively less substantial, with importers demonstrating an approximate 50.3% growth and non-importers at 45.7%.

Regarding export markets, it appears that the companies exhibiting the most growth are those exclusively exporting to one market. Given that companies that exclusively export to the non-EU market have an average growth of over 68% compared to those that export only to the EU market.

Table 4.14: Growth rate by export markets

Non-exporters	Exporters	Export Market 1	Export Market 2	Export Market 3	Export Market 4	Export Market 5
43.3%	78.3%	163.6%	56.4%	39.1%	35.8%	94.8%

Concerning imports, table 4.15, the companies displaying the most growth are those exclusively importing from the non-EU market having a growth, on average, more than four times of the firms that import exclusively from the EU market.

Table 4.15: Growth rate by import markets

Non-Importers	Importers	Import Market 1	Import Market 2	Import Market 3	Import Market 4	Import Market 5
45.7%	50.3%	232.0%	73.8%	46.6%	49.9%	48.1%

# Chapter 5

## Results

The regressions presented in this chapter were made by STATA software. The "robust" option was applied for models using the OLS method, and the "Cluster" option was applied for models using the fixed effects model to address potential heteroskedasticity in the models. The outcomes of the models employing the Ordinary Least Squares method with sales per employee as the dependent variable were examined. Subsequently, the Fixed Effects method was employed to compare the results obtained from both approaches and draw conclusions. Additionally, for consistency checks and an analysis of alternative performance measures, the OLS method was employed again, using the growth index variable as the dependent variable. .

According to the information provided in the descriptive statistics, the EBITDA per employee and ROS variables were discarded. The negative values of these variables may not necessarily imply poor performance. Considering that the dataset predominantly comprises micro and small companies, it is plausible that these EBITDA values are influenced by fiscal factors and the greater ease with which such companies can present less precise and somewhat influenced results (Shea, 2023).

Moreover, it should be noted that if a company utilizes its profits from operations to invest in other areas such as real estate, the value of EBITDA could be low, but the company may still demonstrate a good performance ( Caccamo, 2016) (Berman and Knight, 2009).

Due to the highly skewed distribution of sales per employee that did not approximate a normal distribution, the logarithm was applied to the variable sales per employee to facilitate the analysis of the impact of the independent variables.

The use of the logarithm not only provides a more direct and intuitive interpretation of the results, enabling the analysis of the impact of a company's characteristic in percentage terms on the value of the dependent variable, but it also aids in fulfilling the assumptions of the models, as opposed to using variables that measure the level of  $y$ . Additionally, strictly positive variables often have conditional distributions that present heteroskedastic or are skewed, and taking the log can help mitigate, if not eliminate both issues (Wooldridge, 2012).

Furthermore, another benefit of using the logarithm is the substantial reduction in the range of values for the variable. This feature is especially advantageous, particularly when dealing with significant non-

etary amounts such as a company's sales volume. By narrowing the scope of values for the dependent variable, OLS estimates become less vulnerable to the impact of extreme values or outliers.

The other variable used is the growth rate of the company. However, with this ratio, a significant number of negative growth rates could arise, indicating that the firm decreases its sales volume. Additionally, the distribution of the growth rate was found to be quite irregular. To overcome this issue, one option would be to use the logarithm of the growth sales. However, since a percentage of these values is negative, the logarithm could not be employed. Therefore, the growth of a company was approached in an alternative manner by developing an index composed of the business volume in year  $t$  divided by the business volume in year  $t-1$ .

Interpreting this index may require some attention, as a company facing a decrease in its business volume presents index values between 0 and 1, while for companies experiencing growth, the values range from 1 to infinity. Consequently, when computing the average, it is influenced by the values of the companies that encountered growth. For example, considering a company that halves its turnover, the index will be 0.5, and another firm that doubles its turnover will have an index of 2. When we take the average, the value would be 1.25, indicating that, on average, the companies grew, which is not the case.

However, applying the logarithm to this index rectified this situation, when the logarithm is applied, the value of a company that is declining will be negative and will assume absolute values equal to a company that is growing in the same proportion.

In this section, when analyzing the models, it is necessary to pay attention to specific language nuances. Indicating that a coefficient is significant means that the null hypothesis cannot be rejected, leading to the conclusion that the effect of that variable is different from zero. When examining the effect of a variable through the coefficient, it is necessary to consider the concept of *ceteris paribus*, meaning that companies with all other characteristics equal are compared, with only the one being analyzed being different. Additionally, when stating, for example, that type 2 companies have a sales per employee value 50% higher than type 0, it is implied that, on average, type 2 companies have a value that is 50% higher, holding all other characteristics constant.

## 5.1 Ordinary Least Squares

All models analyzed in this subsection have the logarithm of sales per employee as the dependent variable. In all models, there are control variables over company size, labor qualification in the company, region, CAE coding by letter, and year. To interpret the estimated coefficients as percentages of sales per employee variation, it is necessary to apply the transformation  $100(e^{\beta} - 1)$ .

Analyzing model 1, it was observed that companies of type 3 have, on average, sales per employee that are 144% ( $100 \times (e^{0.894} - 1)$ ) higher than a company of type 0. Companies exclusively focused on product sales (type 4) have, on average, a sales per employee value approximately 84% higher than type 0. Service companies (type 0) exhibit the lowest value of sales per employee, followed by type 1 companies, which are approximately 18% higher than type 0. Type 2 companies are approximately 36%

higher than type 0. Analyzing the R-squared of this regression, it is found that this model explains 27.9% of the variation in the logarithm of sales per employee.

Continuing the analysis, evaluating the impact of exports on a company, utilizing Model 1. It was observed that the coefficient of the "exporter" variable is significant at the 1% level and has a positive value, suggesting a positive effect of exports. This indicates that exporting companies tend to have better performance. On average, a company that exports has sales per employee approximately 36% higher than a company that does not export.

To conduct a more comprehensive analysis of exports, a further examination will be undertaken to determine whether specific markets lead to better performance through exporting. This will involve investigating which market(s), or whether exporting to various markets, has a positive effect on a company's performance. For this detailed analysis, model 2 will be examined.

Among exporting companies, the best-performing ones are those that predominantly export to the non-EU markets (above 70% of their exports are to those markets). On average, these companies have approximately 58% higher sales per employee than non-exporting companies. Furthermore, companies with significant export levels to both markets (community and extra-community) outperform those solely focused on the community market, with their sales per employee approximately 41% higher than non-exporting firms. These companies have sales per employee values roughly 10% lower than those exporting solely to the extra-community market and about 8.5% higher than companies exporting solely to the community market. Consequently, excluding companies with no export activity, those exporting exclusively to the community market have the second-lowest average sales per employee. Following them are companies exporting predominantly (more than 70%) but not exclusively to the community market, with values quite similar to non-exporting firms.

Given the distinct characteristics of service-based and product-based companies, it is interesting to examine whether the impact of exports differs for these two types of businesses. This analysis will be conducted using Model 3, which includes the interaction between the exporter variable and the firm type variable.

By introducing this interaction, the coefficient of the exporter variable increases compared to model 1. The companies that benefit the most from being exporters are type 0 companies, showing approximately 51% more sales per employee than non-exporting companies. Product-oriented companies (type 4) demonstrate a very similar value for being exporters. However, the interaction coefficient is not significant, making it difficult to confirm the result, but it indicates only 1% of sales per employee lower than that of type 0 exporters. Companies that exhibit the least benefit from being exporters are type 3 companies, which, on average, have a value that is 26% lower in sales per employee than type 0 exporters, but still 12% higher than non-exporting companies.

By analyzing the variables related to imports in Model 1, it is possible to assess whether there is a positive impact on a company's performance if it engages in importing. Upon including this variable, it exhibits a positive coefficient, indicating a positive effect for importing companies. In this case, it is observed that a company engaged in importing has, on average, a sales per employee value that is 70% higher than a company that is not an importer.



Table 5.1: Logarithm of sales per employee regressions using OLS

	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6
Firm Type 1	0.164*** (0.002)	0.163*** (0.002)	0.173*** (0.002)	0.168*** (0.002)	0.174*** (0.002)	0.163*** (0.002)
Firm Type 2	0.309*** (0.002)	0.307*** (0.002)	0.314*** (0.002)	0.312*** (0.002)	0.314*** (0.002)	0.310*** (0.002)
Firm Type 3	0.894*** (0.002)	0.893*** (0.002)	0.929*** (0.003)	0.928*** (0.003)	0.945*** (0.003)	0.894*** (0.002)
Firm Type 4	0.608*** (0.003)	0.608*** (0.003)	0.610*** (0.003)	0.602*** (0.003)	0.604*** (0.003)	0.608*** (0.003)
Exporter	0.309*** (0.003)		0.411*** (0.004)	0.302*** (0.003)	0.376*** (0.005)	0.377*** (0.003)
Importer	0.532*** (0.003)		0.538*** (0.003)	0.743*** (0.007)	0.699*** (0.008)	0.609*** (0.003)
Exporter X Importer						-0.26*** (0.006)
Small firm	0.259*** (0.002)	0.259*** (0.002)	0.258*** (0.002)	0.258*** (0.002)	0.257*** (0.002)	0.256*** (0.002)
Medium/Big firm	0.535*** (0.005)	0.538*** (0.005)	0.546*** (0.005)	0.541*** (0.005)	0.548*** (0.005)	0.548*** (0.005)
Log Age	0.018*** (0.001)	0.018*** (0.001)	0.019*** (0.001)	0.019*** (0.001)	0.019*** (0.001)	0.018*** (0.001)
Employees Education 1	0.063*** (0.002)	0.064*** (0.002)	0.066*** (0.002)	0.065*** (0.002)	0.067*** (0.002)	0.062*** (0.002)
Employees Education 2	0.199*** (0.002)	0.197*** (0.002)	0.200*** (0.002)	0.200*** (0.002)	0.200*** (0.002)	0.198*** (0.002)
Employees Education 3	0.254*** (0.003)	0.251*** (0.003)	0.252*** (0.003)	0.253*** (0.003)	0.252*** (0.003)	0.252*** (0.003)
Export Market 1		0.409*** (0.008)				
Export Market 2		0.458*** (0.007)				
Export Market 3		0.346*** (0.008)				
Export Market 4		0.250*** (0.005)				
Export Market 5		0.261*** (0.004)				

Import Market 1		0.437***				
		(0.024)				
Import Market 2		0.732***				
		(0.011)				
Import Market 3		0.590***				
		(0.008)				
Import Market 4		0.494***				
		(0.004)				
Import Market 5		0.526***				
		(0.003)				
Firm Type 1 x Exporter			-0.168***		-0.132***	
			(0.009)		(0.009)	
Firm Type 2 X Exporter			-0.074***		-0.036***	
			(0.009)		(0.009)	
Firm Type 3 X Exporter			-0.302***		-0.222***	
			(0.006)		(0.007)	
Firm Type 4 X Exporter			-0.011		0.003	
			(0.008)		(0.008)	
Firm Type 1 X Importer				-0.232***	-0.163***	
				(0.013)	(0.014)	
Firm Type 2 X Importer				-0.201***	-0.171***	
				(0.01)	(0.011)	
Firm Type 3 X Importer				-0.369***	-0.283***	
				(0.008)	(0.009)	
Firm Type 4 X Importer				-0.118***	-0.089***	
				(0.009)	(0.009)	
Constant	11.762***	11.767***	11.743***	11.707***	11.706***	11.732***
	(0.385)	(0.385)	(0.385)	(0.375)	(0.377)	(0.382)
Observations	2210718	2210718	2210718	2210718	2210718	2210718
R-squared	0.279	0.279	0.280	0.280	0.280	0.280
F-stat	18506.505	15974.007	17242.26	17206.777	16051.884	18189.555
Adj R2	0.279	0.279	0.280	0.280	0.280	0.280

Robust standard errors are in parentheses. \*\*\* p<.01, \*\* p<.05, \* p<.1 The dependent variable is sales per employee in logarithm. Data from 2010 to 2020. Control Variables include: Year, Region, CAE, Firm size, Employees education, Age and Firm Type. The base level of each interaction and categorical variable was omitted

Similarly to what occurs with exports, upon examining model 2, it is found that companies that benefit the most from being importers are the ones that import primarily from the non-EU market but not exclusively (with values between 70% and 100%). These companies, on average, have a sales per employee

value that is 108% higher than companies with no imports. The companies benefiting the least from being importers are those importing exclusively from the non-EU market. Nevertheless, these companies still have, on average, a value approximately 53% higher in sales per employee than companies that are not importers. This is followed by those importing the majority but not exclusively from the community market.

According to model 4, companies benefiting the most from being importers are companies of type 0, with an average increase of 110% compared to companies with no importation. Among the importing companies, it is observed that following the type 0 companies, the companies that benefit the most from being importers are those of type 4 (exclusively dealing in products), with a sales per employee value 11% lower than the importing type 0 companies but 87% higher than the non-importing companies. On the other hand, the companies that benefit the least from being importers are the type 3 companies, with 31% lower sales per employee than the type 0 importer companies but 45% higher than the companies that do not import.

In the models analyzed so far, the impact of exports and imports was evaluated separately, without considering the possibility of firms engaging in two-way trade. To assess this effect, an interaction between the variable "exporter" and the variable "importer" was introduced in Model 6. Upon doing this, a company that only exports shows, on average, a sales per employee value 46% higher than companies without international trade. This value is about 38% lower compared to a company that solely imports, where these importing companies demonstrate roughly 84% more sales per employee than firms without international trade. A company engaged in both importing and exporting presents a sales per employee value 107% higher than a company without international trade, 69% higher than a company that only exports, and 23% higher than a company that only imports.

To conduct a more detailed analysis of the data, consideration can be given to the characteristics of companies in terms of their primary focus (products or services) and the target export market. This can be achieved by creating an interaction between the variable firm type and the variable export market. By doing this, Model 7 presented in table A.7 in the Appendix was created, providing significant insights by enabling the categorization of companies into 25 different groups. Analyzing this interaction is not as straightforward, as there are five coefficients of the export market variable and the coefficients of the interaction between this variable.

Therefore, to evaluate the impact of exports considering these categories, it was necessary to add the value of the export market variable with the coefficient of the interaction. In other words, to assess the effect of a type 3 company exclusively exporting to the non-EU market, one needs to add the value of the coefficient of the non-EU market to the coefficient of the interaction between type 3 and that market.

The table 5.2 s offers a clear overview of the combined coefficients, facilitating a more straightforward interpretation of the impact of exporting to different markets for each company type. The table presents the sum of the coefficient of the export market variable with the coefficient of the interaction. If both coefficients are significant in the model, this was also reflected in the table. The complete regressions for the models can be found in table A.7 in the appendix.

In this analysis, companies of type 0 that export to both the EU market and non-EU markets with

substantial values (between 30% and 70% for each market) tend to benefit the most from exporting. On average, these companies achieve a sales per employee value that is 119% higher than companies with no export activities. On the other hand, companies that derive the least benefit and have no benefit from exporting are type 3 firms that export mainly but not exclusively to the community market, having a sales per employee value 2% lower than the non-export firms.

Exporting to multiple markets tends to be more effective than exporting to a single market for firms of types 0 and 1, which primarily focus on services. For companies with higher sales volume from the sale of products (types 2, 3, and 4), the impact of exports is higher for companies primarily focused on a specific market, particularly the non-EU market, compared to companies that engage with multiple markets.

However, some exceptions exist. For instance, in type 4 firms, those exporting predominantly but not exclusively to the non-EU market display higher sales per employee than those exclusively exporting to the non-EU market.

For example, a company of type 0 with substantial export levels to both markets (between 30 and 70%) demonstrates, on average, a sales per employee figure that is 119% higher than a company with the same characteristics but without export activities. On the other hand, a company of type 0 that exclusively exports to the non-EU market shows, on average, a sales per employee figure 33% higher than a non-exporting company. However, in the case of type 4 companies those exclusively exporting to the extra-community market have, on average, a sales per employee figure 73% higher than non-exporting companies, while a company exporting to more than one market exhibits a 48% higher figure than a non-exporter firm.

Across all types of companies, taking their respective types into account and focusing solely on firms that export to a single market, companies exclusively exporting to the non-EU market, on average, exhibit a higher value of sales per employee compared to companies that exclusively export to the EU market. For instance, in the case of a Type 0 company exclusively exporting to the non-EU market, the average sales per employee figure is 41% higher than that of non-exporting companies, while for the EU market, it stands at 33%. This pattern remains consistent across all types of companies.

To analyze the companies considering their type and the market from which they import, the same procedure as for exporters was performed. Examining the table 5.2 that presents the sum of the coefficients of the "market import" variable with the interaction coefficient, in model 8, it was observed that the interaction coefficient between type 3 companies that import mostly from market 1 is not significant, thus making it impossible to analyze this type of company. The companies benefiting the most are those of type 0, importing significant values from both markets, as these companies, on average, show about 203% more sales per employee than the non-importing companies. On the other hand, the companies benefiting the least from being importers are the type 2 companies that mostly import from the non-EU market, showing 32% more sales per employee than the non-importing companies.

For companies of types 0, 1, 2, and 4, those that import from both the EU and non-EU markets have higher sales per employee than those importing from only one market. However, for type 3 companies, those importing from only one market have higher sales per employee than those importing from more

than one market. Among types 0, 1, 2, and 4, the companies importing mainly, but not exclusively, from the non-EU market show the highest sales per employee. In contrast, for type 3 companies, those importing exclusively from the non-EU market demonstrate the highest sales per employee. Unlike with exports, it was observed that among the companies that import from only one market, for types 0, 1, 2, and 4, those importing from the EU market demonstrate better sales per employee, while for type 3 companies, higher values are associated with imports from the non-EU market.

In the analyzed models so far, particularly when examining the impact of exports by interacting with firm type and the market they export to, the interactions were conducted individually for either exports or imports, considering only one characteristic in each model. Model 5 is the outcome of combining Model 3 and Model 4, where it interacted the exporter variable with the company type and the importer variable with the company type. In this model, the coefficients vary slightly. This situation can be explained by the fact that some exporting companies are also importers, and when analyzing the impacts of exports, the impacts of a company being an importer can be captured by the fact that they are also exporters, influencing the coefficient value. Hence, it is important to analyze this model that examines both imports and exports.

Upon analyzing Model 5, the coefficient value of the "exporter" variable decreased compared to Model 3 but increased compared to Model 4. Conversely, the coefficient of the "importer" variable demonstrated an increase in Model 5 compared to Model 3, yet it decreased compared to Model 4.

In Model 5, the absolute values of the coefficients for the interaction variables were lower than those in Models 3 and 4. There was a significant difference in the coefficient of the interaction between the "importer" variable and the company type. In Model 4, type 1 importing companies exhibited a lower value of sales per employee compared to type 2 companies. However, in Model 5, it was observed that type 1 importing companies demonstrated a higher value than type 2 companies.

Model 9 combines the results of Models 7 and 8, introducing interactions between the "firm type" variable and the "market export" variable, as well as between the "market import" variable and the "firm type" variable. Comparing the coefficients of the "market export" variable in Models 7, 8, and 9 reveals some differences. The order and values of the coefficients change between Models 7 and 8, suggesting a shift in the companies with higher benefits of exporting between different markets. However, in Model 9, the order aligns with that of Model 7, indicating consistency in the sequence of companies between these two models. The coefficient values in Model 9 closely resemble those in Model 7 compared to Model 8 for the "exporter" variable. A similar pattern was observed for the "importer" variable, where the order remains the same between Models 8 and 9, in line with expectations. Despite a slight change in the values of the interaction coefficients, the differences are not substantial.

Table 5.2: Interaction between Firm Type Export and Import Market

Model 7		Model 8		Model 9			
Firm Type X Exporter Market		Firm Type x Importer Market		Firm Type X Exporter Market		Firm Type x Importer Market	
Type 0 X	0.347***	Type 0 X	0.597***	Type 0 X	0.335***	Type 0 X	0.595***
Market 1	(0.011)	Market 1	(0.046)	Market 1	(0.011)	Market 1	(0.046)
Type 0 X	0.766***	Type 0 X	0.942***	Type 0 X	0.713***	Type 0 X	0.813***
Market 2	(0.015)	Market 2	(0.032)	Market 2	(0.016)	Market 2	(0.033)
Type 0 X	0.786***	Type 0 X	1.111***	Type 0 X	0.717***	Type 0 X	0.901***
Market 3	(0.016)	Market 3	(0.027)	Market 3	(0.017)	Market 3	(0.028)
Type 0 X	0.705***	Type 0 X	0.892***	Type 0 X	0.649***	Type 0 X	0.726***
Market 4	(0.012)	Market 4	(0.016)	Market 4	(0.013)	Market 4	(0.017)
Type 0 X	0.287***	Type 0 X	0.649***	Type 0 X	0.266***	Type 0 X	0.614***
Market 5	(0.005)	Market 5	(0.009)	Market 5	(0.005)	Market 5	(0.009)
Type 1 X	0.306***	Type 1 X	0.303***	Type 1 X	0.318***	Type 1 X	0.355***
Market 1	(0.025)	Market 1	(0.103)	Market 1	(0.025)	Market 1	(0.104)
Type 1 X	0.460***	Type 1 X	0.627***	Type 1 X	0.477***	Type 1 X	0.640***
Market 2	(0.027)	Market 2	(0.053)	Market 2	(0.029)	Market 2	(0.055)
Type 1 X	0.352***	Type 1 X	0.615***	Type 1 X	0.362***	Type 1 X	0.611***
Market 3	(0.035)	Market 3	(0.052)	Market 3	(0.035)	Market 3	(0.054)
Type 1 X	0.239***	Type 1 X	0.465***	Type 1 X	0.249***	Type 1 X	0.469***
Market 4	(0.021)	Market 4	(0.025)	Market 4	(0.022)	Market 4	(0.027)
Type 1 X	0.164***	Type 1 X	0.508***	Type 1 X	0.165***	Type 1 X	0.533***
Market 5	(0.011)	Market 5	(0.016)	Market 5	(0.011)	Market 5	(0.017)
Type 2 X	0.476***	Type 2 X	0.278***	Type 2 X	0.490***	Type 2 X	0.253***
Market 1	(0.023)	Market 1	(0.077)	Market 1	(0.023)	Market 1	(0.077)
Type 2 X	0.464***	Type 2 X	0.606***	Type 2 X	0.480***	Type 2 X	0.593***
Market2	(0.023)	Market2	(0.046)	Market2	(0.024)	Market2	(0.047)
Type 2 X	0.309***	Type 2 X	0.515***	Type 2 X	0.319***	Type 2 X	0.510***
Market 3	(0.026)	Market 3	(0.038)	Market 3	(0.027)	Market 3	(0.039)
Type 2 X	0.249***	Type 2 X	0.534***	Type 2 X	0.252***	Type 2 X	0.53***
Market 4	(0.019)	Market 4	(0.020)	Market 4	(0.020)	Market 4	(0.021)
Type 2 X	0.283***	Type 2 X	0.550***	Type 2 X	0.28***	Type 2 X	0.545***
Market 5	(0.013)	Market 5	(0.014)	Market 5	(0.013)	Market 5	(0.014)
Type 3 X	0.424***	Type 3 X	0.606***	Type 3 X	0.442***	Type 3 X	0.62***
Market 1	(0.020)	Market 1	(0.071)	Market 1	(0.020)	Market 1	(0.072)
	0.217***		0.559***		0.269***		0.633***

Type 3 X		Type 3 X		Type 3 X		Type 3 X	
Market 2	(0.018)	Market 2	(0.036)	Market 2	(0.019)	Market 2	(0.036)
Type 3 X	0.050***	Type 3 X	0.360***	Type 3 X	0.109***	Type 3 X	0.443***
Market 3	(0.019)	Market 3	(0.028)	Market 3	(0.019)	Market 3	(0.030)
Type 3 X	-0.023***	Type 3 X	0.305***	Type 3 X	0.036***	Type 3 X	0.380***
Market 4	(0.014)	Market 4	(0.017)	Market 4	(0.014)	Market 4	(0.018)
Type 3 X	0.156***	Type 3 X	0.407***	Type 3 X	0.178***	Type 3 X	0.431***
Market 5	(0.010)	Market 5	(0.010)	Market 5	(0.010)	Market 5	(0.011)
Type 4 X	0.548***	Type 4 X	0.315***	Type 4 X	0.536***	Type 4 X	0.296***
Market 1	(0.024)	Market 1	(0.062)	Market 1	(0.024)	Market 1	(0.062)
Type 4 X	0.54***	Type 4 X	0.877***	Type 4 X	0.495***	Type 4 X	0.860***
Market 2	(0.023)	Market 2	(0.037)	Market 2	(0.024)	Market 2	(0.038)
Type 4 X	0.395***	Type 4 X	0.735***	Type 4 X	0.349***	Type 4 X	0.716***
Market 3	(0.023)	Market 3	(0.03)	Market 3	(0.024)	Market 3	(0.032)
Type 4 X	0.37***	Type 4 X	0.694***	Type 4 X	0.318***	Type 4 X	0.674***
Market 4	(0.016)	Market 4	(0.018)	Market 4	(0.016)	Market 4	(0.019)
Type 4 X	0.327***	Type 4 X	0.572***	Type 4 X	0.313***	Type 4 X	0.566***
Market 5	(0.012)	Market 5	(0.010)	Market 5	(0.012)	Market 5	(0.011)
Constante	11.734***	11.735***		11.732***			
	(0.380)	(0.382)		(0.382)			
Observations	2210718	2210718		2210718			
R-squared	0.281	0.282		0.280			
F-stat	11881.604	9479.668		18189.555			
Adj R2	0.281	0.282		0.280			

Sum of the value of the coefficients of export or import market with the coefficient of the Interaction between firm type and export or import market. Robust standard errors are in parentheses. \*\*\*  $p < .01$ , \*\*  $p < .05$ , \*  $p < .1$  The dependent variable is the sales per employee in logarithm. Data from 2010 to 2020. Control Variables include: Year, Region, CAE, Firm size, Employees education, Age and Firm Type. The base level of each interaction was omitted

As the primary focus lies in analyzing the effect of exports and imports in Portuguese companies, the introduction of certain control variables in the models aims to yield more reliable and trustworthy results. Analyzing these control variables is also crucial for evaluating the effect of other characteristics on firm performance. Considering this, the analysis primarily considered Model 8, which is the most comprehensive and has one of the highest adjusted R-squared values.

Analyzing the variable related to the company's size, smaller companies, the micro-sized ones, have, on average, the lowest value of sales per employee. Small companies, on the other hand, have an average sales per employee value that is 29% higher than micro-sized companies, while medium and big companies have, on average, a value that is 72% higher compared to micro-sized companies.

A crucial control variable to analyze and include in the models is related to the age of the company.

Companies go through different growth phases, and newer firms are influenced by certain factors compared to older ones. Therefore, the introduction of the age variable through the logarithm of age was undertaken. As a result, it was found that older companies, on average, have a higher value of sales per employee. Specifically, a company that is 1% older will, on average, have sales per employee that are 2% higher.

Upon introducing the variables related to labor force characteristics, such as the level of education, particularly the presence of employees with higher education, it was found that companies with no employees holding a university degree, while keeping all other characteristics equal, have the lowest values of sales per employee.

Companies with at least one employee having a higher education degree and less than 30% of the workforce with higher education, on average, have higher sales per employee by 7% compared to companies without any employees holding a higher education degree. Furthermore, companies with a percentage of workers with higher education between 30% and 70% have, on average, a higher value of sales per employee by 22% than the firms that do not have any employee with a higher education degree. Additionally, companies with a percentage between 70% and 100% have values of sales per employee that are, on average, 28% higher than those of companies with no employees holding a higher education degree.

The coefficients for the regions are all significant, with the region of Lisbon showing the highest value of sales per employee. On the other hand, the region of Porto presents a slightly lower value, with the difference between these coefficients being less than 1%.

For the variable related to the CAE of the company, represented by a letter, the coefficients were significant for all CAEs. The introduction of this CAE variable was crucial as it enables the consideration of the specific characteristics of each industry and sector, thereby accounting for the nuances inherent in each activity or sector.

One of the control variables of particular interest in the analysis is the variable related to the year. Including this variable allows for the control of possible external effects on companies, such as political measures, specific events that may have influenced the performance of companies, and other factors in that year.

Using the year 2010 as a base, the years between 2011 and 2015 had a negative impact on the performance of companies, with the sales per employee value being, on average, 6% lower in 2011 compared to 2010. The lowest average sales per employee value was recorded in 2012, with a decrease of approximately 10% compared to 2010. On a positive note, 2019 was the year with the highest average sales per employee value, about 13% higher than in 2010, when considering constant company characteristics.

## 5.2 Fixed Effects

In Table 5.3, the models are the same as before, but this time, the fixed effects were applied, with the addition of clustered standard errors at a firm level. This method helps control for unobservable



individual time-invariant firm characteristics that might be causing discrepancies in terms of the results between firms.

Let's begin by analyzing model 10 in table 5.3 similar to the one presented in Model 1, which includes more general variables.

Before delving into the analysis of the model, it is important to note the adjusted R-squared value. It stands at 3.8%, suggesting that our model can only explain about 3.8% of the variation in the logarithm of sales per employee. However, for this type of model, such a low value is common and expected.

When analyzing the model, it becomes evident that compared to the OLS model, there are differences in the coefficient values. However, it is observed that, overall, the relationship between the variables remains consistent. In other words, even though the coefficients are smaller, the pattern persists, such that the coefficient for a company exclusively dedicated to selling products is larger than the coefficient for a company engaged in both product sales and services, using both methods.

In the analysis of model 10, it was found that a company of type 3 exhibits a sales per employee value 61% higher than that of a company of type 0, which is the type of company with the highest value of sales per employee. On the other end of the spectrum, companies of type 0 demonstrate the lowest value. Consequently, arranging the types of companies based on their sales per employee value, we have Type 3 followed by Type 4, then type 2, followed by type 1, and finally type 0.

Upon examining the exports and imports, it was noted that while the coefficient is smaller, exporting companies exhibit a sales per employee value 18% higher compared to non-exporting companies, and importing companies show a value 19% higher compared to non-importing companies.

Concerning the markets to which companies export, similarities were observed with the model obtained via OLS. However, according to this model, the companies that benefit the most from exporting are those exclusively exporting to the extra-community market, displaying a 27% increase in sales per employee compared to non-exporting firms. The export benefit diminishes as the level of exports to the EU market rises. The lowest export premium is observed for companies that exclusively export to the EU market, representing an increase of about 13% compared to a company that does not export.

Regarding the importation market, according to the model 11, an importer obtains the greatest benefit when importing primarily but not exclusively from the non-EU market, representing an average increase of about 24% in the company's sales per employee. Following this, the companies that benefit the most are those that import substantial levels from both the EU and the non-EU markets. The importation market with the least influence on a company's performance is the community market, where a company exclusively importing from that market results in only an average increase in sales per employee of about 17% compared to non-exporters.

In a comparison similar to the results obtained through the OLS method, examining model 15 indicates that firms engaged in international activities, particularly both importing and exporting (two-way traders), demonstrate an average value 39% higher than that of firms without any international activities. Following these, companies engaged solely in importing showcase a 20% higher average, while those involved only in exporting show a 19% increase.

Table 5.3: Logarithm of sales per employee regressions using fixed effects

	Model 10	Model 11	Model 12	Model 13	Model 14	Model 15
Firm Type 1	0.121*** (0.003)	0.121*** (0.003)	0.123*** (0.003)	0.122*** (0.003)	0.123*** (0.003)	0.121*** (0.003)
Firm Type 2	0.270*** (0.005)	0.270*** (0.005)	0.270*** (0.005)	0.271*** (0.005)	0.270*** (0.005)	0.270*** (0.005)
Firm Type 3	0.476*** (0.007)	0.475*** (0.007)	0.475*** (0.007)	0.480*** (0.007)	0.478*** (0.007)	0.476*** (0.007)
Firm Type 4	0.361*** (0.007)	0.361*** (0.007)	0.353*** (0.007)	0.356*** (0.007)	0.35*** (0.007)	0.361*** (0.007)
Exporter	0.164*** (0.004)		0.138*** (0.006)	0.165*** (0.004)	0.139*** (0.006)	0.17*** (0.004)
Importer	0.177*** (0.004)		0.177*** (0.004)	0.163*** (0.008)	0.167*** (0.008)	0.185*** (0.004)
Exporter X Importer						-0.024*** (0.006)
Small firm	-0.033*** (0.003)	-0.033*** (0.003)	-0.033*** (0.003)	-0.033*** (0.003)	-0.033*** (0.003)	-0.033*** (0.003)
Medium/Big firm	0.023** (0.010)	0.021** (0.010)	0.023** (0.010)	0.024** (0.010)	0.024** (0.010)	0.023** (0.010)
Log Age	0.057*** (0.002)	0.057*** (0.002)	0.057*** (0.002)	0.057*** (0.002)	0.057*** (0.002)	0.057*** (0.002)
Employees Education 1	-0.047*** (0.002)	-0.048*** (0.002)	-0.048*** (0.002)	-0.047*** (0.002)	-0.048*** (0.002)	-0.047*** (0.002)
Employees Education 2	-0.046*** (0.003)	-0.046*** (0.003)	-0.046*** (0.003)	-0.046*** (0.003)	-0.046*** (0.003)	-0.046*** (0.003)
Employees Education 3	0.016*** (0.005)	0.016*** (0.005)	0.016*** (0.005)	0.016*** (0.005)	0.016*** (0.005)	0.016*** (0.005)
Export Market 1		0.238*** (0.010)				
Export Market 2		0.232*** (0.007)				
Export Market 3		0.166*** (0.007)				
Export Market 4		0.16*** (0.006)				
Export Market 5		0.118*** (0.005)				

Import Market 1			0.216***			
			(0.021)			
Import Market 2			0.268***			
			(0.011)			
Import Market 3			0.221***			
			(0.008)			
Import Market 4			0.186***			
			(0.005)			
Import Market 5			0.158***			
			(0.004)			
Firm Type 1 X Exporter			-0.026***		-0.024***	
			(0.008)		(0.009)	
Firm Type 2 X Exporter			0.014		0.013	
			(0.010)		(0.010)	
Firm Type 3 X Exporter			0.038***		0.043***	
			(0.009)		(0.009)	
Firm Type 4 X Exporter			0.102***		0.093***	
			(0.010)		(0.010)	
Firm Type 1 X Importer				-0.02	-0.011	
				(0.012)	(0.013)	
Firm Type 2 X Importer				0.008	0.007	
				(0.011)	(0.011)	
Firm Type 3 X Importer				-0.008	-0.013	
				(0.010)	(0.010)	
Firm Type 4 X Importer				0.059***	0.046***	
				(0.010)	(0.010)	
Constant	100.708***	100.709***	100.71***	100.707***	100.708***	100.708***
	(0.099)	(0.099)	(0.099)	(0.098)	(0.098)	(0.099)
Observations	2210718	2210718	2210718	2210718	2210718	2210718
R-squared	0.038	0.038	0.038	0.038	0.038	0.038
F-stat	7380.776	6340.642	6830.404	6820.518	6340.747	7240.657
Adj R2	0.038	0.038	0.038	0.038	0.038	0.038

Robust standard errors are in parentheses. \*\*\* p<.01, \*\* p<.05, \* p<.1 The dependent variable is the sales per employee in logarithm. Data from 2010 to 2020. Control Variables include: Year, Region, CAE, Firm size, Employees education, Age and Firm Type. The base level of each interaction and categorical variable was omitted

Analyzing the effect of exports considering the company type, some differences become apparent compared to the models using the OLS method. The coefficient of the interaction between company type 3 and the exporter variable is not significant. According to this model, the companies benefiting

the most from being exporters are those of type 4, exhibiting a sales per employee value approximately 11% higher than type 0 exporters. Conversely, companies with the least benefit from being exporters are those of type 1.

The majority of the coefficients of the interaction between firm type and importer are not significant, making it impossible to draw conclusions about the effect on imports to the different firm types.

The remaining models that categorize companies by their type and the specific market to which they export or import will not be analyzed. This decision is influenced by the model's specificity and the relatively limited number of companies undergoing changes based on these two characteristics, potentially impacting the reliability of the results.

### **5.3 Growth Index**

Examining multiple variables is crucial for a comprehensive analysis of firm performance. While sales per employee is an essential measure of productivity, exploring the impact of other indicators of performance like the logarithm of the growth index, is equally important. Though the specific details of these models were not discussed, a qualitative examination of how exports and imports influence company growth was performed.

The low R-squared values in these models suggest that the variables considered can only explain approximately 6.5% of the variability in the company's growth index. Moreover, it's worth noting that some of the coefficients in these models are not statistically significant.

According to model 1, table 5.4, companies of type 3 exhibit the highest growth, followed by type 2, type 4, type 1, and lastly, type 0.

Regarding the variables related to import and export, the coefficients are significant and positive, suggesting a favorable impact on the company's growth. This implies that, on average, companies engaged in export or import activities experience higher growth compared to those that do not participate in such activities. As in other models, the coefficient of the importer variable is larger than that of the exporter variable.

Analyzing the exports concerning the markets, the findings suggest that companies benefit the most from exporting primarily to the non-EU market but not exclusively. Additionally, companies exclusively exporting to the EU market and those predominantly exporting to the EU market also exhibit favorable growth. However, the coefficient of the export market 1 is not significant, making its analysis less reliable from an econometric perspective.

In terms of import markets, the analysis reveals that companies exclusively importing from the non-EU market demonstrate the highest growth rates. They are closely followed by companies that primarily import from the non-EU market but not exclusively.

The findings from models 19, 20 and 21, which consider the interaction between firm types and the exporter and importer variables, will not be taken into account because very few coefficients from the interaction are significant.

Table 5.4: Logarithm of Growth Index regressions using OLS

	Model 16	Model 17	Model 18	Model 19	Model 20	Model 21
Firm Type 1	0.033*** (0.001)	0.032*** (0.001)	0.034*** (0.001)	0.033*** (0.001)	0.033*** (0.001)	0.033*** (0.001)
Firm Type 2	0.050*** (0.001)	0.050*** (0.001)	0.052*** (0.002)	0.050*** (0.002)	0.052*** (0.002)	0.050*** (0.001)
Firm Type 3	0.084*** (0.002)	0.084*** (0.002)	0.087*** (0.002)	0.088*** (0.002)	0.089*** (0.002)	0.084*** (0.002)
Firm Type 4	0.038*** (0.002)	0.038*** (0.002)	0.038*** (0.002)	0.036*** (0.002)	0.037*** (0.002)	0.038*** (0.002)
Exporter	0.022*** (0.002)		0.034*** (0.003)	0.022*** (0.002)	0.033*** (0.003)	0.025*** (0.002)
Importer	0.030*** (0.001)		0.031*** (0.001)	0.043*** (0.004)	0.036*** (0.005)	0.034*** (0.002)
Exporter X Importer						-0.013*** (0.003)
Small firm	0.067*** (0.001)	0.067*** (0.001)	0.067*** (0.001)	0.067*** (0.001)	0.067*** (0.001)	0.067*** (0.001)
Medium/Big firm	0.089*** (0.002)	0.089*** (0.002)	0.090*** (0.002)	0.090*** (0.002)	0.090*** (0.002)	0.089*** (0.002)
Log Age	-0.117*** (0.001)	-0.117*** (0.001)	-0.117*** (0.001)	-0.117*** (0.001)	-0.117*** (0.001)	-0.117*** (0.001)
Employees Education 1	0.018*** (0.001)	0.018*** (0.001)	0.019*** (0.001)	0.018*** (0.001)	0.019*** (0.001)	0.018*** (0.001)
Employees Education 2	0.007*** (0.001)	0.007*** (0.001)	0.007*** (0.001)	0.007*** (0.001)	0.007*** (0.001)	0.007*** (0.001)
Employees Education 3	-0.011*** (0.002)	-0.011*** (0.002)	-0.011*** (0.002)	-0.011*** (0.002)	-0.011*** (0.002)	-0.011*** (0.002)
Export Market 1		0.008 (0.006)				
Export Market 2		0.038*** (0.004)				
Export Market 3		0.012*** (0.004)				
Export Market 4		0.017*** (0.002)				
Export Market 5		0.026*** (0.003)				

Import Market 1			0.068***			
			(0.018)			
Import Market 2			0.050***			
			(0.006)			
Import Market 3			0.027***			
			(0.004)			
Import Market 4			0.028***			
			(0.002)			
Import Market 5			0.028***			
			(0.002)			
Firm Type 0 X Exporter						
Firm Type 1 X Exporter			-0.017***		-0.018***	
			(0.006)		(0.006)	
Firm Type 2 X Exporter			-0.030***		-0.032***	
			(0.006)		(0.007)	
Firm Type 3 X Exporter			-0.028***		-0.020***	
			(0.004)		(0.004)	
Firm Type 4 X Exporter			-0.004		-0.007	
			(0.005)		(0.005)	
Firm Type 1 X Importer				-0.009	0.001	
				(0.008)	(0.008)	
Firm Type 2 X Importer				-0.030	0.004	
				(0.006)	(0.007)	
Firm Type 3 X Importer				-0.032***	-0.023***	
				(0.005)	(0.005)	
Firm Type 4 X Importer				0.003	0.009*	
				(0.005)	(0.005)	
.cons	-0.356	-0.356	-0.358	-0.363	-0.363	-0.358
	(0.296)	(0.296)	(0.295)	(0.295)	(0.295)	(0.295)
Observations	1858651	1858651	1858651	1858651	1858651	1858651
R-squared	0.065	0.065	0.065	0.065	0.065	0.065
F-stat	2017.397	1724.211	1856.858	1857.065	1720.034	1974.551
Adj R2	0.065	0.065	0.065	0.065	0.065	0.065

Robust standard errors are in parentheses. \*\*\* p<.01, \*\* p<.05, \* p<.1 The dependent variable is growth index in logarithm.

Data from 2011 to 2020. Control Variables include: Year, Region, CAE, Firm size, Employees education, Age and Firm Type. The base level of each interaction and categorical variable was omitted

Regarding the control variables, age has a negative effect on company growth, which is an expected

result since companies tend to experience higher growth rates in their early years of operation (Huynh and Petrunia, 2010).

## Chapter 6

# Conclusions

This dissertation evaluates the performance of companies considering some of their characteristics, depending on their focus, whether they are a company dedicated to selling products or providing services. It examines the impact of a company being an exporter or importer, or being a two-way trader, and also investigates for which types of companies this effect of export or import is high. Additionally, it looks at the effects of exporting to only one or multiple markets and which market demonstrates the best performance, both for exporters and importers.

From the descriptive analysis, it was noticed that, on average, importing companies outperformed non-importing ones, and exporters also showed better performance compared to non-exporting companies. When analyzing the models, it became clear that indeed, both exporting and importing companies demonstrated better performance. The data analysis only allows control for one variable, but using econometric models allows control for multiple variables. Since the coefficients are significant, it indicates that exporting or importing companies indeed show improved sales per employee. It was also found that companies engaging in export or import activities exhibit higher growth rates compared to those that do not. Two-way trading companies show greater benefits than one-way traders, displaying higher sales per employee and experiencing more significant growth.

Taking into account the export markets, it was observed, both through the fixed effects method and the OLS method, that there is generally a greater benefit in exporting to more than one market rather than exclusively to one market. Companies exporting at higher levels to the non-EU market showed a higher value of sales per employee.

Regarding the import markets, companies importing from more than one market, especially from the non-EU market, showed a higher value of sales per employee. Additionally, in terms of growth, importers with a higher percentage of imports from the non-EU market exhibited greater growth.

In both models, the coefficients of the export markets and import markets were significant (except for one), and all the coefficients were positive. This indicates that exporting, regardless of the market, has a positive effect on businesses, leading to increased productivity.

Furthermore, in all models, there is a positive benefit in being both importers or exporters for all types of businesses. All types of companies demonstrate a positive advantage, both in terms of sales



per employee and in growth, when engaging in exporting or importing activities.

It was possible to observe the effects of exportation and importation based on the type of company and the market to which they export and import. This analysis allowed the identification of the companies that had better performance in these specific contexts.

In all the analyzed models, it was possible to observe a variation in the company's performance over the years. Between 2010 and 2015, there was a decline in the value of sales per employee, as well as a negative growth trend among the companies. However, from 2015 onwards, there was an increase in both sales per employee and the growth index of the companies.

In general, being an importer or exporter is beneficial for firms, resulting in a positive impact on sales per employee and overall firm growth. This trend holds true for all types of companies and for all the markets where companies engage in importing or exporting activities.

Some limitations of our work can be considered. In addition to those mentioned throughout the dissertation, it would be important to use more variables to better characterize the performance of companies. However, since the database consists of a wide variety of companies, it is difficult to find variables that reflect the characteristics of all types and sizes of companies.

Another limitation to consider is how we define exporters and importers. Some of the companies in our database may be indirect importers or exporters. For example, a company may sell its products to another Portuguese company, which then handles the export. In a way, this company is also an exporter, but our database does not allow us to analyze such situations. Another limitation of this study is related to the variable "sales per employee." Some companies may outsource certain stages or activities to other businesses, resulting in the actual number of employees being higher than what is reported in our database.

In future work, it would also be interesting to add other characteristics of the companies to this analysis, such as research and development (R&D) investment. It would also be valuable to conduct a more detailed analysis of import and export markets, rather than a general one, by examining, for example, specific country-to-country trade dynamics.

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# Appendix A

## Appendix

Table A.1: Firm size distribution between 2010 and 2020

Year	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
Number of Micro Firms	162645	163821	158969	160276	164794	166105	168758	170813	172700	171438	167318
% of Micro Firms	78%	79%	80%	81%	81%	80%	80%	79%	79%	78%	78%
Number of Small Firms	37489	35839	32661	31763	32647	34082	35300	36908	38658	39312	38882
% of Small Firms	18%	17%	16%	16%	16%	16%	17%	17%	18%	18%	18%
Number of Medium/Big Firms	7230	7091	6605	6616	6743	6944	7243	7758	8121	8324	8106
% of Medium/Big Firms	3%	3%	3%	3%	3%	3%	3%	4%	4%	4%	4%
Total of Firms	207364	206751	198235	198655	204184	207131	211301	215479	219479	219074	214306

Table A.2: Evolution of the volume of exporters of each type to turnover of that type

Year	% of exporters volume to turnover				
	Type 0	Type 1	Type 2	Type 3	Type 4
2010	10,2%	13,9%	9,3%	16,3%	17,6%
2011	10,5%	16,2%	10,8%	17,8%	22,2%
2012	12,2%	19,2%	13,9%	20,2%	24,3%
2013	13,1%	22,3%	14,3%	20,9%	24,3%
2014	14,7%	22,0%	15,8%	20,6%	24,3%
2015	16,1%	19,5%	15,1%	20,8%	23,2%
2016	16,0%	18,5%	14,5%	19,8%	21,1%
2017	16,2%	21,2%	14,5%	20,5%	22,9%
2018	14,7%	21,8%	14,3%	19,9%	25,3%
2019	15,2%	21,1%	13,0%	20,5%	24,3%
2020	16,7%	15,7%	12,8%	19,3%	23,6%

Table A.3: Evolution of the percentage of exports volume and percentage of exporters by firm size

YEAR	% of exporters volume to turnover			% of number of exporters		
	Micro	Small	Medium/Big	Micro	Small	Medium/Big
2010	4,2%	9,2%	18,1%	3,5%	12,6%	32,5%
2011	5,2%	10,6%	20,2%	4,1%	14,1%	34,9%
2012	5,9%	12,7%	22,7%	4,3%	16,5%	38,5%
2013	6,1%	13,4%	23,8%	4,6%	17,8%	40,0%
2014	6,2%	13,8%	24,1%	4,7%	18,3%	40,9%
2015	6,0%	13,1%	24,2%	4,8%	17,5%	41,3%
2016	5,7%	12,7%	22,9%	4,8%	17,1%	40,0%
2017	5,6%	12,1%	24,4%	4,9%	16,5%	39,3%
2018	5,5%	11,7%	24,4%	4,9%	15,8%	39,0%
2019	5,4%	11,6%	24,3%	4,9%	15,6%	38,5%
2020	5,3%	11,7%	23,2%	4,7%	15,3%	38,9%

Table A.4: Evolution of the volume of imports of each type to purchases of that type

Year	% of importers				
	value to total purchases by firm type				
	Type 0	Type 1	Type 2	Type 3	Type 4
2010	10,0%	19,9%	9,7%	16,6%	17,9%
2011	10,4%	22,2%	12,1%	17,3%	22,0%
2012	11,7%	25,4%	15,9%	19,1%	23,5%
2013	13,1%	31,7%	15,5%	20,8%	24,6%
2014	14,2%	31,7%	17,4%	20,4%	23,9%
2015	15,8%	28,1%	16,6%	20,4%	23,1%
2016	15,3%	26,7%	17,1%	20,1%	20,6%
2017	14,5%	28,3%	17,2%	19,8%	22,9%
2018	15,6%	29,2%	16,7%	19,6%	26,2%
2019	16,1%	30,6%	14,1%	19,9%	24,2%
2020	16,8%	19,7%	15,5%	18,9%	24,5%



Table A.5: Evolution of the percentage of exports volume and percentage of importers by firm size

Year	% of importers value to total purchases by firm type			% of number of importers by firm type		
	Micro	Small	Medium/Big	Micro	Small	Medium/Big
2010	6,4%	14,7%	27,3%	3,6%	14,2%	37,3%
2011	6,5%	14,5%	27,8%	3,5%	14,3%	39,2%
2012	6,9%	15,2%	28,4%	3,5%	15,0%	39,7%
2013	7,0%	16,0%	30,4%	3,7%	15,9%	41,6%
2014	7,3%	16,4%	30,7%	3,8%	16,3%	42,4%
2015	7,2%	16,2%	31,1%	3,8%	16,1%	42,7%
2016	7,2%	16,1%	28,2%	3,9%	16,0%	41,9%
2017	7,0%	16,0%	29,1%	3,9%	15,9%	41,0%
2018	6,9%	15,8%	29,4%	3,9%	15,6%	41,8%
2019	6,7%	15,6%	29,5%	3,9%	15,4%	41,6%
2020	6,5%	15,8%	29,5%	3,8%	15,1%	41,3%

Table A.6: Evolution of sales per employee over years by firm type and firm size

Year	Sales per Employee (€)								
	Overall	Firm Size			Firm Type				
	Micro	Small	Medium/Big	Type 0	Type 1	Type 2	Type 3	Type 4	
2010	94 912 €	66 273 €	128 675 €	564 104 €	58 392 €	50 845 €	72 667 €	183 838 €	125 379 €
2011	96 927 €	62 552 €	126 553 €	741 333 €	58 831 €	49 307 €	73 419 €	208 903 €	119 879 €
2012	95 205 €	60 731 €	127 665 €	764 434 €	57 793 €	48 026 €	68 910 €	204 118 €	120 565 €
2013	97 472 €	62 439 €	134 559 €	768 117 €	57 137 €	49 886 €	73 813 €	216 233 €	120 472 €
2014	100 030 €	63 865 €	137 570 €	802 120 €	55 657 €	54 008 €	79 110 €	226 418 €	123 860 €
2015	97 132 €	64 595 €	135 864 €	685 325 €	56 520 €	53 422 €	89 286 €	201 057 €	123 281 €
2016	98 266 €	65 617 €	132 665 €	691 321 €	56 973 €	53 063 €	92 059 €	205 011 €	125 625 €
2017	104 639 €	68 712 €	138 207 €	735 956 €	59 716 €	57 495 €	103 723 €	219 635 €	133 445 €
2018	104 416 €	70 518 €	140 525 €	653 404 €	60 078 €	58 395 €	110 306 €	210 053 €	138 127 €
2019	105 386 €	72 343 €	140 124 €	621 879 €	61 285 €	60 234 €	106 073 €	208 611 €	145 418 €
2020	95 186 €	67 438 €	131 462 €	493 920 €	52 834 €	56 343 €	80 999 €	197 346 €	136 469 €

Table A.7: Logarithm of sales per employee regressions using OLS

Variables	Model 7	Model 8	Model 9
Firm Type 1	0.173*** (0.002)	0.168*** (0.002)	0.174*** (0.002)
Firm Type 2	0.312*** (0.002)	0.31*** (0.002)	0.313*** (0.002)
Firm Type 3	0.928*** (0.003)	0.927*** (0.003)	0.943*** (0.003)
Firm Type 4	0.609*** (0.003) (0.005)	0.601*** (0.003) (0.005)	0.603*** (0.003) (0.005)
Log Age	0.018*** (0.001)	0.018*** (0.001)	0.018*** (0.001)
Employees Education 1	0.068*** (0.002)	0.066*** (0.002)	0.069*** (0.002)
Employees Education 2	0.195*** (0.002)	0.197*** (0.002)	0.195*** (0.002)
Employees Education 3	0.246*** (0.003)	0.25*** (0.003)	0.246*** (0.003)
Export Market 1	0.347*** (0.011)	0.407*** (0.008)	0.335*** (0.011)
Export Market 2	0.766*** (0.015)	0.456*** (0.007)	0.713*** (0.016)
Export Market 3	0.786*** (0.016)	0.34*** (0.007)	0.717*** (0.017)
Export Market 4	0.705*** (0.012)	0.253*** (0.005)	0.649*** (0.013)
Export Market 5	0.287*** (0.005)	0.248*** (0.004)	0.266*** (0.005)
Import Market 1	0.432*** (0.024)	0.597*** (0.046)	0.595*** (0.046)
Import Market 2	0.737*** (0.011)	0.942*** (0.032)	0.813*** (0.033)
Import Market 3	0.598*** (0.008)	10.111*** (0.027)	0.901*** (0.028)
Import Market 4	0.515*** (0.004)	0.892*** (0.016)	0.726*** (0.017)

Import Market 5	0.525*** (0.003)	0.649*** (0.009)	0.614*** (0.009)
Firm Type X Export Market			
Type 1 X Market 1	-0.041 (0.025)		-0.017 (0.025)
Type 1 X Market 2	-0.306*** (0.027)		-0.236*** (0.029)
Type 1 X Market 3	-0.434*** (0.035)		-0.355*** (0.035)
Type 1 X Market 4	-0.465*** (0.021)		-0.4*** (0.022)
Type 1 X Market 5	-0.123*** (0.011)		-0.101*** (0.011)
Type 2 X Market 1	0.129*** (0.023)		0.155*** (0.023)
Type 2 X Market2	-0.301*** (0.023)		-0.233*** (0.024)
Type 2 X Market 3	-0.477*** (0.026)		-0.398*** (0.027)
Type 2 X Market 4	-0.456*** (0.019)		-0.397*** (0.020)
Type 2 X Market 5	-0.004 (0.013)		0.014 (0.013)
Type 3 X Market 1	0.076*** (0.020)		0.107*** (0.020)
Type 3 X Market 2	-0.548*** (0.018)		-0.444*** (0.019)
Type 3 X Market 3	-0.736*** (0.019)		-0.608*** (0.019)
Type 3 X Market 4	-0.728*** (0.014)		-0.613*** (0.014)
Type 3 X Market 5	-0.131*** (0.010)		-0.088*** (0.010)
Type 4 X Market 1	0.2*** (0.024)		0.201*** (0.024)
Type 4 X Market 2	-0.226*** (0.023)		-0.218*** (0.024)
Type 4 X Market 3	-0.391***		-0.368***

	(0.023)	(0.024)
Type 4 X Market 4	-0.335***	-0.331***
	(0.016)	(0.016)
Type 4 X Market 5	0.039***	0.047***
	(0.012)	(0.012)
Firm Type X Import Market		
Type 1 X Market 1	-0.294***	-0.239**
	(0.103)	(0.104)
Type 1 X Market 2	-0.315***	-0.173***
	(0.053)	(0.055)
Type 1 X Market 3	-0.496***	-0.29***
	(0.052)	(0.054)
Type 1 X Market 4	-0.427***	-0.256***
	(0.025)	(0.027)
Type 1 X Market 5	-0.141***	-0.081***
	(0.016)	(0.017)
Type 2 X Market 1	-0.319***	-0.341***
	(0.077)	(0.077)
Type 2 X Market2	-0.335***	-0.219***
	(0.046)	(0.047)
Type 2 X Market 3	-0.595***	-0.391***
	(0.038)	(0.039)
Type 2 X Market 4	-0.358***	-0.196***
	(0.020)	(0.021)
Type 2 X Market 5	-0.099***	-0.069***
	(0.014)	(0.014)
Type 3 X Market 1	0.009	0.026
	(0.071)	(0.072)
Type 3 X Market 2	-0.382***	-0.18***
	(0.036)	(0.036)
Type 3 X Market 3	-0.751***	-0.457***
	(0.028)	(0.030)
Type 3 X Market 4	-0.587***	-0.346***
	(0.017)	(0.018)
Type 3 X Market 5	-0.242***	-0.183***
	(0.010)	(0.011)
Type 4 X Market 1	-0.283***	-0.298***
	(0.062)	(0.062)

Type 4 X Market 2		-0.064*	0.047
		(0.037)	(0.038)
Type 4 X Market 3		-0.375***	-0.185***
		(0.030)	(0.032)
Type 4 X Market 4		-0.197***	-0.051***
		(0.018)	(0.019)
Type 4 X Market 5		-0.077***	-0.048***
		(0.010)	(0.011)
Constant	11.757***	11.734***	11.735***
	(0.386)	(0.38)	(0.382)
Observations	2210718	2210718	2210718
R-squared	0.282	0.281	0.282
F-stat	11939.353	11881.604	9479.668
Adj R2	0.282	0.281	0.282

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Robust standard errors are in parentheses. \*\*\* p<.01, \*\* p<.05, \* p<.1 The dependent variable is the sales per employee in logarithm. Data from 2010 to 2020. Control Variables include: Year, Region, CAE, Firm size, Employees education, Age and Firm Type. The base level of each interaction and categorical variable was omitted

