
Sector productivity and geographical diversification as export enhancing factors: the case of Portugal

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Abstract: An investigation of the relationship between productivity growth and exporting is vital to understand whether productivity-enhancing policies or those of export promotion are more adequate for economic progress. This article considers the relationship between exporting and productivity for 32 economic activities, in Portugal, from 2006 to 2017. It is found that economic activities with high productivity levels are systematically likelier to register higher export levels than less productive ones. This result corroborates the self-selection theory. Furthermore, the effect of geographical diversification on the volume of exports is tested, as well as the presence of diminishing returns in this association. For both cases significant results are found, suggesting that economic activities enlisting more export destinations tend to possess higher export volumes, but also that after a certain threshold the negative effects of geographical diversification offset the associated positive benefits.

Keywords: economic activities; self-selection; geographical diversification; exporting; productivity; diminishing returns; Portugal.

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1 Introduction

Strengthening industry competitiveness is a crucial factor for economic growth. The productivity gap between countries and its growth are regarded as key aspects determining the comparative advantage in international trade. Theoretically, it is evidenced that international trade (and specifically exports) boosts economic development (Beckerman, 1962; Kaldor, 1970; Balassa, 1988; Bhagwati, 1988). Therefore, an investigation concerning the variables that influence exports is vital to understand which trade policies are more adequate for economic progress (Clerides et al., 1998; Aw et al., 2000; Melitz, 2003; Wagner, 2007; Vendrell-Herrero et al., 2017).

Thus, the present study aims to empirically investigate the relationship between export, productivity and geographical diversification, and ultimately to help Portuguese industries develop their competitiveness in foreign markets and become more productive, before commencing to engage in foreign direct investment and become international. As far as I can tell, this seems to be the first work focusing particularly on the Portuguese economy and on a period of financial distress, and hence, these research efforts can enrich the vast literature on firms' internationalisation by filling this gap.

Additionally, one should notice the fact that most studies on this subject relate either the productivity at firm level (Clerides et al., 1998; Melitz, 2003; Yang, 2003; Loecker, 2007; Love and Mansury, 2007; Wagner, 2007; Vu et al., 2016; Gomes et al., 2017; Newman et al., 2017; Vendrell-Herrero et al., 2017) or the productivity of general manufacturing or services sectors (Bernard and Jensen, 1999; Ayadi and Matoussi, 2014; Sharma and Mishra, 2011) with exporting activity, and that there does not exist a vast literature that tests this relationship using macro-data for specific economic activities, rather than company level or merely vast cluster sectors. For instance, Polder et al. (2009) refer the lack of studies contemplating macro data from both manufacturing and services industries.

Nonetheless, as pointed out by Eaton et al. (2012), despite the fact that treating heterogeneous individual companies as points on a continuum permits an abundant number of convenient implications, these models possess several relevant limitations:

- 1 shocks to individual firms do not have an aggregate effect
- 2 it might be unreasonable to assume a continuum when there is a small number of companies (frequently zero) engaged in exporting
- 3 finite solutions for aggregates require restrictions on parameter values that may be inconsistent with the data.

Arkolakis et al. (2010), that postulate that micro-level data must be combined with macro models to have a significant impact on the estimates of gains from trade, further emphasise the limitations associated with the use of micro-level data on recent international trade literature.

Therefore, one of the contributes of this study is the establishment of a relationship between exports and productivity, utilising disaggregated macro inputs, thus eliminating pertinent criticisms attributed to this line of literature.

An additional contribution of this research is the study of the relationship between export destination and exports volume, at sector level. As referred by Cieslik et al. (2012), there does not exist on international marketing and business literature a complete base knowledge concerning current trends on geographic diversification, a fact that impedes the advancement of our understanding on this subject and, therefore, that hinders the ability to produce significant managerial and political recommendations.

Besides, the still embryonic research stream addressing this subject has produced conflicting empirical results (Boehe and Jiménez, 2016). For instance, there have been uncovered both linear (Dhanaraj and Beamish, 2003) and curvilinear (Aulakh et al., 2000) relationships between geographical diversification and export intensity, as well as a positive effect on sales (Hirsch and Lev, 1971) or cash flow stability (Shaver, 2011). Hence, the shape of the relationship between the volume of exports and geographical diversification seems to remain obscure, requiring further investigation.

In addition, as referred by Shaver (2011), the study of export diversification naturally soothes the majority of the shortcomings identified in recent internationalisation literature by Verbeke and Brugman (2009), since it focuses on one element of the value chain (sales), it restricts itself to one internationalisation entry mode (exporting) and it concentrates on one internationalisation motive (market-seeking).

Moreover, this study is very relevant because in order to face the recent crisis the Portuguese government utilised a policy that stimulated and incentivised exporting and tried to attract more foreign direct investment. Thus, the extent to which the productivity of Portuguese industries influences their capacity to compete in international markets and their export behaviour merits academic and scholarly attention, because it is vital to assess if the policies in place are the most effective ones to achieve economic growth.

Furthermore, the choice of the specific case of Portugal is justified because of concerns associated with the inferior degree of productivity of Portuguese industries compared to other European economies (Alves, 2017) and the acknowledgement that if they become more productive, they could improve their involvement on international activity, which has consistently been one of the main objectives of Portuguese authorities in order to increase the external competition of the country's lagging economy. Therefore, it is important to identify the main factors that drive Portugal's economic growth, so that more effective policies can be drawn (Andraz and Rodrigues, 2010), both for the Portuguese economy and for nations with similar economic structures and financial problems. In this way, the predominant influence of this project is to deliver a response to the discussion 'How can Portuguese industries become more productive and increase their exports volume?'

The paper is organised as follows. In Section 2, I provide a review of previous literature and I develop hypotheses. To do so, I first resort to the self-selection literature to enlighten the relationship between exports and productivity. Afterwards, I make use of further research to describe the relationship between geographical diversification and performance and I apply these concepts to the specific case of Portugal. In Section 3 of this study, I describe the utilised research methods, and in Section 4, I portray the main findings of the paper. Finally, in Section 5, I discuss the aforementioned results, the theoretical, governmental and managerial implications of this research, I draw this project's main limitations, and I provide suggestions for future research.

2 Literature review and hypotheses

Nowadays, the pressure for international growth and expansion is being intensified by the increasing rate of globalisation. At the beginning of their internationalisation process, companies lean towards exports, rather than towards foreign direct investment, since this mode of entry entails inferior levels of foreign market acquaintance and of factor engagement (Johanson and Vahlne, 1977). Moreover, literature focusing on the link between economic performance and international trade has highlighted that an orientation towards exports is frequently linked to superior levels of GDP growth, and it is even argued by many scholars that emerging countries pursuing export strategies usually out-perform others implementing import-substitution policies (Havrylyshyn, 1990; Feenstra, 1995; Edwards, 1998). Thusly, it is very relevant to study the role of

international trade, and more specifically of exports, in economic growth and on firm performance.

In this way, there is a vast literature that attempts to explain the relationship between exports and productivity. For instance, departing from the premise that entering export markets involves fixed costs, it is posited that relatively more efficient companies alone manage to export (Clerides et al., 1998; Helpman et al., 2004). Costs associated with market research and the development of new marketing strategies, negotiating with further associates, contracting employees skilled in leading offshore chains, setting up additional distribution and transportation grids, adapting the domestic product range to foreign consumption, must be incurred by companies contemplating entry into foreign markets. Solely the companies with marginal costs low enough can generate the profits necessary to compensate said costs. Therefore, exporting firms tend to be more productive because their productivity levels are higher in the first place. This theory is known as the self-selection model.

This line of thought is also in accordance with the export literature on the resource-based view (RBV) theory (Lafuente et al., 2015; Peng, 2001), since companies are regarded as ‘packages’ of varied and diverse resources utilised to attain and preserve comparative advantage (Barney, 1991; Wernerfelt, 1984). As a matter of fact, the research developed by Bloodgood et al. (1996) found that the uniqueness of resource bundles of certain companies helps explain their higher levels of productivity. In this way, it is logical to hypothesise that a company’s capabilities and resources also influence productivity and, consequently, international sales.

Hence, it would be fair to expect solid signals of self-selection into foreign markets, and, in fact, empirical evidence seems to bear this out. For instance, a study developed by Wagner (2007) found staggering evidence of this mechanism: relatively more productive companies are consistently more prone to engage in exporting. Moreover, this result also seems to be corroborated by the studies of Bernard and Jensen (1999), Melitz (2003), Aw et al. (2000), and Gomes et al. (2017). Therefore, the following hypothesis is drawn:

Hypothesis 1 Economic activities with higher levels of productivity tend to possess a higher volume of exports.

Additional literature on the internationalisation topic, like Loecker’s (2007) work, evidenced that the exports volume and the number of destinations are positively associated: as firms start to diversify their export destinations to countries where the psychic distance is low (Johanson and Vahlne, 1977), a higher number of export destinations seems to result in an increased volume of international sales. This relationship is probably due to the fact that, firstly, amplifying commercial activity within the same region of origin allows for the exploitation of similarities in market behaviour and managerial knowledge across territories, which lessen marginal costs of eventual adaptations (Boehe and Jiménez, 2016). Secondly, increased multinationality allows for wider access to foreign product innovation and technological knowledge, more varied international networks to face domestic competition, economies of scope and of scale, reduced impact of domestic economic and business fluctuations, the possibility to take advantage of differences in factor costs between countries, price discrimination, improved cross-subsidisation, and arbitrage potential with wider geographic amplitude, among many other advantages (Kogut, 1985; Benvignati, 1987; Grant, 1987; Gomes and Ramaswamy, 1999; Contractor et al., 2003).

Furthermore, Herzer and Nowak-Lehmann (2006) argue that export diversification is the most efficient therapy for periods of financial crisis, uncertainty and fluctuations, since it avoids the flaws of export concentration. For example, fluctuations in sales volume, unreasonable prices, volatility of exchange rates and investment risks can be prevented by utilising this strategy.

The Asian 'Tigers' are the proof of the vital role of geographical diversification: the adoption of policies of this nature provided fruitful economic returns for these countries. Research on this topic demonstrated that multinationality aided in reducing exposure to trade erosion and external shocks and in bolstering export performance and general economic growth (Abouellial and Dioquino, 2015).

However, the works that postulate this positive relation also identify numerous reasons as to why the costs related to geographical diversification might offset potential benefits. Grant (1987), for instance, indicates that bounded rationality may hinder managers' capacity to successfully deal with greater complexity linked to multinationality. Thus, he argues that increased multinationality may negatively impact performance. Also, a study developed by Hitt et al. (1997) evidences that a high degree of geographical diversification has a negative effect on performance, as a result of managerial capabilities being overly spread and of coordination problems. For instance, a raise in operational complexities (e.g., logistics and manufacturing) may render an entire system dysfunctional (Levinthal and Warglien, 1999), wiping out the initial benefits from learning and synergistic diversification effects. Following the same line of thought, it is argued that geographical diversification may imply adjustment costs in manufacturing, export marketing mix strategies and logistics, which, in turn, depend on variables such as distance and regulatory environment (Berry et al., 2010; Dow and Karunaratna, 2006; Ghemawat, 2001; Boddewyn et al., 1987). And based on similar arguments, Gomes and Ramaswamy (1999) defend that after a certain degree of geographical diversification, the gains from diversification are counterbalanced by informational and transactional costs. These arguments are corroborated by Contractor et al.'s (2003) research, in which it is found that an extensive level of geographic diversification hampers performance.

This is due to the fact that diversity becomes more difficult to manage when the range of export destinations is too wide, since each country possesses specific economic, geographic, administrative and cultural characteristics (Bartov et al., 1996; Reeb et al., 1998). Therefore, at this stage, expanding to other geographies implies international marketing adjustments and product R&D, as well as modifications in the supply chain and respective logistic, which may greatly increase organisational complexity and, consequently, damage firm performance, by virtue of limited managerial capacity (Boehe and Jiménez, 2016; Ruigrok et al., 2007). For instance, countries from Central America, such as Costa Rica, El-Salvador, Guatemala, and Honduras, practiced diversification policies, but could not conquer economic stability (Stanley and Bunnag, 2001). In this way, it is fair to assume that the positive effect of multinationality on the amount of exports is not always verified with the same intensity (Contractor et al., 2003), and as there are also variables negatively influencing the effect of geographical diversity on performance, one could expect the magnitude of this relationship to be dependent on the number of export destinations.

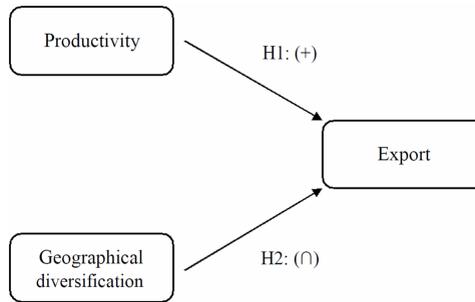
In sum, I expect a quadratic relationship between the volume of exports and the degree of geographical diversification. The slope should increase at first because of

synergistic and diversification effects, and then decrease, in an advanced stage, as a result of amplified adaptation and complexity costs. Hence, it is expected that:

Hypothesis 2 The relationship between the degree of geographical diversification and the volume of exports displays an inverted U-shaped pattern.

Figure 1 summarises the relationships established in the aforementioned hypotheses:

Figure 1 Theoretical framework and hypotheses



3 Data and research methods

3.1 The data

To test the hypotheses mentioned in the Literature Review, data from *Instituto Nacional de Estatística* (INE) was utilised. INE is the central body of production and diffusion of official statistics in Portugal. This institution resorts to both the Intrastat (a monthly inquiry and a permanent system of statistical collection employed in the European Union) and the *Documento Administrativo Único* (a document that is necessarily presented by companies and individuals to the Portuguese customs during the act of exporting and importing) to obtain figures for the trade of goods and services between Portugal and other countries.

The dataset is appropriate to test the relationship between exports, productivity and geographical diversification, since, after excluding variables with missing values:

- 1 it covers a wide period (from 2006 to 2017)
- 2 it considers 197 countries
- 3 it comprises figures for a vast number of economic activities, from both manufacturing and services industries.

3.2 Measures

3.2.1 Dependent variable

This study examines the effect of productivity and geographical diversification on the volume of exports. Thus, the dependent variable is the volume of exports.

Exports are the annual Portuguese exports value of goods and services, divided by destination country, economic activity and year. The availability of complete data in INE

narrowed the number of examined economic activities (the 32 analysed economic activities are presented in annex – Table A1) and years (from 2006 to 2017). Despite this limitation, it was still possible to obtain figures for a vast and significant dataset.

Afterwards, the yearly export value for each economic activity was obtained by summing up the value of exports for each year and economic activity for all countries.

3.2.2 Independent variables

To measure productivity the variable *apparent labour productivity*, measured in $t - 1$, was utilised. According to INE, it corresponds to the annual Portuguese value of the contribution of the labour factor, measured by the added gross value generated by each worker at service. Figures are divided by economic activity and year (2005–2016 was the considered period) and measured in euros. Since the variable ‘exports’ only possesses 32 economic activities, only those were kept for this variable.¹

To obtain figures for the *number of export destinations*, the same methodology utilised by Ramaswamy’s (1993) was applied to count the number of countries that registered an export value larger than zero concerning each economic activity and year.

Dummy variables were included to represent the examined years and economic activities.

A data profile of all relevant variables included in the model is presented in Table 1.

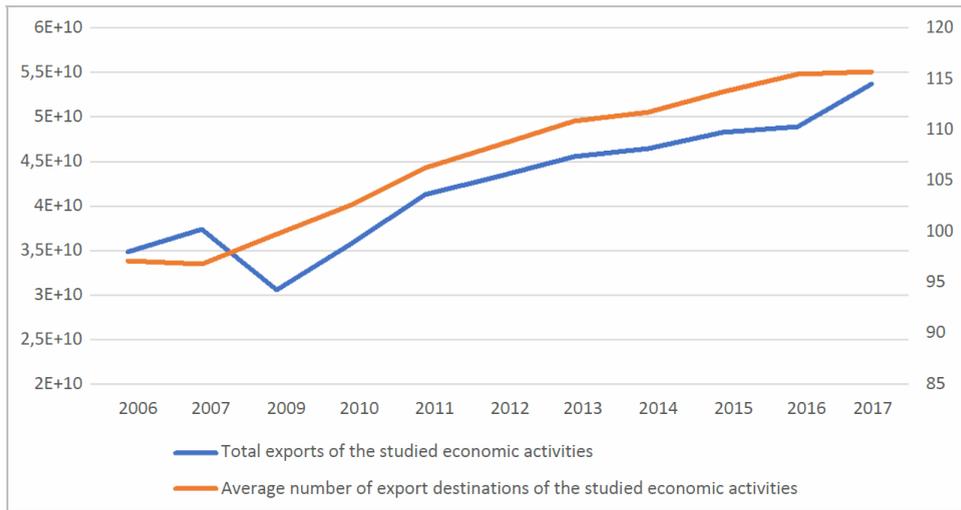
Table 1 Descriptive statistics of all relevant variables included in the model

<i>Variable</i>	<i>Obs.</i>	<i>Mean</i>	<i>Std. deviation</i>	<i>Min.</i>	<i>Max.</i>
Export value, Ln((Export value + 1),)		1,313,698,223.54	1,247,362,672.04	0.00	6,048,271,735
Number of export destinations, _{<i>t</i>}	384	106.40	53.49	0.00	172.00
Productivity _{<i>t-1</i>} Ln(Productivity _{<i>t-1</i>})		61,057.38	108,927.42	8,332.05	761,140.84
		10.38	0.94	9.03	13.54

3.3 The sample

Figure 2 shows the evolution of the total exports value and of the average number of export destinations of the studied economic activities. While in 2006 the total export value of the studied economic activities was about 35 billion euros, by 2017 it was about 54 billion euros, which represents an increase of approximately 54%. By performing a similar analysis to the number of export destinations, it can be seen that the figures for this variable have been constantly increasing, except for the year of 2007. There were, on average, 92 export destinations for the studied economic activities in 2016, while in 2017 there were almost 116, an increase of approximately 26%.

These results seem to indicate that recent globalisation trends (e.g., born global firms) and public policies (e.g., Portugal 2020) encouraged the entry of firms into exports. Furthermore, they corroborate the increased dependence of the Portuguese economy on exports over the last decade, reinforcing the need to examine the determinants of this variable.

Figure 2 Evolution of the total exports value and of the average number of export destinations of the studied economic activities (see online version for colours)

3.4 Analytical strategy

Firstly, in order to be able to interpret the coefficient of the variables *Exports* and *productivity* as a percentage, a logarithmic transformation was performed. This step was also introduced to reduce heteroscedasticity and hence enhance estimation accuracy because there were big differences in the distribution of the data. And, regarding the variable *exports*, as there were some economic activities that did not register any international sale in some years, 1 euro was added to all figures, so that it would be possible to perform the \ln transformation.

Moreover, to address the quality criteria for international diversification research of Verbeke and Brugman (2009) and deal with potential sources of endogeneity, which can bias estimation results, this study also introduces some econometric steps aimed at minimising this subject.

For instance, as for potential omitted variable bias, by resorting to year fixed effects, I control for overlooked heterogeneity across periods, which might be caused by, for instance, an overall preference between exports or national economy for a specific year or unnoticed momentary shocks (e.g., political), amid others. Moreover, following Vu et al. (2016), and Cassiman and Golovko (2011), the model uses sector random effects, taking advantage of the yearly panel structure of the dataset to handle time-invariant unobserved sector heterogeneity.

Furthermore, to address potential reverse-causality, I utilise one-year lagged *productivity*, which makes the model dynamic. In this way, past productivity affects the present volume of exports and not the reverse.

3.5 Empirical model

I start by testing the effect of *productivity* on *exports*. In this way, following Aquilante and Vendrell-Herrero (2019), to test Hypothesis 1, equation (1) was modelled, in which

the subscript t identifies the year of the observation, i the economic activity, δ_t represents year fixed effects (FEs), v_i indicates economic activity dummies/FEs, v_t refers to time dummies/FEs, and is the error term:

$$\begin{aligned} \text{Ln}(\text{export value}_t)_i &= \alpha + \beta_1 * \text{Ln}(\text{Productivity}_{t-1})_i \\ &+ \beta_2 * (\text{Number of export destinations}_t)_i + \delta_t + v_i + v_t + \varepsilon_{it} \end{aligned} \quad (1)$$

Subsequently, to test Hypothesis 2 equation (2) was modelled, in which the subscript t identifies the year of the observation, i the economic activity, δ_t represents year fixed effects (FEs), δ_i indicates economic activity dummies/FEs, v_t refers to time dummies/FEs, and is the error term:

$$\begin{aligned} \text{Ln}(\text{export value}_t)_i &= \alpha + \beta_1 * \text{Ln}(\text{Productivity}_{t-1})_i \\ &+ \beta_2 * (\text{Number of export destinations}_t)_i \\ &+ \beta_3 * \left((\text{Number of export destinations}_t)_i^2 \right) + \delta_t + v_i + v_t + \varepsilon_{it} \end{aligned} \quad (2)$$

4 Results

As previously mentioned, two equations were modelled, utilising sector random effects and year fixed effects with robust standard errors, to test Hypotheses 1 and 2. Results are presented in Table 2.

Table 2 Regressions based on sector random effects and year fixed effects, with robust standard errors in parentheses

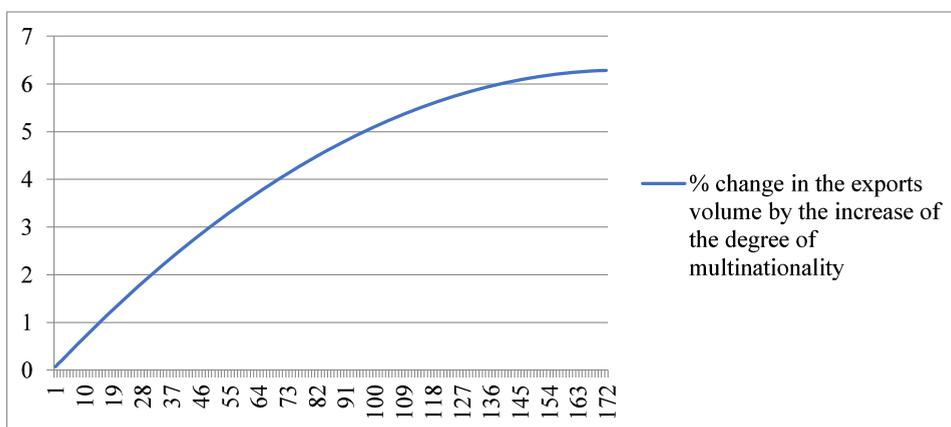
	<i>Regression 1</i>	<i>Regression 2</i>
Ln(Productivity _{t-1})	0.611** (0.250)	0.625*** (0.242)
Number of export destinations	0.0337*** (0.00785)	0.0711*** (0.0274)
(Number of export destinations) ²		-0.000201* (0.000119)
Constant	9.784*** (3.469)	8.406** (3,784)
N	376	376
R ²	0.695	0.763

Notes: Level of statistical significance: ***1%, **5% and *10%. The departing variable is Ln(Export value_t), and only the relevant variables are presented.

Hypothesis 1 postulates that economic activities with higher levels of productivity tend to possess a higher exports volume. This implies that $\beta_1 > 0$, which can be confirmed in Regression 1 with a level of significance of 5% and in Regression 2 with a significance of 1%, suggesting that, ceteris paribus, if one-period lagged productivity increases by 1%, then the volume of exports will increase by, approximately, 0,6%. Therefore, these results appear to validate the self-selection theory.

Furthermore, Hypothesis 2 posits that the relationship between the degree of geographical diversification and the volume of exports displays an inverted U-shaped pattern. In this model, it implies that $\beta_2 > 0$ and $\beta_3 < 0$. The results consistently support this hypothesis as β_2 is positive and highly significant in both regressions ($p < 0,01$) and β_3 , the coefficient of the squared term, is negative, with a significance level of 10%. Hence, a larger number of export destinations seem to lead to a higher exports volume. However, there are diminishing returns in the effect of geographical diversification on the exports volume. Actually, and as it can be seen through Figure 3, after exporting to 165 countries, for each new destiny exports increase by almost 0%.

Figure 3 Evidence of diminishing returns: exports increase less and less with the increase of geographical diversification (see online version for colours)



Also, it is interesting to note that overall, the model has a good fit. For instance, Regression 2 predicts correctly 76.3% of exports value.

5 Discussion and conclusions

This study utilises sector-level data from Portugal to examine the relationship between the volume of exports and productivity and to analyse the liaison between exports and the degree of geographical diversification. The null hypotheses are:

- 1 economic activities with higher levels of productivity tend to possess a higher volume of exports
- 2 the relationship between the degree of geographical diversification and the volume of exports displays an inverted U-shaped pattern.

Hence, based on data from 32 economic activities and 197 countries, over the period of 2006 through 2017, the obtained results shed light over unaddressed questions and conflicting results on internationalisation literature.

First, it was found that a higher level of productivity increases the chances of registering a higher volume of exports, corroborating previous literature on the self-selection theory. This is probably due to the fact that more productive exporters are

more able to overcome the fixed costs necessary to engage in trade with foreign markets. That is, solely the companies with marginal costs low enough can generate the profits necessary to compensate the fixed costs associated with exporting. Besides, this theory also seems to be applicable to the specific case of the Portuguese conjecture, and namely to periods of financial distress.

Second, it was found an inverted U-shaped relationship between the degree of geographical diversification and the volume of exports. In this way, increased levels of geographical diversification are associated with higher volumes of exports, due to synergistic and diversification effects (e.g., wider access to foreign product innovation and technological knowledge, economies of scope and of scale and reduced impact of domestic economic and business fluctuations), and to the fact that amplifying commercial activity within the same region of origin allows for the exploitation of similarities in market behaviour and managerial knowledge across territories. However, taking into consideration that each country possesses specific economic, geographic, administrative and cultural characteristics, after a certain point geographical diversification may start to negatively affect the export volume, since bounded rationality may hinder managers' capacity to successfully deal with greater complexity linked to high levels of diversity, managerial capabilities become overly spread, coordination problems start arising and informational and transactional costs become excessive.

5.1 Theoretical implications

Results suggest that productivity and geographical diversification are significant variables affecting the volume of exports, contributing to our understanding of the factors that influence a potentially large share of an economy's GDP.

Moreover, this study contributes to the international economics literature by utilising macro data, grouped by economic activity, to empirically study the relationship between exports and productivity. Consequently, it efforts to enlighten a relevant research void (Polder et al., 2009; Arkolakis et al., 2010) and deviate from the limitations pointed out by Eaton et al. (2012).

Likewise, it contributes to the still embryonic research stream focusing on the relationship between geographical diversification and the volume of exports by shedding light on contradictory and inconsistent empirical results (Hirsch and Lev, 1971; Aulakh et al., 2000; Dhanaraj and Beamish, 2003; Shaver, 2011; Boehe and Jiménez, 2016), while addressing the quality criteria for international diversification research of Verbeke and Brugman (2009).

5.2 Practical implications

On the policy front, these findings suggest that export promotion policies are more effective if escorted by actions to assist industries to enhance their productivity. This will aid companies to enter foreign markets by acquiring a real competitive edge.

Therefore, even though the Portuguese direct export promotion policy has been utilised with success to support the Portuguese economy, it should be accompanied by productivity strengthening industrial policies, since productivity improvements seem to, by themselves, bolster exports.

This could be achieved, for instance, through policies that reduce bureaucracy, incentive innovation and R&D investment and the exploration of recent technologies.

Moreover, this research has direct managerial implications. The first one is that firms should try to increase productivity to augment their volume of exports, but they should do it before engaging in foreign trade because, since there are fixed costs linked with exporting, only companies with marginal costs low enough can compete in foreign trade.

This productivity enhancement can be achieved by, for instance, utilising technology to improve their operations (e.g., internet of things, Industry 4.0, artificial intelligence, automatisisation, communication tools, e-purchasing, smart inventory control systems, etc.) betting on innovation and differentiation (Aw et al., 2007; Lileeva and Trefler, 2010), building a constructive attitude and participation of management, creating a positive work environment atmosphere, and incentivising proactive employees (Kumar et al., 2016).

Secondly, to sell more abroad, companies should diversify their export destinations. Nevertheless, there seems to exist a trade-off between augmenting the degree of multinationalisation and performance, as after a certain level of geographical diversification exports start to decay.

5.3 Limitations and directions for further research

Commonly to previous studies, this academic work has limitations. For instance, labour productivity was utilised to draw general conclusions concerning productivity. In this way, it would also be interesting to take into consideration and include data for capital productivity in the model to assess if results hold, even though this information is not currently available.

In addition, it could be asked: is the high productivity of economic activities that self-select into export markets a result of an exogenous random shock (e.g., the Portuguese crisis, or the reforms and incentives given by the Portuguese government to increase exports), or of a strategy to plan the entry into foreign markets? New studies addressing this question would be welcomed.

Another limitation may be that the Hausman test recommends the utilisation not only of year fixed effects, but also of sector fixed effects (even though, as previously mentioned, random effects have been used in other self-selection studies) to help control any possible variability at the economic activity level.

All and all, much academic research remains to be built to mature our comprehension of the impact of productivity on international trade. For instance, while data on foreign direct investment is not currently available, due to Portuguese legislative limitations, if it becomes publicly accessible it will allow for additional analyses to be carried out to provide a more comprehensive picture of the relationship between exports and imports and FDI and their role on economic growth.

This study is based on data for 32 economic activities, and while more information is not currently available, it might be that it becomes obtainable in the future. Therefore, upcoming projects testing the studied relationships and using figures for other economic activities will be saluted.

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Notes

- 1 Even though total factor productivity would be a more suitable benchmark, it was not utilised due to lack of information on capital productivity. However, labour productivity is a widely used measure, and therefore it is fairly utilised here.

Annex

Table A1 Studied economic activities and respective designation

<i>Economic activity designation</i>	<i>Name of the economic activity</i>
EA01	Products of agriculture, hunting and related services
EA02	Products of forestry, logging and related services
EA03	Fish and other fishing products and services incidental to fishing
EA04	Mining and quarrying ¹
EA05	Food products and beverages
EA06	Tobacco products
EA07	Textiles
EA08	Wearing apparel and furs
EA09	Leather and leather products
EA10	Wood and products of wood and cork (except furniture), and articles of straw and plaiting materials
EA11	Pulp, paper and paper products
EA12	Printed matter and recorded media
EA13	Coke, refined petroleum products and nuclear fuel
EA14	Chemicals, chemical products and man-made fibres
EA15	Rubber and plastic products
EA16	Other non-metallic mineral products
EA17	Basic metals
EA18	Fabricated metal products, except machinery and equipment
EA19	Machinery and equipment n.e.c.
EA20	Office machinery and computers
EA21	Electrical machinery and apparatus n.e.c.
EA22	Radio, television and communication equipment and apparatus
EA23	Medical, precision and optical instruments; watches and clocks
EA24	Motor vehicles, trailers and semi-trailers
EA25	Other transport equipment
EA26	Furniture; other manufactured goods n.e.c.
EA27	Electrical energy, gas, steam and hot water
EA28	Computer and related services
EA29	Other business services
EA30	Sewage and refuse disposal services, sanitation and similar services
EA31	Recreational, cultural and sporting services
EA32	Other services

Notes: ¹Data for 'apparent labour productivity' was only available as a broad economic activity of mining and quarrying, while in 'exports' this economic activity was subdivided into the following ones: coal and lignite, and peat; crude petroleum and natural gas, and services incidental to oil and gas extraction, excluding surveying; uranium and thorium ores; metal ores; other mining and quarrying products. To deal with this fact the values of exports of these five economic activities were added so that it was possible to match the two aforementioned variables.