


## Article

# Do ISO Certifications Enhance Internationalization? The Case of Portuguese Industrial SMEs

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**Abstract:** In the last decades, the academic literature has devoted considerable attention to the determinants of export performance. In result of those research efforts in identifying and examining the influence of such determinants, the literature presents a wide set of variables associated with higher levels of exports. This paper provides a contribution to that literature by trying to evidence the impact of firm certification—namely, in terms of the firm’s quality, environmental, and health and safety management systems—on export performance. The paper analyses an unbalanced sample of 1684 Portuguese industrial SMEs for the period 2010 to 2020, uses other determinants of internationalization as control variables, and explores the possibility of moderating effects on the certification–internationalization relationship. Two alternative econometric methods are employed: a random-effects model and a Tobit model. The results evidence the importance for firms, especially in the low or medium–low technology sectors, to have certain ISO certifications in order to further develop their export activities and increase their foreign acceptance, particularly in the European Union markets. Further, certification seems to reinforce the positive relation between firm size and internationalization.

**Keywords:** internationalization; SMEs; firm certification; ISO certification; liability of foreignness



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## 1. Introduction

The debate on factors affecting the international development of small- and medium-sized enterprises (SMEs) continues to attract the interest of the literature. Traditionally, the literature extensively emphasized the obstacles or barriers to internationalization and the main factors enhancing SMEs’ international activities [1–7].

Given the domestic market limitations, internationalization can provide potential returns to an individual firm [8,9] due to two main reasons: (i) internationalization offers new opportunities for value creation by providing access to new resources, knowledge, business practices, and foreign stakeholders; (ii) internationalization helps to reduce fluctuations in revenue by diversifying risks over several countries. Nevertheless, the asymmetric nature of the information present in the relation between national firms and foreign customers constitutes a relevant barrier to SMEs’ international development. This paper provides a contribution to the literature about the role of SMEs’ internal capabilities and skills for determining their export activities, evidencing the impact of firm certification—namely, in terms of the firm’s quality, environmental, and health and safety management systems—on reducing information asymmetries and enhancing export performance. Specifically, under competing assumptions that certification could be adopted by firms either proactively or reactively, the objective of this paper is to study the effects of the adoption by firms of ISO 9001, ISO 14001, and ISO 45001/18001 certifications on their exports.

Using an unbalanced panel data of 1684 Portuguese industrial SMEs for the period 2010 to 2020, and using other determinants of internationalization as control variables, we explore the certification–internationalization relation. This paper fills a gap in the

literature, since (i) it distinguishes between the impact of different types of certifications (ISO 9001, ISO 14001, and ISO 45001/18001) in different export markets, and (ii) it examines the possible moderating role of certain variables in the certification–internationalization relation. To the best of our knowledge, this study is one of the first to examine the impact of firm certification on internationalization. The results evidence the importance for firms, especially in the low or medium–low technology sectors, to have certain ISO certifications in order to further develop their export activities and increase their foreign acceptance, particularly in the European Union markets.

The rest of the paper is structured as follows. The next section reviews the literature about the relation between certification and firm internationalization. That section also presents the other determinants of internationalization and the hypotheses to be tested. Section 3 presents the variables, the data, and the methodology to be used. The following section presents and discusses the empirical results, with the final section highlighting some concluding remarks.

## 2. Literature Review

Exporting is, generally, the first stage of the process of internationalization [10] and is the most common foreign market entry mode among SMEs, given the greater flexibility and lower business risk and resource commitment, compared to other ways of entering foreign markets [11–13]. International business literature has advanced a set of strategies and determinants of international diversification and trade [10,14–17], highlighting the associated benefits and costs [18–20], and presenting relevant literature reviews (e.g., [21,22]).

Previous studies on the internationalization of SMEs pointed out that the findings might be country-specific (e.g., [2]), and underlined that more research is needed on different national environments. The Portuguese manufacturing sector is predominantly constituted by SMEs; therefore, it represents a relevant setting for research into SMEs' business decisions, thus providing a contribution to the literature about SMEs' internationalization determinants.

Increasingly, quality, environmental, and social responsibility, as well as good governance concerns, are part of firms' business agendas. Presently, these issues are critical to firms' growth and survival, since legal obligations and stakeholder pressures are increasingly greater [23,24]. Additionally, the literature indicates that management system certifications provide clear improvements in firms' operations, processes, and products [25]. Albeit incurring in accreditation costs, by obtaining international certification standards, firms intend to signal the quality of their products or services, surpassing the liability of foreignness, reducing transaction costs, and gaining a competitive advantage over other firms [26,27]. Thus, it could be expected that there is a positive relation between firms' commitment with quality, environmental, and other issues and export performance, but papers exploring this link are scarce [23,28,29].

Different theoretic frameworks suggest several factors on the pace of internationalization. These can be classified as to whether they stress internal resource factors (such as market knowledge and the resource base of the firm) or external factors (such as market volume and the competitive environment) [21,30]. For individual firms, entering the export market constitutes a high-risk decision that encompasses sunk costs, revenue volatility due to exchange rate movements, limited knowledge of external market conditions, local competition, and cultural assimilation [31]. Different internal or firm-specific characteristics, such as size, age, productivity, and product diversification, have been shown to be associated with SMEs' internationalization [32–34].

The present paper is focused on a specific internal determinant of firm internationalization, assessing if internationalization is influenced by the existence of some kind of firm certification, either in quality, environmental, or health and safety systems. Firm internationalization is a multidimensional construct heavily researched in the literature [35], but here we are interested in the relation of internationalization with firm certification, and in particular, the effects derived from the firm's different management systems certifications.

### 2.1. The Impact of Certification on Firm's Internationalization

The adoption by firms of different kinds of certification has grown considerable in the last decades. Such certifications can be seen as representing a dual role: an internal management tool and a way to signal a firm's qualities among its stakeholders. In this paper, we focus our attention on that second role.

In an increasingly complex and global environment, SMEs face many challenges in international trade, finding it difficult to enter and explore the potential opportunities provided by different markets. Information incompleteness constitutes a relevant barrier to export expansion, either in terms of the extensive margin (export new goods or enter into new markets) or in terms of the intensive margin (increase volumes of exports to current trade partners). Given the severe information problems involved in exporting activities, adding new destination countries or new goods and services may be challenging, in particular for SMEs with limited international experience and a scarcity of human resources. As argued by several authors [36–38], incomplete information creates frictions in the process of matching between buyers and sellers across national borders; therefore, this is an obstacle to the development of export activities. These problems are even more significant for SMEs located in a peripheral country, such as Portugal, and that produce differentiated products.

Internationally recognized certification seals issued from third-party entities can be seen as a way to address market failures and help firms surpass the liability of foreignness. Established in 1987, the International Organization for Standardization (ISO) 9001, which defines certification standards for goods, frameworks, and administrative systems, has emerged as the world's leading quality framework, with over one million companies and organizations in over 170 countries certified with ISO 9001 [39]. For instance, at the end of 2020, there were 6147 Portuguese firms certified with ISO 9001, compared with around 4800 in 2010 [40]. In the last couple of decades, ISO certifications diversified to other areas, and firms increasingly tended to gather a set of certifications in order to meet customer requirements and maintain their competitiveness in national and international markets. For instance, ISO 14001 serves as a tool for the encouragement of environmental and sustainable management, and ISO 45001, which succeeded OHSAS 18001, specifies requirements for an occupational health and safety management system. These three standards are, generally, jointly acknowledged by the acronym QES (quality, environment, safety). Additionally, ISO 26001 certifies the firm's social responsibility commitment, and ISO 37001 serves as an anti-bribery management system standard. Related to the ISO 26000 series, the SA 8000 standard, issued in 1997 and published by SAI (Social Accountability International) is a leading international certification standard that encourages organizations to develop, maintain, and apply socially acceptable practices in the workplace.

The purpose of an international standard is to provide clear identifiable references acknowledged worldwide and, thus, indirectly foster international trade by signaling product quality, reliability, and the firm's values and sound business management acumen [41,42]. Notice that certification does not guarantee that the firm is better or more efficient than its competitors. Nevertheless, several studies evidence that certified firms outperform non-certified firms, with the reasons residing mostly in improvements in internal business processes and cost reductions. However, the effects on financial performance are mixed (e.g., see [25] for a survey). The way in which certification reinforces a firm's competitive position has been studied by some authors who are grounded in the resource-based view (RBV) perspective, which assumes that firms build competitive advantages by reuniting resources and capabilities that are difficult for competitors to copy [43,44]. From the RBV perspective, ISO certifications are resources that may act as "drivers" of internationalization capability, reinforcing protection of the firm's competitive advantage. In this argument, it is assumed that certification constitutes a self-regulation instrument which firms voluntarily adopt and collaboratively develop in order to obtain several internal benefits: organizational, environmental, legal and regulatory compliance, etc. [25,45]. However, there are reasons to believe the competing assumption, that certification represents a compulsory

response to external incentives and pressures from the industry [46–48]—for instance, financial incentives to obtain certification or the existence of a certain mandatory certification in order to access a regulated market. This argument can also be studied according to the institutional theory, which analyses the social and cultural pressures that lead firms to become more isomorphic [49]. The kind of institutionalization reached by some types of certifications has made them a necessary requirement for entering the market. Thus, certification is a response to stakeholder pressure rather than something voluntarily adopted to improve the firm's overall operations and use of resources and capabilities. Additionally, certification also contributes to solve an information-asymmetry problem, signaling firm quality to the market. According to [48], in the majority of studies, SMEs' external motivations seem to be more predominant over internal reasons since certification allows firms to cope with external pressures and signal their position in the global market. This is even more important in the international context, since the possibilities to screen and evaluate a large number of potential suppliers are limited [50].

The literature studying the certification–internationalization nexus is recent and limited, with a set of descriptive or case-specific papers (e.g., [48,51]) focused on the effects on trade derived from the adoption of QES standards by firms, mostly large ones, located in developing countries [51,52]. Regarding environmental certification, [53] evidenced that export considerations and government requirements were significant drivers of certification, as was a desire to reduce costs and improve the quality of production. Ref. [54], using a large sample of Canadian manufacturing SMEs, evidenced that the adoption of ISO 9001 was related to an increase in the likelihood of exporting, and to a higher export-to-sales ratio. Performing a survey of firms located in Israel's six main trade partners, [55] evidenced that, while the international market still considers price and quality as the most relevant factors in the selection of suppliers, environmental certification is a feature frequently taken into consideration. The authors of [56] evidenced that SA 8000 certification adoption implies an increase in the bilateral exports of goods and services, especially in developing countries. Ref. [57], using data collected with a questionnaire answered by 231 Spanish agri-food firms, evidenced that ISO certifications positively influence firms' level of internationalization, thus confirming the RBV theory. Recently, [52] evaluated the association of quality, environment, and safety standards on international trade in developed and developing countries. Their results evidenced that the adoption of those standards, particularly ISO 9001, had a positive and significant effect on the exports of goods and services in developing countries. A similar result was obtained in a recent survey made by [58], which evidenced that organizations acknowledged that the internal effects of the adoption of ISO 14001 were positive, translating to increasing profits and exports.

Due to potential endogeneity issues, it is complex to study the influence of the adoption of QES standards on exports. Export growth could be an effect of the earlier adoption of the standards, but could also be the trigger to adopt such standards. We will keep this possibility in mind in our study.

Following the literature presented above, and grounded in the RBV perspective of the firm, it is hypothesized that firm certification is positively related to internationalization. Nevertheless, that effect could be different according to types of certifications, export destinies, and industrial sectors. For instance, it can be expected that the nexus between certification and internationalization is stronger for firms with exports focused on the European Union (EU) market, rather than for firms mainly exporting to the rest of the world. Naturally, requirements to export to non-EU markets differ between countries, but for simplicity, and due to the database that is going to be used, we hypothesize that EU countries are more exigent and adopt stricter rules; therefore, the stakeholder and institutional pressures for obtaining certain certifications are stronger. Additionally, it can be expected that ISO certifications are more relevant in sectors such as foods and beverages or pharmaceuticals, whereas they could be less relevant in less-competitive and less-regulated sectors.

Differences in internationalization levels between firms can be related to differences in firm-specific advantages, as well as differences in an industry's characteristics where firms operate. Industry classification is a relevant factor influencing internationalization, since industries present different financial structures, competitiveness levels, and resource demands. Thus, following [7,59], but in the context of the certification–internationalization relation, it is relevant to study if there are significant differences between certified and non-certified firms within particular industries, classified according to their technological intensity.

As a result of this literature review, we can now state a first set of the hypotheses to be tested:

**Hypothesis 1 (H1).** *The degree of firm internationalization is positively related with firm certification;*

**Hypothesis 1.1 (H1.1).** *Firm internationalization is positively related with firm certification;*

**Hypothesis 1.2 (H1.2).** *That effect differs between types of certifications (quality, environmental, and safety);*

**Hypothesis 1.3 (H1.3).** *That effect differs between export destinies (EU vs. non-EU countries);*

**Hypothesis 1.4 (H1.4).** *That effect differs between sectors (classified according to technological intensity).*

## 2.2. Additional Determinants of Internationalization

Even though our paper is focused on the relation between firm certification and internationalization, it includes a set of control variables in order to rule out alternative determinants of the sampled firms' levels of internationalization. In addition to their direct impact on internationalization, we intend to explore the moderating role of some organizational characteristics in influencing the certification–internationalization relationship. These variables are traditionally used in studies about internationalization determinants: firm profitability, age, size, and debt (e.g., [4,7,34,60–63]).

Regarding these control variables, we state the following set of hypotheses:

**Hypothesis 2 (H2).** *The relation between firm certification and internationalization differs between less and more profitable firms, the latter presenting higher levels of internationalization;*

**Hypothesis 3 (H3).** *The relation between firm certification and internationalization differs between younger and older firms, the latter presenting higher levels of internationalization;*

**Hypothesis 4 (H4).** *The relation between firm certification and internationalization differs between larger and smaller firms, the former presenting higher levels of internationalization;*

**Hypothesis 5 (H5).** *The relation between firm certification and internationalization differs between more or less indebted firms, the latter presenting higher levels of internationalization;*

**Hypothesis 6 (H6).** *There are moderating roles from these variables on the firm certification–internationalization relation.*

## 3. Materials and Methods

### 3.1. Dependent and Independent Variables

The dependent variable—exports—is measured as the ratio between total exports and total sales. This variable will also be considered to distinguish between exports to the European Union (EU) and exports to markets outside the EU. The reason for this broad



distinction lies in the availability of data, as the database does not provide country disaggregated data for firms' exports. The independent variables related to firm certification are computed as dummy variables, with certified firms presenting "1", and "0" otherwise. We consider three different types of certifications: ISO 9001, ISO 14001, and ISO 45001/18001.

Even though our paper is focused on the relation between firm certification and internationalization, we include the following set of control variables in order to rule out alternative determinants: profitability, age, size, and debt. Profitability is measured by the ratio between EBITDA and total assets. For kurtosis reasons, the variables age (AGE) and size (SIZ) are measured, respectively, as the log of the number of years since the firm's inception and the log of total assets. The debt level of the firm is measured as total debt (TD = Total liabilities/Total assets) and its subdivision in short-term and long-term debt (respectively, STD = Current Liabilities/Total Assets and LTD = Non-current Liabilities/Total Assets).

### 3.2. Data and Methodology

This paper analyses a sample of SMEs from the industrial sectors (codes 10 to 32, from the European Classification of Economic Activities—NACE—Rev. 2) obtained from SABI (*Sistema de Análise de Balanços Ibéricos*), a financial database powered by Bureau van Dijk. The data regarding certification were obtained from IPAC (Portuguese Institute for Certification). Departing from the list of over 6000 ISO certified firms in 2020, applying the criteria for SMEs definition (Commission Recommendation 2003/361/EC) and, thus, excluding micro firms, considering only firms already existing in 2014 and presenting at least six years of data for the period from 2010 to 2020, we obtained unbalanced panel data of 1684 SMEs distributed by all industrial sectors. The three most-represented sectors are sectors 25 (Fabricated metal products), 22 (Rubber and plastic products), and 28 (Machinery and equipment), with 403, 163, and 136 firms, respectively, whereas sectors 12 (Tobacco), 19 (Refined petroleum), 21 (pharmaceutical products), and 30 (Other transport equipment) are represented by only a handful of firms.

The sample is composed of SMEs with an average age of 30 years, accounting for total sales slightly above EUR 11.000 M (of which EUR 4.600 M are exports), total assets of EUR 13.000 M and an average EBITDA to total assets of 9.22% in 2020. In 2020, 1634 firms had an ISO 9001 certification (compared to 649 in 2010), 331 had an ISO 14001 certification (84 in 2010), and 139 had an ISO 45001/18001 certification (the first 22 in 2013). In addition to sector 10 (food products), certified firms are more present in highly capital-intensive sectors, such as sectors 22 (rubber and plastic products), 23 (other non-metallic mineral products), 25 (fabricated metal products), and 28 (machinery and equipment).

Before estimating the different models, we present, in Table 1, the variables' mean values in 2020, and the correlation matrix. Regarding the correlation coefficients, they are generally low, indicating the absence of multicollinearity problems.

**Table 1.** Mean values and correlation matrix between independent variables.

	Mean Value (in 2020)	ISO9001	ISO14001	ISO45001	REBITDA	AGE	SIZ	STD	LTD
EXP_S	35.61%	−0.035 (***)	0.075 (***)	0.024 (***)	0.017 (**)	0.005	0.218 (***)	0.029 (***)	−0.020 (***)
EXP_S_EU	26.87%	0.018 (**)	0.095 (***)	0.030 (***)	0.039 (***)	0.017 (**)	0.300 (***)	−0.053 (***)	−0.020 (***)
EXP_S_XEU	8.18%	0.046 (***)	0.068 (***)	0.046 (***)	−0.025 (***)	0.032 (***)	0.184 (***)	−0.016 (**)	−0.017 (**)
ISO9001	97.03%	1	0.164 (***)	0.100 (***)	−0.011 (***)	0.295 (***)	0.270 (***)	−0.149 (***)	−0.049 (***)
ISO14001	19.66%		1	0.446 (***)	0.029 (***)	0.108 (***)	0.300 (***)	−0.053 (***)	−0.020 (***)
ISO45001	8.25%			1	0.002 (***)	0.053 (***)	0.168 (***)	−0.009 (***)	−0.020 (***)
REBITDA	9.22%				1	−0.058 (***)	0.045 (***)	−0.204 (***)	−0.095 (***)
AGE	3.22					1	0.379 (***)	−0.225 (***)	−0.112 (***)
SIZ	8.41						1	−0.134 (***)	−0.035 (***)
STD	32.39%							1	−0.139 (***)
LTD	20.65%								1

Notes: \*\*  $p < 0.05$ ; \*\*\*  $p < 0.01$ . EXP\_S = Total exports/Total sales; EXP\_S\_EU = Exports to EU countries/Total sales; EXP\_S\_XEU = Exports to non-EU countries/Total sales; REBITDA = EBITDA/Total assets; AGE = Log of the firm's number of years; SIZ = log of total assets; STD = Current liabilities/Total assets; LTD = Non-current liabilities/Total assets.

In order to attain our research objective, we apply a panel data methodology that can be estimated through three different regression models: pooled ordinary least squares (POLS), fixed-effects model (FEM), and random-effects model (REM). Applying the Breusch–Pagan and Hausman tests to choose the most appropriate regression technique, the results indicate that a REM is preferable. We alternatively run the three possible dependent variables (EXP\_S, EXP\_S\_EU, and EXP\_S\_XEU) on the ISO certification variables and the control variables profitability (REBITDA), AGE, SIZ, and debt.

Additionally, since the three different dependent variables are left-censored (obviously, variables EXP\_S, EXP\_S\_EU, and EXP\_S\_XEU have values between zero and one), we adopt a Tobit methodology. Tobit regressions are nonlinear; therefore, the coefficients should be interpreted with care and do not measure the real causal effect on the dependent variable. This effect is correctly measured only by the marginal effect; however, the coefficients maintain the significance and sign of the marginal effects, allowing the test of our hypothesis.

The explanatory power of the REM model is given by the overall  $R^2$ , and the significance of the Tobit regression is assessed by reference to the Wald  $\chi^2$  statistic. Notice that running the regressions with the certification variables lagged one year, considering the total debt instead of its division in short-term and long-term debt, using other measures of profitability (e.g., return on assets or return on sales), or excluding the year 2020 due to the COVID-19 pandemic did not yield different results.

#### 4. Results and Discussion

The regression results for the random-effects model are presented in Table 2, where the different dependent variables are run on the “ISO certification” variables (ISO9001, ISO14001, and ISO45001), and the control variables REBITDA, AGE, SIZ, and debt (STD and LTD). The first three columns present the results when studying the relation between ISO 9001 certification and exports, whereas columns 4 to 6 and 7 to 9, respectively, consider ISO 14001 and ISO 45001/18001.

**Table 2.** Results: random-effects model.

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
	EXP_S	EXP_S_EU	EXP_S_XEU	EXP_S	EXP_S_EU	EXP_S_XEU	EXP_S	EXP_S_EU	EXP_S_XEU
C	0.224 *** (0.044)	−0.104 ** (0.044)	−0.061 *** (0.022)	0.271 *** (0.044)	−0.108 ** (0.044)	−0.057 ** (0.022)	0.269 *** (0.044)	−0.115 *** (0.044)	−0.061 *** (0.022)
ISO9001	−0.043 *** (0.006)	0.009 ** (0.004)	0.001 (0.003)						
ISO14001				0.005 (0.011)	0.017 ** (0.007)	0.010 * (0.006)			
ISO45001							0.002 (0.013)	0.012 (0.011)	0.003 (0.007)
<i>Controls</i>									
REBITDA	0.015 (0.028)	0.037 * (0.020)	−0.010 (0.018)	0.022 (0.029)	0.036 * (0.020)	−0.010 (0.018)	0.022 (0.028)	0.036 * (0.020)	−0.010 (0.018)
AGE	−0.075 *** (0.009)	0.014 * (0.007)	0.002 (0.004)	−0.088 *** (0.009)	0.016 ** (0.007)	0.001 (0.004)	−0.088 *** (0.009)	0.017 ** (0.007)	0.002 (0.004)
SIZ	0.045 *** (0.005)	0.037 *** (0.005)	0.017 *** (0.003)	0.040 *** (0.005)	0.037 *** (0.006)	0.017 *** (0.003)	0.041 *** (0.005)	0.037 *** (0.006)	0.017 *** (0.003)
STD	0.044 * (0.023)	0.011 (0.013)	−0.006 (0.011)	0.050 ** (0.024)	0.010 (0.013)	−0.006 (0.011)	0.050 ** (0.024)	0.010 (0.013)	−0.006 (0.011)
LTD	0.038 * (0.023)	0.011 (0.014)	−0.002 (0.011)	0.040 * (0.023)	0.011 (0.015)	−0.002 (0.011)	0.040 * (0.023)	0.011 (0.015)	−0.002 (0.011)
<i>Overall R<sup>2</sup></i>	<b>3%</b>	<b>5%</b>	<b>3%</b>	<b>2%</b>	<b>5%</b>	<b>3%</b>	<b>2%</b>	<b>5%</b>	<b>3%</b>

Notes: Estimation with robust standard errors. Standard deviations presented in brackets. \*  $p < 0.10$ ; \*\*  $p < 0.05$ ; \*\*\*  $p < 0.01$ .

The results evidence a significant relation between ISO 9001 and ISO 14001 certifications and the level of internationalization, particularly regarding the exports to the EU countries, which present higher coefficients. ISO 14001 also seems to be relevant when exporting to non-EU countries, and ISO 45001 does not seem to be relevant. These results partially confirm hypotheses H1.1–1.3 and those of some previous authors [54,57,58], indicating that SMEs with quality and environmental certifications present higher export levels, in particular when exporting to the exigent EU market. Regarding the control variables, our results only confirm hypothesis H4 (positive relation between firm size and exports), whereas hypotheses H2 (positive relation between firm profitability and exports) and H3 (positive relation between firm age and exports) are only both confirmed when considering exports to EU countries. Finally, hypothesis H5 is not confirmed, since the results indicate that debt has a positive relation with internationalization. Smaller firms present lower internationalization levels, possibly as a result of their lack of resources and difficulties with accessing finance and specific skills [7]. Typically, firms in Portugal are micro or small firms, so policymakers should create an adequate set of incentives to foster mergers and acquisitions as a way to improve firms' internationalization. Profitability seems to exert a positive effect on export intensity, at least for the EU countries, evidencing that firm profitability and liquidity generation is an important factor for a higher level of internationalization. The firm's age seems to have a positive impact on the level of exports to the EU. Possibly, older firms are more likely to be in the maturity phase, with well-established export markets and international ties. This effect is absent when considering SMEs' exports to non-EU countries (probably exporting to new or non-traditional markets), where firm age does not seem to bring any advantage in terms of exports.

The results of the Tobit model in Table 3 only partly corroborate the results from the previous regressions. The positive relation between ISO 9001 and internationalization vanishes, only appearing as a significative positive relation for ISO 14001 and exports to the EU. This last result is also obtained by [54], given the more environmentally conscious European markets when compared to the global average. Firm size maintains its positive impact and long-term debt also shows a significative negative relation. Thus, the relation between certification and internationalization becomes less clear, motivating our following analysis at a sectoral level.



**Table 3.** Results: Tobit model (complete sample).

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
	EXP_S	EXP_S_EU	EXP_S_XEU	EXP_S	EXP_S_EU	EXP_S_XEU	EXP_S	EXP_S_EU	EXP_S_XEU
C	−0.374 *** (0.030)	−0.500 *** (0.024)	−0.416 *** (0.017)	−0.369 *** (0.031)	−0.486 *** (0.025)	−0.413 *** (0.017)	−0.379 *** (0.030)	−0.503 *** (0.024)	−0.414 *** (0.017)
ISO9001	−0.071 *** (0.008)	−0.011 * (0.006)	0.001 (0.004)						
ISO14001				−0.005 (0.010)	0.025 *** (0.008)	0.006 (0.005)			
ISO45001							−0.040 *** (0.014)	−0.019 (0.012)	0.012 (0.008)
<i>Controls</i>									
REBITDA	0.076 * (0.040)	0.162 *** (0.035)	−0.101 *** (0.024)	0.088 ** (0.041)	0.162 *** (0.035)	−0.102 *** (0.024)	0.089 ** (0.041)	0.164 *** (0.035)	−0.101 *** (0.024)
AGE	−0.029 *** (0.005)	−0.021 *** (0.004)	−0.005 * (0.003)	−0.037 *** (0.005)	−0.022 *** (0.004)	−0.005 * (0.003)	−0.037 *** (0.005)	−0.022 *** (0.004)	−0.005 * (0.003)
SIZ	0.101 *** (0.003)	0.090 *** (0.002)	0.058 *** (0.002)	0.096 *** (0.003)	0.087 *** (0.003)	0.058 *** (0.002)	0.098 *** (0.003)	0.090 *** (0.002)	0.058 *** (0.002)
STD	0.103 *** (0.020)	0.088 *** (0.015)	−0.014 (0.012)	0.120 *** (0.020)	0.091 *** (0.015)	−0.014 (0.011)	0.121 *** (0.020)	0.091 *** (0.015)	−0.014 (0.011)
LTD	−0.045 ** (0.021)	−0.034 ** (0.016)	−0.058 *** (0.014)	−0.035 (0.021)	−0.032 * (0.016)	−0.057 *** (0.014)	−0.036 * (0.021)	−0.033 ** (0.016)	−0.057 *** (0.014)
LR $\chi^2$ (df = 2)	<b>1203.4 ***</b>	<b>1463.3 ***</b>	<b>1453.6 ***</b>	<b>1085.3 ***</b>	<b>1486.3 ***</b>	<b>1452.6 ***</b>	<b>1082.9 ***</b>	<b>1460.2 ***</b>	<b>1457.0 ***</b>
Log L	<b>−11,221.9</b>	<b>−7524.7</b>	<b>−2741.1</b>	<b>−11,268.0</b>	<b>−7522.2</b>	<b>−2740.5</b>	<b>−11,265.4</b>	<b>−7525.4</b>	<b>−2740.2</b>

Notes: Estimation with robust standard errors. Standard deviations presented in brackets. \*  $p < 0.10$ ; \*\*  $p < 0.05$ ; \*\*\*  $p < 0.01$ .

Thus, in order to study potential differences between sectors, Eurostat's aggregation of the manufacturing industry is used, according to technological intensity. Following the Eurostat classification and considering the NACE Rev. 2 at the two-digit level of the firms in our sample, the following groups of sectors are defined: high-technology (NACE 21 and 26), medium-high technology (NACE 20, 27, 28, 29, and 30), medium-low technology (NACE 19, 22, 23, 24, and 25), and low-technology (NACE 10, 11, 12, 13, 14, 15, 16, 17, 18, 31, and 32). Table 4 presents the results for those four aggregates, considering in the regressions, for brevity reasons, only the variables ISO 9001 and ISO 14001. Notice that the separate estimation for the different sectors contributes to the reduction of potential endogeneity problems.

The results presented in Table 4 evidence that ISO 9001 and ISO 14001 certifications exert a broadly positive impact in exports for low and medium-low technology firms. In contrast, for medium-high and high technology sectors, the impact is negative or not significant. Regarding the control variables, the results are broadly in accordance with the results for the complete sample presented above. These results allow us to confirm hypothesis H1.4, indicating that industry characteristics seem to matter in terms of the relationship between SMEs ISO certifications and their levels of internationalization. A possible explanation for this result could be the necessity that firms producing lower technology, and less differentiated goods, have to present quality and environmental certifications, particularly in more competitive markets, such as the EU. On the contrary, for firms pertaining to the medium-high and high technology sectors, ISO 9001 and ISO 14001 certifications do not seem to bring any advantages in terms of exports. Surely, exports of such goods depend on other competitiveness factors not considered in our analysis. A possible explanation could be the fact that firms pertaining to the medium and medium-high technology sectors prefer to focus their export efforts on EU markets (averaging almost 30% of sales), with residual (and more volatile) exports to non-EU markets (less than 10% of sales). Moreover, there is a greater prevalence of foreign firms in the high and medium-high technology sectors (higher levels of FDI in those sectors), and those firms export a large part of their output. Therefore, given their multinational status and tight integration in international trade networks, having a certification loses its relevance as a tool to reduce informational asymmetries in international trade. Certification is a significant and highly

regarded determinant of exports in the EU markets, while for other markets it seems to be less significant. Exports to the more distant non-EU markets are certainly determined by other factors, external to firms, such as commercial diplomacy, exchange rates, or the economical/political context.

**Table 4.** Results: Tobit model (firms divided according to technology intensity).

	Low Technology (n = 546)		Medium-Low Technology (n = 748)		Medium-High Technology (n = 356)		High Technology (n = 34)	
Dependent variable EXP_S_EU								
C	−0.294 *** (0.044)	−0.282 *** (0.044)	−0.641 *** (0.034)	−0.620 *** (0.035)	−0.659 *** (0.046)	−0.685 *** (0.048)	0.449 *** (0.142)	0.532 *** (0.155)
ISO9001	0.006 (0.011)		0.016 * (0.009)		−0.050 *** (0.013)		−0.122 *** (0.041)	
ISO14001		0.031 ** (0.014)		0.037 *** (0.012)		−0.015 (0.016)		−0.012 (0.044)
Controls								
REBITDA	0.042 (0.064)	0.039 (0.064)	0.211 *** (0.045)	0.205 *** (0.044)	0.255 *** (0.064)	0.265 *** (0.065)	−0.011 (0.168)	−0.043 (0.165)
AGE	−0.018 ** (0.007)	−0.017 ** (0.007)	0.005 (0.006)	0.007 (0.006)	−0.058 *** (0.009)	−0.066 *** (0.008)	−0.040 * (0.023)	−0.051 ** (0.023)
SIZ	0.061 *** (0.005)	0.059 *** (0.005)	0.093 *** (0.004)	0.091 *** (0.004)	0.129 *** (0.005)	0.130 *** (0.005)	0.020 (0.014)	0.005 (0.015)
STD	0.252 *** (0.030)	0.251 *** (0.030)	0.066 *** (0.020)	0.066 *** (0.020)	−0.043 (0.031)	−0.022 (0.030)	−0.286 *** (0.106)	−0.290 *** (0.108)
LTD	−0.118 *** (0.031)	−0.118 *** (0.030)	0.009 (0.023)	0.009 (0.023)	0.069 * (0.035)	0.080 ** (0.036)	−0.191 (0.145)	−0.216 (0.152)
LR $\chi^2$ (df = 2)	273.4 ***	281.1 ***	827.0 ***	841.2 ***	766.4 ***	743.2 ***	16.0 **	12.86 **
Log L	−2604.7	−2602.9	−3097.7	−3095.0	−1475.0	−1482.1	−108.4	−112.4
Dependent variable EXP_S_XEU								
C	−0.159 *** (0.026)	−0.160 *** (0.027)	−0.569 *** (0.026)	−0.547 *** (0.026)	−0.504 *** (0.035)	−0.530 *** (0.036)	−0.544 *** (0.108)	−0.470 *** (0.106)
ISO9001	0.028 *** (0.007)		−0.021 *** (0.006)		0.013 (0.009)		−0.103 *** (0.031)	
ISO14001		0.007 (0.010)		0.029 *** (0.008)		−0.046 *** (0.011)		−0.016 (0.037)
Controls								
REBITDA	−0.093 *** (0.035)	−0.098 *** (0.034)	−0.087 ** (0.035)	−0.085 ** (0.035)	−0.121 ** (0.054)	−0.117 ** (0.054)	0.246 ** (0.117)	0.210 * (0.112)
AGE	−0.019 *** (0.005)	−0.016 *** (0.005)	0.012 *** (0.004)	0.010 ** (0.004)	−0.008 (0.006)	−0.006 (0.006)	−0.041 *** (0.015)	−0.051 *** (0.015)
SIZ	0.037 *** (0.003)	0.038 *** (0.003)	0.068 *** (0.003)	0.063 *** (0.003)	0.068 *** (0.003)	0.073 *** (0.003)	0.091 *** (0.012)	0.078 *** (0.012)
STD	−0.085 *** (0.018)	−0.094 *** (0.018)	0.003 (0.018)	0.009 (0.017)	0.036 (0.022)	0.036 (0.022)	0.057 (0.072)	0.049 (0.073)
LTD	−0.143 *** (0.019)	−0.146 *** (0.019)	−0.018 (0.017)	−0.015 (0.017)	0.056 * (0.030)	0.050 * (0.031)	−0.132 * (0.068)	−0.149 ** (0.075)
LR $\chi^2$ (df = 2)	263.7 ***	250.8 ***	792.4 ***	797.1 ***	490.0 ***	501.6 ***	67.6 ***	59.7 ***
Log L	−747.7	−756.8	−1226.7	−1227.0	−510.2	−503.6	−48.1	−53.2

Notes: High-technology (NACE 21 and 26); medium-high technology (NACE 20, 27, 28, 29 and 30), medium-low technology (NACE 19, 22, 23, 24, 25), and low-technology (NACE 10, 11, 12, 13, 14, 15, 16, 17, 18, 31 and 32). Estimation with robust standard errors. Standard deviations presented in brackets. \*  $p < 0.10$ ; \*\*  $p < 0.05$ ; \*\*\*  $p < 0.01$ .

Finally, regarding hypothesis H6, we test the presence of moderating effects in the certification–internationalization relation associated with firm size and age. Table 5 presents the results obtained with the introduction of the interaction variables AGE\_ISO9001, SIZ\_ISO9001, AGE\_ISO14001, and SIZ\_ISO14001.

**Table 5.** Results: random-effects model (moderating effects).

	EXP_S_EU				EXP_S_XEU			
C	−0.105 ** (0.044)	−0.092 ** (0.047)	−0.109 ** (0.044)	−0.114 ** (0.045)	−0.061 *** (0.022)	−0.042 * (0.024)	−0.056 ** (0.022)	−0.055 ** (0.022)
ISO9001	−0.012 (0.016)	−0.021 (0.025)			−0.001 (0.011)	<b>−0.043 *** (0.015)</b>		
ISO14001			0.017 (0.039)	<b>0.158 ** (0.071)</b>			0.033 (0.027)	−0.030 (0.046)
AGE_ISO9001	0.007 (0.005)				0.001 (0.004)			
SIZ_ISO9001		0.004 (0.003)				<b>0.005 *** (0.002)</b>		
AGE_ISO14001			0.000 (0.011)				−0.007 (0.008)	
SIZ_ISO14001				<b>−0.016 ** (0.008)</b>				0.004 (0.005)
<b>Controls</b>								
REBITDA	0.038 * (0.020)	0.037 * (0.020)	0.036 * (0.020)	0.036 * (0.020)	−0.010 (0.018)	−0.010 (0.018)	−0.010 (0.018)	−0.010 (0.018)
AGE	0.013 * (0.007)	0.015 ** (0.007)	0.016 ** (0.007)	0.016 ** (0.007)	0.001 (0.004)	0.003 (0.004)	0.001 (0.004)	0.001 (0.004)
SIZ	0.037 *** (0.006)	0.035 *** (0.006)	0.037 *** (0.006)	<b>0.038 *** (0.006)</b>	0.017 *** (0.003)	<b>0.015 *** (0.003)</b>	0.017 *** (0.003)	0.017 *** (0.03)
STD	0.012 (0.013)	0.011 (0.013)	0.010 (0.013)	0.010 (0.013)	−0.006 (0.011)	−0.006 (0.011)	−0.006 (0.011)	−0.006 (0.011)
LTD	0.012 (0.015)	0.011 (0.015)	0.011 (0.014)	0.010 (0.014)	−0.002 (0.011)	−0.002 (0.011)	−0.002 (0.011)	−0.001 (0.011)
<b>Overall R<sup>2</sup></b>	<b>4%</b>	<b>5%</b>	<b>5%</b>	<b>5%</b>	<b>3%</b>	<b>3%</b>	<b>3%</b>	<b>3%</b>

Notes: Estimation with robust standard errors. Standard deviations presented in brackets. \*  $p < 0.10$ ; \*\*  $p < 0.05$ ; \*\*\*  $p < 0.01$ .

The results in Table 5 evidence the presence of moderating effects of firm size in the relation between certification and internationalization. The size of the firm has been acknowledged as a factor affecting the adoption of a certification (e.g., [64,65]). Interestingly, the positive relation between size and exports to EU countries is reinforced by the existence of an ISO 14001 certification. Thus, larger exporting firms seem to benefit from environmental certification when exporting to the EU markets. We can posit that the benefits that firm size brings to export intensity are reinforced when firms are certified, both contributing to a better positioning of the firm in EU markets. This result has a clear policy implication: recommend and support ISO 14001 certification for the Portuguese medium firms trying to export to the EU. Regarding ISO 9001 certification, it seems that the positive effect of firm size in exports is reduced due to the presence of that certification. This size effect deserves more attention in future research.

## 5. Conclusions

In light of the current literature about internationalization-enhancing factors, this paper fills a gap studying the relevance of ISO certifications on the firms' export intensity. An unbalanced sample of 1684 Portuguese industrial SMEs for the period 2010 to 2020 is used, with other determinants of internationalization as control variables, and the possibility of moderating effects on the certification–internationalization relation is explored. The results evidence the importance for firms to have certain ISO certifications in order to further develop their export activities and increase their acceptance in foreign markets. Further, certification seems to reinforce the positive relation between firm size and internationalization and the positive impact is more significant in low or medium–low technology intensity sectors.

This paper gives a contribution to the literature about ISO certifications' impact on internationalization. Nevertheless, some limitations of this study should be mentioned: (i) in the first place, firms' degree of internationalization is affected by many variables that were not considered (e.g., managerial labor and product markets, political and economic factors, or even the personality of shareholders and managers). The quantitative nature of this study could be complemented with qualitative research using case studies; (ii) secondly, firms may use other internationalization methods that have not been explored. For instance, certification could be useful to overcome initial problems of lack of trust, but after firms start exporting, other forms of competitiveness assume a greater importance; (iii) thirdly, for convenience reasons, the dataset comprises only certified firms in 2020, but a large number of exporting Portuguese firms in 2020 had no kind of ISO certification. Future analyses of the relation should compare a larger number of firms (certified and non-certified). Moreover, when considering a dichotomic variable to see whether the firm is certified or not, we are not analyzing the degree of commitment, implementation, or internalization of the ISO certifications; (iv) a factor that can limit the generalization of the results is that the measures of internationalization used in the literature differ widely, leaving us with the question of whether our results are dependent on the measures used and on the specific context of the Portuguese economy; (v) finally, the generalization of our results should be considered carefully. Internationalization can be either a result of certification or a reason to obtain certification. This potential endogeneity in the relationship between certification and export performance could be addressed in future studies. While finding appropriate instrumental variables may be difficult, some possible alternatives are the use of propensity score matching or system GMM methods.

From a policy perspective, a strategic commitment to quality, environmental, and safety issues could be considered as selection criteria in public export-promotion programs. Firms that realize the need for a stronger commitment to those issues have a greater chance of increasing their presence in foreign markets, particularly in the EU countries. Given the scant literature to date that is focused on the certification–internationalization nexus, there are several research areas to be explored—namely, the role that could be played by governmental entities supporting firm certification as part of the internationalization support programs.

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