UNIVERSIDADE CATÓLICA PORTUGUESA

The Determinants of Internationalization

in the Portuguese Metalworking Industry

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Católica Porto Business School
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Abstract

A considerable attention has been devoted by the literature to the determinants of internationalization. This research aims to explore the relation between internationalization and the following determinants: Size, innovation, productivity, international trade fairs, management influence and government assistance. Using a sample of 48 firms in the Portuguese metalworking industry for a period of two years, we have found the following results after controlling for firm-specific unobserved characteristics. Productivity has a positive impact on internationalization. Size has no significant impact suggesting that size is not a barrier for internationalization and small and medium firms can success in internationalization as well as large firms. Innovation was insignificant suggesting that innovation is not important determinant for internationalization. Also none of international trade fairs, management influence and government assistance determinates has significant effect. Furthermore, our findings indicate that there are unobserved characteristics captured by firm fixed effects, that have significant impact and they are important in explaining firm's internationalization. Further studies are suggested for future research to investigate these unobserved characteristics. The sample size is the main limitation of the research.

Keywords: Internationalization, Innovation, Productivity, Size, Management influence, Government assistance

Resumo

Uma atenção considerável tem sido dada aos determinantes da internacionalização. O presente trabalho tem como objetivo explorar a relação ente a internacionalização e os seguintes determinantes: dimensão, inovação, produtividade, presença em feiras internacionais, influência da gestão e assistência/apoio do governo. Utilizando uma amostra caracterizada por 48 empresas da indústria metalúrgica Portuguesa ao longo de um período de 2 anos, foi possível concluir os seguintes resultados, controlando para as características não observáveis especificas das empresas: A produtividade tem um impacto positivo na internacionalização. A dimensão da organização não tem um impacto significativo na capacidade de internacionalização, sugerindo assimque tanto uma PME pode ter tanto sucesso na internacionalização, como uma grande empresa. A inovação não foi uma variável significativa neste estudo, sugerindo assim, que esta não é determinante para a internacionalização. Variáveis como feiras internacionais, a influência da gestão e a assistência/apoio do governo não revelaram um efeito significativo. Contudo, os resultados obtidos indicam que existem características não observáveis, capturadas por efeitos fixos, que são importantes para a explicação da internacionalização das organizações. Para estudar estas características não observáveis são sugeridas pesquisas futuras. A dimensão da amostra é a principal limitação desta pesquisa.

Palavras-chave: Internacionalização, Inovação, Produtividade, Dimensão, Influência da gestão, Assistência/apoio do governo.

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Chapter 1
Introduction

It is generally agreed that internationalization has positive effects on development of the economy as a whole as well as on the development of individual firms. Internationalization is very important for its role in accelerating firms' growth (Kylaheiko, *et al*., 2010), reducing firm's risk (Knickerbocker, 1973) and increasing firm's survival (Majocchi, *et al*., 2005). Internationalization exposes firms to opportunities to grow and helps them learn how to grow (Sapienza, *et al*., 2006). Moreover, when firms internationalize, the number of profitable opportunities is multiplied (Brush, 1992).

The importance of internationalization is nowadays is even greater since the firms' product life cycle has significantly shortened because of the strong competition (Julien, 1996), which lead them to seek for new international opportunities through exporting part of their production or joining a business network in order to extend their product's life cycle.

However, why can some firms successfully expand into international markets and grow their international operations and activities while others cannot? The literature has listed several internal and external determinants that lead the firms to success in the internationalization process. In our research we focus on the main determinants referred in the literature: Size (Calof, 1993), innovation (Altomonte, *et al.*, 2014), productivity (Sharma and Mishra, 2015), management

influence (Aaby and Slater, 1989), international trade fairs (Bello and Barksdale Jr., 1986), and government assistance (Seringhaus, 1986).

Most empirical studies show the role of firm size as an effective internal determinant for internationalization (Majocchi and Zucchella, 2003) where other studies argue that it is irrelevant (Bonaccorsi, 1992). Literature also suggest that innovation lead to internationalization (Altomonte, *et al*., 2014). Other studies refer to productivity as an important factor to increase the exports (Reis and Forte, 2014). Furthermore, many researches emphasize the important role that management structure (Cavusgil, 1984) and formal meetings (Dalli, 1995). Moreover, marketing studies refer to international trade fairs as an effective way to promote exports for internationalization (Tanner and Chonko, 1995). Finally, several studies highlight the effectiveness of government assistance in supporting firms' internationalization (Shamsuddoha, *et al*., 2009).

The aim of this research is to investigate the main internationalization determinants referred the literature. Particularly: size, innovation, productivity, international trade fairs, management influence and government assistance. To do so, we surveyed 48 firms from the Portuguese metalworking industry for a period of two years. We started by performing a preliminary analysis to examine the relation between internationalization and each of the examined variables. Than, in order to avoid the endogeneity issues of this type of analysis, we analyzed the obtained data using multiple variable linear regression

We found that after controlling for firm-specific unobserved characteristics, productivity has a positive impact on internationalization, suggesting that productive firms are more close to success when they internationalize. Size is insignificant suggesting that small and medium firms can succeed in internationalization as well as large firms. Innovation is not significant indicating that innovative and non-innovative firms can succeed in internationalization. International trade fairs are also not significant suggesting that attending these

trade fairs are not an important factor for internationalization. Management structure and the number of formal meetings are insignificant, suggesting that these management aspects do not have impact on internationalization. Government assistance is also insignificant, suggesting that firms are able to internationalize whether they receive assistance from government or not. Finally, we found that unobserved characteristics captured using firm fixed effects have a significant impact on internationalization and are important for explaining it.

This research includes seven chapters; the remainder is organized as follows: Chapter 2 presents the literature review on internationalization and measurement methods used, Chapter 3 presents econometrics procedures, methodology and linear regression equations, Chapter 4 provides data description and the research design, Chapter 5 presents preliminary analysis, Chapter 6 presents estimation results, illustrations and discussion and Chapter 7 presents the conclusion, limitations and recommendations for future research.

Chapter 2
Literature Review

2.1 Internationalization Concept

Internationalization takes many forms. Some examples include exports, imports and foreign direct investments. Exports are the most popular strategy for firms to internationalize especially for small and medium sized firms (Leonidou and Katsikeas, 1996). Further. They are associated with low level of commitment and risk (Lu and Beamish, 2006). Firms are pushed to exports either by external change agents like foreign customers (Bilkey, 1978) or motivated by long-term profits (Hunt, *et al*., 1967). Export intensity has been widely used as a measure for exports in the literature (Zou, 1998; Katsikeas, *et al*., 2000) as it is characterized by objectivity and being acceptable for the managers.

2.2 Internationalization Determinants: Relationship and Measurement

2.2.1 Size

The relation between firm size and internationalization has been widely argued through literature. Many authors support a positive relation between firm and export intensity (Shih, 2010; Majocchi, *et al*., 2005; Šuštar and Šuštar, 2005; Dass, 2000; Moini, 1995; Samiee and Walters, 1990; Yaprak, 1985). This

result can be justified by two arguments. First, large firms have greater financial and managerial resources and stronger competitive advantages comparing to smaller ones, which allow them to look for opportunities to expand in foreign markets using the excess resources. Second, large firms tend to have benefited from higher economies of scales (Wagner, 1995). However, other authors do not support the existence of a relation between both variables. Pla-Barber and Alegre (2007) show that there is no evidence for a relation between firm size and exports on a study on French biotechnology producers. The researcher argue that the positive relation exists only on product based industries which depend on production efficiency that and is not valid on science-based firms. Bonaccorsi (1992) shows on a study on Italian manufacturing firms that, in spite of the fact that large firms usually have better resources than smaller ones, smaller firms can still exploit the opportunities to be involved in international activates and enter the foreign market. Calof (1994) validate Bonaccorsi (1992) results on a research of large sample of Canadian manufacturing firms.

The literature suggests various measures to capture firm size, the most popular measure is the number of employees (Bonaccorsi, 1992; Dass, 2000; Majocchi, *et al*., 2005). Other measure is total annual sales following (Cavusgil and Nevin, 1981; Hester, 1985; Holden, 1986; Calof, 1994) or both measures (Beamish and Dhanaraj, 2003; Javalgi, *et al*., 2000; Burton and Schlegelmilch, 1987). An alternative measure is firm assets following Moellera , *et al.* (2004).

2.2.2 Innovation

Pla-Barber and Alegre (2007) show a positive and significant impact of innovation on export intensity.[1] The research argues that innovation develops a

[1] Literature identify innovation as an effective instrument for firms to achieve growth either by creating new products or services or performing a significant improvement on existing ones or by combining both strategies (Kylaheiko, *et al*., 2010). Others identify Innovation as the successful exploitation of new ideas, implementation of new programs, new product introductions, or new services that met two characteristics: novelty and use (Amabile, *et al.*, 1996).

source of competitive advantages that firms can use to get over international barriers and enter a foreign market. Cassiman and Golovko (2011) support these findings and argue that firms must have new technological capabilities to be active international markets. The authors also add that innovation capabilities play an important role in explaining the export behavior for firms. Alvarez (2007) and Kumar and Siddharthan (1994) support this finding on similar research on Chilean manufacturing firms and Indian technology manufacturing, respectively. Zhao and Li (1997) show that the influence of innovation activities on export intensity is positive and significant on a study that includes Chinese manufacturing firms from a variety of different industries. Altomonte, *et al*. (2014) denote that innovation leads to internationalization on a study on European firms. Wakelin (1998) supports this finding only for large firms on a study of manufacturing firms from United Kingdom. The reason being that large firms tend to have innovation advantage and differentiated products (Acs and Audretsch, 1978).

Innovation can be measured by innovation outputs that include copyrights, designs and patents or by innovation inputs that are measured mainly by research and development (R&D) activities (Altomonte, *et al*., 2014). R&D intensity which represents the ratio of R&D expenditure to total sales is the most popular measure for innovation (Beamish and Dhanaraj, 2003; Blonigen and Taylor, 2000; Hirsch and Bijaoui, 1985).

2.2.3 Productivity

Firms with high productivity have more exports than those with low productivity. This fact has been rarely argued through literature. Clerides, *et al*. (1998) found that efficient productive firms attain higher exports levels on a study that includes a variety of different industries firms from Colombia, Mexico,

and Morocco. Reis and Forte (2014) show that productivity positively affects export intensity on a study of Portuguese industrial firms. Melitz (2003) argues that only high productive firms will gain the additional export sales and increase their foreign market share which, as result, increase their export intensity. At the same time, it will force the less productive once to exit. On the contrary, Crinò and Epifani (2008) on a study of Italian manufacturing firms show that productivity is negatively correlated with export intensity at low-income countries. They argue that more productive firms tend to export higher quality products that do not have strong markets at low-income countries. However, this relation is not applied on high-income countries and depend on trade costs.

Literature has referred to several approaches to measuring productivity. First, total factor productivity *TFP,* which include estimating firm's output, labor and capital (Sharma and Mishra, 2015; Levinsohn and Petrin, 2003). Second, Gross value added *GVA* as in Aparaschive, *et al.* (2011)

2.2.4 Management influence

The Literature includes a considerable number of studies that examine the relation between managerial attributes and internationalization. Bilkey (1978) on a review of export literature studies, shows that the percentage of exported sales tend to be higher with more experienced management. Sapienza, *et al*. (2006) argue that managers' experience is necessary to raise their firms' exports to foreign markets. In addition, previous experience reduces the time and costs that are associated with the internationalization process which helps firms to increase their survival possibilities (Hannan, 1998). Majocchi, *et al*. (2005) also concluded that a small increase in firm management experience has a great influence on export intensity. Moreover, Aaby and Slater (1989) refer that manager's positive attitude toward exports is the first step in the internationalization process. Dalli (1995) considers that administrative arrangements, including formal meetings for

export, are essential components of the whole internationalization process. Beamish, *et al*. (1999) demonstrate that firms which have a separate export unit within their management structure have significantly higher exported sales than firms that treat export in same way as domestic sales. Furthermore, managers with previous international experience provide access to new markets using business networks based on prior trust and reputation (Holm, *et al*., 1996; Chetty and Campbell-Hunt, 2003; Belso-Martinez, 2006). Consistent with this, managers who have a positive international perception are more likely to develop their position at international markets (Manolova, *et al.,* 2002).

Management can be measured by years of international experience of managers (Gray, 1997; De Luz, 1993), management structure following Cavusgil (1984) and administrative arrangement, including number of formal meetings (Dalli, 1995; Aaby and Slater, 1989).

2.2.5 International trade fairs

Trade fairs are considered effective instruments that give firms the opportunity to introduce their new products and services, as well as establish personal contact with new potential customers (Motwani, *et al*., 1992). Trade fairs also provide a low-cost increase in exported sales, shorten the sales cycle (Tanner and Chonko, 1995) and maintain the visibility of the firm's name and products (Banting and Blenkhorn, 1974). Wilkinson and Brouthers (2000) show that trade shows have a positive impact on direct sales exports on a study of Export manufacturing firms from the United states.

There are many common ways to measure international trade fairs impacts. The most popular are audience measures like cost of visitor and number of leads generated (Herbig, *et al*., 1994), and the number of trade fairs that firm participated following Evers and Knight (2008)

2.2.6 Government assistance

The importance of government assistance programs has been fully recognized in the literature. However, its effect on internationalization of firms is rarely considered. Shamsuddoha, *et al*. (2009) conclude that government assistance provided to support marketing has direct impact on export intensity on a study on industrial exporting firms from Bangladesh. Freixanet (2012) supports this finding especially in the first steps of the firms' internationalization process on a study involving all exporting firms from Catalonia, Spain. Furthermore, he shows that export assistant programs increase the competitive advantage of the firms. Francis and Collins-Dodd (2004) on a study on Canadian information technology and telecommunications firms emphasizes the efficiency of government export assistance programs in improving the competency of firms, helping them to carry out their export goals and to achieve their expansion strategies.

On the other hand, Bernard and Jensen (2004) show that government assistant has no effect on the possibility of exporting on a study on manufacturing firms from the United States. This results came in accordance with Seringhaus (1986) study which finds no relation between assistant programs and export intensity or the number of orders. The author argues that firms vary in the way they use the assistance depend on their experience which does not always lead to positive results.

The literature has reported several proxies to measure government assistance. Francis and Collins-Dodd (2004) indicate that the number of programs used represents a good measure. Seringhaus (1986) used the awareness and utility of government assistance as measure for government assistance.

Chapter 3
Econometrics Procedures

Based on the variables that we have reviewed, we build our baseline model to examine the effect of the different variables on internationalization using the multiple variable linear regression model that has been used in Altomonte, *et al.* (2014), who study the impact of innovation on internationalization using a large sample of European manufactures. Our model is as following:

(1) $INT_{it} = \beta_0 + \beta_1 SIZ_i + \beta_2\, INN_{it} + \beta_3\, PRT_{it} + \beta_4 MNG_i + \beta_5 FMT_i + \beta_6 ITF_{it} + \beta_7 GOV_{it} + \varepsilon_{it}$

where INT_{it} represents an internationalization measure of firm i in time t, SIZ_i represents a size measure of firm i, INN_{it} represents an innovation measure of firm i in time t, PRT_{it} represents a productivity measure of firm i in time t, MNG_i and FMT_i represent management influence measures of firm i (where MNG_i represents a management structure measure of firm i and FMT_i represents a formal meetings measure of firm i), GOV_{it} represents a government assistance measure of firm i in the time t, $\beta = (\beta_0, \beta_1, \beta_2, \beta_3, \beta_4, \beta_5, \beta_6, \beta_7)$ is the vector of beta coefficients of interest and ε_{it} is the error term of firm i in time t, that includes the impact of all unobserved internationalization determinants.

Measuring the variables productivity PRT_{it} and management influence MNG_{it} is not easy. First, measuring productivity is a complicated process that requires calculating the total factor productivity (TFP) and labor productivity (LP) models to estimate total productivity (Sharma and Mishra, 2015). Second, management influence includes a large number of factors that are, according to Aaby and

Slater (1989) hard to measure accurately. To overcome this complexity, we include fixed-effect μ_i for each firm *i* that captures the all observed and unobserved firm's specific determinants (including size and management influence). In this case our model will become:

$$(2)\ INT_{it} = \beta_0 + \beta_2\ INN_{it} + \beta_3\ PRT_{it} + \ \beta_6 ITF_{it} + \beta_7 GOV_{it} + \mu_i + \varphi_{it}$$

where μ_i represents the fixed effects term of firm *i* and φ_{it} the error term of firm *i* in time *t*.

As the innovation impact might differ between large and small firms following Wakelin (1998) and Acs and Audretsch (1978), we introduce heterogeneity by interacting innovation with firm size, which result in the following new model:

$$(3)\ INT_{it} = \beta_0 + \beta_1\ INN_{it} + \beta_2\ INN_{it}.SIZ_i + \beta_3\ PRT_{it} + \ \beta_6 ITF_{it} + \beta_7 GOV_{it} + \mu_i + \varphi_{it}$$

The original model that has been used in Altomonte, *et al.,* (2014) includes internationalization and innovation variables. We add size as a main exogenous variable following Majocchi, *et al.,* (2005). Also we add productivity as exogenous variable following Reis and Forte (2014). Also we add two exogenous variables as measures for management influence. The first is related to management structure following Cavusgil (1984). The second is related to the number of formal meetings following Dalli (1995). Finally, we add a government assistance variable following Seringhaus (1986) and an international trade fairs variable according to Evers and Knight (2008). The interaction variable between innovation and size is used following Wakelin (1998).

According to the literature, different impacts have been reported about the relation between internationalization and the above different variables. We can summarize them in table 1.

Table 1. Internationalization determinants impacts in literature

Variable	Authors	Country of Study	Industry	Impact
Size	Bonaccorsi (1992)	Italy	Industrial	Neutral
Size	Calof (1994)	Canada	Manufacturing	Neutral
Innovation	Altomonte, C., Aquilante, T., Békés, G., and Ottaviano, G.(2014)	Europe	Manufacturing	+Positive
Innovation	Pla-Barber and Alegre (2007)	France	Biotechnology	+Positive
Innovation	Alvarez (2007)	Chile	Manufacturing	+Positive
Innovation X Size	Wakelin (1998)	UK	Manufacturing	+Positive
Productivity	Reis and Forte (2014)	Portugal	Manufacturing	+Positive
Int. Trade Fairs	Wilkinson and Brouthers (2000)	USA	Manufacturing	+ Positive
Management influence	Dalli (1995) Cavusgil (1984)	Italy	SME Manufacturers	+Positive
Government assistance	Shamsuddoha, Ali and Ndubisi (200)	Bangladesh	SME Manufacturers	+Positive

Chapter 4
Data Description

The analysis in this research exploits CATIM data, the technological center for the metalworking industry in Portugal, which includes a unique directory of firms in the metal manufacturing and similar or complementary industries. CATIM directory covers most of Portuguese metal firms, including metal and steel industries, machinery and high technology works, metal constructions and accessories and tools industries related to metal.

CATIM directory has several unique features. First, it is a complete directory built to be representative of the firms in the metal manufacturing industry, covering almost all metal firms in Portugal. Second, it is a directory of firms in related industries providing homogenous data that leads to more confident results.

4.1 Research Design

For our investigation, we design an interactive survey in the form of questionnaire including multiple choice, yes/no questions and a small number of qualitative questions that require brief answers to help shorten the completion time. The survey included 11 questions covering a wide range of aspects that

affect firm's different practices and strategies for the period of two years: 2013 and 2014.[2]

We start by producing a pilot questionnaire and performing a visit to one of the firms included in the data in order to evaluate the efficiency, clarity and reliability of the questionnaire. We incorporated the feedback from this visit and sent out the final version by email through Catim mailing system in three rounds, along with a cover letter describing the objective of the research and confirming the confidentiality of the responses. The survey was in Portuguese and English. We obtained responses from 48 firms for the two years' period. We think the sample size is sufficient to perform our analysis, but it still constitutes a limitation of this research.

The questionnaire involved eight variables, identified from the literature:

1. Internationalization: We choose the export intensity, defined as the ratio of exports to total sales, as a measure for internationalization. We assume that export intensity is a good predictor for several reasons. First, it is widely used in recent literature and empirical research (Altomonte, *et al*., 2014; Majocchi, *et al*., 2005; Beamish and Dhanaraj, 2003; Moen, 1999; Bonaccorsi, 1992). Secondly, it is an objective measure does not face managers' resistance for confidently, especially for those firms that do not publish their financial results publicly.
2. Size: in our research, we consider the number of employees as indicator for firm size since it is the most common measure following (Majocchi, *et al.*, 2005; Bonaccorsi, 1992; Holzmüller and Kasper, 1991; Lee and Yang, 1990)
3. Innovation: R&D intensity is commonly used as an indicator to measure the innovation. R&D activities are classified in four main types: product adaption and improvement, new product research, rationalized R&D and

[2] Refer to appendix

strategic asset-seeking (Dunning and Narula, 1995). R&D intensity is the annual R&D expenditure of the firm divided by total sales. R&D intensity is considered a good indicator of innovation and technological improvements, because a high R&D to sales ratio means a high expenditure on product development and technological shifts (Beamish and Dhanaraj, 2003)

4. Productivity: to capture productivity, we use the concept of gross value added (GVA), which represents the value of products or services that have been produced subtracted of the cost of all inputs during a certain period of time. This variable has been previously used by Aparaschive, *et al.* (2011). It is worth mentioning here that gross value added amount is required by Portuguese government when firms report their financial results for tax purpose. This means that the variable is known by firms.
5. International trade fairs: a simple measure has been used to estimate the impact of international trade fairs on internationalization which is the number of trade shows that each firm has participated outside their domestic market. This measure has been used by Evers and Knight (2008) and partially used by Goodnow and Goodnow (1990) to study the impact of trade shows on exports.
6. Management influence: we use two variables to measure management influence.
    i) The first is management structure which clarify whether the firm management is centralized or decentralized following Cavusgil (1984).
    ii) The second is the number of formal meetings held annually by the firm, a measure used by Dalli (1995).
7. Government assistant: government assistant can take many forms including export promotion programs (marketing) or tax exemption to support the exports (finance). Measuring government assistance requires

various information and high awareness. We use a simple yes/no question to identify whether firms have used any governmental assistance in their internationalization process following Seringhaus (1986) methodology.

Table (2) reports the summary statistics of the above 8 variables for the 48 firms. The results suggest that the median firm has 40 employees, spends of sales 1% on innovation, has centralized management with 2 annual formal meetings, does not attend international trade fairs and does not receive government assistance, resulting in an export intensity of 34% of sales.

Table 2. Summary statistics

Variable	Obs	Mean	Median	Std. Dev.	Min	Max
Internationalization	90	0.379	0.34	0.292	0	1
Size	96	73.33	40	109.9	4	540
Innovation	90	0.027	0.01	0.039	0	0.15
Productivity	64	0.301	0.29	0.165	0.02	0.57
Management Structure	96	0.875	1	0.332	0	1
Formal Meetings	94	5.574	2	8.542	0	50
Int. trade fairs	96	1.166	0	1.889	0	9
Gov. assistance	96	0.187	0	0.392	0	1

Chapter 5
Preliminary analysis

Before estimating the linear equations described in chapter 3, we start by performing a preliminary analysis between the dependent variable and each of independent variables in our study in order to examine a first relation between the variables. Here it is important to indicate that these results can be biased because the analysis can be affected by other variables.

5.1 Size

As shown on figure 1, size seems to have a positive impact on internationalization. It is notable that as the size of the firm is increased, the internationalization is increased as well.

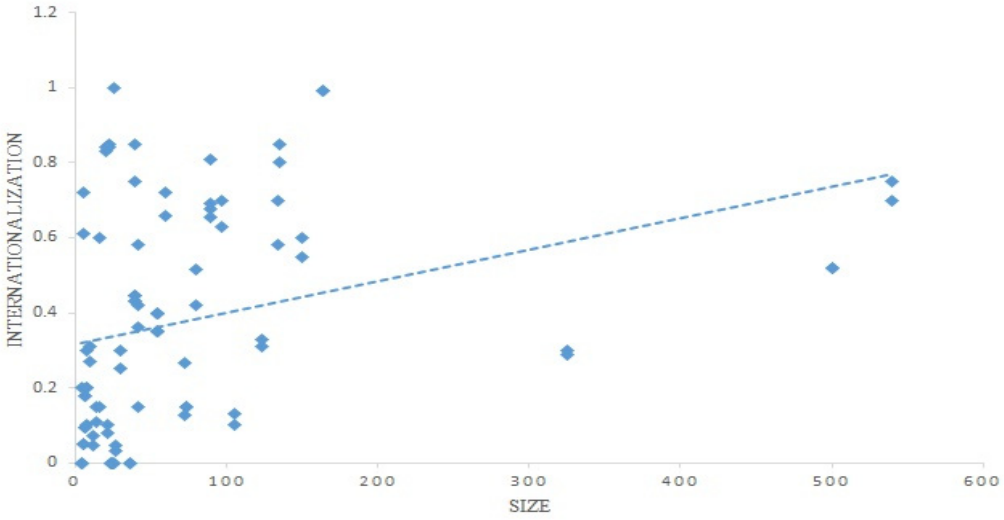

Figura 1. Preliminary analysis of internationalization with size

5.2 Innovation

We find that innovation also seems to have a positive impact on internationalization as shown on figure 2 in accordance with literature review. It is notable that as the innovation of the firm is increased, the internationalization is increased as well.

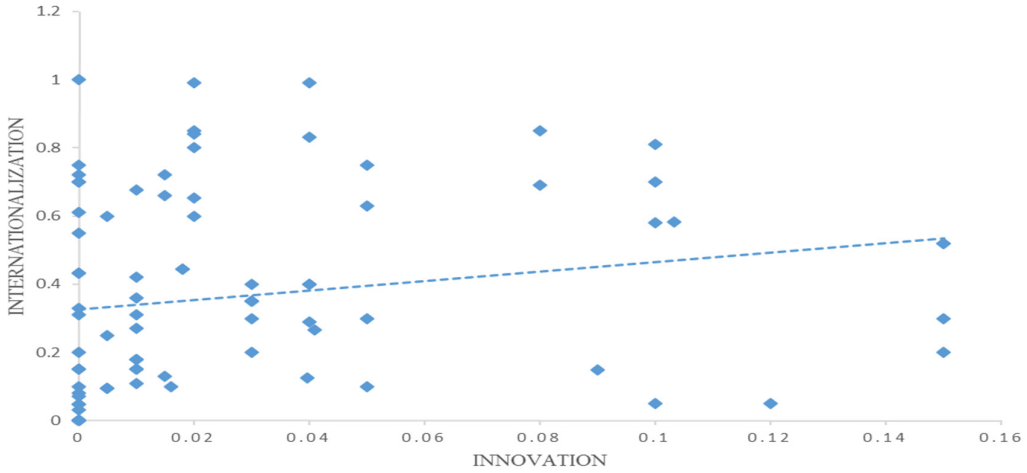

Figure 2. Preliminary analysis of internationalization with innovation

5.3 Productivity

Consistent with the literature, we find that productivity also seems to have a positive impact on internationalization, as shown on figure 3. It is notable that as the productivity of the firm is increased, the internationalization is increased as well.

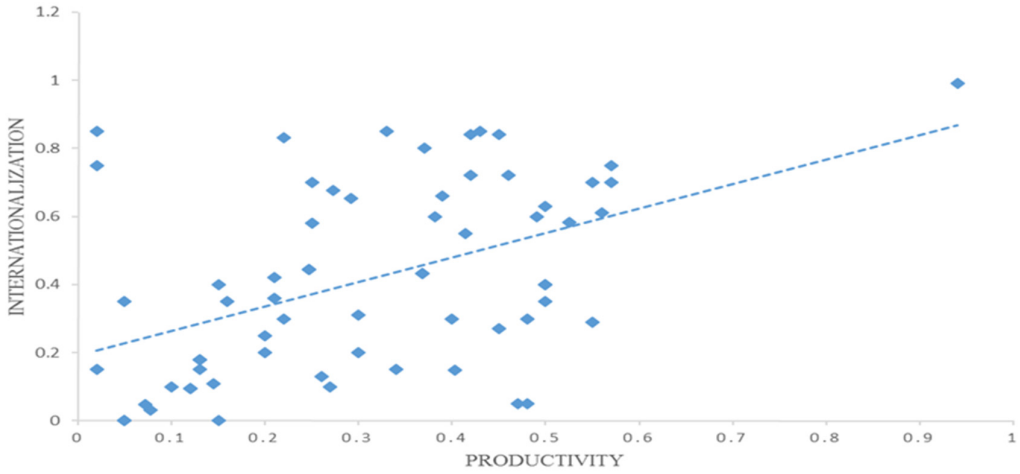

Figure 3. Preliminary analysis of internationalization with productivity

5.4 International trade fairs

Consistent with literature, we find that international trade fairs also seem to have a positive impact on internationalization, as shown on figure 4. It is notable that the as the number of international trade fairs the firm attends is increased; the internationalization is increased as well.

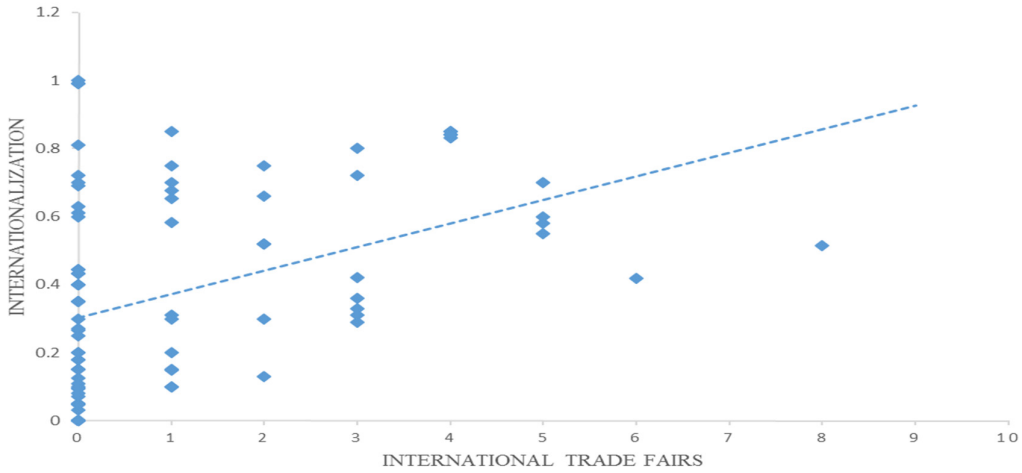

Figure 4. Preliminary analysis of internationalization with int. trade

5.5 Management influence

I. Formal meetings: consistently with the literature review, we find that formal meetings seem to have positive impact on internationalization as shown in figure 5. It is notable that the more formal meetings that firms held annually, the more success in internationalization process they will be.

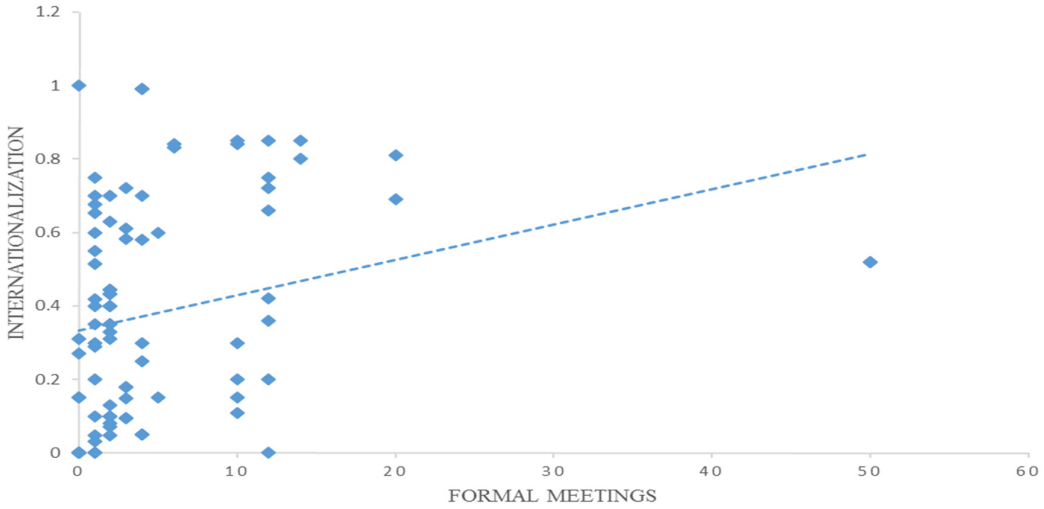

Figure 6. Preliminary analysis of internationalization with formal meetings

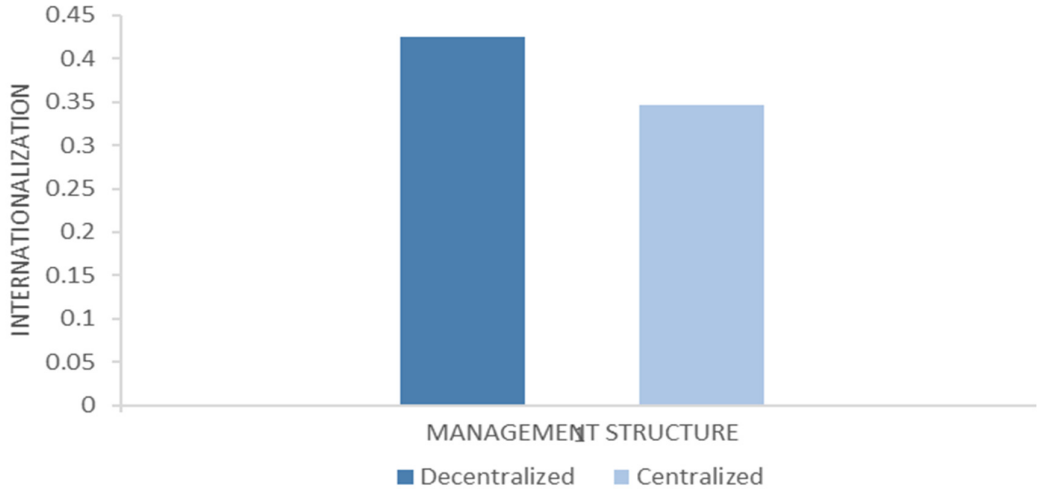

Figure 5. Preliminary analysis of internationalization with management

II. Management structure: consistently with the literature, we find that firms with decentralized management seem to have higher levels of internationalization than centralized firms as shown on figure 6.

5.6 Government assistance

Consistently with the literature review, we find that government assistance also seems to have a positive impact on internationalization as shown on figure 7. It is notable that firms that have received an assistance from the government; seem to have higher levels of internationalization than firms that have not received such assistance.

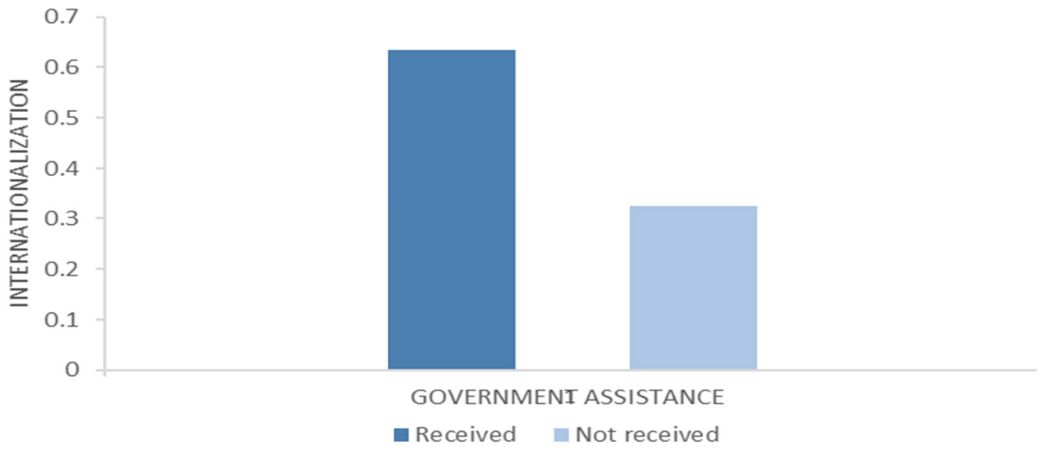

Figure 7. Preliminary analysis of internationalization with gov. assistance

Chapter 6
Estimation Results and Discussion

Table 3 presents the results of the analysis. Our dependent variable is internationalization that is represented by export intensity. Specification (1) shows the results of an ordinary least squares estimation using model (1). This specification includes as explanatory variables size, innovation, productivity, international trade fairs, government assistance, management influence dummy variable and the number of formal meetings. The productivity coefficient is of the expected sign and statistically significant suggesting that firms with higher productivity are more internationalized. The size coefficient is statically insignificant, which seems to indicate that firm size is not an important factor for internationalization. The coefficient of international trade fairs is statistically insignificant which seems to indicate that attending more international trade fairs do not impact internationalization. The innovation coefficient is also insignificant this may be explained by the high costs of technological capabilities that could affect the internationalization of the firm. Management influence, formal meeting and government assistance coefficients are also insignificant, which indicate that those variables do not have impact on firm's internationalization.

Specification (2) present the estimation results after controlling for firm fixed-effects. These capture firm observed (like size and management influence) and

unobserved specific determinants that do not change over the time. This leads to a change in the absolute value of the coefficients, including innovation, international trade fairs, productivity and government assistance coefficients, which suggest that these variables might be correlated with the unobserved firm characteristics, that if included in the error term would cause endogeneity and lead to biased results. Applying firm fixed effects lead to restrain potential sources of bias, solve endogeneity and generate more enhanced results.

None of variables including innovation, productivity, international trade fairs and government assistance are statistically significant which means that the results that we obtained from specification (1) are evidently biased. Moreover, the variables that impact the internationalization are all included in the unobserved characteristics. The problem with specification (2) is that it did not consider the unobserved effects related to heterogeneity in innovation activities between large and small firm. The problem arise as large firms have an advantage over small ones in innovation activities including expenditure on R&D and technological capabilities, these unobserved effects might be correlated with the innovation explanatory variable causing endogeneity. To overcome this problem, we control for innovation heterogeneity in Specification (3).

Table 3. Estimation results

	(1)	(2)	(3)
Internationalization Parameters			
Size	0.0004	-	-
	(0.0003)	-	-
Innovation	-0.6536	1.9172	4.7977*
	(0.7556)	(1.4723)	(2.4744)
Innovation X Size	-	-	-0.0483
	-	-	(0.0337)
Productivity	0.6149***	-0.4069*	0.4341**
	(0.1852)	(0.2111)	(0.2080)
International trade fairs	0.0254	0.0022	0.0220
	(0.0292)	(0.0429)	(0.0443)
Management	0.2026**	-	-
	(0.0992)	-	-
Formal Meetings	0.0136*	-	-
	(0.0070)	-	-
Government assistance	-0.1907*	0.1532	0.1000
	(0.1138)	(0.2141)	(0.3666)
Constant	0.0862	-0.0113	0.2982
	(0.1600)	(0.1964)	(0.2490)
Firm fixed effects	No	Yes	Yes
Statistical Parameters			
Number of observation	62	62	62
R-squared	0.4709	0.9473	0.9512

∗ Significant at the 0.10 level.

∗∗ Significant at the 0.05 level.

∗∗∗ Significant at the 0.01 level

We introduce a new heterogeneous variable by interacting innovation with size, this new variable will capture the unobserved effects related to innovation activities out of the error term. Results from specification (3) shows that the productivity coefficient is significant in fact, which suggests that higher productive firms are more internationalized. All the other variables including innovation, international trade fairs and government assistance remain insignificant, in addition to the innovation-size interaction variable, that is also insignificant. This emphasize part of the results that we obtained from specification (2).

We can conclude that controlling for firm fixed effects improves results and the R-squareds. The unobserved firm characteristics are important in explaining internationalization., which suggest that models (2) and (3) are much better in explaining firms' internationalization than model (1). We suggest that further studies are needed in order to investigate the unobserved characteristics that are captured by firm fixed effects in our models.

The overall contrariety in the estimation results with the literature might be explained by the differentiation of the Portuguese metal industry that represents our sample from the other cases in other countries and industries.

Chapter 7
Conclusion, Limitations and Future Research

7.1 Conclusion

The relation between internationalization and firm size, innovation, productivity, management influence, international trade fairs and government assistance has been extensively reviewed through literature from different perspectives. We have designed and tested a research framework that joins these seven variables into three models.

Results from the first model show a positive impact of productivity which is consistent with prior researches, suggesting that higher productivity firms are more internationalized. Size, innovation international trade fairs, management influence and government assistance was insignificant suggesting that none of these variables have a real impact on the internationalization process of the Portuguese metal working firms.

In the second model, we applied fixed-effects term firms that captures all observed (including size and management influence) and unobserved firm's specific determinants. Results shows that all the tested variables are insignificant, suggesting that the determinants that impact the internationalization are mostly unobserved characteristics of the firm.

Our last model adds a control for innovation by interacting it with size, in addition to firm fixed effects, in order to control the unobserved effects that may arise because of the heterogeneity between large and small firms. Results show a

significant impact for productivity after controlling for firm-specific effects confirming its importance for internationalization. Also it emphasizes the results that we obtained from second model regarding the insignificancy of the other variables.

Finally, we can conclude several findings from our research. First, productivity is the most important determinant for internationalization that firms should give considerable attention. Higher productivity firms are more close to success in international markets. Second, firm Size is not an important factor for internationalization, which suggests that not only large firms can internationalize, but even small and medium firms can succeed in foreign markets. In other words, this means that size is not a barrier for internationalization. Third, even though literature has emphasized the importance of innovation for internationalization, our findings show that innovation is not important for internationalization, which suggest that innovative and non-innovative firms can internationalize. Fourth, international trade fairs are also not an important determinant for internationalization, suggesting that exhibiting at international trade fairs is not essential to success in foreign markets. Fifth, the structure of management and the number of formal meetings do not have effect on internationalization. Sixth, government assistance is also not an important determinant for internationalization. In other words, this means that firms can internationalize without receiving assistance from government. Seventh, there are unobserved characteristics that have a significant impact on internationalization. However, they are not included in our research. Our model has captured these unobserved characteristics through firm fixed effects, but defining them need further research.

7.2 Limitations and Directions for Future Research

These results are limited to our sample that includes Portuguese metalworking industry firms. The sample size is also considered a limitation of this research even if it was sufficient to perform our analysis.

For future research it is highly recommended to investigate the unobserved characteristics that we refer above. We also suggest to add new internal and external characteristics like firm ownership, promotion strategy, export profitability, firm age, distribution plans, export commitment and exporting market which could have impact on internationalization. It may also be interesting to replicate our research using other measure of internationalization instead of export intensity. For example, "being an exporter" or "growth" or "performance". It is also suggested that the same strategy could be applied to other industries in Portugal or other manufacturing firms in Europe

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Appendix

Research survey (English version)

1) What's your core business product/ service of your company?
2) Please indicate the total number of employees of your company (in and outside Portugal).
3) What percentage of employees works outside Portugal?
4) What is the ratio of gross value added (GVA) to total revenues?
5) What percentage of revenues derives from sales outside Portugal (exports)?
6) With reference to the management organizational structure of your company, which of the following statements better describe your firm: decisions in your company are centralized or decentralized?
7) Approximately, how many formal planning meetings do you hold annually for foreign markets planning, for export exploration, and for the promotion of new products in foreign markets?
8) In how many fairs has your company participated outside Portugal?
9) Has your company received assistance from the government to support export efforts (including tax exemption or cash payments)?
10) What is the ratio of research and development (R&D) expenditure to total revenues?

Research survey (Portuguese version)

1) Qual é o principal produto/serviço da sua empresa?
2) Indique o número total de funcionários da sua empresa (dentro e fora de Portugal).
3) Qual é a percentagem de funcionários que trabalham fora de Portugal?
4) Qual é a percentagem do valor acrescentado bruto (VAB) no total das receitas?
5) Qual é a percentagem das receitas que resultam de vendas para fora de Portugal (exportações)?
6) Em relação à estrutura organizacional de administração, qual das seguintes afirmações melhor descreve a situação na sua empresa: As decisões são centralizadas ou descentralizadas?
7) Aproximadamente, quantas reuniões formais de planeamento/definição de estratégias são realizadas anualmente no âmbito do planeamento de estratégias de penetração em mercados externos, nomeadamente no que diz respeito a exploração de oportunidades em novos mercados e promoção de novos produtos destinados a esses mercados externos?
8) Em quantas feiras participou a sua empresa fora de Portugal?
9) Recebeu algum apoio governamental à exportação (incluindo alguma isenção de taxa ou algum subsídio)?
10) Qual é a percentagem das despesas de investigação e desenvolvimento (I&D) no total das receitas?