Capital Structure Choices and Exports: the Case of the Portuguese Mold Industry

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Abstract

This paper analyses the impact of export's intensity on capital structure choices of 647 Portuguese firms of the mold industry, for the period 2010-2017. Not only exports intensity variables are considered, but also variables to deal with firm specific characteristics and macroeconomic factors to fulfill the paper's aim. Four alternative proxies of capital structure are used: total, long-term, short-term debt and bank loans. Analyzing an unbalanced sample of 4225 observations, using a panel data methodology and estimating the models with fixed effects for firms, the findings of the study reveal that the reliable determinants for leverage are asset structure, growth opportunities, non-debt tax shields, liquidity, risk, size, age and macroeconomic factors. Export's intensity is only relevant to explain debt through bank loans, while export's intensity to countries outside Europe is relevant to explain both total and short-term debt. The main results are consistent with the pecking order theory which propose a hierarchy of funds. The trade-off theory is also relevant. Finally, this study shows that firms from the mold industry are more indebted than other Portuguese firms (in mean), and short-term debt is more relevant in the total leverage of the firm.

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1. **Introduction**

Diverse studies analyze capital structure decisions. The existing and growing literature on this thematic point out that understanding the determinants of capital structure decision remains a challenge, not only to the academia but also to market players. Moreover, there are diverse theories, and there is no one that explains all results, suggesting that institutional and macroeconomic framework have an impact on the conclusions (Myers, 2001, Koralun-Bereźnicka, 2018).

The more relevant works in capital structure area are the seminal study of Modigliani and Miller (1958), that generated numerous discussion about the impact of leverage in the firm's value, the work of Modigliani and Miller (1963), that introduced the market imperfections, detecting a benefit of tax savings when the firm ask for debt and, later on, De Angelo and Masulis (1980) established the trade-off theory, Myers and Majluf (1984) and Myers (1984) highlighted the pecking order theory, and Baker and Wurgler (2002) the market timing theory.

International studies analyzing the determinants of capital structure are diverse. Some examples that analyzed small and medium enterprises (SME) are: Jordan, Lowe and Taylor (1998), Bhaird and Lucey (2010), Mateev and Inavov (2010), Mateev, Poutziouris and Ivanov (2013), Palacín-Sánchez, Ramírez-Herrera and Pietro (2013). Studies analyzing Portuguese data also exist, as for example those of Vieira and Novo (2010), Serrasqueiro and Nunes (2011), Antão and Bonfim (2012), Vieira (2013), Proença, Laureano e Laureano (2014), Vergas, Cerqueira e Brandão (2015), Pacheco (2016), Lisboa (2017), Mota and Moreira (2017). Although, studies analyzing the association between capital structure, internationalization, firms' specific characteristics and macroeconomic factors have been much less studied.

This study aims to analyze the impact of exports on the firm's capital structure. The main question addressed in this study is whether the capital structure is affected by export's intensity and countries to which the firm export. Moreover, it aims at finding the importance of a firm's specific characteristics and macroeconomic factors. Macroeconomic factors, which are less used by researchers, play an important role in the relationship between the firm and the debtholder, leading to an impact in the firm's capital structure.

The sample comprises over 647 firms for the mold industry over the period from 2010 till 2017. We focus on the Portuguese market, a European country with small-size that is almost unexplored. Portuguese firms are characterized by high levels of debt (Banco de Portugal, 2018). Moreover, we focus on the mold industry because these firms export over 85% of the total production (Cefamol, 2018), playing an important role in the Portuguese economy. These firms are SME that represent 99% of firms in Portugal (Pordata, 2018).

Four alternative proxies of capital structure are used, namely total, long-term, short-term debt and bank loans. Most works only use one measure: total debt or also take into account debt's maturity. Studies using bank loans as a proxy of capital structure are scarce (Lisboa, 2017). To explain capital structure, we use the following determinants:

export's intensity (total and exports intensity to both European countries and non-European ones), asset structure, profitability, growth opportunities, non-debt tax shields, liquidity, risk, size, age and macroeconomic factors (gross domestic product growth and inflation tax growth).

We document that exports intensity to countries outside Europe (-), asset structure (+), growth opportunities (-), risk (-) and size are relevant to explain the total debt of the firms in the sample. Moreover, debt maturity impacts the results as asset structure and liquidity positively impact long-term debt and negatively impact short-term debt, while non-debt tax shield negatively impacts long-term debt and positively impacts short-term debt. When leverage is measured by bank loans, the main impacts of long-term debt are obtained, since the percentage of bank loans is similar to those of non-current liabilities. Although exports intensity is only relevant to positively explain bank loans suggesting that firms that export more need more funds and thus look for loans to finance its activity. Findings also show that firms from the mold industry prefer short-term debt than long term-debt, which is consistent with the results of Bank of Portugal and previous results from Portugal (e.g. Proença *et al.*, 2014, Lisboa, 2017). Finally, results are consistent both with the pecking order and the trade-off theory. First, we concluded that SME prefer self-funding rather than debt, consistent with the hierarchy of funds suggested by the pecking order theory. When using debt, firms with more collateral and better financial situation have more probability of increasing leverage and benefiting from tax savings, as is suggested by the trade-off theory.

The main results are especially important to corporate finance literature. We extend the literature on capital structure as we analyze the impact of export' intensity in the firm's indebtedness, which is a factor almost unexplored, but which can explain the additional financing needs of firms. We also include macroeconomic factors, while most studies only include firm's specific characteristics. Depending on the countries' situation, the firm's choices regarding capital structure can change. Moreover, we use different ways to measure debt, whereas most studies only use total debt, but a firm's indebtedness may be affected by its maturity, as we prove in this study. Finally, we study private firms, of a specific industry and country that exports the majority of its production, making an important contribution to the Portuguese financial situation. Our conclusions are relevant to the mold industry association as they can understand these firms' indebtedness. Therefore, this association can try to negotiate better conditions with banks, creditors or even with the government since the need of this firms to look for debts is to sustain their activity, especially to look for external customers. Finally, the results are also relevant to practice, as managers may understand which variables should be considered when deciding on the financing mix, and when considering markets and firm' characteristics.

The rest of the paper is organized as follows: after this introduction section, the second section presents the literature review and hypotheses development. In the third section, a description of the sample is provided, and the variables used, and the proposed model are explained. Section four presents the results and the paper ends in section five where the conclusion is provided.

2. Literature review and hypothesis

The Modigliani and Miller (1958) seminal paper about the irrelevance of capital structure on firm performance has been the basis of the debate over capital structure

choices. Although, the first work about this thematic back to 1952, where Durand (1952) argued that there is an optimal capital structure that minimize the weight average cost of capital. Modigliani and Miller (1958) established the relationship between debt and market value under the assumption of perfect markets and tax absences, but these markets do not exist.

Later, other works, in the presence of market imperfections, found that capital structure impacts the company value (Modigliani and Miller 1963). Using debt firms benefit from tax deduction as financial expenses are deductible. Thus, capital structure is relevant.

Diverse theories appeared to explain the firms' indebtedness, namely the trade-off theory, the pecking order theory, the agency cost theory, the information asymmetry theory, the market timing theory, among others. This diversity shows that there is no consensus about the optimal capital structure (Myers, 2001), so the thematic is still actual and relevant.

The trade-off theory suggests that firms can find an optimal capital structure that is the one reaches the equilibrium point between the costs of debt and its benefits (De Angelo and Masulis, 1980). The firm must balance between the firm's value creation through fiscal benefits of debt and the marginal costs of debt, namely financial distress, bankruptcy and other. Therefore, firms increase debt whenever they lower tax payments and bankruptcy costs (Myers, 2001). Although to increase debt firms must have a financial situation that allows them to look for debt and fixed assets that can be used as collateral in case of failure.

The pecking order theory argues that managers follow a preference order by type of financing, preferring internal financing (via self-financing), and when it is not enough they look for additional funding: first debt issuance that lower the risk of information asymmetries, and lastly the issuance of shares (Myers and Majluf, 1984, Myers, 1984). Issuing new shares has costs to shareholders as they may lose the firm control (Fama and French, 2002).

The agency theory establishes that debt is a way to monitor managers and reduce the conflict of interests between the principal and managers (Jensen and Meckling, 1976). These agency costs are related to information asymmetries. Not all investors have the same level of information and can use it to their own interests (Vergas *et al.*, 2015).

Finally, the market timing theory was proposed by Baker and Wurgler (2002) and argues that firms issue new equity when share price is overvalued compared to book value as it indicates lowercosts of issuance. In this case, the firm reduces its indebtedness. This theory is only relevant to listed firms since it depends on the market price.

Not all researchers found the relevance of all theories. It depends not only on the sample analyzed but also on researchers' aims. The macroeconomic environment, as well as the country, analyzed also influences the decision-making of the firms as well as the way of financing (Bernardo, Albanez and Securato, 2018, Koralun-Bereźnicka, 2018). Although these analyses are relatively recent in the literature of capital structure.

Based on these theories, diverse studies propose several firm specific variables to explain capital structure choices, namely: export's intensity, asset structure, profitability, growth opportunities, non-debt tax shields, liquidity, risk, size, age, dividends, tax rate, debt serving capacity, crisis effect, macroeconomic factors, among others. We will focus on the determinants that in our opinion, are more relevant to fill this work' aims.

- **Export' intensity**

Entering a foreign market is a high-risk decision for every firm (Pacheco, 2016). If for one side it can increase the firm's volatility due to little knowledge about the market, the culture and competition, and it leads to additional costs, for another side firm's earnings increase and volatility can decrease due to international diversification as the markets usually are imperfectly correlated (Shapiro, 2013). Moreover, firms that export usually receive the amount in debt in advance, or part of it, due to the distance and legal system differences between the countries (Lisboa, 2017). Therefore, these firms usually have more free cash flow.

The trade-off theory suggests a positive relationship between exports and leverage since firms that export more are less liquidity constrained and thus, have less difficulty to access to debt and use it to benefit from tax savings (Pacheco, 2016). In light with the pecking order theory, a negative relationship is also suggested as these firms prefer to use self-finance rather than debt (Shapiro, 2013).

Chen and Yu (2011), Albaity and Chuan (2013) and Pacheco (2016) found that exports cause a negative impact on debt. Although, some studies suggest a non-linear relationship between exports and leverage (e.g. Saito and Hiramoto, 2010). In the first stage of internationalization the relation should be negative, but after a certain stage in may turn up positive, yielding a U-shaped relation. In the first stage, firms use self-funding to finance its export's intensity. Although, these funds may not be enough, special to finance rapid growth. Thus, after a certain level of export's intensity, firms' indebtedness increases. Therefore, we will test the presence of a linear and a non-linear relationship between export's intensity and debt. The first hypothesis naturally follows:

Hypothesis 1: Export' intensity is negatively related with debt, at least in a first stage, and turn in positive after a certain level.

Pacheco (2016) found that the relationship between internationalization and debt depends on its maturity. In the beginning, firms use short-term debt to finance sales export, since the additional risk of internationalization limits access to credit. After a certain stage of exports, firms easily access to long-term debt since the firm shows the sustainability of its operation, and thus reduces the short-term debt. Therefore, a U-shaped relationship between exports and long-term debt and debt through bank loans (since is usually the amount of long-term debt in Portugal) and an inverse U shape to short-term debt is suggested. Hypothesis 1 can be subdivided into:

Hypothesis 1a: Export's intensity has a U-shape relationship with long-term leverage and debt through loans.

Hypothesis 1b: Export's intensity has an inverse U-shape relationship with short-term leverage.

The impact of exports can also depend on the type of countries where the firm exports. Firms that export to riskier markets, namely outside the European Union have lower debt capacity since more agency costs may appear. Thus, debtholders have less propensity to lend money to these firms due to high risk (Pacheco, 2016). From another side, firms that export more to European countries have less risk due to cultural and geographical proximity and can easily access to leverage. The following hypotheses are established:

Hypothesis 1c: Firms that export to non-European countries use less debt than firms that export to European countries.

- **Asset structure**

Fixed assets can be used as collateral in case of the firm's failure, and thus are expected to be more valuable than other assets (Psillaki and Daskalaskis, 2009). Framed on the trade-off theory a positive relationship between assets tangibility and leverage is established since debtholders are protected from the risk of failure and so can lend money (Harris and Raviv, 1991). Moreover, firms with more tangibility have less agency costs since the investment in fixed assets reduces the firm's cash flows and the conflicts of interests between the principal and managers (Jensen and Mecking, 1976). Problems with information asymmetries are also smaller as these firms have higher liquidation value (Proença et al., 2014). The pecking order also predicts a positive relationship since to make new investments in fixed assets firms need more financeand internal financing is usually insufficient, so firms need to look for debt (Myers and Majluf, 1984).

Previous studies as those of Psillaki and Daskalaskis (2009), Bhaird and Lucey (2010), Cortez and Susanto (2012), Mateev *et al*. (2013), Proença *et al*. (2014), Vergas *et al*. (2015), and Mota and Moreira (2017) found this positive relationship between asset tangibility and leverage. The second hypothesis is the following:

Hypothesis 2: Asset structure is positively related with the firm's leverage.

The impact of asset structure in debt intensity can be influenced by its maturity (Palacín-Sánchez *et al*., 2013). Asset tangibility is usually used as collateral to long-term debt, so it has a positive impact on this type of debt. Although, to short-term debt, the impact is the opposite since tangible assets are not required by short-term creditors. These creditors want to receive the money in credit as fast as possible and fixed assets are stable and more difficult to convert into cash. Vieira and Novo (2010), Serrasqueiro and Nunes (2011), Palacín-Sánchez *et al*. (2013), Proença *et al*. (2014), Pacheco (2016) and Lisboa (2017), all find these relations. Thus, our second hypothesis is divided into two:

Hypothesis 2a: Asset tangibility is positively related with long-term debt and bank loans.

Hypothesis 2b: Asset tangibility is negatively related with short-term debt.

- **Profitability**

Based on the agency costs theory, debt is a mechanism to control managers opportunistic behaviors when the firm has free cash flows (Jensen, 1986). Therefore, a positive relationship between firm's profitability and leverage is expected (Ganiyu, Adelopo, Rodionova, and Samuel, 2018). More profitable firms have greater capacity to obtain debt and repay it on the expected dates. The trade-off theory suggests that more profitable firms are more indebtedness to benefit from interest tax savings due to the payment of interest (Modigliani and Miller, 1963). Moreover, these firms have greater capacity to repay the amount in debt, and thus creditors can easily give credit (Harris and Raviv, 1991).

For another side, the pecking order theory argues that firms prefer to use self-financing first. More profitable firms have more internal funds, thus less need of debt (Myers, 1984). Only when these funds are not sufficient, the firm looks for third party resources, namely debt and last issuing new stocks (Myers and Majluf, 1984). Thus, the pecking order theory suggests a negative relationship between profitability and leverage.
Several empirical studies, special the ones studying SME are consistent to support the pecking order theory (Psillaki and Daskalaskis, 2009, Vieira and Novo, 2010, Serrasqueiro and Nunes, 2011, Cortez and Susanto, 2012, Mateev *et al.*, 2013, Proença *et al.*, 2014, Vergas *et al.*, 2015, Pacheco, 2016, Lisboa, 2017). Moreover, they found that this relation does not depend on the debt's maturity. As this study focus on small and medium size firms, the proposed hypothesis is the following:

Hypothesis 3: Profitability is negatively related with the firm's leverage.

- **Growth opportunities**

Firms with high growth opportunities usually need more financial resources since it is required to pay their investment (Lisboa, 2017). Internal funds are usually insufficient and thus, the firm look for debt to fulfill their financial needs, according to the pecking order theory (Vergas *et al.*, 2015). The agency theory also suggests a positive relationship between growth opportunities and debt since in firms with more opportunities, managers have greater tendency to engage in opportunistic behaviors, investing in suboptimal investment choices and debt can be a mechanism to control it since there is a need to repay debt on the due dates (Ganiyu *et al*, 2018). Firms with large growth opportunities also have more return. Likewise, looking for debt allow these firms to benefit to tax savings, according to the trade-off theory. Moreover, high growth is a sign that the company has sustainability, and thus creditors have more propensity to lend money (Proença *et al.*, 2014).

Palacín-Sánchez *et al.* (2013), Proença *et al.* (2014), Vergas *et al.*, (2015), Lisboa (2017), among others found a positive relationship between growth opportunities and debt. This relation does not depend on debt maturity. Thus, the hypothesis below is formulated:

Hypothesis 4: Growth opportunities is positively related with the firm's leverage.

- **Non-debt tax shields**

Some investments (in fixed assets) increase depreciation expenses, and firms can substitute tax benefits of debt financing by using depreciation (DeAngelo & Masulis, 1980). Based on the trade-off theory, a negative relationship between non-debt tax shields and debt is suggested (De Angelo and Masulis, 1980; Cortez and Susanto,

2012). Although to have more depreciation expenses, firms need to make new investments and, in that case, self-funding is usually not enough, thus increasing the firms' financial needs. According to the pecking order theory, a positive relationship is expected. Moreover, as we have explained before, fixed assets can be used as collateral in case of the firms' failure, and so firms can easily access to debt (Proença *et al.*, 2014).

De Miguel and Pindado (2001) and Pacheco (2016) found a negative relationship, while Vergas *et al.* (2015) and Lisboa (2017) found a positive one, and Titman and Welssels (1988) and Serrasqueiro and Nunes (2011) did not find any impact. As we study Portuguese SME as Lisboa (2017), we expect to find the same impact. This leads to the following hypothesis:

Hypothesis 5: Non-debt tax shields is positively related with the firm's leverage.

- **Liquidity**

Liquidity also impacts the firm's capital structure decisions. Firms with more liquid assets are more able to meet current liabilities as they have more free cash flow. The pecking order theory suggests a negative relationship between liquidity and debt as firms with more cash use this self-financing rather than debt (Myers, 1984). Although these firms also have less risk and can easily access to debt. In line with the trade-off theory, companies with more liquidity look for debt to benefit from tax savings. These facts suggest a positive relationship between liquidity and debt.

Most studies as Antão and Bonfim (2012), Proença *et al.* (2014), Pacheco (2016), Lisboa (2017), Mota and Moreira (2017), Yildiz (2018) found a negative relationship. Thus, the following hypothesis is established:

Hypothesis 6: Liquidity is negatively related with the firm's leverage.

The impact of liquidity on debt can be influenced by its maturity. More liquid firms have less short-term debt as they have free cash flows. Although, these firms have less risk of bankruptcy and can easily access to long-term and bank loans, following the trade-off theory. Hypothesis 6 is divided into two as follows:

Hypothesis 6a: Liquidity is negatively related with short-term debt.

Hypothesis 6b: Liquidity is positively related with long-term debt and bank loans.

- **Firm risk**

Firm risk and debt are intrinsically linked as more indebt firms have more uncertainty and tendency to go bankrupt, because the firm's expenses increase and earnings decrease (Jensen and Mecking, 1976). Firms with high volatility have difficulty in issuing more debt as debtholders want to have the amount in credit repaid. Based on the trade-off theory, a negative relationship is expected. The pecking order theory also suggests a negative relationship since the greater the firm risk the greater the possibility of the firm to become insolvent (Myers, 1984).

Firms in the sample are SME, which are normally firms with high risk due to their dimension. Moreover, these firms focus on the export market and constantly need to

innovate to survive in the competitive market, which increases more the firm risk (Pacheco, 2016).

Vieira and Novo (2010), Serrasqueiro and Caetano (2015), and Pacheco (2016) found that riskier firms are more in debt, may be due to the undercapitalization of Portuguese SMEs. Hypothesis 7 naturally follows:

Hypothesis 7: Firm risk is negatively related with the firm's leverage.

There are several ways to measure risk. In this study, we will follow Pacheco (2016) and will use two financial ratios: the solvency ratio and the structure ratio. The first ratio aims to see the firm's ability to pay their credit, reflecting the risk that creditors support. This ratio should be, in theory, more than 50% and the higher the value, the less risk the firm has. Therefore, a positive relationship is expected when analyzing this ratio. The structure ratio shows the percentage of equity that will be absorbed by long-term debt. The higher the ratio the riskier is the firm, so we expect a negative relationship between structure ratio and debt.

- **Firm size**

Most studies found a relationship between the firm size and leverage, but results are mixed. Larger firms tend to access to debt at a cheaper cost than small-size firms. Based on the trade-off theory, large-size firms are usually more diversify, have more reputation, have a lower risk of bankruptcy, and usually have more earnings to repay the amount in debt, so can easily access to debt (Titman and Wessels, 1988). Moreover, these firms have less difficulty to access to capital markets, and information asymmetries are less evident (Fama and French, 2002). A positive relationship between firm size and debt is suggested.

However, firms prefer equity rather than debt. Larger-firms usually have more self-funding, so based on the pecking order theory, a negative relationship between size and debt is proposed (Myers and Majluf, 1984). Regarding small-size firms, the lack of information transparency, the larger probability of bankruptcy may make it difficult for these firms to access to debt.

Studies that analyze SME (Fama and French, 2002, Psillaki and Daskalaskis, 2009, Bhaird and Lucey, 2010, Saito and Hiramoto, 2010, Vieira and Novo, 2010, Mateev *et al.*, 2013, Palacín-Sánchez *et al.*, 2013, Proença *et al.*, 2014, Pacheco, 2016, Lisboa, 2017) found a positive relationship, so our next hypothesis is:

Hypothesis 8: Firm size is positively related with firm's leverage.

The mixed results found by some researchers can be explained by the debt's maturity. In fact, small-sized firms have difficulties in accessing debt, especially long-term debt and bank loans, so finance their activity with current debt (Lisboa, 2017). When the firm grows, it can easily access to bank loans and long-term debt and in this case, use less short-term debt (Pacheco, 2016). Thus, it is expected that size positively impacts long-term debt but has the opposite relation with short-term debt.

Palacín-Sánchez *et al.* (2013) and Proença *et al.* (2014) found these impacts. Pacheco (2016) and Lisboa (2017) only found a positive impact between firm size and long-term debt. Thus, hypothesis 8 can be subdivided into two:

Hypothesis 8a: Firm size is positively related with long-term debt and bank loans.

Hypothesis 8b: Firm size is negatively related with short-term debt.

- **Firm age**

The firm age can also impact the level of its indebtedness. Older firms have higher reputations for credit worthiness due to previous relationships. Moreover, these firms are less prone to bankruptcy since they are more diversified and have more experience dealing with financial problems. Therefore, these firms can more easily access debt, according to trade-off-theory (Bhaird and Lucey, 2010). Younger firms have difficulty accessing debt as debtholders do not know their ability to repay the debt.

Although, on the other hand, older firms usually have more free cash flows and so can use self-finance rather than debt. Younger firms have insufficient self-funding and have difficulties in accessing to capital markets, so debt is the only way to finance the firm's activity (Vieira, 2013). In line with pecking order theory, a negative relationship between firm age and debt is expected.

A negative relationship between debt and firm' age was found by previous studies as Jordan *et al.* (1998), Bhaird and Lucey (2010), Palacín-Sánchez *et al.* (2013), Lisboa (2017) among others. This leads to the next hypothesis:

Hypothesis 9: Firm age is negatively related with the firm's leverage.

- **Macroeconomic factors**

Some researchers found that firms adapt their capital structure depending on macroeconomic factors (Bernardo *et al.*, 2018). The adjustment is faster in good macroeconomic conditions than in bad states of the economy (Yildiz, 2018). The growth of the gross domestic product (GDP) causes a negative impact on the firm's leverage. The greater the GDP the higher the probability of the firm to generate resources and use retained earnings to invest in the firm. Therefore, according to with pecking order theory a negative relationship is expected between GDP growth and debt.

Regarding inflation, high inflation rate causes a contraction in the economy and more difficulty ingenerating funding. Likewise, the firm needs to look for leverage to sustain their presence in the market. This result also goes in line with the pecking order theory.

Hypothesis 10a: GDP growth is negatively related with the firm's leverage.

Hypothesis 10b: Inflation tax growth is positively related with the firm's leverage.

3. Sample, variables and model
3.1 Sample

The sample in study comprises 647 Portuguese firms from the mold industry, dating to the period 2010-2017. The data was gathered from SABI database of Bureau Van Dijk and macroeconomic factors from Pordata.

Portugal is a country almost unexplored due to its dimension. Analyzing this country helps to understand it better and using a single country we exclude cultural, legal and other differences that can biased results when we analyze different countries. Moreover, debt is the dominent type of financing. Around 67% of the firm's assets are financed through liabilities (Banco de Portugal, 2018). This fact gives added relevance to exploring the capital structure of Portuguese firms.

Moreover, we want to analyze the impact of exports intensity in the firm's capital structure. The study of Cefamol (2018) shows that firms from this industry export over 85% of the total production, which gives relevance to analyzing this industry. This industry is in the 3rd place analyzing Europe and in the 8th place analyzing the world, which proves its significance.

This industry is geographically bipolar: Marinha Grande (with more representativeness) e Oliveira de Azeméis. The final sample has a total of 4225 observations.

3.2 Variables

We use four alternative dependent variables, namely total debt (**TDebt** - total liabilities/total assets), long-term debt (**LTD** - Non-current liabilities/total assets), short-term debt (**STD** - current liabilities/total assets), bank loans debt (**BDebt** – bank loans and similar/total assets).

As independent variables, we use variables to measure export's intensity, firm's specific characteristics and macroeconomic impact. These variables were selected to test the previous hypothesis proposed. They are presented in the following table:

Table 1: Independent variables

Hypothesis	Acronym	Independent variable	Formula	Expected sign TD			
				TDebt	LTDebt	STDebt	BDebt
H1	**Exp**	Exports	Export sales/total sales	-	-	+	-
	Exp2		Export sales squared	+	+	-	+
H1c	**ExpEU**	Export to EU	Export to EU/Total sales	+			
	ExpOEU	Export to outside EU	Export to outside EU/Total sales	-			
H2	**AS1**	Assets structure	Fixed assets/total assets				
	AS2	Or	Non-current assets/total assets	+	+	-	+
	AS3	Or	(Non-current assets+inventories)/total assets				
H3	**Prof**	Profitability	EBIT/Total assets	-	-	-	-
H4	**GO1**	Growth Opportunities	Annual change of total assets	+	+	+	+
	GO2	Or	Annual change of ln (total assets)				
H5	**NDTS**	Non-debt tax shields	Depreciations/total assets	+			
H6	**Liq**	Total liquidity	Current assets/current liabilities	-	+	-	+
H7	**SR**	Solvency ratio	Equity/total liabilities	+			
	STR	Structured ratio	Non-current liabilities/equity	-			

H8	**Size**	Firm size	Ln (total assets)	+	+	-	+
H9	**Age**	Firm age	Number of years the firm is in activity	-			
H10a	**GBP**	Gross domestic product	GDP annual growth	-			
H10b	**Inflation**	Inflation rate	Inflation annual growth	+			

The next table presents the summary statistic of the variables presented above, namely mean, median, maximum, minimum and standard deviation.

Table 2: Descriptive Statistics

	Mean	**Median**	**Maximum**	**Minimum**	**Std. Dev.**
TDebt	0.7095	0.6809	12.7853	0.0000	0.5506
LTDebt	0.2258	0.1591	7.8932	0.0000	0.3137
STDebt	0.4837	0.4213	12.7853	-0.4135	0.4894
BDebt	0.2244	0.1759	10.5502	0.0000	0.3168
Exp	0.2160	0.0052	1.0000	0.0000	0.3241
Exp2	0.1517	0.0000	1.0000	0.0000	0.2877
ExpEU	0.1729	0.0000	1.0000	0.0000	0.2809
ExpOEU	0.0431	0.0000	1.0000	0.0000	0.1312
AS1	0.3162	0.3070	0.9926	0.0000	0.2094
AS2	0.3504	0.3482	0.9926	0.0000	0.2205
AS3	0.2661	0.2708	0.9926	-0.8883	0.2754
Prof	0.1070	0.1113	2.9913	-22.1732	0.3851
GO1	0.3532	0.0562	458.2164	-1.0000	7.2423
GO2	0.0085	0.0041	0.8575	-0.2647	0.0386
NDTS	0.0620	0.0541	0.7180	-0.4389	0.0515
LIQ	6.0701	1.4123	4653.6050	-3.3737	93.8360
SR	20.9803	0.4681	36706.6300	-1.0000	791.8857
STR	2.3906	0.3451	2617.7350	-150.8273	58.6237
Size	13.2433	13.1800	17.7687	4.8789	1.6554
Age	15.8470	14.0000	71.0000	0.0000	10.9370
GDP	1.4143	2.6000	4.4000	-4.4000	2.8965
Inflation	1.2706	0.6000	3.7000	-0.3000	1.2521

This table presents descriptive statistics, namely mean, maximum, minimum, and standard deviation, for the variables, include in the model: Tdebt (total debt), LDetb (long-term debt), SDebt (short term debt), BDebt (bank loans debt), exp (export sales), exp 2 (export sale square), expEU (export to European countries), expOEU (export to countries outside EU), AS (asset structure), Prof (profitability), GO (growth opportunities), NDTS (non-debt tax shields), Liq (liquidity), SR (Solvency ratio), STR (structure ratio), size, age, GDP (gross domestic product growth), Inflation (inflation rate).

Analyzing the previous table, the following facts emerge:
1) On average, the firms from the mold industry finance 71% of their investment through liabilities. The Portuguese Bank estimates that in mean, Portuguese firms finance 67% of their investment in 2017, and this number was decreasing in the last years (Banco de Portugal, 2018). Vieira (2013) found that the debt level of listed Portuguese firms was 69%, Proença *et al*. (2014) analyzing SME found that these firms

used around 67% of debt, and Lisboa (2017) analyzing export firms found an average of 58%. This suggests that the firms in our sample are more indebted than other Portuguese firms, which can be explained due to the specificities of the industry.

Short-term debt is more relevant than long-term debt in the total debt of the firms. Proença *et al*. (2014) and Lisboa (2017) found similar results suggesting that SME have more difficulties in accessing long-term debt and thus prefer to finance their activity using current liabilities, especially using credit from suppliers. The amount of bank loan to finance the firm's activity is similar to the amount of long-term debt, suggesting that more prominent item of non-current liabilities are loans. On average bank loans finance 22% of the firm's activity, which is smaller than the mean value present by the Portuguese bank for the average of the Portuguese firms, that is 36% (Banco de Portugal, 2018).

2) In mean, the percentage of exports' intensity is 22%. Some companies export the totality of their production while others do not export anything. This number is smaller than the one presented by Cefamol, the Portuguese association of the mindustry, that says that in mean companies from this industry export over 85% of the total production (Cefamol, 2018). Although the difference in results can be explained by the fact that some firms sell to an intermediary (that usually is Portuguese) and this intermediary sells to external firms. Moreover, 17% of exports are for European countries, while 4% are for other countries than European ones. Cefamol (2018) identify the following major markets for mold products: Spain, Germany, France, Czech Republic and Poland (European countries), and USA and Mexico (non-European countries). Additionally, Cefamol also identifies that the major customers are from the automotive industry and packaging.

3) Fixed assets represent 31% of the total assets, 35% if we consider the total non-current assets. Cefamol (2018) argues that firms from this industry are innovative and high-tech, which justify the high percentage of fixed assets over total assets. Lisboa (2017) found similar results to Portuguese firms that export. The impact of depreciation over total assets is 6%, meaning that most firms are making new investments to follow the market tendency.

4) In mean the firms of the sample are profitable (11% of total assets), are growing (assets' annual growth 35%), and have liquidity although the firm's risk is also high. On average, the firm's age is 16 years, the older firm has 71 years and there are in the sample new firms that have now started their activity.

5) Finally, GDP and inflation rate growth are positive.

In the next table the correlation coefficients between the selected variables are presented.

Table 3: Correlation Matrix

	TDebt	LTDebt	STDebt	BDebt	Exp	Exp2	ExpEU	ExpOEU	AS1	AS2	AS3	Prof	GO1	GO2	NDTS	LIQ	SR	STR	Size	Age	GDP	Inflation
TDebt	1																					
LTDebt	0.472 ***	1																				
STDebt	0.828 ***	-0.104 ***	1																			
BDebt	0.550 ***	0.532 ***	0.283 ***	1																		
Exp	-0.019	-0.070 ***	0.023 ***	0.010	1																	
Exp2	-0.016	-0.072 ***	0.028 *	-0.004	0.966 ***	1																
ExpEU	-0.021	-0.061 ***	0.015	0.008	0.915 ***	0.881 ***	1															
ExpOEU	-0.003	-0.042 ***	0.024	0.007	0.510** *	0.498 ***	0.120 ***	1														
AS1	0.005	0.172 ***	-0.104 ***	0.247 ***	0.003	-0.026	0.011	-0.016	1													
AS2	-0.020	0.149 ***	-0.117 ***	0.218 ***	0.027 *	0.004	0.034 **	-0.006	0.887 ***	1												
AS3	-0.056 ***	0.135 ***	-0.149 ***	0.178 ***	-0.062 ***	-0.078 ***	-0.041 ***	-0.065 ***	0.768 ***	0.876 ***	1											
Prof	-0.146 ***	-0.010	-0.158 ***	-0.041 ***	-0.008	-0.011	-0.003	-0.015	0.040 ***	0.030056 *	0.050307 ***	1.000000										
GO1	-0.002	0.014	-0.011	-0.016	-0.017	-0.012	-0.014	-0.010	0.005	0.001	0.008	0.005	1									
GO2	-0.076 ***	-0.052 ***	-0.052 ***	-0.080 ***	-0.018	-0.014	-0.006	-0.032 *	0.041 ***	0.026 *	0.036 **	0.175 ***	0.450 ***	1								
NDTS	-0.002	0.045 ***	-0.032 **	0.071 ***	-0.081 ***	-0.099 ***	-0.066 ***	-0.059 ***	0.358 ***	0.288 ***	0.293 ***	0.143 ***	-0.008	-0.047 ***	1							
LIQ	-0.045 ***	0.012	-0.058 ***	-0.028 *	-0.035 **	-0.028 *	-0.032 **	-0.019	-0.035 **	-0.010	-0.004	-0.009	0.280 ***	0.071 ***	-0.047 ***	1						
SR	-0.032 **	-0.018	-0.025	-0.018	-0.016	-0.013	-0.015	-0.008	-0.034 **	0.060 ***	0.055 ***	-0.013	-0.002	-0.012	-0.029 *	0.379 **	1					
STR	0.015	0.030 **	-0.002	0.031 **	0.007	0.001	-0.006	0.029 *	0.032	0.026 *	0.001	-0.008	-0.001	-0.007	-0.016	0.017	-0.001	1				
Size	-0.148 ***	-0.115 ***	-0.095 ***	0.080 ***	0.554 ***	0.497 ***	0.518 ***	0.2609 ***	0.245 ***	0.296 ***	0.161 ***	0.055 ***	0.003	0.046 ***	-0.048 ***	-0.045 ***	-0.032 **	0.007	1			
Age	-0.057 ***	-0.061 ***	-0.026 *	0.050 ***	0.293 ***	0.2608 ***	0.260 ***	0.168 ***	0.022	0.057 ***	-0.029 *	-0.029 *	-0.044 ***	-0.137 ***	-0.212 ***	-0.005	-0.002	0.003	0.440 ***	1		
GDP	-0.051 ***	0.023	-0.072 ***	0.031 **	-0.016	-0.019	-0.008	-0.021	0.065 ***	0.075 ***	0.110 ***	0.009	-0.013	0.017	-0.003	-0.012	0.009	-0.019	0.064 ***	0.076 ***	1	
Inflation	0.031 **	-0.017	0.046 ***	-0.009	0.008	0.006	0.002	0.014	-0.029 *	-0.044 **	-0.087 ***	0.016	0.025	-0.023	0.031 **	0.019	-0.017	0.020	-0.029 *	-0.051 ***	-0.693 ***	1

Total and short-term debt are highly correlated, but these variables are alternative proxies of capital structure, not used in the same model. The same happens to export's variables, and to the different alternative measures of asset structure, but none these variables are not used in the same model. None of the other variables are highly correlated, at least not to a significant extent.

When long-term debt increases, bank loans also increase, and short-term debt decreases. Export' intensity is only negatively correlated with long-term debt as it is expected, but the sign does not change after a certain level of exports. Moreover, the same sign is found when we consider exports to European and non-European countries, suggesting that debt does not depend on the type of country to which the firm export, contrary to our expectations that were in risky countries, creditors may lend less money.

Most of the correlations between leverage and the independent variables exhibit the expected signs of the hypotheses. The exceptions are: growth opportunities and size that are negatively correlated with debt, contrary to our expectations. Although, firms with rapid growth and large-size firms can have more self-funding and prefer to use it rather than debt, according to the pecking order theory.

Three alternative of asset structure are included. AS3 is the one that has more significance to explain the dependent variables, so we decide to use that one in the model. We also include two alternative variables to measure the firm's growth opportunity. As GO2 has more significance to explain capital structure, we select that variable to introduce in the model.

3.3 Model
We use two models to validate the hypotheses established. The first model only analyzed exports intensity, while the second one takes into account if exports is to European or non-European countries.

$$\text{Debt}_{i,t} = \alpha + \beta_1 \times \text{Exp}_{i,t} + \beta_2 \times \text{Exp}_{i,t}^2 + \beta_3 \times \text{AS}_{i,t} + \beta_4 \times \text{Prof}_{i,t} + \beta_5 \times \text{GO}_{i,t} + \beta_6 \times \text{NDTS}_{i,t} + \beta_7 \times \text{Liq}_{i,t} + \beta_8 \times \text{SR}_{i,t} + \beta_9 \times \text{STR}_{i,t} + \beta_{10} \times \text{Size}_{i,t} + \beta_{11} \times \text{Age}_{i,t} + \beta_{12} \times \text{GDP}_{i,t} + \beta_{13} \times \text{Inflation}_{i,t} + U_i + \varepsilon_{i,t} \tag{1}$$

$$\text{Debt}_{i,t} = \alpha + \beta_1 \times \text{ExpEU}_{i,t} + \beta_2 \times \text{ExpOEU}_{i,t} + \beta_3 \times \text{AS}_{i,t} + \beta_4 \times \text{Prof}_{i,t} + \beta_5 \times \text{GO}_{i,t} + \beta_6 \times \text{NDTS}_{i,t} + \beta_7 \times \text{Liq}_{i,t} + \beta_8 \times \text{SR}_{i,t} + \beta_9 \times \text{STR}_{i,t} + \beta_{10} \times \text{Size}_{i,t} + \beta_{11} \times \text{Age}_{i,t} + \beta_{12} \times \text{GDP}_{i,t} + \beta_{13} \times \text{Inflation}_{i,t} + U_i + \varepsilon_{i,t} \tag{2}$$

The debt intensity is regressed against exports intensity and its square (exp) or exports intensity to European countries (expEU) and to non-European ones (ExpOEU), asset structure (AS), profitability (prof), growth opportunities (GO), non-debt tax shields (NDTS), liquidity (Liq), solvency ratio (SR), structured ratio (STR), size, age, GDP growth (GDP), and inflation tax (growth). "i" represents the individual firms and "t" the year analyzed; "U" is also added to incorporate the fixed effects of firms (cross-section); and ε represents the error of the model.

The model was estimated using the ordinary least square methodology (OLS) with fixed effects for firms. Random effects were also analyzed, but analyzing the Hausman test,

fixed effects are more accurate to estimate the model. Results of the Hausman test are present in the next table to justify the choice for fixed effects estimation.

Table 4: Hausman test

	TDebt	LDebt	SDebt	BDebt
Model (1)	176.0685 ***	39.1718 ***	238.0186 ***	48.8124 ***
Model (2)	177.5404 ***	39.5597 ***	240.5696 ***	49.3080 ***

*, **, *** Significant at the 10%, 5% and 1% levels, respectively.

As we can see, the fixed effects model is more accurate to analyze the impact of the established determinants on the firm's leverage with a significant level of 1%.

4. Results

The results of the regression of the firm's capital structure against the determinants used in this study, model (1) are present in the next table.

Table 5: Results for the total sample

	TDebt	LDebt	SDebt	BDebt
C	3.0971 ***	0.3950 ***	2.7018 ***	0.2178 *
Exp	-0.0351	0.0652	-0.1003	0.1052 *
Exp2	-0.0010	-0.0747	0.0737	-0.0784
AS3	0.0925 ***	0.1681 ***	-0.0754 **	0.2072 ***
Prof	-0.0154	0.0029	-0.0184	-0.0085
GO2	-0.7094 ***	-0.6486 ***	-0.0599	-0.8609 ***
NDTS	-0.1047	-0.3499 ***	0.2453 *	-0.2416 **
LIQ	0.0000	0.0002 ***	-0.0002 **	0.0000
SR	-0.0000	-0.0000 **	0.0000	-0.0000
STR	-0.0001 *	0.0000	-0.0002 ***	0.0000
Size	-0.1839 ***	-0.0194 *	-0.1645 ***	-0.0023
Age	0.0036	0.0038 *	-0.0002	-0.0008
GDP	0.0002	0.0014	-0.0012	0.0045 ***
Inflation	-0.0044	0.0013	-0.0056	0.0016
Adj. R2	74.24%	53.28%	67.06%	61.62%
F-Statistic	19.4710 ***	8.3091 ***	14.0475 ***	11.2790 ***

This table presents the results estimation of model 1. Column 1 - TDebt (total debt), column 2- LDetb (long-term debt), column 3 - SDebt (short-term debt), BDebt (bank loans debt). The explanatory variables are: exp (export sales), exp 2 (export sale square), AS (asset structure), Prof (profitability), GO (growth opportunities), NDTS (non-debt tax shields), Liq (liquidity), SR (Solvency ratio), STR (structure ratio), size, age, GDP (gross domestic product growth), Inflation (inflation rate).
*, **, *** Significant at the 10%, 5% and 1% levels, respectively.

We only present results for the estimation of the model using ordinary least square methodology with fixed effects for firms since is the most accurate model, as we proved before. Although the same estimations were done using random effects (results are sent under request).

The estimated model explains 74% of total debt, 53% of long-term debt, 67% of short-term debt and 62% of bank loans debt. Similar results were obtained to Portugal by other researchers (Proença *et al.*, 2014; Vergas *et al.*, 2015; Lisboa, 2017). Moreover, analyzing the F-statistic we can see that the model is relevant.

Export's intensity and its square are insignificant to explain firm's leverage, contrary to the expectations of hypothesis 1, 1a and 1b. The exception is to debt measured through

bank loans. In this case, firm's that export more are more indebted (using bank loans) as the financing needs to enter or maintain its activity in a foreign market increase. Self-funding is usually insufficient to finance rapid growth, and so these firms look for debt to sustain its activity. This result is consistent with the pecking order theory, since firms look for debt only when self-funding is not enough to fulfill financial needs. Regarding creditors, as these firms usually have a sustainable activity and want to growth, creditors are more confident that they will pay back the credit and easily grant it. This result is in line with the trade-off theory as firms with less financial problems can easily access to leverage.

For the other variables of debt, it was expected that firms that export more will have more earnings and free cash flow and thus less need of liabilities, but after a certain level of exports, to finance rapid growth, firms need to increase its leverage. To our model export' intensity looks insignificant to explain other types of liabilities rather than loans. Similar results were found by Pacheco (2016) and Lisboa (2017) for the same market – Portugal. Moreover, in the correlation matrix, we found that export's intensity has no correlation with total debt except with long-term debt (in a negative way) and with short-term debt (in a positive way), but this relationship is explained by other firm's characteristics, and so disappear in multivariable analysis.

Hypotheses 2, 2a and 2b are validated. Fixed assets are accepted as collateral, especially to long-term and bank loans debt. Therefore, as asset structure increases, debt also increases, since creditors are protected from the risk of failure as suggested by the trade-off theory. Also, the pecking order theory suggests this relation since firms with more fixed assets have greater financial needs and self-funding is not enough, so firms need to look for debt. To short-term debt, the impact is the opposite since short-term creditors do not accept fixed assets as a guarantee due to the difficulty in turning them into money in a short-term. Therefore, asset structure has a negative impact on short-term debt. Similar results were found by Proença *et al*. (2014), Vergas *et al*. (2015), Pacheco (2016), Lisboa (2017), among others.

Firm's leverage is not influenced by its profitability. Therefore hypothesis 3 is not validated. We expect, based on the pecking order theory, that more profitable firms have more free cash flows and thus, prefer to use internal funds rather than look for new debt. In the correlation matrix debt is negatively correlated with profitability, but using a multivariable analysis this effect disappears, suggesting that other variables explain the firm's profitability.

Growth opportunities negatively impact total and long-term debt contrary to our expectations (hypothesis 4), but positively impact bank loans. Firms with high more growth opportunities look for a bank loan to finance their activity. Usually retained earnings are not enough to finance new investment opportunities and firms need to look for additional capital. Based on the pecking order theory, in this case, firms look for debt. These firms also can easily access to debt and use it to have tax benefits, following the trade-off theory. Finally, this result is also in line with the agency cost theory since such firms are subject to under-investment and thus debt is a way to control the manager's opportunistic behaviors.

Regarding non-debt tax shields, it has no impact in total debt but has a positive impact on short-term debt and bank loans and a negative impact on long-term debt.

Debtholders see the investment in fixed assets a good sign of the firm's sustainability and thus, they have a propensity to lend money, especially through bank loans. Moreover, suppliers and others recognize the investment made by the firm as a way to sustain its activity and are more aware to negotiate larger days outstanding payments. This result is consistent with the trade-off theory which argues that firms substitute tax savings of debt expenses by depreciations. To long-term debt, the impact is the opposite. Firms with more depreciations have made more investment and thus need more liabilities to pay these new investments, as suggested by the pecking-order theory. Mota and Moreira (2017) also found a negative impact of NDTS on firm's leverage.

The findings show liquidity has no impact on the total debt but, a positive impact on long-term debt and a negative impact on short-term debt. Therefore, hypotheses 6a and 6b are validated. Firms with more free cash flows have less current financing needs as they have sufficient cash to pay credits, in line with the pecking order theory. For another side, more liquid firms have less risk of bankruptcy and, based on the trade-off theory, can easily access to long-term debt and benefit from tax savings due to financial expenses. Similar results were found by Pacheco (2016) and Lisboa (2017).

The variable structured ratio, a proxy of firm's risk, is economic relevant to explain total debt as well as short term debt, confirming hypothesis 7. Firms with higher risk have less debt due to the difficulty to access to it. The trade-off theory is then validated. Regarding long-term debt, the firm's risk shows the opposite relationship, contrary to our expectations. Firms with more risk have more debt. This finding can be explained by the agency cost theory since more risky firms can have more conflicts of interests between managers and shareholders and debt is used to reduce these conflicts. This last relationship was also found by Vieira and Novo (2010), Serrasqueiro and Caetano (2015) and Pacheco (2016).

Size shows a negative relationship with leverage, contrary to our expectations in hypothesis 8 and with the previous results found to Portugal (e.g. Pacheco, 2016 and Lisboa, 2017). Large-size firms may have more free cash flows and then prefer to use internal funds rather than debt. This result is consistent with the pecking order theory. The same relationship is found when we analyze long-term and short-term debt. Hypothesis 8b is validated but not hypothesis 8a. Small-size firms are the ones that have more debt since these firms have few self-funding and need to look for alternative forms of financing to sustain their growth. In this paper, we analyze a specific industry, with singular characteristics – the mold industry. This industry exports the majority of its production, are innovative and use high-technology (Cefamol, 2018). These facts justify the difference found comparing with other studies that analyze Portuguese firms.

The firm's age does not impact the total leverage but has a positive impact on long-term debt. Hypothesis 9 is not proved. Due to the reputation of creditworthiness, older firms easily access to debt, especially long-term debt. This result is consistent with the trade-off theory that argues that firms with a more stable financial situation can easily access debt and use it to benefit from tax savings.

Finally, macroeconomic variables are insignificant to explain the firm's total debt, as well as long-term and short-term debt. Although GDP positively impacts bank loans, contrary to our expectations. When GDP grows, all the economy has more resources,

banks as well. Thus, banks have more opportunity to lend money to firms, which explains this result.

The results obtained from the estimation of model 2 are presented in table 6.

Table 6: Results for the total sample

	TDebt	LDebt	SDebt	BDebt
C	3.1088 ***	0.3886 ***	2.7199 ***	0.2102 *
ExpEU	-0.0092	0.0020	-0.0112	0.0370
ExpOEU	-0.1299 **	-0.0048	-0.1251 **	0.0386
AS3	0.0931 ***	0.1677 ***	-0.0743 **	0.2067 ***
Prof	-0.0153	0.0029	-0.0183	-0.0085
GO2	-0.7146 ***	-0.6540 ***	-0.0597	-0.8662 ***
NDTS	-0.1044	-0.3488 ***	0.2443 *	-0.2404 **
LIQ	0.0000	0.0002 ***	-0.0002 **	0.0000
SR	-0.0000	-0.0000 **	0.0000	-0.0000
STR	-0.0001 *	0.0000	-0.0002 **	0.0000
Size	-0.1845 ***	-0.0187 *	-0.1658 ***	-0.0017
Age	0.0034	0.0039 *	-0.0005	-0.0007
GDP	0.0003	0.0014	-0.0011	0.0045 ***
Inflation	-0.0044	0.0013	-0.0057	0.0017
Adj. R2	74.26%	53.26%	67.08%	61.60%
F-Statistic	19.4960 ***	8.3051 ***	14.0616 ***	11.2727 ***

This table presents the results estimation of model 1. Column 1 - TDebt (total debt), column 2- LDetb (long-term debt), column 3 - SDebt (short-term debt), BDebt (bank loans debt). The explanatory variables are: expEU (export to European countries), expOEU (export to countries outside EU), AS (asset structure), Prof (profitability), GO (growth opportunities), NDTS (non-debt tax shields), Liq (liquidity), SR (Solvency ratio), STR (structure ratio), size, age, GDP (gross domestic product growth), Inflation (inflation rate).
 *, **, *** Significant at the 10%, 5% and 1% levels, respectively.

When we analyze if exports intensity is for European or non-European countries the previous results are found. The model is still relevant, and its explanatory power is similar.

Moreover, we verify that firms that export more to non-European countries have less leverage (total debt), as it is expected in hypothesis 1c. Due to the uncertain of these countries, the distance and the differences in culture, the legal system, among others, creditors are less propense to lend money to finance these firms. The same results are found to short-term debt, but the impact is insignificant to long-term and bank loans debt. When exporting, firms receive the amount in debt (part or all) in advance, and thus can pay in advance short-term obligations. Finally, exports to European countries have no impact on the firm's debt, at least at a significant level. European countries belong to the same continent, have some similar policies and legislations, have the same currency. Thus, selling to the national market or exporting to European countries is similar, at least at a debt level.

5. Conclusion

This study aims to see the determinants that influence the choice of capital structure of Portuguese firms from the mold industry. The mold industry is a high-tech and innovative sector that exports a large proportion of its production, contributing to the growth of the gross domestic product and to enrich the Portuguese country. We study an unbalanced sample of 646 firms, with a total of 4225 observations, covering a period

from 2010 until 2017. Four alternative proxies of debt intensity were used: total, long-term, short-term and bank loans debt. Moreover, 14 determinants were analyzed to see if explain firm's indebtedness: exports intensity, asset structure, profitability, growth opportunities, non-debt tax shields, liquidity, risk, size, age, and macroeconomics factors.

Regarding the results, as expected exports intensity to non-European countries (-), asset structure (+), and risk (-) impact total debt, while growth opportunities (-) and size (-) have the opposite relationship. These findings are consistent with the pecking order theory: firms have a hierarchical preference for using funds. Firms prefer to use self-funding, and when it is insufficient to finance their investments, firms look for debt. The trade-off theory is also significant to explain results as firms with more collateral, reputation and long-term relations with creditors easily access to debt as its risk of bankruptcy is smaller. Moreover, these firms want to benefit from tax savings. The relevance of these two theories proves that one singular one is insufficient to explain the results of the capital structure of Portuguese firms, at least, those of the mold industry. Similar results were found to Portugal by Vieira and Novo (2010), Proença *et al.* (2014), Vergas *et al.* (2015), Pacheco (2016) and Lisboa (2017).

Debt maturity has an impact on these results. Non-debt tax shield (-), and liquidity (+) impact long-term debt but have the opposite impact on short-term debt, following the predictions and previous researchers. Moreover, long-term debt is also explained by the firm's age. Bank loans follow the same impact of long-term debt, as the majority of non-current liabilities are loans, but exports intensity also impacts it in a positive way.

Our results provide some insights to characterize the Portuguese firms from the mold industry. We show that these firms are, in mean, highly indebted and most part of it is short-term debt. This can be explained due to the difficulty of these firms to access to long-term debt, not only because of their risk but also due to its dimension (firms are small and medium size). Moreover, we prove that firms prefer to use internal capital (self-funding) and when it is not enough, then they look for debt. We validate that when gross domestic product grows, banks may have more money to lend to firms and then firm's bank loans increase.

Results also evidence the more relevant determinants affecting capital structure decisions, namely exports intensity, asset structure, non-debt tax shields, liquidity, risk, growth opportunities, size, age and macroeconomic factors. These outcomes are relevant to firm's managers, as they can understand when and why their indebtedness should increase. The association of the mold industry can also use this information, especially to guarantee better conditions of loans or other credits for firms of this industry, defending the better solutions for them. The government and other regulators can understand that firms are not homogeneous and depending on the industry de financial situation can be singular. Finally, this study contributes to academic as it explores a group of firms more homogeneous, with similar characteristics, avoiding biased results due to heterogeneities among different industries. Most studies focus on a whole country or group of countries. Moreover, this industry has a great contribution to the gross domestic product and the sustainability of the country. This study focusses on small and medium size enterprises (SME), and most studies analyze listed firms that are not representative of the country's companies. In Portugal, SMEs represent 99% of the firms. We also take into account exports intensity and the markets to where companies

export (EU and non-EU) which is usually not considered but as we prove that this has an impact on debt structure.

This paper has accomplished the proposed aims. Although, as is the case with all studies, it has some limitations. We analyze a singular country and industry, which help us to avoid biased results but then we cannot extrapolate results. Moreover, we choose some determinants, but in the literature are diverse others that can be addressed to the model, substituting some of the ones included. Therefore, in the future, it would be interesting to extend this study to other countries to validate the robustness of findings.

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