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Regional Heterogeneity Impact on Capital Structure: The Case of the Textile Industry in Portugal

O Impacto da Heterogeneidade Regional na Estrutura de Capital: O Caso da Indústria Têxtil em Portugal

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Abstract

This study aims to analyze the impact of regional heterogeneity on micro, small and medium enterprises (MSMEs) capital structure. Specifically, this paper studies the regional impact on firms' indebtedness through indicators that measure regional social, economic, and financial development, and also if the determinants that explain firms' debt levels are different across regions belonging to the same country. Fixed effect models are applied to an unbalanced panel data of 1,566 firms of the manufacturing textile industry in Portugal, over the period 2015-2020. The data is collected from the SABI and Pordata databases. Results suggest that regional development, namely regional expansion, and the number of bank branches impact firms' indebtedness. These differences influence the firm's access to different financial funds and can justify the geographical concentration of firms in some regions. We also found a substitute effect of bank and trade credit but only to firms located in the Centre region.

Keywords: Capital structure, debt, regional heterogeneity, regional development, Portugal.

JEL Codes: G32, L67

Resumo

Este estudo tem como objetivo analisar o impacto da heterogeneidade regional na estrutura de capital das micro, pequenas e médias empresas. Especificamente, este trabalho analisa o impacto regional no endividamento das empresas através de indicadores que medem o desenvolvimento social, económico e financeiro regional, e também se os determinantes que explicam o endividamento das empresas são diferentes entre regiões pertencentes ao mesmo país. Para tal são analisados dados em painel não balanceado de 1.566 empresas da indústria transformadora têxtil em Portugal, no período 2015-2020, através de modelos com efeitos fixos. Os dados foram recolhidos nas bases de dados SABI e Pordata. Os resultados sugerem que o desenvolvimento regional, nomeadamente o crescimento regional e o número de agências bancárias têm impacto no endividamento das empresas. Estas diferenças influenciam o acesso da empresa a diferentes formas

de financiamento e podem justificar a concentração geográfica das empresas em algumas regiões. Encontrámos também um efeito substituto do crédito bancário e comercial, mas apenas para empresas localizadas na região Centro.

Palavras-Chave: Estrutura de capital, endividamento, heterogeneidade regional, Portugal.

Códigos JEL: G32, L67

1. INTRODUCTION

Capital structure is not a new theme, but there is still interest in understanding the determinants that explain firms' capital structure decisions (Gajdosikova & Valaskova, 2022). Initially, researchers focused on identifying firm characteristics impact on financial decisions (e.g., Harris & Raviv, 1991; Handoo & Sharma, 2014). Macroeconomic were also introduced to explain firms' indebtedness, as firm decisions depend on the country's economic context (e.g., Terra, 2007; Bernardo et al., 2018). Then, some studies focused on the importance of institutional factors by analyzing cross-country samples (e.g., De Jong et al., 2008; Psillaki & Daskalakis, 2009; Shahzad et al., 2021). More recently, studies focused on cross-regional differences to explain firms' financing patterns, especially for small and medium enterprises (SMEs) (e.g., Butzbach & Sarno, 2019; Ozturk & Yasuda, 2023).

The region where the firm is located may influence funding patterns since not all regions give access to the same economic and social opportunities. Geographical concentration exists, and economic activity is more relevant in specific areas, which creates imperfect competition across firms and disparities regarding regional development (Ascani et al., 2020). Palacín-Sánchez et al. (2013) argued that regional heterogeneity impacts the choice of SMEs' capital structure as it is a combination of several factors. Therefore, this study aims to expand the financial literature on capital structure thematic by understanding the regional influence on the capital structure.

There is an increasing interest in the regional impact on capital structure (see Palacín-Sánchez et al., 2013; Palacín-Sánchez & Di Pietro, 2016; Matias & Serrasqueiro, 2017; Di Pietro et al., 2018; Butzbach & Sarno, 2019; Di Pietro et al., 2019; Ozturk & Yasuda, 2023). This work is distinguished from the existing ones, especially from the work of Matias and Serrasqueiro (2017), who analyze Portuguese SMEs, and Granado et al. (2022) who analyze Portuguese firms from the textile industry. First, we use a more recent period (2015-2021).

Second, we not only focus on total debt and debt maturity (short and long-term debt) but also on specific cases of debt, namely bank credit and trade credit that are less analyzed by researchers but are especially relevant to SMEs. Palacín-Sánchez et al. (2019) argued that bank and trade credits are the two most important forms of financing for small firms. This fact was also confirmed by Berger and Udell (1998) who found that small businesses are financed by owner's equity, loans or credit card debt, and commercial credit. However, trade credit can be dependent on the relationship between the firm and suppliers, which also can justify the spatial concentration of firms in some regions.

Third, more than splitting the sample into regions and comparing the differences in the determinants that explain capital structure as Matias and Serrasqueiro (2017) and others have done, we have introduced quantitative variables that reflect regional economic and social development to understand its impact on capital structure. Ho and Wilhelmsson (2022) show that new firms appear in regions where there is accessibility to bank branches. Therefore, we intend to analyze if the regional development impacts firms' capital structure, which can explain why firms are more located in some regions. Brenner and Niebuhr (2021) argue that there is a need for new policies and strategies to foster the development of some lagging regions. This work gives insights that can give some clues about what is needed to develop some regions.

Finally, control variables to deal with firms' specific characteristics (profitability, size, age, asset structure, growth opportunities, liquidity, and non-debt tax shield), as well as macroeconomic factors (GDP growth and inflation rate), are also added as there is a broad consensus on those factors that show a significant impact on debt (e.g., Bernardo et al., 2018).

To accomplish the work's aim, an unbalanced panel data of 1,566 Portuguese firms from the textile industry is analyzed during the period 2015-2020. To explain capital structure, regional factors that measure its economic and social development, as well as firm's specific determinants and macroeconomic factors are included. The models are estimated for the total sample and per region.

After this introduction topic, where the aim of the study is presented, the literature review appears in section 2. Then, the sample, variables, and methodology are presented. Results are shown and discussed in section 4. Finally, section 5 concludes the study.

2. LITERATURE REVIEW

Capital structure is related to firms' funding options – equity and liabilities, to finance their assets (Shahzad et al., 2021). It impacts the firm's future financial sustainability since an accurate financial mix influences its financial stability and profitability (Gajdosikova & Valaskova, 2022). Some authors have tried to find a theory to explain the optimal capital structure, while others have focused on understanding which determinants are more relevant to explain the firm's capital structure. Even if several works analyze this theme, no conclusive evidence has been reached, as it can depend on the country, industry, and/or regional specificities.

2.1. Capital structure theories

The classic theory, proposed by Durand (1952), argues that there exists an optimal capital structure that allows for maximizing the firm value and minimizing the weighted average cost of capital, through the optimal combination of debt and equity. Later, Modigliani and Miller (1958), under a set of assumptions, report that a firm's capital structure has no impact on its value. However, in 1963 the same authors introduced the assumption of the tax benefits of debt and argued that the firm value increases with debt due to tax savings (Modigliani & Miller, 1963).

DeAngelo and Masulis (1980) developed the trade-off theory that argues that the optimal capital structure results from the balance between the advantages of debt (tax benefits of debt) and its costs and risks (of financial distress).

The agency theory (Jensen & Meckling, 1976) argues that debt is an external mechanism to reduce the conflict of interest between shareholders (the principal) and managers (the agent) by decreasing free cash flows available. Although another type of agency cost appears, between shareholders and creditors/debtholders (Jensen & Meckling, 1976). Higher levels of debt increase creditors' losses in case the firm fails its debt covenants. Thus, equity and debt should be balanced to minimize the total agency costs.

The pecking order theory did not establish an optimal capital structure but adjusted their financial decisions to a hierarchy of funds as a result of cumulative funding needs (Myers, 1984). First, managers prefer to use internal funds - self-funding, to maintain the firm's control. When these sources are scarce, firms resort to external funds, starting with debt and, if the need persists, issuing new equity. This choice is justified by the information asymmetry as managers hold private information about the firm (Myers, 1984; Fama & French, 2002). This is particularly relevant to SMEs as their information is opaquer than to large firms (Palacín-Sánchez et al., 2013) and the degree of uncertainty about public information is greater (Serrasqueiro & Caetano, 2015).

To listed firms, there is also the market timing theory, proposed by Baker and Wurgler (2002) which advocates that firms issue shares (replacing debt) when market value increases. According to this theory, there is no ideal capital structure, but funding decisions result from the fluctuations of the firm's value in the financial market.

2.2. Regional impact on capital structure

Economic and social differences across regions influence the availability of funds to firms, especially to SMEs which have pronounced problems of asymmetric information (Serrasqueiro and Caetano 2015; Di Pietro et al. 2018).

Some studies focus on comparing SME financing decisions between different regions (e.g., Palacín-Sánchez et al., 2013; Matias & Serrasqueiro, 2017; Butzbach & Sarno, 2019; Ozturk & Yasuda, 2023), while others focus on regional development by understanding the impact of some factors as regional GDP, number of bank branches and banking concentration per region (Palacín-Sánchez & Di Pietro, 2016; Di Pietro et al., 2018; Di Pietro et al., 2019). A firm's access to different financial sources may depend not only on the region itself, due to the industry concentration, but also on its economic and social development, as firms have different opportunities whether located in more (or less) developed regions.

Palacín-Sánchez et al. (2013) found differences in debt levels across regions and that firm-factor determinants impact capital structure depending on the region analyzed. The authors justified these differences with regional singularities concerning economic development, financial system structure, tax systems, and/or cultural aspects. A similar analysis was done by Matias and Serrasqueiro (2017) that found that on Portuguese firms debt ratios are affected by the same determinants, but there are differences in debt levels across regions. Butzbach and Sarno (2019) argue that firms in underdeveloped regions (in southern Italy) have more difficulty to access to debt, presenting higher levels of equity than other Italian regions. Ozturk and Yasuda (2023) found some similarities between prefectures regarding some firm-specific determinants that explain firms' capital structure. Moreover, the authors analyze pairs of prefectures and found that there is no clustering and there are similarities across prefecture pairs.

Other studies introduced regional quantitative factors as explanatory factors of firms' capital structure. Palacín-Sánchez and Di Pietro (2016) showed that the regional financial sector and the number of bank branches, impacts SMEs' debt levels. Moreover, the higher concentration of bank branches leads to a decrease in the level of indebtedness. Di Pietro et al. (2018), analyzing Spanish SMEs, found that the regional institutional environment is relevant to explaining debt levels. Less developed regions resort more to debt to invest, due to the lack of internal sources of financing. Di Pietro et al. (2019) also identified regional differences in capital structure of Italian SMEs. A more developed financial sector, as well as regional economic development, has a positive impact on debt levels, as firms have more investment opportunities and the contact with local banks favors the use of debt as a financial source. However, the existence of a concentrated banking market reduces the use of debt since banks ask for less information opacity, which is difficult in SMEs. The authors suggest that regional differences in SME leverage could influence regional economic resilience.

The previous studies mainly focus on Italy, Spain, and Portugal, as these three countries are characterized by substantial differences among regions concerning social and economic development (Butzbach & Sarno, 2019). Only in countries with great differences between geographical areas is relevant to explain its impact on the firm access to external finance.

3. METHODOLOGY

3.1. Sample

This work aims to understand the regional heterogeneity impact on the capital structure of Portuguese MSMEs in the textile manufacturing sector.

In Portugal, MSMEs are 99,9% of Portuguese firms (Pordata, 2023). The capital market is small and relatively underdeveloped compared to other large European countries or the U.S.A. Firms financial sources are mainly owners' equity, trade credit, or bank credit (Palacín-Sánchez et al., 2019). In small firms, the owner is usually the firm manager, and information is not transparent (La Porta et al., 1998). Therefore, these firms are especially financially vulnerable due to financing constraints.

A specific industry - the textile manufacturing industry, is analyzed as firms from the same industry tend to adopt similar financing patterns (La Rocca et al., 2011). Moreover, the firm's variables and agency conflicts are also influenced by the industry in which the firm operates (Di Pietro et al., 2018). Textile manufacturing is one of the oldest and most traditional industries operating in Portugal and is still one of the most relevant (Granado et al., 2022). This industry contributes to Portuguese internationalization, through exports, especially to Spain, France, the U.S.A, Germany, and the U.K., but also imports of materials from Spain, Italy, India, Germany, and

China. Moreover, it contributes to employment, to gross value added (GVA), and to gross domestic product (GDP) (DGAE, 2018).

This industry is present in all of the seven regions of NUTS II (Nomenclature of Territorial Units Statistics) in Portugal: North, Centre, Lisbon, Alentejo, Algarve, Azores and Madeira, which allows the analysis of regional influence. However, most of the textile manufacturing industry is located in the North region (around 68% of the firms in this industry) (INE, 2023) showing the existence of geographical concentration of industries.

There are significant disparities across the Portuguese regions. The next table shows some information per region (average values of 2015-2020).

Table 1: Information per Portuguese region

	North	Centre	Lisbon	Alentejo	Algarve	Azores	Madeira
Firms per Km2	19.9	9.3	118.1	2.7	14.1	11.8	33.5
Firms per 1,000 inhabitants	11.9	11.7	12.5	11.7	15.9	11.3	10.6
GDP growth	2.98	2.92	2.18	1.90	2.85	2.10	1.22
Grant credit/GDP	0.92	0.64	1.82	0.68	0.71	0.90	0.64
Number of bank branches per 1,000 inhabitants	0.05	0.09	0.02	0.13	0.10	0.07	0.09

Source: Data collected from the Pordata database

Most of the Portuguese businesses are in the Lisbon region (which includes the Portuguese capital - Lisbon) and the North region (which includes the second highest city - Oporto). In Lisbon and Oporto, the existence of airports and ports makes it easy to import and export (Banco de Portugal, 2023). This fact is confirmed by the analysis of the previous table as most of the firms per km2 are located in the Lisbon region, followed by Madeira and the North regions. On the opposite, Alentejo is the region with fewer firms per km2. If we analyze the number of firms per inhabitant the majority is in the Algarve region, which is a tourist region, with sun and beach, followed by the Lisbon region.

Analyzing GDP growth, the North and Centre regions are the ones with more economic development (from 2015 to 2020). However, the Lisbon region is still the one that grants more credit over GDP. Finally, analyzing the number of banks per 1,000 inhabitants, the highest value is in the Alentejo region, which can be justified as it is a region with few inhabitants and a high dimension regarding km2. These conclusions suggest that there may exist advantages to industries being concentrated in some regions, for example, the access to specialized workers, and the closest relationship with suppliers and customers. Ascani et al. (2020) argue that there exists a spatial agglomeration of economic activities, contributing to the geographical concentration of firms and persons.

Macroeconomic and regional data was collected in the Pordata database, while firms' financial data was collected from the SABI database (Iberian Balance Sheet Analysis System) from Bureau Van Dijk. Only MSMEs were selected, as large-size firms have different opportunities to access capital markets and the main focus is the maximization of the firms' value, while MSMEs also focus on non-monetary aims to fulfill the personal objectives of their owners/managers (Matias & Serrasqueiro, 2017). Therefore, selected firms are the ones with less than 250 employees, whose turnover does not exceed 50 million euros, or whose total balance sheet does not exceed 43 million euros (Portugal 2020, 2021).

The period analyzed is 2015 to 2020. Portugal suffered a high public deficit after the international financial crisis of 2007/2008 and asked for Troika's financial support to surpass this situation. From 2011 to 2014 several contraction measures were applied (Publico, 2019). We started in 2015 to avoid the impact of the financial crisis. 2020 was the last year with available data at the moment of collection.

The final sample is an unbalanced sample, composed of 1,566 firms in the textile manufacturing industry, with a total of 8,082 observations.

3.2. Measures

To measure capital structure five alternative proxies are used: total debt (TD = total liabilities divided by total assets), debt by maturity – short-term debt (STD = current liabilities divided by total assets), and long-term debt (LTD = non-current liabilities divided by total assets), and specific cases of debt – bank credit (BC = loans and similars divided by total assets) and trade credit (TC = creditors divided by total assets). All variables are based on book values, as the firms analyzed are non-listed.

Most works focus on total debt and debt by maturity (e.g., Handoo & Sharma, 2014; Matias & Serrasqueiro, 2017; Ali et al., 2022; Granado et al., 2022). Portuguese firms from the textile manufacturing industry are highly dependent on short-term debt (e.g., Granado et al., 2022), so analyzing debt by maturity is crucial. Moreover, we also use specific cases of finance, as bank and trade credits are especially relevant to small-size firms, which is the type of firms under study (Berger & Udell, 1998; Palacín-Sánchez et al., 2019). Analyzing different alternatives of financial sources helps us to understand the preferences of debt and to draw an overall picture of MSME's capital structure decisions.

The regional effect is measured in two ways: by analyzing the economic, financial, and social development of the region, and through the analysis per region of the determinants that better explain the capital structure.

- Regional GDP growth is the annual growth of GDP per region (Palacín-Sánchez & Di Pietro, 2016; Di Pietro et al., 2019).
- Number of bank branches is the natural logarithmic of the number of bank branches (Palacín-Sánchez & Di Pietro 2016; Di Pietro et al. 2019).
- Number of bank branches per inhabitant is the number of bank branches divided by 1000 inhabitants (Palacín-Sánchez et al. 2013; Di Pietro et al. 2019).
- Bank deposits over GDP is the total bank deposits divided by the regional GDP (Palacín-Sánchez & Di Pietro 2016; Di Pietro et al. 2018)

As control variables we include: 1) firms' characteristics, namely: profitability (Earnings Before interests and taxes divided by total assets), firm' size (natural logarithm of total assets), firm age, asset structure (fixed assets divided by total assets), growth (annual growth of total assets), liquidity (current assets divided by current liabilities), non-debt tax shields (depreciations divided by total assets); 2) macroeconomic factors: GDP annual growth and inflation rate. These determinants were frequently used by previous researchers and are relevant to explain SMEs capital structure (e.g., Psillaki & Daskalakis 2009; Palacín-Sánchez et al. 2013; Matias & Serrasqueiro 2017; Shahzad et al. 2021; Ozturk & Yasuda 2023).

3.3. Data analysis

Figure 1 shows the conceptual model that this study aims to analyze.

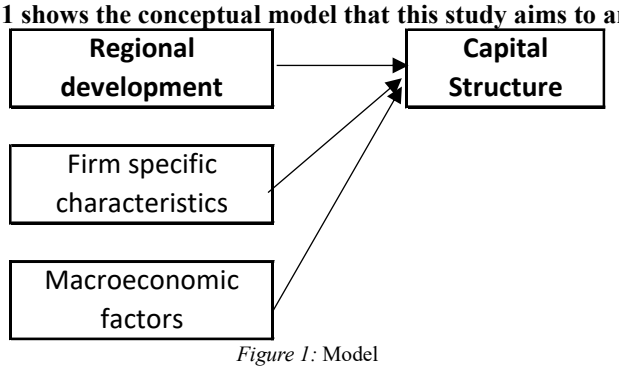


Figure 1: Model

The panel data methodology is used since it reduces collinearity problems and incorporates more degrees of freedom and heterogeneity control (Palacín-Sánchez & Di Pietro, 2016). Several authors such as Palacín-Sánchez et al. (2013), Matias and Serrasqueiro (2017), and Shahzad et al. (2021) used the same methodology for similar studies.

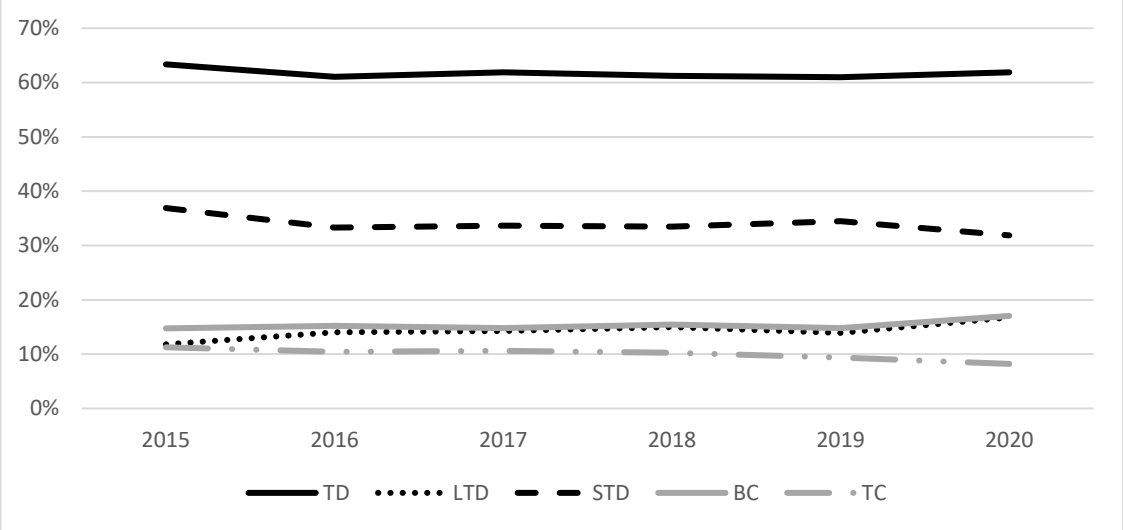
The F Test, the Breusch-Pagan Test, and the Hausman Test are estimated to understand which is the most accurate estimation method: OLS, fixed or random effects.

4. RESULTS

4.1. Sample characterization

The Kolmogorov-Smirnov test showed that the variables are not normally distributed, so the results are compared through median values. The next figure shows the evolution of the median value of the five proxies of capital structure.

Figure 2: Evolution of the median value of capital structure proxies



Note: BC: bank credit; LTD: long-term debt; STD: short-term debt; TC: trade credit; TD: total debt.

Figure 2 shows that Portuguese MSMEs from the textile industry prefer short-term debt over long-term debt. Similar results were found by Granado et al. (2022). Debt levels remain more a less constant over the period analyzed (2016-2020). In 2019 short-term debt slightly decreased and long-term debt suffered the opposite effect, mainly due to the pandemic caused by COVID-19, which caused financial instability. Bank credit is similar to long-term debt, suggesting that when resorting to long-term debt, firms prefer bank loans. Finally, trade credit is residual, suggesting that firms prefer another source of finance than suppliers' credit.

Figure 3: Median value of total debt by region

Figure 3 shows the information on the median values of the capital structure proxies per Portuguese region.

Comparing total debt by region (figure 3), Madeira is the region with the highest indebtedness, followed by Lisbon and Alentejo regions. Azores is the region with lower debt levels but is also the one with less representation in the sample.

4.2. Descriptive statistics

The next table presents the descriptive statistics, namely: mean, median, standard deviation (std. Dev.), minimum, and maximum, for the variables of this study.

Table 2: Descriptive Statistics

	Mean	Median	Std. Dev.	Minimum	Maximum
TD	0.6304	0.6160	0.3411	0.0057	1.9943
LTD	0.2225	0.1435	0.2612	0.0000	1.9571
STD	0.4078	0.3378	0.2980	0.0000	1.9928
BC	0.2140	0.1533	0.2335	0.0000	1.7718
TC	0.1625	0.0997	0.1866	0.0000	1.9329
Regional GDP growth	2.8116	4.3000	3.8363	-15.0000	8.4000
Ln (N. BB)	7.2251	7.2654	0.2890	4.5539	7.4431
N.BB per inhab.	0.0489	0.0461	0.0204	0.0039	0.5164
B Dep/GDP	1.0026	0.9604	0.1166	0.6412	1.7481
Profitability	0.0364	0.0345	0.1645	-2.5044	1.3884
Size	12.9651	12.8026	1.7725	6.7520	19.5288
Age	20.2022	17.0000	16.7621	1.0000	115.0000
Asset Structure	0.2644	0.2158	0.2269	0.0000	0.9916
Growth Opp.	0.2053	0.0350	1.8898	-0.8573	93.4287
Liquidity	3.8742	1.9255	8.6319	0.0000	191.2321
NDTS	0.0425	0.0326	0.0412	0.0000	0.5568
GDP growth	0.6164	2.6800	4.2617	-8.4400	3.5100
Inflation	0.6264	0.5000	0.4627	0.0000	1.4000

Note: B Dep/GDP: bank deposits divided by GDP; BC: bank credit; Growth Opp: Growth opportunities; LTD: long-term debt; N. BB: Number of bank branches; N.BB per inhab: Number of bank branches per 1,000 inhabitants; NDTS: Non debt tax shields; STD: short-term debt; TC: trade credit; TD: total debt.

In the median, 62% of firms' total assets are financed through liabilities. While some firms in the textile industry do not depend on debt, others present negative equity, as the maximum of total debt (TD) is higher than 100%. According to Banco de Portugal, in 2020, on average, small and medium-sized companies in the textile manufacturing sector had around 56% of total debt (Banco de Portugal, 2023), which is slightly lower than that presented (it only refers to one year while we are analyzing a 6-year horizon).

Short-term debt is predominant, with a median of 34% over total assets, while long-term debt weighs 14%. This conclusion corroborates previous findings that firms from the textile industry prefer short-term debt over long-term debt (Granado et al., 2022), and have more difficulties in accessing long-term debt (Serrasqueiro et al., 2016). Bank loans finance (in median) 15% of firms' total assets. Trade credit represents around 10% of total assets which is slightly smaller than the results presented by the Bank of Portugal in 2020 - small and medium-sized companies in the textile manufacturing sector had 15% of trade credit (Banco de Portugal, 2023). Berger and Udell (1998) argue that small businesses are financed by owner's equity, loans, or credit card debt, which is in line with our results.

During the period analyzed, regional GDP growth was positive, but the period analyzed included downturns and upturns. There is also some volatility among the sample (as we saw in Table 1), showing regional disparities.

Bank concentration, measured by ln (number of bank branches) is 7.27, which is similar to those obtained in Italy - 6.40 (Di Pietro et al., 2019), but smaller than the one obtained in Spain - 10.05

(Palacín-Sánchez & Di Pietro, 2016). When dividing the number of bank branches per 1,000 inhabitants the median value is small (0.05), suggesting that there are few bank branches per inhabitants, especially compared to Spain where the mean value was 0.336 (Palacín-Sánchez et al., 2013). The bank deposits over GDP are around 0.96 (median value), which is similar to the value of Italy – 0.94 (Di Pietro et al., 2018), and higher than the value of Spain - 0.84 (Palacín-Sánchez & Di Pietro, 2016).

Moreover, firms from the textile industry are on average profitable, but there is a high dispersion of the data, meaning that not all follow this tendency. Analyzing the variable size shows that there are micro firms but also some medium-sized ones. Firms are around 20 years old (the oldest is 115 years old). The asset structure indicates (median) that 22% of the assets of textile manufacturing firms are fixed assets. Most of the firms present growth opportunities, but there are discrepancies among the sample. Liquidity is in mean and median positive, and higher than 1, suggesting that current assets are sufficient to cover short-term obligations (current liabilities). Finally, depreciations represent around 3% of total assets (median).

In what concerns macroeconomic variables, country GDP growth is smaller (median value) than regional GDP growth, which confirms regional differences. The inflation rate was similar during the period analyzed.

We performed the correlation matrix as well as the VIF (Variance inflation factor) analysis to identify multicollinearity problems[1]. There is a high correlation between regional GDP growth and GDP growth, so we decided not to include the macroeconomic variable GDP growth. The other variables are not highly correlated and neither present a VIF higher than 4.

4.3. Model results

Table 3 reports the estimation results for the total sample, to each capital structure proxy. All models were estimated using fixed effects, as it was the more accurate estimation method.

Table 3: Results for the total sample

	TD	LTD	STD	BC	TC
c	0.4203	−0.5191	0.9394 ***	−0.9703 ***	−0.2615
Reg. GDP growth	−0.0023	−0.0036 ***	0.0013	−0.0035 ***	0.0007
Ln (N. BB)	0.1066 ***	0.0508 *	0.0558 *	0.0787 ***	0.0661 ***
N.BB per inhab.	−0.4110 *	−0.4142 *	0.0032	−0.3939 *	0.0185
B Dep/GDP	−0.0681	−0.0088	−0.0593	−0.0527	−0.0144
Profitability	−0.3647 ***	−0.1431 ***	−0.2215 ***	−0.1476 ***	−0.0991 ***
Size	−0.0315 **	0.0258 **	−0.0573 ***	0.0454 ***	0.0050
Age	−0.0164	−0.0011	−0.0153	0.0200	−0.0231 **
Asset Structure	0.1000 ***	0.2713 ***	−0.1713 ***	0.2353 ***	−0.1106 ***
Growth Opp.	0.0043 **	0.0023 *	0.0020	0.0005	0.0024 *
Liquidity	−0.0042 ***	0.0034 ***	−0.0076 ***	0.0006	−0.0024 ***
NDTS	−0.2760 **	−0.1040	−0.1720	−0.0884	−0.1974 **
Inflation	−0.0005	0.0106 ***	−0.0110 ***	0.0023	0.0055 **
F-test	21.6335 ***	17.2310 ***	18.0635 ***	16.1205 ***	14.0816 ***
Breusch-Pagan test	9637.38 ***	7227.27 ***	6345.67 ***	7955.09 ***	7699.75 ***
Hausman test	67.4361 ***	42.4280 ***	57.9302 ***	38.3398 **	43.4678 ***

Note: B Dep/GDP: bank deposits divided by GDP; BC: bank credit; Growth Opp: Growth opportunities; LTD: long-term debt; N. BB: Number of bank branches; N.BB per inhab: Number of bank branches per 1,000 inhabitants; NDTS: Non debt tax shields; Reg. GDP Growth: Regional GDP growth; STD: short-term debt; TC: trade credit; TD: total debt.

*, **, *** represent a level of 10%, 5% and 1%, respectively.

Results of Table 3 show that not all variables are relevant to explain all capital structure proxies, but when relevant they usually have the same impact, with some exceptions (the control variables: size, asset structure, liquidity, and inflation).

Regional GDP growth negatively explains long-term debt and bank credit. In periods of regional growth, firms increase earnings and can use self-funding to finance their financial needs. Therefore, bank credit and long-term debt (which is mainly composed of bank credit) decrease. This conclusion is in line with the pecking order theory but is the opposite found in Spanish firms (Palacín-Sánchez & Di Pietro, 2016) and Italy (Di Pietro et al., 2019), suggesting specific particularities of Portuguese firms.

[1] Results under request

Regarding the number of bank branches, it positively explains all proxies of debt. Results indicate that the higher the number of bank branches the more the firm's indebtedness. Similar results were found by Palacín-Sánchez and Di Pietro (2016) and Di Pietro et al. (2019), who suggest that more bank branches contribute to decreasing information asymmetries and agency problems.

When the number of bank branches is divided by 1,000 inhabitants, the impact is negative to explain total debt, long-term debt, and bank credit. Table 1 shows that the number of bank branches per 1,000 inhabitants is smaller in regions with more firms per Km2, suggesting that in regions with more persons, there are fewer bank branches, making it more difficult to access bank credit and long-term debt.

The last variable that measures regional economic and social development – bank deposits over GDP, does not impact any capital structure proxy.

Analyzing the control variables, profitability negatively impacts all proxies of capital structure. Profitable firms have more self-funding, so according to the pecking order theory, will use less debt to fulfill financial needs. Similar conclusions were found by Matias and Serrasqueiro (2017) and Shahzad et al. (2021).

Size positively impacts long-term debt and bank credit but negatively impacts total debt, short-term debt, and trade credit. Previous studies also found that the size effect is related to debt maturity. Large-size firms have less information asymmetries and uncertainties so have more ability to access long-term debt and bank loans and prefer to resort to it instead of short-term debt to benefit from tax savings (Rajan & Zingales, 1995; Matias & Serrasqueiro, 2017). This result is in line with the trade-off and the agency theories.

Older firms use less trade credit. These firms usually have more self-funding, according to the pecking order theory, so have fewer financial needs and can pay early to suppliers. Even if some researchers found that age impact depends on debt maturity (e.g., Matias & Serrasqueiro, 2017), our results do not corroborate that finding.

Asset structure positively impacts total debt, long-term debt, and bank credit, while negatively impacts short-term debt and trade credit. Fixed assets can be used as collateral in cases of non-repayment of a debt. Therefore, firms can easily access bank credit, which is most of the long-term debt. This positive impact is suggested by the trade-off, the pecking order, and the agency theories. To short-term credits, the result is the opposite as suppliers and similar prefer firms with higher liquidity as can easily repay the firm's short-term covenants. Similar conclusions were found by Palacín-Sánchez et al. (2013), Serrasqueiro et al. (2016), and Ali et al. (2022).

Growth opportunities positively impact total debt, long-term debt, and trade credit, in line with the proposal of the trade-off, the pecking order, and the agency theories. To expand, firms need more funding, and so increase debt. Moreover, debt is a way to control managers' opportunism to invest in projects that only maximize self-interests, and firms can use debt to benefit from tax savings (Handoo & Sharma, 2014).

More liquid firms have more cash flows and, based on the pecking order theory, can use internal funds to cover financial needs. This impact is found in total debt, short-term debt, and trade credit. However, liquid firms have a lower risk of bankruptcy and can easily access long-term debt, benefiting from tax savings as suggested by the trade-off theory. Similar results were found by Serrasqueiro et al. (2016) and Ali et al. (2022).

The higher the weight of depreciation on total assets the less the total debt and trade credit. Depreciations are tax-deductible, acting as a substitute for debt, as suggested by the trade-off theory. To the other capital structure proxies, the impact of NDTS is not statistically significant.

Finally, the inflation rate positively impacts long-term debt and trade credit but negatively impacts short-term debt. The higher the inflation, the higher the firm's costs, which contributes to increase funding needs. Therefore, long-term debt increases as well as suppliers' credit. Although, as other short-term debtholders may also have financial needs, for short-term debt the effect is the opposite.

As a synthesis, our results show that regional economic, financial, and social development impacts firms' capital structure. Firms have different opportunities in more developed regions, which explains the geographical concentration of industries in those regions. Moreover, firm-specific characteristics as well as macroeconomic factors are also relevant to explain firms' indebtedness, but the relevance of the variables depends on the proxy analyzed. Additionally, there is no unique

theory that explains the total findings, suggesting that firms use a mix of strategies when looking for liabilities to finance their assets.

The next table shows the results of the estimated model per region. The results are presented to the North, Centre, and Lisbon regions, separately, and to other regions, which include Alentejo, Algarve, Madeira, and Azores, since there were few observations in all these regions. The estimation method depends on the proxy and region analyzed and it is identified on the table.

Analyzing Table 4 we see that there are some regional differences. The relevance of the variables that explain each capital structure proxy depends on the region analyzed. Regional GDP growth positively explains short-term debt to the Lisbon region, and trade credit to the Centre region. However, regional GDP negatively explains bank credit to the Centre region. This finding is new since to the total sample, this variable causes a negative impact on long-term debt and bank credit. In periods of regional expansion, firms located in the Lisbon region increase short-term debt as their investments usually increase. In the Centre region, firms look more for trade credit to the detriment of bank credit, suggesting a substitute effect of these specific cases of finance. This fact suggests that not all regions perform in the same way, and there are specific singularities.

The number of bank branches only explains the total debt of other regions and bank credit to firms located in the Centre region, while the number of bank branches per 1,000 inhabitants is special relevant to explaining total debt, long-term debt, and bank credit in other regions, but it also explains trade credit to firms located in Lisbon region.

The variable bank deposits over GDP, which was insignificant to the total sample, positively explains total debt and short-term debt to the Lisbon region, bank credit to firms located in the North region, and trade credit to firms in the Centre region. As there is more money available, firms can easily access debt as suggested by Palacín-Sánchez and Di Pietro (2016) and Di Pietro et al. (2018). Again, to firms located in the Centre region, the impact is the opposite of bank credit, corroborating the substitute effect between bank and trade credit in this region.

Regarding the control variables, when relevant to explain capital structure proxies, are in line with the findings of the total sample. The main difference is the variable age, which presents contradicting signs depending on the region analyzed.

As a synthesis, only the Centre region presents a substitute effect between bank and trade credits. To the other regions, this impact is not relevant, suggesting some particularities of this region.

Table 4: Results per region

	Total Debt				Long-term Debt				Short-term Debt			
	North	**Centre**	**Lisbon**	**Other**	**North**	**Centre**	**Lisbon**	**Other**	**North**	**Centre**	**Lisbon**	**Other**
c	−1.0841	0.5305	1.0730	1.0138	−0.0056	0.0419	0.0825	−0.0536	−1.0785	0.4886	0.1733	1.0674
Reg. GDP growth	0.0053	−0.0057	0.0035	−0.0051	−0.0051	−0.0091	−0.0017	−0.0026	0.0104	0.0034	0.0066 *	−0.0025
Ln (N. BB)	0.5882	0.1850	−0.0114	0.6414 *	−0.2575	0.1449	0.0540	0.0463	0.8457	0.0401	0.0238	0.5951
N.BB per inhab.	−58.5831	−3.7789	−6.2847	−0.4964 **	38.2341	−3.2951	−3.3461	−0.4402 **	−96.8172	−0.4838	−4.8915	−0.0561
B Dep/GDP	0.5175	−0.1806	0.3840 ***	−0.2296	−0.1447	−0.2055	0.0827	−0.0817	0.6621	0.0249	0.3707 *	−0.1479
Profitability	−0.3744 ***	−0.1672 *	−0.4259 ***	−0.7135 ***	−0.1532 ***	−0.0301	−0.2345 **	−0.1032	−0.2212 ***	−0.1370 **	−0.3295 ***	−0.6104 ***
Size	−0.0246 *	−0.0555	−0.0359	−0.3342 ***	0.0320 **	−0.0300	−0.0164	0.0150	−0.0565 ***	−0.0255	−0.0043	−0.3491 ***
Age	−0.0208	0.0088	−0.0943 ***	0.2383 *	−0.0015	0.0004	−0.0721 ***	0.0135	−0.0194	0.0084	−0.0409	0.2248 **
Asset Structure	0.0954 ***	0.0443	0.1192 *	0.5283	0.2694 ***	0.2342 *	0.2044 *	0.5929 ***	−0.1740 ***	−0.1898	−0.1399	−0.0646
Growth Opp.	0.0037 *	0.0634	−0.0006	0.0612 **	0.0020	0.0642	−0.0028	−0.0194	0.0017	−0.0008	0.0016	0.0806 ***
Liquidity	−0.0047 ***	−0.0028 **	−0.0047 *	0.0004	0.0027 ***	0.0059 ***	0.0032	0.0003	−0.0074 ***	−0.0087 ***	−0.0125 **	0.0001
NDTS	−0.2390	0.5846	−0.4862	−3.3824 ***	−0.0946	0.3451	0.2709	−2.4992 **	−0.1444	0.2395	−0.6487	−0.8832
Inflation	−0.0026	0.0056	−0.0047	−0.0250	0.0135 **	0.0224	0.0388 *	−0.0701	−0.0162 **	−0.0168	−0.0363 *	0.0451
F-test	19.4156 ***	2.0811 **	4.7600 ***	19.5147 ***	16.2457 ***	2.3295 **	1.4132	5.0221 ***	15.7214 ***	2.1935 **	3.3807 ***	39.9988 ***
Breusch-Pagan t.	8062.1800 ***	739.7230 ***	434.3470 ***	67.5453 ***	6429.3700 ***	593.6180 ***	178.6330 ***	47.4390 ***	5236.6600 ***	325.4850 ***	377.8830 ***	57.9112 ***
Hausman test	59.7670 ***	31.4888 **	16.9213	88.1386 ***	40.5757 ***	29.5006 ***	21.1455 **	26.6637 ***	58.0570 ***	50.7100 ***	16.5880	172.3120 ***
Method	FE	FE	RE	FE	FE	FE	OLS	FE	FE	FE	RE	FE

	Bank Credit				Trade Credit			
	North	**Centre**	**Lisbon**	**Other**	**North**	**Centre**	**Lisbon**	**Other**
	−2.7213 **	−2.3701	−9.0166	0.5053	−0.9787	−0.0095	−0.5430	0.0519
Reg. GDP growth	0.0060	−0.0109 ***	−0.0152	−0.0029	0.0036	0.0066 **	0.0019	−0.0019
Ln (N. BB)	0.6409	0.5733 **	2.5451	0.0025	0.3348	−0.0446	0.09939	0.1028
N.BB per inhab.	−68.0148	−13.4403	−528.0250	−0.3662 *	−32.6879	4.5668	−8.9181 **	0.0201
B Dep/GDP	0.6889 *	−0.4134 **	−0.3017	−0.1235	0.2038	0.2770 *	0.0721	−0.0084
Profitability	−0.1558 ***	−0.1077 **	−0.0474	−0.1079	−0.1031 ***	−0.0662 *	−0.1573 ***	−0.0149
Size	0.0483 ***	−0.0075	0.0379	−0.0223	0.0082	−0.0127	0.0249	−0.0425
Age	0.0132	0.0895	0.0360	0.0498	−0.0192 *	−0.0188	−0.0770 ***	0.0056
Asset Structure	0.2318 ***	0.2445 **	0.1450	0.7325 ***	−0.1172 ***	−0.0795	−0.1180 **	−0.0509
Growth Opp.	0.0000	0.0465	−0.0007	−0.0177	0.0023 *	0.0109	0.0018 ***	0.0050
Liquidity	0.0002	0.0015	0.0029	−0.0002	−0.0026 ***	−0.0022 ***	−0.0025 *	−0.0000
NDTS	−0.0977	0.1881	0.3900	−2.4374 **	−0.1922 **	−0.1578	−0.2406	−0.0121
Inflation	−0.0018	0.0125	0.0441	−0.0481	0.0022	−0.0001	0.0048	0.0137
F-test	15.4370 ***	2.9189 ***	1.8371 *	6.8265 ***	12.3486 ***	4.3928 ***	4.2054 ***	90.5222 ***
Breusch-Pagan t.	6824.45 ***	656.745 ***	267.510 ***	35.1999 ***	6543.33 ***	445.234 ***	270.104 ***	101.79 ***
Hausman test	47.3983 ***	23.6087 **	23.9180 **	35.5799 ***	42.9207 ***	43.9539 ***	11.0654	19.6085 *
Method	FE	FE	FE	FE	FE	FE	RE	FE

5. CONCLUSION

This work aims to understand the impact of the regional social, economic, and financial development on the capital structure of Portuguese MSMEs in the textile manufacturing industry. The theme of regional heterogeneities has been gaining more attention in the last years since it helps to explain why some regions are less developed than others, and why there is a high concentration of persons and businesses in some geographical spaces (Brenner & Niebuhr, 2021). In Portugal, regional differences exist, with some regions more developed than others.

To have an overall picture of firms' indebtedness, five alternative proxies of the capital structure were used: total debt, long-term debt, short-term debt, bank credit, and trade credit. Conclusions are singular depending not only on debt maturity ratios, which are analyzed by the majority of studies, but also when the specific cases of debt: bank loans, or commercial credit are studied. MSMEs are highly dependent on short-term debt but also on trade credit, and access to bank loans not always is easy. Therefore, understanding different types of capital structure is relevant. Moreover, this study allows us to understand whether bank and trade credit are substitutes or complementary. In our case, the substitute effect of bank credit and trade credit exists only for firms located in the Centre region.

As explanatory determinants, specific variables to measure regional development were used, namely regional GDP growth, number of bank branches, number of bank branches per 1,000 inhabitants, and bank deposits over GDP. Additionally, the analysis was made per region to understand regional impacts. There is no consensus on how to measure regional impact on firms' indebtedness. Most works focus on analysis per region, but our results show that specific variables of regional development are relevant to explain firms' indebtedness. Although, the impact depends on the proxy analyzed and the region study. Regional expansions negatively impact long-term debt and bank credit. When splitting the sample into regions this impact is only found in the Centre region and to explain bank credit. The opposite effect is found in short-term debt to the Lisbon region and trade credit to the Centre region. The number of bank branches also contributes to increased debt levels, but when analyzing the variable per 1,000 inhabitants the impact is the opposite as in regions with more firms per km2, the number of bank branches per inhabitant is smaller. Bank deposits over GDP variables are also relevant to explain some capital structure proxies but only when each region is analyzed separately. These results are in line with previous research that found regional heterogeneity in the capital structure (e.g., Palacín-Sánchez et al., 2013; Palacín-Sánchez & Di Pietro, 2016; Matias & Serrasqueiro, 2017; Di Pietro et al., 2018; Butzbach & Sarno, 2019; Di Pietro et al., 2019; Ozturk & Yasuda, 2023). These conclusions show that more developed regions benefit firms, as they can have access to more funding alternatives, which can help to boost their activity.

Firm-specific characteristics (profitability, size, age, asset structure, growth opportunities, liquidity, and non-debt tax shields), as well as macroeconomic factors (inflation rate), are also relevant to explain MSMEs' capital structure.

This work makes several contributions to the literature by analyzing the regional impact on firms' capital structure, a thematic that is gaining prominence in the last years. We not only analyze which determinants better explain capital structure per region, as most of the works, but we analyze how regional economic and financial development impact firms' financial structure. This last impact is less explored, and as far as we know it was never explored in the Portuguese context. Additionally, we measure capital structure using five different proxies: total debt and debt by maturity, which are the most used proxies, and bank credit and trade credit, two specific cases of finance that are less explored, but which are relevant specially to small-size firms.

In addition to the adds to the literature review, this work also contributes to practice. It helps company managers understand the need to use different forms of financing and what can justify the use of one type over another. It also helps suppliers and banks to understand the financing needs of firms according to the region where they are located. The closer relationship between firms and debtholders and the development of the region impact firms' capital structure. Finally, this work contributes to the government to apply new policies that contribute to reducing regional disparities. Our results show that regions are unique, which may justify why some industries are concentrated in one region rather than another. In a country with large regional differences, the financial decisions not only involve business criteria but also institutional factors that create opportunities depending on where the firm is located.

The aims of the paper were fulfilled, but like all works, this one is not without limitations. First, only one industry from one country was analyzed which, on the one hand, avoids biased results since different sectors have different debt levels, but on the other, it does not allow the generalization of results. For future investigations, it would be interesting to analyze regional differences in other industries and countries. Additionally, other variables to measure regional development, such as the number of firms per region, distance to airports or ports, and municipal investment, could be added. Finally, the impact of internalization of firms and the impact of COVID-19 can be also relevant analysis to understand the change in debt levels and in the factors that explain it, but also the regional differences that can be enhanced in particular cases.

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