Are the determinants of debt maturity in the healthcare sector different by geographic region in Portugal? Pane Data Evidence

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Abstract

Purpose: This paper aims to analyze the determinants of debt maturity in the health sector in Portugal.

Design: To achieve this aim, data from 447 companies for the period 2014-2020 were analyzed, using three regions. To test the proposed hypothesis we have used dynamic panel data methodology, specifically the GMM-System estimation model.

Findings: The results suggest that decisions on debt result from a set of factors specific to companies and macroeconomic circumstances, in which they carry out their activity, being different according to the studied region and debt maturity.

Originality: Regional variations in debt maturity can highlight disparities in financial management practices and the ability of different regions to manage their healthcare debt over time. Regional variations in debt maturity can indicate differing levels of financial risk exposure for different areas. Understanding these variations allows policymakers to implement risk management strategies that ensure the stability of the health sector across regions.

Keywords: Debt, Health, GMM System, Portuguese Regions

1. Introduction

The origin of economic thought on debt emerged from the empirical studies developed by Modigliani and Miller (1958), where they argue that in perfect markets, without market frictions and information asymmetry, the capital structure is irrelevant and does not affect the value of the company. It was in this context that the vast existing literature and the various empirical theories on the determinants of capital structure emerged.

The objective of this paper is to analyze the financial structure of companies that make up the health sector in Portugal, which comprises "human health activities in inpatient health establishments, clinical practice in outpatient clinics and other human health activities" (INE, 2007, p.255). To this end, it tries to answer two fundamental questions: (1) Do the specific factors of companies and macroeconomics condition the indebtedness of the health sector in Portugal? (2) Are there differences in the determinants of indebtedness concerning the three analyzed regions?

The health sector represents a unique domain that imposes high economic and financial control on the part of managers and regulators, involving a continuous analysis of the financial situation of companies. This sector in particular encounters new challenges daily, essentially in developed countries, where spending represents a considerable proportion of the Gross Domestic Product (GDP) (Ferreira, Marques & Nunes, 2018). In Portugal, the scenario is no different, and in 2015, according to statistical data revealed by INE, health expenditure represented around 9.3% of GDP. In addition, the debt ratio of the companies that make up this sector was 54% and 56% for 2014 and 2020 respectively, evidence that is in line with what was found in this research.

Given the scarcity of scientific literature in this sector, particularly in a country where the national health system is the order of the day, with successive strikes, causing political instability and noise among users, it seems opportune to study it. The involvement of stakeholders, including healthcare professionals, government, local communities and the general population, is crucial to finding effective solutions to managing hospital debt. Broad and regional participation of different stakeholders can result in more comprehensive and collaborative approaches to addressing financial challenges and to this extent, this work may be of interest to all of these stakeholders.

To test the hypotheses proposed, according to specific and macroeconomic variables, the panel data methodology was used, more specifically, the GMM-System, by Arellano and Bover (1995) and Blundell and Bond (1998). To achieve the proposed objective, data were collected from 447 companies integrated into the health sector in Portugal for the period from 2014 to 2020.

This article has the following structure: Section 2 presents the literature review and hypotheses. Section 3 characterizes the research methodology. Then, the results are discussed and the conclusions are presented, in sections 4 and 5 respectively.

2. Literature Review and Hypothesis

2.1 Company-Specific Variables

2.1.1 Return on Assets- ROA

ROA represents the return on all capital invested in the company, which is an economic performance assessment indicator traditionally used in the literature (Queiroz et al., 2020). However, the relationship between profitability and debt is controversial (Harris & Raviv, 1991; Rajan & Zingales, 1995; Saif-Alyousfi, et al., 2020), not least because, according to the Fiscal Effect Theory proposed by Modigliani and Miller (1963), companies can choose to issue debt (external financing), to take advantage of tax benefits on interest payments. This positive relationship between profitability and leverage is in line with the Trade-Off theory. A positive relationship between profitability and indebtedness is expected, since the most profitable companies are more likely to obtain debt and, in turn, meet their periodic payments.

On the contrary, following the Pecking-Order theory and the classic studies developed by Myers (1984) and Myers and Majluf (1984), there is a negative relationship between profitability and debt. This inverse relationship is because companies' investments are

made using self-financing (given that higher levels of profitability imply more retention of profits) without the need to go into debt (Khémiri & Noubbigh, 2018).

Several empirical studies support the Pecking-Order Theory, among them, Wessels (1988); Rajan and Zingales (1995); Sogorb-Mira and How (2005); De Jong, Kabir, and Nguyen (2008); Zeitun, Temimi, and Mimouni (2017) and Neves, Serrasqueiro, Dias, and Hermano (2020). Alipour, Mohammadi, and Derakhshan (2015); Matias and Serrasqueiro (2017); D'Amato (2020), demonstrated that the short- and long-term debt ratio is also negatively affected by the company's profitability. According to the previous literature, the following hypotheses are proposed (without a predefined signal):

H1: There is a significant relationship between profitability and debt.

H1a: There is a significant relationship between profitability and short-term debt.

H1b: There is a significant relationship between profitability and long-term debt.

2.1.2 Tangibility

Considering the Trade-Off theory, companies with high levels of tangible assets have lower bankruptcy costs, which is a relevant factor in determining the capital structure. According to De Jong et al., (2008) there is a positive relationship between asset tangibility and indebtedness, which derives from the assumptions that tangibility is related to the possibility of offering more real guarantees.

The Pecking-Order theory also predicts a positive relationship between tangibility and indebtedness and assumes that high levels of tangible assets are related to a decrease in information asymmetry since investors can easily estimate the value of these assets (D'Amato, 2020), so companies with more tangible assets have more potential to get into debt.

According to Zeitun et al., (2017), the effects of tangibility on indebtedness are mixed. On the one hand, tangibility affects possible financial problems, leading to a decrease in agency costs between investors and creditors, due to the reduction of transfer risk when these are used as collateral (Harris & Raviv, 1991; Bartholdy & Mateus, 2011). This cost reduction implies a positive relationship between tangibility and indebtedness (Rajan & Zingales, 1995; Titman & Wessels, 1988). On the other hand, according to Frank and Goyal (2008), tangibility can harm indebtedness, a result that can be explained by the reduction of asymmetric information problems associated with tangible assets, which makes equity capital less expensive.

Due to the empirical studies carried out, several authors have proven the positive relationship between asset tangibility and debt (e.g., Timan & Wessels, 1988; Rajan & Zingales, 1998; De Jong et al., 2008). However, according to Matias and Serrasqueiro (2017), the relationship between tangibility and indebtedness will depend on the temporal element of the debt (short

or long-term). According to Hall, Hutchinson and Michaelas, (2004); Proença, Laureano and Laureano (2014); Matias and Serrasqueiro (2017), there is a negative relationship between asset tangibility and short-term debt, and there is a positive relationship with the level of long-term debt (Sogorb-Mira & How, 2005). According to the literature, the following hypotheses are proposed (without a predefined signal):

H2: There is a significant relationship between asset tangibility and debt.

H2a: There is a significant relationship between asset tangibility and short-term debt.

H2b: There is a significant relationship between asset tangibility and long-term debt.

2.1.3 Business Growth

This is an important indicator to explain companies' capital structure decisions since positive fluctuations intensify the availability of funds, which in turn can be used in the company's development and growth. However, the relationship between growth and indebtedness is not consensual among the various empirical studies.

According to the Trade-Off theory, debt decreases in companies with high levels of growth, due to the costs associated with debt, uncertainties, and vulnerabilities, showing that companies prefer to use internal funds (De Jong, Kabir & Nguyen, 2008; Zeitun et al., 2017; Anton, 2019 or Zeitun & Goaied, 2021).

In contrast, the Pecking-Order theory assumes a positive relationship between debt and growth opportunities. According to Myers and Majluf (1984), growing companies need additional financial resources to finance future investments. According to Sogorb-Mira (2005), when companies' investment needs exceed internal resources, they need external resources to finance themselves and involve more debt in their capital structure. In addition, the growth in business volume indicates to creditors that companies are financially healthy and unlikely to go into default, assigning them more favorable lines of credit.

Michaelas, Chittenden, and Poutziouris (1999); Frank and Goyal (2008); Proença et al., (2014); Matias and Serrasqueiro (2017) argue for a positive relationship between growth and debt. Regarding debt maturity, according to Czerwonka and Jaworski (2021), the faster the growth, the greater the short-term debt. However, Serrasqueiro and Nunes (2012) find opposite relationships for debt maturity. These show that more mature companies decrease the level of short-term debt and increase long-term debt to finance the company's growth and development. Based on the above, the following hypotheses are proposed (without a predefined signal):

H3: There is a significant relationship between turnover growth and debt.

H3a: There is a significant relationship between turnover growth and short-term debt.

H3b: There is a significant relationship between turnover growth and long-term debt.

2.1.4 Operational Risk

This is a variable related to the volatility of operating results, EBIT - Earnings Before Interest and Taxes. Generally, the empirical literature shows the presence of a negative relationship between risk and the debt ratio, justified by the volatility of earnings (Bradley, Jarrell & Kim, 1984; De Jong et al., 2008; D'Amato, 2020). Both Pecking-Order and Trade-Off theories support this relationship. Myers (1977), understands that the volatility of results increases borrowing costs and makes access to debt more difficult and risky. In this way, a lower level of indebtedness is expected for companies with greater variations in results (Kenourgios, Savvakis & Papageorgiou, 2020). However, Kim and Sorensen (1986), demonstrate a positive relationship between risk and indebtedness, a result that tends to contradict the Pecking-Order and Trade-Off theories. According to the authors, this effect can be explained by the decrease in debt agency costs. Despite the high operational volatility, companies contract more external debt to finance potential investments and, consequently, reduce systemic risks.

In addition, Booth, et al., (2001), demonstrate that opposite signals are expected between countries due to the specific institutional characteristics in which each company operates, such as tax rules and laws applied to the bankruptcy of each company.

Concerning debt maturity, Esperança, Gama and Gulamhussen (2003) find a positive relationship between risk and short-term debt, which is justified by the difficulty that companies, especially SMEs, have in choosing the type of debt they contract. , generally depending on short-term debt. Neves et al., (2020), in a study applied to Portuguese SMEs, also find a positive relationship between risk and total and short-term indebtedness, because this result can reflect the economic situation faced (e.g., the crisis of sovereign debt from 2010-2014) and specific institutional characteristics applied in Portugal. According to the previous literature, the following hypotheses are proposed (without a predefined signal):

H4: There is a significant relationship between risk and indebtedness.

H4a: There is a significant relationship between risk and short-term debt.

H4b: There is a significant relationship between risk and long-term debt.

2.1.5 Current ratio

Liquidity measures the ease with which an asset is converted into monetary means to satisfy current liabilities (Queiróz et al., 2020). According to D'Amato (2020), companies

with more liquid assets are less likely to go bankrupt in the short term and, consequently, manage to increase their leverage using the liquidity of assets (De Jong et al., 2008). However, companies with low levels of liquidity tend to have higher bankruptcy costs, making it more difficult to obtain debt (Degryse, Goeij & Kappert, 2012). Even so, liquidity ratios can have a dual effect on decisions about the financial structure (Alipour et al., 2015; Saif-Alyousfi et al., 2020). According to the Pecking-Order Theory, there is a negative relationship between liquidity and debt. This relationship results from the high liquidity ratio producing a negative effect on external debt since these companies can finance their investments using internal resources, thus being less dependent on external capital (Myers & Majluf, 1984; Deesomsak, Paudyal & Pescetto, 2004; Proença et al., 2014).

In contrast, the Trade-Off Theory advocates a positive relationship between liquidity and debt. This theory suggests that companies with high liquidity ratios are more able to meet their obligations and therefore more able to contract debt (Alipour et al., (2015); Vo, 2017). According to the literature, the following hypotheses are proposed (without a predefined signal):

H5: There is a significant relationship between general liquidity and indebtedness.

H5a: There is a significant relationship between general liquidity and short-term debt.

H5b: There is a significant relationship between general liquidity and long-term debt.

2.1.6 Tax Benefits Beyond Debt

Tax benefits beyond debt (NDTS – Non-debt tax shield) are factors that can influence the determination of a company's capital structure and correspond to benefits (in which debt interest is not integrated) that contribute to the reduction of taxation (DeAngelo & Masulis, 1980; Sogorb-Mira, 2005). For this, companies tend to invest some capital in research and development.

The Trade-Off theory predicts a negative relationship between NDTS and debt (DeAngelo & Masulis, 1980). NDTS provides an alternative means of lowering taxes on earnings and can contribute to mitigating the effect of debt tax benefits. According to Bradley et al., (1984); Frank and Goyal (2009); Serrasqueiro and Caetano (2015), the increase in NDTS causes a decrease in the level of external indebtedness in its financial structure, thus demonstrating that the tax savings resulting from debt amortizations and depreciations play a substitute role since it represents an alternative to the deduction tax provided by the debt.

On the other hand, according to the Pecking-Order theory and the studies developed by Bradley et al., (1984); Chang, Lee, and Lee (2009); Ali, Rangone, and Farooq (2022), there is a positive effect between NDTS and debt, indicating that companies that invest considerably in fixed assets produce high levels of depreciation and tend to contract more debt. This positive relationship can be explained by the reduction in agency costs since the increase in depreciation and amortization implies a higher financial surplus available to managers (more agency costs), so the way to reduce irrational use is through intensifying debt.

Regarding debt maturity, Ahmad and Etudaiye-Muhtar (2017), in a study on the capital structure of SMEs, found a positive effect on short-term debt and a negative effect on long-term debt. According to the previous literature, the following hypotheses are proposed (without a predefined signal):

H7: There is a significant relationship between tax benefits beyond debt and indebtedness.

H7a: There is a significant relationship between tax benefits beyond debt and short-term debt.

H7b: There is a significant relationship between tax benefits beyond debt and long-term debt.

2.1.7 Size

According to the Agency Cost Theory, larger companies present superior results and lower bankruptcy costs (Stoiljkovic, et al., 2022).

Based on the Trade-Off theory and the studies developed by Sogorb-Mira (2005) and Koksal & Orman (2015) there is a positive effect between size and debt. According to this theory, larger companies are generally more diversified, present less risk, and encounter fewer financial difficulties, which makes it easier for them to obtain external financing (Kenourgios et al., 2019). However, the Pecking-Order theory defends a negative relationship between size and debt, under the assumption that larger companies usually have more self-financing capacity (Silva, Gomes & Lopes, 2020).

According to Serrasqueiro and Nunes (2012), the impact of company size on the financing structure depends on the maturity of the debt. Long-term debt may be associated with high transaction costs for smaller companies, which are more dependent on short-term debt, compared to larger companies. García-Teruel and Martínez-Solano (2007), concluded that the origin of funds for small companies is internal and when they run out or are insufficient, they resort to short-term debt. Regarding debt maturity, it is common to find in the literature a positive effect between size and long-term debt and a negative

effect for short-term debt (Hall et al., 2004; Serrasqueiro & Nunes, 2012; Proença et al. al., 2014). Nevertheless, several authors have found a positive relationship between the three debt ratios, such as Abor and Biekpe, (2009); Matias and Serrasqueiro (2017); Saif-Alyousfi et al., (2020). Based on the above, the following hypotheses are proposed (without a predefined signal)

H6: There is a significant relationship between firm size and debt.

H6a: There is a significant relationship between firm size and short-term debt.

H6b: There is a significant relationship between firm size and long-term debt.

2.1.8 Social Expenses

Human capital offers competitive advantages that can generate added value for companies (Neves & Proença, 2021). According to Kamath (2008), in the service sector, human capital is more significant than tangible assets and improves profitability and productivity indicators, hence the need to keep employees motivated, with adequate salaries, as well as other benefits that allow them to have equity and improved quality of life. Human capital is strongly influenced by innovation, learning and training, knowledge (generally in tacit form), and skills (Sharabati, Jawad & Bontis, 2010).

Currently, organizations are effectively more concerned and involved with environmental issues, as well as issues of a social nature, gradually developing strategies that allow for strengthening social responsibility initiatives (Okafor, Adeleye & Adusei, 2021), thus providing a guarantee on how employee rights are being fulfilled (Neves, Castanheira, Dias, Silva & Cancela, 2022).

In a study on the performance of Corporate Social Responsibility (CSR) and debt strategies, Cheng, Ioannou, and Serafeim (2014) showed that companies with better results in CSR are subject to fewer external financing restrictions. These authors proved that the greater the commitment and transparency of the interested parties in the development of CSR activities, the greater the possibility of them going into debt.. According to the previous literature, the following hypotheses are proposed (without a predefined signal):

H8: There is a significant relationship between social expenses and debt.

H8a: There is a significant relationship between social expenditures and short-term debt.

H8b: There is a significant relationship between social expenditures and long-term debt.

2.1.9 Age

Under the Pecking-Order theory, there is often a negative relationship between age and the level of indebtedness. According to Petersen and Rajan (1994); Serrasqueiro and

Caetano (2015); and Neves et al., (2020), younger companies tend to take on more debt than more mature companies, because older companies have higher accumulated earnings to finance their investments, substituting external debt for self-financing. These authors also state that companies that successfully survive the initial phase of entrepreneurial activity are more likely to retain profits, thus increasing financial autonomy. At the same time, Palacín-Sánchez, Ramírez-Herrera and Di Pietro (2013) identify a negative relationship between age and debt, arguing that younger companies are forced to contract more debt, due to the difficulty of generating sufficient profits to face development and investment necessary for the survival of companies.

The Trade-Off theory suggests that more mature companies are more stabilized in the market and therefore tend to resort to more loans. Some studies (Serrasqueiro & Nunes, 2012; Mota & Moreira, 2017) argue that age is a relevant element in accessing debt and show that this can be an advantage in obtaining external financing through business credibility and the confidence that companies present to creditors, thus providing them with better financing conditions (more favorable lines of credit). According to Matias and Serrasqueiro (2017) the relationship between age and indebtedness results from the maturity of the debt, suggesting that the more mature the companies, the lower the levels of short-term debt. These authors verify a negative relationship between age and short-term debt and a positive relationship for long-term debt. According to these authors, more mature companies resort more to long-term debt, due to the higher level of tangible assets, which can be used as a guarantee of access to financial markets, in contrast to more recent companies. According to the previous literature, the following hypotheses are proposed (without a predefined signal):

H9: There is a significant relationship between age and indebtedness.

H9b: There is a significant relationship between age and short-term debt.

H9c: There is a significant relationship between age and long-term debt.

2.2 Macroeconomic Variables

2.2.1 Consumer Confidence Index (CCI)

Psychological aspects effectively play a relevant role in the economy and show signs of the economic situation (Vieira, Neves & Dias, 2019). The consumer confidence index (CCI) has received a lot of attention in recent years from researchers and policy bodies (Tjandrasa & Dewi, 2022) and is an important indicator of the current and future economy (Ferrer, Salaber & Zalewska, 2016) conditioning business decisions.

Aydogan (2017) confirms that the CCI influences the volatility of nine stock markets between 2004-2015. The author, who used the consumer confidence index as a proxy for investor sentiment, found a negative effect for France and Germany (designated civil law countries), but a positive effect exclusively for Ireland, a country considered common law. Although there are no works that directly relate the CCI with corporate debt levels, we admit that if they affect the volatility of real economies, they also affect the level of risk that companies face in contracting debt. Thus, the following hypotheses are proposed:

H10: There is a significant relationship between CCI and indebtedness.

H10a: There is a significant relationship between CCI and short-term debt.

H10b: There is a significant relationship between CCI and long-term debt.

2.2.2 Interest rate

The interest rate is seen as an indicator of the cost of debt and is a key macroeconomic element, expected to be negatively related to debt (Savvakis, Kenourgios, & Papageorgiou, 2021; Panda & Nanda, 2020).

Kenourgios et al., (2019), in a study that analyzes the capital structure of European SMEs during the period 2005-2015, find that interest rates have a negative relationship with indebtedness for all microenterprises.

In opposition, Daskalakis, Balios, and Dalla (2017); Savvakis et al., (2021), find a positive effect between interest rates and debt, on the assumption that companies do not adjust debt according to interest rates, except when they expect a period of reduced growth or stagnation country's economy. Daskalakis et al., (2017), prove that regardless of the policies used by Central Banks to lower interest rates, companies reduce the demand for external financing due to the economic environment.

Graham and Harvey (2001) demonstrated that most managers prefer short-term debt when short-term interest rates are lower than long-term interest rates, waiting for long-term interest rates to decrease. However, companies have a preference for long-term debt when it is lower compared to the interest rates of previous periods. According to the previous literature, the following hypotheses are proposed (without a predefined signal):

H11: There is a significant relationship between interest rates and debt.

H11a: There is a significant relationship between interest rates and short-term debt.

H11b: There is a significant relationship between interest rates and long-term debt.

3. Research Design

3.1 Sample

The sample consists of companies belonging to the health sector, more specifically entities with CAE: 86 – Human Health Activities. To study the financial structure of companies in the health sector in Portugal and given that the business density differs greatly between different regions of the country, a global sample, and three subsamples were considered. The Global sample consists of statistical data from 447 companies and concerns companies located in Mainland Portugal[1]. The subsamples were built based on three groups: North Region, consisting of 135 companies; Metropolitan Region of Lisbon made up of 226 companies; Center and South Region, made up of 86 companies[2].

The data referring to the specific variables of the companies were extracted according to the information available in the SABI database (Iberian Balance Sheet Analysis System). Concerning macroeconomic variables, they were taken from the database provided by Banco de Portugal.

3.2 Variables

Table 1 presents the dependent and independent variables under study.

Table 1- Variables

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[1] The Islands were excluded from our study since only 13 companies presented results for the years under analysis (Azores and Madeira, 6 and 7 companies, respectively).
[2] For the Center and South Samples, the two regions were aggregated. The central region only presented data for 53 companies and the South Region 33.

Variables	Designation	Proxy	Authors
Dependent			
Total debt	*DebtT*	$\frac{Total Debt}{Total\ Assets}$	Sogorb-Mira (2005); D'Amato (2020); Neves *et al.,* (2020).
Short Term Debt	*DebtST*	$\frac{Current\ Liabilities}{Total\ Assets}$	Matias & Serrasqueiro (2017); Neves *et al.,* (2020); Zeitun & Goaied (2021).
Long Term Debt	*DebtLT*	$\frac{Non-Current\ Liabilities}{Total\ Assets}$	Matias e Serrasqueiro (2017); Neves *et al.,* (2020); Kuc & Kalicanin (2021).
Independent			
Company Specifics			
Return on Assets	*ROA*	$\frac{EBIT}{Total\ Assets}$	Sogorb-Mira (2005); Matias & Serrasqueiro (2017); Zeitun & Goaied (2021).
Tangibility	*Tang*	$\frac{Tangible\ Fixed\ Assets}{Total\ Assets}$	Matias & Serrasqueiro (2017); Czerwonka & Jaworski (2021)
Business Volume Growth	*BVG*	$\frac{(BN_t - BN_{t-1})}{BN_{t-1}}$	Aborr & Biekpe (2009); Proença *et al.,* (2014).
Risk	*Risk*	$\frac{\sigma EBIT}{Total\ Assets}$	Kim & Sorensen (1986); De Jong *et al.,* (2008); D'Amato, (2020).
Current ratio	*CR*	$\frac{Current\ Assets}{Current\ liabilities}$	Proença *et al.,* (2014); Alipour *et al.,* (2015); Valer'evna (2021)
Tax benefits beyond debt	*NDTS*	$\frac{(Depreciation + Amortization)}{Total\ Assets}$	Sogorb-Mira (2005); Serrasqueiro & Caetano (2015); Ahmad & Etudaiye-Muhtar (2017)
Size	*Size*	$Ln\ (Total\ Assets)$	Sogorb-Mira (2005); Camfield *et al.,* (2018); Vieira *et al.,* (2019).
Social Expenses	*SE*	$Ln\ (\ Personnel\ Expenses\ +\ Post\text{-}Employment\ Benefit\ +\ other\ benefits\ )$	Cancela, et al., (2020); Neves *et al,* (2022)
Age	*Age*	$Ln\ (Age)$	Serrasqueiro & Caetano (2015) ; Mota &

			Moreira, (2017); Neves *et al.,* (2020).
Macroeconomics			
CCI	*CCI*	*Consumer Confidence Index*	Aydogan (2017); Vieira *et al.,* (2019);
Interest Rates	*IRate*	*Cost of Borrowing for Companies*	Panda & Nanda, (2020); Savvakis *et al.,* (2020)

3.2 Methodology and Estimation Method

The methodology used is panel data. This methodology is applied to a sample of individuals or companies, analyzed over time, and allows for obtaining different observations about each individual. The study covers the period between 2014-2020, covering the post-Troika period, with some economic recovery, and the beginning of the pandemic crisis caused by Covid-19 that affected all economies with visible impacts on the health sector. To perform the econometric analysis, the STATA17 software was used. This study uses a dynamic estimator of panel data, more specifically the GMM (Generalized Method of Moments), which allows for controlling the correlation errors over time and the heterogeneity between the companies analyzed (Neves, 2018; Sardo, Serrasqueiro, & Alves, 2018). The main advantages of this methodology are, firstly, it allows controlling the unobservable heterogeneity (which, due to the nature of the problems addressed, can bias the results) through the individual effect that is later eliminated by taking the first differences of the variables, and secondly, correcting endogeneity (which arises from the casual relationship that the explanatory variables have with the debt ratios in our study). The main disadvantages are in terms of the high complexity of the techniques used; and the use of specialized statistical software that can produce inconsistent estimates due to the omission of endogeneity biases (Ullah, Akhtar, & Zaefarian, 2018). This last disadvantage was solved using the GMM-System estimation method (Arellano & Bond, 1991; Neves, 2018; Ullah et al., 2018) of instrumental variables.

3.3 Empirical Models

The GMM-System Model for the elaboration of this work is presented as follows:

$$Y_{it} = \beta_0 Y_{it-1} + \beta_1 X_{it1} + \beta_2 X_{it2} + \ldots + \beta_k X_{itk} + u_{it} + v_i$$

where i=1,…, N represents the individuals, t=1,…, T represents the time periods and N x T represents the total number of observations; $Y_{i,t}$ is the dependent variable; X_{it} represents k explanatory variables; $\beta_1, \beta_2,..., \beta_k$ are the coefficients; the error term is composed of a random element u_{it}, which may vary between companies and periods, and the individual effect v_{it} specific to each company and invariant in time. In this way, we will test three models according to the three dependent variables defined before; total indebtedness, short-term indebtedness, and long-term indebtedness, with the meaning of each explanatory variable shown in Table 1.

Model 1:

$$
\begin{aligned}
\boldsymbol{DebtT_{it}} = {} & \beta_0\,(DebtT)_{it-1} + + \beta_1\,(ROA)_{it} + \beta_2\,(Tang)_{it} + \beta_3\,(BVG)_{it} \\
& + \beta_4\,(Risk)_{it} + \beta_5\,(CR)_{it} \\
& + \beta_6\,(NTDS)_{it} + \beta_7\,(Size)_{it} + \beta_8\,(SE)_{it} + \beta_9\,(Age)_{it} + \beta_{10}\,(CCI)_{it} \\
& + \beta_{11}\,(IRate)_{it} + u_{it} + v_i
\end{aligned}
$$

Model 2:

$$
\begin{aligned}
\boldsymbol{DebtST_{it}} = {} & \beta_0\,(DebtST)_{it-1} + \beta_1\,(ROA)_{it} + \beta_2\,(Tang)_{it} + \beta_3\,(BVG)_{it} \\
& + \beta_4\,(Risk)_{it} + \beta_5\,(CR)_{it} \\
& + \beta_6\,(NTDS)_{it} + \beta_7\,(Size)_{it} + \beta_8\,(SE)_{it} + \beta_9\,(Age)_{it} + \beta_{10}\,(CCI)_{it} \\
& + \beta_{11}\,(IRate)_{it} + u_{it} + v_i
\end{aligned}
$$

Model 3:

$$
\begin{aligned}
\boldsymbol{DebtLT_{it}} = {} & \beta_0\,(DebtLT)_{it-1} + \beta_1\,(ROA)_{it} + \beta_2\,(Tang)_{it} + \beta_3\,(BVG)_{it} \\
& + \beta_4\,(Risk)_{it} + \beta_5\,(CR)_{it} \\
& + \beta_6\,(NTDS)_{it} + \beta_7\,(Size)_{it} + \beta_8\,(SE)_{it} + \beta_9\,(Age)_{it} + \beta_{10}\,(CCI)_{it} \\
& + \beta_{11}\,(IRate)_{it} + u_{it} + v_i
\end{aligned}
$$

Where: $(\varepsilon)it$ –represents the error term that is composed of 2 elements; 1-random disturbance (u_{it}) which can vary between companies and periods; 2- individual effect (v_i), specific to each company and invariant in time. β means coefficients.

4. Results

4.1 Global Sample

4.1.1 Descriptive Statistics

Table 2 presents descriptive statistics of the variables.

Table 2

Table 2 -*Descriptive Statistics – Global Sample*

Variables	Mean	Minimum	Maximum	Stand. deviation
DebtT	59.805	0.105	1026.93	63.90278
DebtST	46.00381	0.03698	1026.93	62.14562
DebtLT	13.80168	0	284.0309	22.38426
ROA	14.02461	-462.77	170.282	41.35673
TANG	0.2784699	0	1	0.2875191
BVG	0.6722911	-1	317.1878	9.58451
Risk	0.0345016	-3.920194	2.503451	0.3641264
CR	10.20655	0	1397.915	49.89058
NDTS	0.0509519	0	1.603615	0.0829319
Size	6.017778	-1.6874	13.19508	3.193617
SE	5.105751	-5.020686	12.53835	3.594903
Age	1.786466	0	6.248043	1.173438
CCI	-12.84306	-23.89167	-4.45	7.502866
IRate	2.837277	1.999167	4.870833	0.861935

All dependent variables used in the study have positive mean values. Regarding independent variables, only the CCI has a negative value concerning the average, which demonstrates the lack of consumer confidence, and negative sentiment on average, about the Portuguese economy.

Of the set of dependent variables under analysis for the global sample, the Total Indebtedness ratio stands out, with an average of 59.81%. This reveals that the companies observed are mostly dependent on borrowed capital in their financial structure. Furthermore, according to data published by INE, the debt ratio of companies that make up the health sector was 54% and 56% for 2014 and 2020, respectively.

The most interesting thing, even when reading these results, is that the level of short-term debt is substantially higher than the level of long-term debt with averages of approximately 46% and 13.8%, respectively, thus demonstrating that short-term external capital has a significant weight in the financial structure of the analyzed companies, which

may suggest some weaknesses in the conditions of financial equilibrium. This reality is also under Hall et al., (2004) who argue that the predominant source of financing for SMEs is short-term debt.

4.1.2 Results- Global Sample

Table 3 presents the estimation results of models 1, 2, and 3 for the global sample.

Table 3

Table 3- Estimation results of models 1, 2, and 3- Global Sample

	DebtT(1)				DebtST(2)				DebtLT(3)			
	Coefficient	Z	P-Value		Coefficient	Z	P-Value		Coefficient	Z	P-Value	
Const.	38.92414	3.02	0.003	***	0.1087044	0.85	0.397		0.086782	0.56	0.572	
L1	0.2072491	2.40	0.016	**	0.2995592	4.71	0.000	***	0.2546754	3.44	0.001	***
ROA	-0.6523331	-12.51	0.000	***	-0.0040116	-6.04	0.000	***	-0.014986	-2.43	0.015	**
TANG	22.9128	4.34	0.000	***	-0.044535	-0.81	0.417		0.1859644	3.73	0.000	***
BVG	0.0833914	2.69	0.007	***	0.0020472	6.88	0.000	***	-0.0007206	-3.00	0.003	***
Risk	14.04731	4.48	0.000	***	0.1301312	4.88	0.000	***	0.0069125	0.22	0.828	
CR	-0.0641026	-4.05	0.000	***	-0.0007917	-2.74	0.006	***	0.0001605	0.99	0.321	
NDTS	44.28605	2.61	0.009	***	0.0317096	0.16	0.870		0.2220155	1.13	0.259	
Size	8.741586	4.61	0.000	***	0.027552	1.23	0.219		0.0711991	3.10	0.002	***
SE	0.9080532	0.98	0.328		0.011278	1.29	0.196		-0.0055434	-0.51	0.607	
Age	-24.08857	-5.23	0.000	***	-0.0299354	-0.54	0.589		-0.1684982	-3.58	0.000	***
CCI	-0.0340629	-0.64	0.520		0.0006069	1.06	0.290		-0.0000332	-0.07	0.948	
IRate	-3.381919	-2.21	0.027	**	0.0196235	1.11	0.268		-0.0485221	-3.16	0.002	***
Sargan	21.71871(19)	0.2985			28.02854(19)	0.0829			27.61796(19)	0.0911		
Wald	394.06(12)	0.0000			267.04(12)	0.0000			312.47(12)	0.0000		
m1	-1.2295	0.2189			-2.3173	0.0205			-3.0844	0.0020		
m2	-0.39651	0.6917			1.7094	0.0874			1.1498	0.2502		

Regression is performed using an unbalanced data panel consisting of 447 companies. It should also be noted that: i) *,**, and *** indicate levels of significance to 10%, 5%, and 1% respectively; ii) the Sargan test with a p-value > 5% shows that the instruments are valid, and the test values in parentheses represent the degrees of freedom; iii) The Wald test presents a p-value < 5% which means that the joint significance and coefficients are significant asymptotically distributed as $\chi2$ under a null hypothesis without significance, with the degrees of freedom in parentheses; iv) the m1 has normal distribution N (0,1) and tests the null hypothesis of absence of first-order autocorrelation against the alternative hypothesis of the existence of first-order autocorrelation; v) The m2 test has a normal distribution. N (0,1) and a higher p-value of 5% allows accepting the null hypothesis of the absence of second-order autocorrelation

Indebtedness levels in one year positively condition those in the following year. Profitability, as expected, is negatively related to total debt, short and long-term, a result that converges with the Pecking-Order theory. This negative relationship can be explained by the self-financing capacity of companies (Titman & Wessels 1988), whereby the more profitable they are, the lower the level of external debt in their financial structure. The results corroborate the hypotheses H1, H1a, and H1b and support the studies by Sogorb-Mira (2005); Serrasqueiro and Caetano 82015); Matias and Serrasqueiro (2017); Neves *et al.,* (2020).

Asset tangibility shows a positive and significant relationship between the total and long-term debt ratio, which supports H2 and H2b. This result suggests that companies with high tangible assets tend to have higher levels of external financing in their capital structure. The result is consistent with the assumptions of both the Pecking-Order theory and the Trade-off theory and with the studies developed by Titman and Wessels (1988); Chen (2004); De Jong *et al.,* (2008). Theoretical assumptions on the effect of tangibility on debt are associated with the use of tangible fixed assets as collateral in the event of default or even bankruptcy. Since our study focused on the health sector and this being a sector with a high concentration of tangible fixed assets (e.g., buildings, highly technological equipment, or vehicles for transporting patients), this result also demonstrates the importance that tangible assets have concerning the need for external financing, given that financing entities generally require tangible guarantees to grant loans. For short-term debt, this variable is not statistically significant, so it is not possible to validate H2a. Following the Pecking-Order theory, growth in turnover has a positive and statistically significant relationship with total and short-term debt, allowing corroboration of H3 and H3a. This result suggests that growing companies need additional resources to support their development (Myers & Majluf, 1984). In this case, business volume growth is not enough to develop potential investment opportunities and, for this reason, they lack complementary funds to finance business evolution (Sogorb-Mira, 2005). Furthermore, this positive relationship can also be explained by the reputation and prestige that the company transmits to creditors, granting them more favorable debt conditions. This result is verified by other authors, among them, Frank and Goyal (2008); Proença *et al.,* 2014; Czerwonka and Jaworski (2021). Additionally,

according to data published by INE- National Statistics Institute [3], between 2014 and 2020 there was a growth of 21% in the turnover of companies that make up the health sector and a growth of 41% in total assets. In contrast, long-term debt shows a negative and statistically significant relationship, a result explained through the Trade-Off theory, which indicates that long-term debt is lower in companies with high levels of growth. This result, on the one hand, suggests that due to the costs associated with debt, indebtedness decreases. On the other hand, due to retained earnings over time, companies can generate sufficient funds to finance their investments. This negative relationship between growth and long-term debt may also mean that this growth in the sector does not induce more long-term debt for fear that this growth will not be sustainable over time. This allows us to corroborate H3b.

The results show a statistically significant positive relationship between risk and total and short-term indebtedness, thus corroborating H4 and H4a. Surprisingly, these results do not match the Pecking-Order and Trade-Off theories. However, the results obtained, although positive, may represent unique institutional specificities applied in Portugal (Neves *et al.,* 2020), such as tax rules and laws applied to corporate bankruptcy. Generically, the greater volatility of operating results can lead to greater debt needs and, as this sector is of public interest, indebtedness increases. Regarding the maturity of the debt, and under the assumptions developed by Esperança *et al.,* (2003the positive relationship between risk and short-term indebtedness can be explained by the type of debt that companies contract, generally depending on short-term debt. These results are in line with those obtained by Esperança *et al.,* (2003); Koksal e Orman (2015); Neves *et al.,* (2020). Even so, it is relevant to mention that the health sector is extremely important for the well-being of the population and the good functioning of the country, which is classified as a primary need. Regardless of the risk that companies present, they continue to have access to lines of credit, mainly in the short term. Concerning long-term debt, the risk is not statistically significant, so it is not possible to accept H4b.

While the Trade-Off theory assumes a positive relationship between general liquidity and debt, the companies studied, in opposition to this theory, show that liquidity and the total

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[3] According to statistical data published by INE, the sector that integrates human health activities, presented a turnover of approximately 5.7 billion euros and 6.9 billion euros, for the years 2014 and 2020, respectively (21% variation, approximately), Total assets, on the other hand, presented a value close to 7.5 billion euros and 10.6 billion euros, for the years 2014 and 2020, respectively (variation of approximately 41%).
Data extracted from the INE database on March 26, 2023 (date of last update: February 27, 2023).https://www.ine.pt/xportal/xmain?xpid=INE&xpgid=ine_indicadores&indOcorrCod=0006587&xlang=pt&contexto=bd&selTab=tab2

and short-term debt ratio are negatively related, a result consistent with the Trade-Off theory. Pecking-Order.

This result suggests that companies with higher liquidity ratios are associated with lower debt levels, so they prefer to obtain financing through internal resources and, consequently, are less dependent on external capital (Alipour *et al.,* 2015). This negative effect is in line with Deesomsak *et al.,* (2004); Proença *et al.,* (2014). Therefore, the result obtained allows us to accept H5 and H5a. About long-term debt, there was no statistical significance, so it is not possible to validate H5b. The results suggest that managers are aware that liquidity is associated with short-term and not long-term commitments to meet the basic principles of financial balance.

Regarding company size, a positive relationship is verified between the ratio of total and long-term debt, which confirms H7 and H7b. This result suggests that company size is positively associated with a higher degree of diversification and less information asymmetry, which helps to reduce the risk and costs of bankruptcy, thus encouraging them to increase their level of indebtedness (Degryse *et al.,* 2012; Neves *et al.,* 2020), under *Trade-Off* theory and following Rajan and Zingales, (1995); Michaelas *et al.,* (1999); Matias e Serrasqueiro (2017). Furthermore, it should be noted that the similar relationship obtained in the tangibility variable suggests that there is a certain degree of adequacy between the liquidity level of investments and the level of liability of origins, that is, the purchase of non-current assets is generally carried out based on long-term financing. Concerning short-term indebtedness, no statistical significance was found, so it is not possible to accept H7a.

Tax benefits beyond debt (NDTS), do not have a significant impact on short- and long-term debt, and it is not possible to validate H6a and H6b. Total indebtedness shows a positive impact. This result follows Bradley *et al.,* (1984); Chang *et al.,* (2009); and Ali *et al.,* (2022). The positive effect between NDTS and debt, suggests that companies in this sector have a high volume of assets and have high depreciation and amortization costs, thus encouraging them to use more external debt.

The variable social expenses did not show statistical significance in any of the debt ratios for the global sample. This result suggests that expenditures related to human capital do not affect indebtedness or debt maturity, not being possible to corroborate H8, H8a, and H8b. The age of these companies is negatively related to total and long-term debt, a result that allows us to accept H9 and H9b.

This effect indicates that companies present in the market for a longer time base their financial structure on income acquired over time and, as such, do not have as much need to resort to external debt, as suggested by the Pecking-Order theory and Palacín-Sánchez *et al.,* (2013); Serrasqueiro e Caetano (2015); Neves *et al.,* (2020). The relationship with the short-term debt ratio is not statistically significant, so it is not possible to accept H9a. The consumer confidence index did not show statistical significance in any of the indebtedness ratios for the overall sample. This result suggests that the psychological and behavioral aspects of consumers do not affect the way companies determine their financial structure in this public utility sector. In addition, the type of debt that companies use (short or long-term) is also not influenced by consumer decision-making. According to the evidence presented, it is not possible to corroborate H10, H10a, and H10b. The interest rate variable has a negative relationship with total and long-term debt, which leads us to accept H11 and H11b. These results indicate that debt levels are sensitive to interest rates and when interest rates are high, debt levels are consequently lower (Panda & Nanda, 2020). This negative relationship between interest rates and indebtedness is in line with Kenourgios *et al.,* (2019); Panda and Nanda (2020); Savvakis *et al.,* (2021). However, the short-term debt ratio is not statistically significant, so it is not possible to accept H11a.

4.1.3 Subsample Results

Tables 4, 5 and 6 presents the estimation results of models by regions.

Tables 4, 5 and 6

Table 4- Estimation Results of models 1, 2 e 3- north

	DebtT(1)				DebtST(2)				DebtLT(3)			
	Coefficient	Z	P-Value		Coefficient	Z	P-Value		Coefficient	Z	P-Value	
Const.	61.0657	5.06	0.000	***	1.218769	7.38	0.000	***	-0.306335	-1.93	0.054	*
L1	0.4030258	6.91	0.000	***	0.5303674	11.58	0.000	***	0.0836149	1.32	0.186	
ROA	-0.6761598	-7.92	0.000	***	-0.0031152	-3.00	0.003	***	-0.0016679	-2.28	0.023	**
TANG	33.01509	4.03	0.000	***	-0.0459393	-0.49	0.627		0.4116824	6.81	0.000	***
BVG	0.0928385	0.13	0.893		0.0022573	0.30	0.761		-0.0039851	-0.68	0.497	
Risk	28.52458	6.58	0.000	***	0.1465822	2.29	0.022	**	0.932012	2.04	0.041	**
CR	-0.0733389	-2.29	0.022	**	-0.0015486	-3.02	0.003	***	0.0001319	0.34	0.731	
NDTS	59.83906	3.01	0.003	***	-0.394445	-1.21	0.224		0.3697531	1.68	0.094	*
Size	1.972019	0.87	0.384		0.010562	0.33	0.742		0.0272507	1.25	0.211	
SE	0.8913602	0.64	0.524		-0.0094651	-0.37	0.711		0.022998	1.60	0.110	
Age	-16.73943	-3.76	0.000	***	-0.308129	-3.90	0.000	***	-0.0242047	-0.47	0.635	
CCI	0.0821282	1.81	0.070	*	-0.00184	-3.21	0.001	***	0.0008816	1.96	0.050	**
IRate	-7.170723	-5.83	0.000	***	-0.1148168	-5.96	0.000	***	-0.0029904	-0.18	0.860	
Sargan		26.38728(19)	0.1198			20.41988(19)	0.3697			21.21707(19)	0.3249	
Wald		1453.50(12)	0.0000			658.62(12)	0.0000			419.46(12)	0.0000	
m1		-2.324	0.0201			-2.4605	0.0139			-2.1232	0.0337	
m2		1.3049	0.1919			0.29638	0.7669			-0.20001	0.8415	

The same information as in table 3 is required

Table 5-*Estimation Results of Models 1, 2, and 3 –*Center and South.

	DebtT(1)			DebtST(2)			DebtLT(3)		
	Coefficient	Z	P-Value	Coefficient	Z	P-Value	Coefficient	Z	P-Value

	Coefficient	Z	P-Value		Coefficient	Z	P-Value		Coefficient	Z	P-Value	
Const.	56.94339	4.29	0.000	***	0.8939369	5.05	0.000	***	0.1156836	1.35	0.177	
L1	0.4948455	6.27	0.000	***	0.5606217	8.64	0.000	***	0.5718809	10.68	0.000	***
ROA	-0.6958914	-8.32	0.000	***	-0.0053974	-7.61	0.000	***	-0.000992	-2.62	0.009	***
TANG	3.123054	0.41	0.679		-0.2940676	-3.11	0.002	***	0.1383524	3.32	0.001	***
BVG	0.0880196	4.79	0.000	***	0.0011569	4.67	0.000	***	-0.0010807	-7.57	0.000	***
Risk	10.24096	2.38	0.017	**	0.0872572	2.06	0.040	**	0.0496549	2.63	0.008	***
CR	-0.2310597	-4.60	0.000	***	-0.0029331	-3.04	0.002	***	0.000881	1.36	0.175	
NDTS	80.21365	2.43	0.015	**	0.7235211	2.45	0.014	**	0.1368826	1.12	0.261	
Size	2.760306	0.95	0.343		-0.0990341	-3.17	0.002	***	0.0095035	0.85	0.396	
SE	0.6346407	0.55	0.583		-0.0013231	-0.12	0.903		0.0067335	0.99	0.320	
Age	-16.33487	-3.44	0.001	***	0.0886735	1.63	0.104		-0.0710103	-3.10	0.002	***
CCI	-0.2172757	-3.37	0.001	***	-0.0015391	-1.69	0.091	*	-0.0004968	-1.00	0.320	
IRate	-3.671552	-2.76	0.006	***	0.0044542	0.25	0.799		-0.0256507	-3.50	0.000	***
Sargan		22.19754(19)	0.2745			17.31152(19)	0.5688			19.48233(19)	0.4263	
Wald		1323.06(12)	0.0000			1739.90(12)	0.0000			2606.19(12)	0.0000	
m1		-1.8454	0.0650			-1.9985	0.0457			-1.7059	0.0880	
m2		-0.01827	0.9854			0.49344	0.6217			-1.5262	0.1270	

The same information as in table 3 is required

Table 6- Estimation Results of models 1, 2, and 3–Lisbon

	DebtT(1)				DebtST(2)				DebtLT(3)			
	Coefficient	**Z**	**P-Value**		**Coefficient**	**Z**	**P-Value**		**Coefficient**	**Z**	**P-Value**	
Const.	14.0903	1.13	0.260		0.108881	0.88	0.376		73.48325	5.80	0.000	***
L1	0.4080823	6.89	0.000	***	0.2725765	3.74	0.000	***	0.4826435	8.38	0.000	***
ROA	-0.7053082	-19.98	0.000	***	-0.0055275	-11.66	0.000	***	0.0948259	2.08	0.037	**

	Coef.	t	p		Coef.	t	p		Coef.	t	p	
TANG	19.6368	3.24	0.001	***	-0.0832653	-1.23	0.219		-46.12427	-4.91	0.000	***
BVG	0.540297	0.95	0.341		-0.0074406	-1.26	0.206		-0.6389294	-0.90	0.366	
Risk	10.34066	2.39	0.017	**	0.1896743	5.09	0.000	***	2.288615	0.58	0.559	
CR	-0.0492653	-5.28	0.000	***	-0.000446	-4.20	0.000	***	-0.0106446	-1.07	0.286	
NDTS	10.81719	0.58	0.559		-0.2214278	-1.22	0.222		68.19879	1.53	0.126	
Size	9.267736	3.83	0.000	***	0.0135219	0.59	0.558		-8.764995	-2.89	0.004	***
SE	-0.7200497	-0.61	0.544		0.0143957	1.68	0.093	*	3.045639	2.05	0.040	**
Age	-16.14139	-2.90	0.004	***	-0.127717	-0.23	0.820		4.937928	0.79	0.430	
CCI	0.2010756	2.62	0.009	***	0.0022002	2.78	0.005	***	-0.1457602	-1.17	0.241	
IRate	1.348916	0.58	0.560		0.0714472	3.40	0.001	***	0.6496926	0.27	0.785	
Sargan	20.82659(19)	0.3465			20.41988(19)	0.4817			23.52022(19)	0.2152		
Wald	1705.47	0.0000			642.20(12)	0.0000			127.34(12)	0.0000		
m1	-2.6485	0.0081			-2.2173	0.0266			-1.9025	0.0571		
m2	-0.36162	0.7176			1.6421	0.1006			1.4389	0.1502		

The same information as in table 3 is required

4.1.4 General Discussion - Subsamples

Generically, the debt levels of one year positively condition those of the following year, in all regions. It is, in fact, a sector that is very dependent on third parties. The higher the ROA, the lower the need for debt to finance investments. The negative sign of this variable in all regions and for all debt maturities corroborates the results obtained by Alipour *et al.,* (2015); Matias and Serrasqueiro (2017); Serrasqueiro and Caetano (2015); Neves *et al.,* (2020); D'Amato (2020), following *Pecking-Order*. This result shows differences in the region of Lisbon, the capital of the country, which appears as the region with the most dissimilar global results from the other regions. In fact, for the Lisbon Region subsample (table 6), it was found that profitability is negatively related to total and short-term indebtedness, similar to the remaining samples. However, for the long-term debt ratio, the opposite was verified (profitability positively and significantly related to long-term debt). This result suggests that companies, when they have high levels of operating profitability, are more able to fulfill their obligations and, consequently, bear more debt in their financial structure. This result is still in line with what was exposed by the Trade-Off theory and the Fiscal Effect theory, and may also suggest that in this region investments are significant and self-financing is no longer enough to cope with it, above all because they are productive investments that generate value.

Regarding tangibility, in the North region, there is a positive relationship between the total and long-term debt ratio, without statistical significance in the short term, similar results were obtained in the Global sample. As for the Center and South region, the total indebtedness is not statistically significant, however, concerning debt maturity, statistical significance is verified, but, the effects are inverse. It is observed that the asset tangibility and the short-term debt ratio have a negative effect, a result that can be explained by the difficulty that companies have in converting them into short-term liquid financial resources. These results are under Proença *et al.,* (2014); Matias and Serrasqueiro (2017). According to Matias and Serrasqueiro (2017), the relationship between asset tangibility and indebtedness depends on the maturity of the debt, and in this sense, contrary to short-term debt, it was verified that there is a positive ratio between tangibility and long-term debt ratio, a result also verified in the previously discussed samples.

 In short, in the Center and South regions, the negative sign between the tangibility and the short-term debt ratio and the positive one with the long-term debt ratio may suggest that the manager of these companies meets the conditions of financial equilibrium, using

permanent capital to finance fixed assets. About the Lisbon region, the short-term indebtedness does not reveal statistical significance, however surprisingly, in the long term there is statistical significance with a negative sign. This negative relationship is yet another substantial difference in this region compared to the other samples and can be explained by the size of the companies (a variable that showed a similar effect for this region in this study). This effect suggests that larger companies, due to their high results compared to smaller companies, possibly materialize sufficient profits to carry out their investments without the need to contract long-term debt, showing a great capacity for self-financing. These results may also want to show management differences in the Lisbon region. Both in the North and in Lisbon, with all the visibility characteristics of the country's largest cities, the growth in turnover does not have significant implications for indebtedness. However, in the other samples, under the Pecking-Order theory, the growth in turnover has a positive and statistically significant relationship with total and short-term debt (Proença *et al.,* 2014; Czerwonka and Jaworski 2021). But the negative sign with long-term debt levels may suggest that the growth of activities in this sector is not sustainable, or at least there is a fear that it will not be, which conditions long-term loans. It may also be based on the Trade-Off theory in line with Lisbon (2019).

The results observed in Tables 4, 5, and 6 show a positive and statistically significant relationship between risk and total/short-term indebtedness for all regions. Generically, the greater volatility of EBIT may lead to a greater need for financing and, as this is a sector of public interest, the indebtedness may increase. Similar to what was observed in the global sample, these results may be due to the unique institutional specificities applied in Portugal (Neves *et al.,* 2020). Regarding long-term indebtedness, only the North region and the Center and South regions show a positive and statistically significant effect. This result, despite being unexpected, can be justified by the importance that the health sector represents for the well-being of the population, which is identified as a primary need, fundamental, and essential for Portuguese society. Regardless of the risk that companies present, they continue to have access to lines of credit. Results for liquidity, are equivalent to those analyzed in the global sample, under the *Pecking Order* and Deesomsak *et al.,* (2004); Proença *et al.,* (2014).

As for the long-term debt ratio, the results did not show statistical significance in all regions. Naturally, the greater the liquidity, the lower the need for short-term debt, which seems reasonable. Moreover, liquidity does not influence long-term debt levels, which allows us to corroborate the previous idea. It seems that the manager is aware of the need

to comply with the minimum financial balance rule and that liquidity can only be associated with the fulfillment of short-term obligations.

Regarding tax benefits beyond debt (NDTS), for the Lisbon Region sample, this variable does not show statistical significance under all debt ratios (total, short, and long-term debt). However, for the North Region and Center, and South Region samples, similarly to the global sample, there is statistical significance with a positive sign between NDTS and total indebtedness, for the same reasons. Concerning debt maturity, only the Center and South Region showed statistical significance between NDTS and the short-term debt ratio, and only the North Region showed statistical significance between NDTS and long-term debt.

The size of the company negatively affects short-term debt levels in the Center and South Zone, which means that these managers do not finance assets with short-term capital, respecting the conditions of financial equilibrium. Only for the Lisbon region do larger companies have lower levels of long-term debt, a result consistent with that obtained for the tangibility of assets, which may suggest that the size of these companies in Lisbon is reaching levels of maturity that may involve some risk for the lender, perhaps due to the absence of collateral. It should be noted that only when the ROA is positive is this type of loan obtained.

The results obtained show a positive and statistically significant effect between social expenditure and the debt ratio in the short and long term, only for the Lisbon region sample. According to the study developed by Kamath (2008), in the service sector, human capital tends to be more significant than tangible assets and improves profitability and productivity indicators. In addition, according to Okafor et al., (2021), social responsibility charges are considered an investment and not an additional cost for organizations. This positive result between social expenses and short- and long-term indebtedness suggests that investment in human resources in the analyzed companies that are part of the health sector may influence the way they plan their financial structure, that is, the higher the expenses related to human capital, possibly the greater its development and, consequently, the greater its level of indebtedness. For the remaining samples, no significant relationship was found between indebtedness and social expenses, a result that is in line with what was obtained in the overall sample. Once again, the Lisbon region presents a result that is different from that seen in the other samples.

These results may suggest that there are no major concerns, beyond Lisbon, in this sector with justice and social welfare, or on the contrary that they do not need to go to the bank

to finance better working conditions and wages[4] because these are already assured, or perhaps because wages and other social benefits are not high in the various classes of workers in this sector [5] (*e.g.,* doctors, nurses, and technicians).

Regarding the age of the company, a negative and significant relationship is verified between the total debt ratio in all regions analyzed. Similar to the global sample, this result suggests that the companies studied that have been present in the market for a longer time (with more prestige and reputation) do not have as much need to resort to external debt. The result obtained is in line with Neves *et al.,* (2020) and *Pecking-Order*. For model 2, only the northern region shows a negative relationship between age and the short-term debt ratio, a result that can be explained by the age of companies in the market, which allows them to retain high earnings and consequently increase their ability to solve problems. their current commitments, which in turn will reduce the need to take on debt in the short term. On the other hand, this result may also reveal that younger companies are forced to take on more debt, due to the difficulty they have in generating sufficient profits to face the company's development in the short term (Palacín-Sánchez *et al.,* 2013). For model 3, we found that there is a negative relationship only for the Center and South regions.

Contrary to what was obtained in the global sample, the companies analyzed in the North region show a mixed effect concerning debt maturity and consumer confidence index (CCI). There was a positive and statistically significant relationship between CCI and total and long-term indebtedness and a negative relationship between CCI and short-term debt.

This result suggests that psychological aspects play an increasingly important role in the way companies plan their financial structure, particularly when we separate the samples by region, which clearly demonstrates the importance of doing so and not just considering companies from one country as a whole.

Some specificities deserve to be noticed. Furthermore, according to studies carried out by Ferrer *et al.,* (2016); Vieira *et al.,* (2019), the decision-making process of consumers, as well as the scope of behavioral finance are important for analyzing the current and future

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[4] According to the news presented by Diário de Notícias on February 28, 2019, the main objective of the strike carried out by nurses was to claim, above all, the issue of career progression, base salary increase and anticipation of the retirement age. https://www.dn.pt/vida-e-futuro/greveenfermeiros-protesto-termina-hoje-mas-profissionais-nao-abandonam-a-luta-10628515.html#media-1

[5] According to the news published by the newspaper Observador on March 9, 2023, there was a strike by doctors on March 8 and 9, 2023, to demonstrate that the daily lack of motivation in the workplace continues to escalate. At stake were not only salary conditions, but also the improvement of conditions and balance at work. https://observador.pt/2023/03/09/medicos-esperam-que-governo-mude-estrategia-apos-greve-com-85-a-90-de-adesao/

economy. For the Center and South regions, there was a negative and statistically significant relationship between the CCI and total and short-term indebtedness, without significance in the long term. In opposition, the results obtained in the Lisbon region show a positive relationship between CCI and total and short-term indebtedness, without significance in the long term. This inverse result suggests, according to Aydogan (2017), that the effects are mixed and may vary according to the specific socioeconomic characteristics of each country and region.

For the interest rate variable, we observed that there is a negative and significant relationship between total and short-term indebtedness for the North region, and for the long term, no statistical significance was proved. For the Center and South regions, a negative effect was verified between total and long-term indebtedness, with no significant evidence for short-term indebtedness. According to the study developed by Graham and Harvey (2001), this result can be explained by the companies' preference regarding debt decisions, that is, when short-term interest rates present lower rates than long-term ones, companies choose to contract short-term debt and vice versa. This result is in line with the conclusions obtained by Kenourgios et al., (2019); Panda and Nanda (2020); Savvakis et al., (2021). Most interesting was the result obtained in the Lisbon region sample, once again different from that obtained in the other samples, which showed a positive and statistically significant relationship between interest rates and short-term indebtedness. If there is a need for funding, at a time when interest rates are high, the manager has to decide to finance himself in the short term (Daskalakis *et al.,* 2017). On the other hand, we can argue that regardless of the increase in short-term interest rates, the companies that form part of the health sector in the Lisbon region lack the resources to meet their short-term commitments and, therefore, are forced to take out short-term loans. In addition, it is also important to highlight the positive effect found between business risk and short-term indebtedness, which, similarly to this one, leads us to conclude that the analyzed companies do not have much choice in the type of debt they contract, generally depending on short-term debt, despite high-interest rate levels.

5. Conclusions

The objective of this paper was to study the determinants of debt maturity of companies in the health sector in Portugal between 2014 and 2020.

Using the panel data methodology, the results show that companies depend mostly on short-term debt, which makes it very difficult to manage without problems of structural financial balance in this sector. The determinants of indebtedness are different by region and depend substantially on the indebtedness variable used, i.e., the maturity of the debt. Generically, it should be noted that it was the sector-specific determinants rather than the macroeconomic ones that contributed most to indebtedness levels, suggesting that regardless of the economic situation, this sector is permanently being financed by external capital, namely short-term given the weight in the total debt.

It should be noted the distinctive results of the Lisbon region with the other subsamples, which shows the importance of studying these companies separately.

The positive effect between business risk and indebtedness for all regions suggests that regardless of the EBIT volatility of this sector, given the relevance it has for civil society and the state, external financing continues to be a reality.

In the Lisbon region, the positive effect between interest rates and short-term debt indicates that, despite the price charged for the loan, they remain dependent on this financing, possibly to resolve short-term commitments. Also in this region, it is possible to verify a negative effect between tangibility/size and long-term debt, which can be explained, on the one hand, through the high transaction costs applied to long-term debt, on the other hand, due to the accumulated gains that allow investments to be made without resorting to long-term debt. The positive sign between ROA and long-term debt, exclusively for the Lisbon region, also shows that companies with more operational profitability are more able to support higher levels of debt, taking advantage of the tax benefits of this debt. These results may suggest differences in management, or that companies in this region already have high amounts of investment, so banks have to beware of some increased financial risk. It should be noted that only in Lisbon there is indebtedness to support social expenses, which once again confirms that the stage of development of this sector and its management is different in this region, the city that is the capital of the country.

To our knowledge, this research is the only one that compares the determinants of indebtedness between the various regions of the country, including the country's capital. It is in this sense that this research differs from the others and that it contributes to a more complete understanding of this topic. This research complements empirical studies in the literature and proves that debt decisions are influenced by specific, internal, and also external, macroeconomic factors. Although the various works carried out on the

determinants of the financial structure of companies, this one, in particular, came to fill the lack of studies applied to the health sector in Portugal.

In addition, this study can help investors to understand more clearly which financial structure determinants they should take into account when financing companies. Additionally, it offers health sector managers information on the characteristics of the financial structure that most influence indebtedness and perceive differences in performance from their peers in the various regions of the country.

Comparing health sector performance across regions can reveal best practices and successful interventions that have worked in certain areas. This can lead to the sharing of knowledge and strategies between regions, facilitating cross-regional learning and collaboration. This understanding can help policymakers address specific challenges unique to each region.

A major limitation of this work is related to the lack of databases that integrate qualitative and quantitative measures in addition to financial data. It would be essential to conduct a more in-depth analysis to fully understand the specific reasons for hospital debt maturity in each region of the country. This would involve a detailed assessment of local health policies and budgets by region, demographic profile, and socioeconomic conditions and support infrastructures to understand how it is possible to turn things around without compromising the future of the country and users.

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