



Article

# Bank Market Power, Firm Performance, Financing Costs and Capital Structure

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**Abstract:** In this study, we provide a thorough analysis, conducted on a company-by-company basis, of the impact of bank concentration and the bank-relative power of banks on firm profitability, financing costs, and capital structure in a small economy like Portugal. Using a sample of 434,990 Portuguese companies, the study spans a time frame of 13 years (from 2006 to 2018). Principal component analysis (PCA) was used to determine bank concentration, and a new variable, “bank-related power”, was introduced. This work employed linear regression with static panel data for fixed and pooled effects, using Driscoll–Kraay standard errors and robust standard error estimation. A direct association was found between business performance and the use of bank credit in highly concentrated banking markets (SMEs), and there is evidence of an inverse relationship when the relative power of banks increases (small business). Evidence also shows that financing costs increase with greater bank concentration, while firms’ capital structure improves under similar conditions. When a bank holds greater relative market power, it tends to exert a negative impact on the capital structure of large companies. However, an inverse relationship is observed in the case of SMEs. Unlike previous studies, the article assesses the effects of bank market power on each of the different companies involved by using both bank concentration (as a composite variable) and a new variable that measures the relative power of banks. Due to its extensive database and expanded time frame, this research is innovative in the context of small-sized companies.

**Keywords:** bank market power; bank concentration; relative power of banks; performance; financing costs; capital structure



**Citation:** Gonçalves, Marisa Pessoa, Pedro M. Nogueira Reis, and António Pedro Pinto. 2024. Bank Market Power, Firm Performance, Financing Costs and Capital Structure.

*International Journal of Financial Studies* 12: 7. <https://doi.org/10.3390/ijfs12010007>

Academic Editors:  
Konstantinos Baltas and Zied Ftiti

Received: 12 October 2023  
Revised: 11 December 2023  
Accepted: 10 January 2024  
Published: 17 January 2024



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## 1. Introduction

The volume of credit granted by the banking system to Portuguese companies has positively evolved over these last few years (?). Concurrently, small- and medium-sized enterprises (SMEs) have played a pivotal role in the Portuguese economy, representing approximately 99.9% of all businesses, generating 63.4% of the wealth produced, and accounting for 77.4% of employment in 2019 (PORDATA 2021).

In this context and considering that bank financing constitutes the main external funding source for SMEs (Meslier et al. 2020), assessing how bank concentration and the relative power of banks may condition the operations of Portuguese companies is of utmost importance, namely in terms of firm profitability, cost of debt, and capital structure. Banking markets in Germany, the Netherlands, and Portugal are overall more competitive compared to other EU nations, as observed by Wang et al. (2020). Despite the numerous studies conducted, an integrative theory capable of comprehensively explaining the intricate field of corporate finance is yet to be formulated.

Building on the hypothesis of perfect capital markets, numerous works argue that financial decisions exert a major impact on business performance (Abdullah and Tursoy

2021). However, contemporary studies recognize the existence of several market imperfections, such as bank concentration, the market power of banks, information asymmetry, and conflicts of interest inherent to corporate finance.

Therefore, the analysis should adopt a collaborative and interconnected approach. The predominance of studies focusing on large companies and markets highlights the importance of delving deeper into how these aforementioned issues specifically impact smaller companies.

Previous studies have successfully examined the specific impact of banking relationships on firm profitability (Agostino and Trivieri 2010; Chauvet and Jacolin 2017; Delis et al. 2017), financing costs (Bonini et al. 2016; Hasan et al. 2017; Wang et al. 2020), and capital structure (González and González 2008; Degryse et al. 2012; Bikker and Spierdijk 2017). Given the lack of studies on the Portuguese business ecosystem, the current investigation offers relevant information on the impact of bank market power on the different dimensions of business activity. The motivation for the present study stems from the significant gap in the existing literature focusing on the specific and nuanced impact of bank market power concentration on individual firms.

Much of the current research tends to focus on macroeconomic trends, often overlooking the microeconomic dynamics that can significantly influence firm-level outcomes. However, further studies are required to further understand this relationship.

The research also addresses the need for size specificity in the current literature, particularly in a small market like Portugal. Understanding that the impact of bank power concentration may vary depending on the size of the companies is crucial for small countries. By including companies of different sizes operating within small geographical contexts, this study aims to uncover nuanced patterns and provide valuable insights to be used for both academic and practical applications in corporate finance. Overall, the research is driven by the need to address these critical gaps and provide a more robust understanding of the implications of bank power concentration on firm-level financial dynamics.

The study makes a timely and relevant contribution to the existing literature, by providing empirical evidence on the significance of bank concentration and the relative power of banks—Bank-Related Power—for each of the different companies, particularly in terms of firm profitability, cost of debt, and capital structure. The work contributes, therefore, to a better understanding of the impact of the banking system on small business activity. Banking relationships affect value creation and provide both current and potential shareholders with analytical tools that enable them to shape future relationships. Considering the sample and the limited number of studies focusing on the Portuguese reality, our research provides results and significant information on the critical role played by banking relationships in company performance. Additionally, the time frame considered allowed us to assess the impact of the subprime crisis (2008–2009) and the sovereign debt crisis (2010–2013) on the dimensions addressed. The innovative nature of this study stems from the introduction of a new variable (Bank-Related Power), its substantial sample size (434,990 companies), and the extended time frame addressed (2006–2018).

Certain limitations regarding access to the database provided by Banco de Portugal emerged during this research, mainly due to the imperative to comply with the General Data Protection Regulation.

The analysis of the results, sorted by business size and year, was conducted using a fixed-effects regression model and the ordinary least squares model (pooled OLS) (Hedges and Vevea 1998; Bell et al. 2019). The fixed-effects model with Driscoll–Kraay standard errors is employed when evidence suggests that one of the assumptions of the fixed-effects estimator needs to be addressed (Topcu and Gulal 2020).

In addition to this introductory chapter, the body of this work comprises five chapters. The second chapter is dedicated to contextualizing the problem under study, identifying the key concepts, and reviewing the studies conducted on this topic. The third chapter encompasses sample selection and the variables under investigation. The fourth covers the

methodology used, as well as the resulting outcomes. Finally, the fifth chapter presents the main conclusions, outlines the study's limitations, and suggests avenues for future research.

## 2. Literature Review

### 2.1. General Framework

The term "Banking relationship" stems from the informational dynamics established between banks and companies, especially when the latter are credit customers (Boot 2000; Chu and Li 2022). It can also be understood as a close and continuous interaction between a bank and a company that allows the former to reduce the information asymmetry inherent in this relationship (Degryse and Ongena 2001; Chu and Li 2022). When the intensity of the relationship cannot be observed directly, a set of proxies, such as duration, amplitude, and number of banking relationships, is employed to measure the strength of the relationship (Pinto 2013).

The literature has shown a growing interest in investigating how banking market structure impacts access to corporate finance. Bank competition is currently considered a particularly relevant dimension within the market structure (Berger et al. 2004; Carbó-Valverde et al. 2009). The traditional vision of the bank market power hypothesis suggests that less competitive banking markets are associated with less credit availability and higher costs. However, an alternative current of thought, known as the information hypothesis, states that increased competition may lead to higher levels of asymmetric information (Dell'Ariccia 2001). Competitive banking markets weaken relationships by depriving banks of the incentive to invest in soft information. Therefore, greater credit availability may be associated with less bank competition (Petersen and Rajan 1995).

The structure of the banking market and the conditions for accessing credit hold particular significance for smaller companies. When SMEs resort to bank credit, they face increased difficulties compared to larger enterprises, insofar as the following: (i) they are more informationally opaque due to the existence of information asymmetries (Han et al. 2015; Chauvet and Jacolin 2017), (ii) they encounter more demanding requirements for implicit guarantees (Wang et al. 2020; Yoshino and Taghizadeh-Hesary 2018), and (iii) they are heavily dependent on the banking system (Petersen and Rajan 1995; Carbó-Valverde et al. 2009). In such circumstances, banks play a crucial role in reducing the financial constraints experienced by SMEs by strengthening banking relationships (Meslier et al. 2020).

In their study, Agoraki et al. (2021) examined the impact that a set of bank-specific and industry-specific determinants, along with the regulatory framework developed under the three main tenets of the Basel II accord, has on credit supply. They conclude that a significant part of the performance of the banking sector is explained by bank-specific determinants, namely portfolio performance, default risk, and leverage. According to the authors, public policies should strive to create an environment of financial stability. In the relationships it establishes with companies, the banking system must bear in mind a set of determinants that includes components like the balance sheet, the quality of the loan portfolio, and the financial services and product portfolio.

A study conducted by Banco de Portugal in the third quarter of 2021 on the conditions required for extending credit to Portuguese companies reveals a slight increase in restrictions and credit maturity across the entire business sector. The study also notes that companies with a higher risk profile are required to provide a greater volume of guarantees and are subjected to higher commissions and fees. These conditions reflect the prevailing risk perception and tolerance levels. On the other hand, when companies exhibit a moderate credit risk, bank competition helps alleviate the restrictions they may face (Banco de Portugal 2021).

Banks' behavior and market power can be assessed through bank concentration and competition. Bank concentration leads to an increase in the size of the major banks in the market (Carbó-Valverde et al. 2009), while bank competition is characterized by the presence of competitiveness/rivalry among banks that will foster the emergence of competitive advantages (Vives 2019).

Bank concentration is commonly measured using the Herfindahl–Hirschman index (HHI), while bank competition is assessed through the Lerner index and Friedman’s H statistic (Bolt and Humphrey 2015). The HHI measures the level of bank concentration, showing the size of banks in the system and the degree of bank concentration in the market, and expressing the market power of each of those variables (Giroud and Mueller 2010; Sulaiman et al. 2019). A high HHI value suggests the presence of a small number of banks with substantial market shares and low competition (Lapteacru 2014; Sulaiman et al. 2019). The Lerner index measures the percentage mark-up of prices over marginal cost, which means that, in a perfectly competitive market, the price of the product equals marginal cost. A Lerner index value close to zero indicates high competition within the banking system and a positive value suggests the prevalence of bank market power (Lapteacru 2014; Spierdijk and Zaouras 2017).

The standard Lerner index is arguably the most commonly employed measure of bank competition; however, it presents some limitations, since it relies on an estimation of the bank’s marginal cost, in other words, the marginal cost used is merely an approximation, which limits the capacity of that method to accurately represent real bank market power. For that reason, Koetter et al. (2012) proposed the adjusted Lerner index. Friedman’s H statistic is also commonly employed for assessing competition when similar factors are considered (Spierdijk and Zaouras 2017; Wang et al. 2020).

The literature review conducted reveals a reduced body of work that has already explored the impact of bank market power on business activity, particularly in terms of profitability, financing costs, and capital structure. Access to financing conditions emerges as a decisive factor in business growth and performance.

## 2.2. The Impact of Bank Market Power on Firm Performance

Leverage has different impacts on corporate profitability: (i) an increase in financial expenses can negatively affect corporate profitability, and (ii) greater financial leverage has the potential to reduce agency costs generated by conflicts of interest between shareholders and managers, thereby positively impacting profitability. The control exercised by credit institutions improves business performance, as managers are held responsible for servicing the debt and, as a consequence, generating a greater volume of cash flows. However, leverage may generate an increase in costs due to the conflicts of interest between shareholders and creditors (Nickell and Nicolitsas 1999; Agostino and Trivieri 2010).

Another analytical perspective emphasizes the importance of the information acquired by the creditor throughout the course of a relationship, as this information will be critical to improving business profitability and value creation (Boot and Thakor 2000; Freixas 2005). Greater bank competition increases banking relationships and allows the provision of a wide range of services. Simultaneously, greater competition reduces the follow-up effort required for each relationship (Pinto 2013). The structure–conduct–performance (SCP) paradigm (Berger 1995) and the bank relative market power hypothesis (RMP) (Smirlock 1985) are two basic models commonly used to assess the impact of market structure on profitability.

A study conducted by Beck et al. (2005) involving more than 4000 companies across 54 countries concludes that small companies are particularly exposed to financial and legal constraints that can have a negative impact on their performance. However, Agostino and Trivieri (2010) assert that SMEs have a strongly concentrated ownership structure, making agency costs irrelevant. These costs are frequently caused by conflicts of interest between ownership and managers and are largely negligible for SMEs where those two entities are often the same person. They also conclude that the negative impact of bank debt on company performance is lower when bank relationships occur in more competitive markets where better credit conditions are offered.

The degree of monopoly within the banking system can pose a challenge to the survival and growth of business activities due to the generated costs. However, the amount of credit has proved to be adequate (Wang et al. 2020). In an analysis of Portuguese companies,

Pinto (2013) states that as bank relationships intensify and the services provided increase, the number of banks that hold information about the company also increases, leading to a decrease in information asymmetry. Consequently, business performance improves to the extent that financing costs, guarantees required by the bank, and supervision and follow-up costs decrease.

The literature (e.g., Chauvet and Jacolin 2017; Wang et al. 2020) further argues that business growth and performance are positively related to financial inclusion—the adequate, timely, and affordable access to a wide range of regulated financial products and services that are crucial to increase financial well-being (Banco de Portugal 2017); however, high bank concentration levels can reduce the effects of financial inclusion. Its impact on business performance depends on the conditions of access to credit and is not necessarily linked to the business dimension (Beck et al. 2005; Chauvet and Jacolin 2017).

In a study conducted on SMEs, Agostino and Trivieri (2010) and Delis et al. (2017) conclude that using bank credit in uncompetitive and concentrated markets negatively impacts business performance. Conversely, for most companies, bank concentration tends to have a positive effect on business performance.

This paper aims to reconcile the divergent perspectives identified in the literature by carefully examining the effects of bank market power on corporate profitability. The following study hypothesis was formulated based on the information collected:

**H<sub>1</sub>.** *Bank market power improves firm performance.*

### 2.3. The Impact of Bank Market Power on Corporate Financing Costs

An assessment of the effect of bank market power on financing costs was conducted by Wang et al. (2020). The authors conclude that an increase in bank market power entails a decrease in the cost of debt. They considered both bank market power and information-based hypotheses in their study. The bank market power hypothesis suggests that the increase in bank market power worsens credit constraints for SMEs, increases interest rates, and reduces access to bank credit (Álvarez and Jara 2016). The information-based hypothesis posits that, due to information asymmetry and agency costs, banks with high bank market power are more motivated to invest in acquiring borrowers' private information, build solid lending relationships, and reduce agency costs, particularly when more informationally opaque companies like SMEs are involved. As a consequence, there will be fewer restrictions on access to bank credit. The information-based hypothesis best reflects the reality of SMEs, given their smaller size, higher information opacity, and greater funding restrictions. Greater competition reduces bank market power, preventing banks from obtaining what is commonly known as an information monopoly (Wang et al. 2020).

Moreover, the information-based hypothesis argues that banks operating in more concentrated markets have stronger incentives to invest in acquiring information, as increased competition constitutes an obstacle to forming stable relationships and is likely to dissuade banks from acquiring information due to the existence of associated high costs associated with this operation. This situation may ultimately lead to the emergence of the free-rider problem (Carbó-Valverde et al. 2009).

In such a circumstance, bank competition makes it difficult for SMEs to access bank credit, as the banks are less motivated to invest in acquiring information and assessing the natural capabilities of SMEs to finance themselves (Hauswald and Marquez 2006; Carbó-Valverde et al. 2009; Chauvet and Jacolin 2017).

In concentrated markets, banks can anticipate credit benefits through the interest rates they charge because companies are less likely to become loyal to another bank. Under these circumstances, it will be easier for younger and more informationally opaque companies to establish stable relationships in less competitive markets, and these relationships will be of utmost importance to reduce costs (Delis et al. 2017).

Conversely, banks wielding greater bank market power may charge interest rates higher than average, influencing financing costs and business investment decisions. From the banks' perspective, young companies seeking credit represent a higher risk associated



with information asymmetry and the absence of guarantees; therefore, they have to face higher interest rates and a reduced credit volume (Hasan et al. 2017). However, banks adopt a different strategy with young companies when they hold greater bank market power: initially, they charge lower interest rates to establish a relationship based on trust and, subsequently, they start charging higher interest rates as companies improve their performance outcomes (Agostino and Trivieri 2010; Delis et al. 2017).

The impact of bank concentration on financing costs led Bonini et al. (2016) to admit that (i) more intense banking relationships lead to lower effective financing costs, while (ii) greater bank concentration leads to a higher cost of finance. More intense relationships reduce the spread applied over the reference interest rate, allowing SMEs to reduce financing costs (Bonini et al. 2016).

Based on the previous analysis, the following study hypothesis was formulated:

**H<sub>2</sub>.** *Bank market power increases the cost of finance for companies.*

#### 2.4. The Impact of Bank Market Power on the Capital Structure of Companies

Credit access conditions determine the financial structure of companies (Álvarez and Jara 2016). The relationship between bank concentration and the capital structure of smaller companies, in line with the pecking order theory, shows a preference for self-financing (Degryse et al. 2012). Bank concentration can have two opposite effects on corporate leverage and, consequently, on capital structure (González and González 2008). In a perfect market with no information asymmetries, banking institutions would have access to all borrowers' information, interest rates would rise, and credit availability would decrease. This would entail a negative impact of bank concentration on companies' leverage. Conversely, in markets with asymmetric information, higher bank market concentration may motivate banks to invest in the acquisition of soft information, do their best to establish closer relationships with borrowers, increase credit availability, and reduce firms' financial constraints. In such circumstances, creditors in concentrated markets are more likely to finance credit-constrained companies, as it becomes easier for these creditors to internalize the benefits of assisting those companies. Relationships with creditors become valuable and appear to operate more through quantities rather than prices. A relationship based on loyalty provides better financing conditions, creating an expectation of a positive relationship between bank concentration and corporate leverage (González and González 2008).

In bank-concentrated markets, companies are highly leveraged, and their weakened capital structure increases the chances of financial distress, especially when they are unable to service their debt and, consequently, face bankruptcy (Pandey 2002). In concentrated banking markets, leverage tends to increase due to the presence of information asymmetry (Pandey 2002; González and González 2008). Therefore, when banks acquire greater market power, the capital structure of companies is likely to deteriorate.

Therefore, the following study hypothesis was formulated:

**H<sub>3</sub>.** *Bank market power positively influences the capital structure of companies.*

### 3. Data and Methods

The Banco de Portugal cooperated in the collection of information, granting restricted access to two databases, but ensuring anonymity regarding the identification of companies: (i) Credit Responsibilities Center (CRC), which contains information on credit offers from banking institutions operating in Portugal, aggregated by companies, and (ii) Harmonized Panel of the Central Balance Sheet, which encompasses financial information in panel data from the Central Balance Sheet database and harmonized variables (Bank of Portugal Microdata Research Laboratory (BPLIM) 2019).

The analysis included information from 434,990 Portuguese companies that established relationships with financial institutions operating in Portugal between 2006 and 2018. To ensure information for the entire period under study, a sample comprising 2,669,785

observations was obtained. Over the 13-year time frame under study, two crises unfolded: the subprime crisis (2008 and 2009) and the sovereign debt crisis (2010 to 2013) (Rua 2017).

Return on assets (ROA), defined as the ratio between operating profits and total assets (Serrasqueiro and Nunes 2012; Gun 2020); interest rate (IR), expressed by the quotient between financial expenses and total debt (Banco de Portugal 2019); and debt-to-assets ratio (DAR), which evaluates the percentage of total assets acquired using borrowed capital (Schjelderup 2016; Gupta 2021) were the dependent variables considered.

To assess bank market power, two independent variables were created: bank concentration and bank-related power.

Bank concentration was determined using the principal component analysis (PCA) method using three indicators that, according to Table 1, exhibited a very high degree of correlation: (i) Max\_relationship—greater bank relationship, which represents the percentage of the company’s largest loan with the bank; (ii) Nb\_relationship—number of bank relationships, which indicates the number of banks with which the company establishes relationships and (iii) Hhi\_relationship—concentration of bank relationships, which measures the concentration of bank relationships using the HHI index to assess the level of bank concentration, and highlights the dimension of the bank within the banking system (Sulaiman et al. 2019). The PCA method was selected since it is a statistical approach that can be used to analyze data and also to prepare it before conducting subsequent statistical tests (Kherif and Latypova 2020).

**Table 1.** Correlation between variables for the construction of the “bank concentration” variable.

	Max_relationship	Nb_relationship	Hhi_relationship
Max_relationship (%)	1.0000	-	-
Nb_relationship (un.)	-0.7778	1.0000	-
Hhi_relationship (%)	0.9879	0.7973	1.0000

According to Table 1, all variables are correlated. A negative relationship is observed between greater bank relationships and the number of banks with which the company establishes a relationship. This correlation is justified by the fact that an increase in the number of relationships entails a decrease in credit availability for each single bank. The HHI index shows positive correlations with both greater banking relationships and the number of banks involved.

The bank-related power variable is obtained from Equation (1). This novel variable was developed and introduced in this study and its primary objective is to make a contribution to the existing literature by enabling the assessment of the power wielded by a particular bank compared to the others with which the company has banking relationships. It is constructed from the average bank share, represented by  $Z_m$ , the average share of each bank in the company’s credit, and Max\_relationship, and is expressed as follows:

Equation (1)—Expression of the “Bank-Related Power” variable

$$\text{Bank – Related Power} = \frac{\text{Max\_relationship}}{Z_m}, \text{ where } Z_m = \frac{1 - \text{Max\_relationship}}{N.\text{banks} - 1}$$

Table 2 displays the descriptive statistics of the variables. To ensure security, data protection, and customers’ confidentiality, Banco de Portugal does not provide the minimum and maximum values of the variables, and hence these statistics are not presented.

**Table 2.** Descriptive statistics of the variables.

Variable	Obs.	Average	Standard Deviation	99th Percentile	90th Percentile	50th Percentile (Median)	5th Percentile	1st Percentile
Return on Asset (ROA)	2665.155	−27.44	9930.14	0.588	0.176	0.023	−0.532	−2.40
Interest Rate (IR)	2422.715	4.162	892.91	2.86	0.143	0.040	0	0
Debt-to-Assets Ratio (DAR)	2665.155	3214.84	1,602,130	2.72	0.661	0.17	0	0
Banking Concentration	2669.407	$2.87 \times 10^{-8}$	1.646	1.29	1.288	1.28	−3.17	−4.79
Bank-Related Power	1,299,522	9.286	19.142	99	19	3.54	1.28	1.04

The table shows that 90% of the observations indicate an interest rate equal to or lower than 14.36%. As for profitability, the values suggest that in 90% of the observations, the ROA is less than 17.61%. Finally, 90% of the observations recorded a debt-to-assets ratio of less than 66.17%. As for bank concentration, 90% of the observations exhibit values lower than or equal to 1.288. The median for all variables stands at values considered reasonable (2.3% for ROA, 4% for the interest rate, and 17% for debt-to-assets ratio).

The average for the bank-related power variable is 9.29, reflecting a 9-fold difference between the power held by the bank with the lowest share and the power of the bank with the highest share. The 90th percentile indicates that 90% of the observations related to the bank-related power variable are less than or equal to 19, which suggests a difference of up to 19 times between the bank with the highest share and the bank with the lowest share. These results suggest the existence of a high concentration of credit.

According to the measures of dispersion used (mean and standard deviation), some of the companies' datasets analyzed can be considered outliers. They are, nonetheless, regarded as true and real outliers, since the database from which the information was collected was provided by a governmental entity. But considering that we are dealing with more than 2.5 million observations, the extreme values displayed by a few companies do not jeopardize the statistical inference. That is why we used the 1st and 2nd, median, 90th, and 99th percentiles to ensure that the values displayed by most companies can be considered normal, and that there are only a few outliers. However, those outliers cannot be excluded because they are real data and real companies. Furthermore, some authors argue that real outliers should be studied as they are often found to be interesting and influential (Aguinis et al. 2013). Gallup (2020) states that, since panel datasets are typically large, it is quite common to have a few distant outliers, which do not significantly affect the estimates. The author further notes that the researchers must ensure that the undisplayed observations are not significant to the estimated relationship.

According to Sullivan and Wallace (2021), the median resists extreme values, while the mean is sensitive to them. However, the mean can be modified by only a single extreme value, regardless of the sample size. Likewise, the standard deviation and variance are sensitive to extreme values; nevertheless, the interquartile range and the median are more robust to outliers.

The Driscoll–Kraay method estimates the covariance matrix of the errors in a way that accounts for potential heteroscedasticity and serial correlation.

Heteroscedasticity and serial correlation can be linked to outliers, especially in time-series data where observations may exhibit temporal dependencies. Serial correlation implies that there is a systematic relationship between the current observation and past observations. Outliers in time-series data may manifest as unexpected spikes or deviations from the typical pattern, potentially leading to serial correlation. By allowing for temporal correlation in the errors, the Driscoll–Kraay standard errors aim to provide more efficient estimates in the presence of serial correlation.



While not explicitly designed to handle outliers, the efficiency gains from addressing serial correlation may help produce more reliable estimates when outliers are present in time-series data.

To complement the analysis, control variables, such as the age of the company (maturity), and its size (micro-, small-, medium-, and large-sized) were considered—following the recommendations of the European Commission issued on 6 May 2003 (2003/361/CE). Total assets (global investment) were also considered. The transformation of total assets using the logarithm serves to minimize significant differences and smoothen out extremes.

Data analysis was conducted using statistical inference techniques, such as static panel data regression, fixed-effects regression model, random-effects regression model, and pooled OLS regression, as well as regression with Driscoll–Kraay standard errors. These techniques were employed to address the research questions under investigation. The use of multiple regression is grounded in certain assumptions: (i) the error term has a population mean of 0; (ii) the error term has a constant variance, measured by homoscedasticity; (iii) the error terms are uncorrelated with each other, in other words, there are no correlations between errors and explanatory variables (absence of multicollinearity); and (iv) the error term is normally distributed (Pesaran 2015). Data treatment was carried out with STATA (statistic data analysis). Multiple linear regression with static panel data was the model used. Panel data provide more information, more data variability, less collinearity among variables, more degrees of freedom, and more efficiency (Wooldridge 2003).

The Hausman test was employed to determine whether a fixed-effects model or a random-effects model is appropriate to analyze the sample. If we cannot reject the null hypothesis ( $H_0$ ) using the Hausman test, it means that the random-effects model is more appropriate; if the null hypothesis is rejected, the fixed-effects model should be preferred (Rabe-Hesketh and Skrondal 2008). When the Hausman test does not reject the null hypothesis, providing evidence of the heterogeneity/variability between individuals, the Breusch–Pagan test is used to determine which of the models (random-effects vs pooled OLS) is more suitable for panel data analysis. It also allows the presence of heteroscedasticity, based on the assumption that the error terms follow a normal distribution (Zivot and Wang 2013).

Table 3 provides a summary of the test results and identifies the most appropriate model to be used in the construction of the regression model for the variables under study. The fixed-effects model will be used for most variables, since  $Prob > chi2$ , with a value close to zero, for a significance level of  $\alpha = 5\%$ , except for situations marked with an asterisk (Breusch–Pagan test was applied in those cases).

The table includes an “annual review” section where the impact of independent variables on dependent variables across different years is assessed. In addition to the dimensions identified by Banco de Portugal—micro-, small-, medium-, and large-sized companies—two new dimensions were created: (i) micro and small companies (encompassing micro- and small-sized companies) and (ii) SMEs (comprising micro-, small-, and medium-sized enterprises).

The regression model estimation for the fixed-effects specifications is provided by expression (1):

$$Y_{it} = \beta_{0i} + \beta_1 X_{1it} + \beta_2 X_{2it} + \beta_3 X_{3it} + \varepsilon_{it} \quad (1)$$

where,  $X_1$  represents bank concentration,  $X_2$  bank-related power and  $X_3$  control variables (age and total assets). Firm size was used as a grouping variable. Age and total assets were not displayed in this study as our main focus was to examine the impact of bank concentration power on each of the companies. Under these circumstances,  $\beta_{0i}$  represents the unobserved, time-invariant individual characteristics that may affect  $Y_{it}$ , that is, individual heterogeneity is captured by  $\beta_{0i}$ . The term  $\varepsilon_{it}$  represents the error term.  $Y_{it}$  represents each dependent variable: ROA, financing costs, and debt-to-assets ratio.

**Table 3.** Summary of the statistical models used to assess independent variables.

Dependent Variable	Business Dimension	Bank Concentration		Bank-Related Power	
		Hausman Test (Prob > chi2)	Fixed/Random Effects/Pooled OLS Model	Hausman Test (Prob > chi2)	Fixed/Random Effects/Pooled OLS Model
Return on Assets (ROA)	Micro-Enterprise	0.0000	Fixed Effects	0.0000	Fixed Effects
	Small Business	0.0000	Fixed Effects	0.0000	Fixed Effects
	Medium Company	0.0000	Fixed Effects	0.0000	Fixed Effects
	Big Company	0.0000	Fixed Effects	0.0000	Fixed Effects
	Micro- and Small-Sized Business	0.0000	Fixed Effects	0.0000	Fixed Effects
	SMEs	0.0000	Fixed Effects	0.0000	Fixed Effects
	Annual Review	0.0000	Fixed Effects	0.0000	Fixed Effects
Interest Rate (IR)	Micro-Enterprise	0.0000	Fixed Effects	0.0000	Fixed Effects
	Small-Sized Business	0.0000	Fixed Effects	0.0000	Fixed Effects
	Medium Company	0.6321 *	Pooled OLS	0.7511 *	Pooled OLS
	Big Company	0.0991 *	Pooled OLS	0.0000	Fixed Effects
	Micro- and Small-Sized Business	0.0000	Fixed Effects	0.0000	Fixed Effects
	SMEs	0.0000	Fixed Effects	0.0602 *	Pooled OLS
	Annual Review	0.0000	Fixed Effects	0.0000	Fixed Effects
Debt-to-Assets Ratio (DAR)	Micro-Enterprise	0.0000	Fixed Effects	0.0000	Fixed Effects
	Small-Sized Business	0.0000	Fixed Effects	0.0000	Fixed Effects
	Medium Company	0.0000	Fixed Effects	0.0000	Fixed Effects
	Big Company	0.0000	Fixed Effects	0.0000	Fixed Effects
	Micro- and Small-Sized Business	0.0000	Fixed Effects	0.0000	Fixed Effects
	SMEs	0.0000	Fixed Effects	0.0000	Fixed Effects
	Annual Review	0.0000	Fixed Effects	0.0000	Fixed Effects

(\*) for results that are significant on a 5% basis.

Estimation with robust standard errors was used since we were unable to achieve heteroscedasticity correction and determine the existence of autocorrelation of errors. In this context, the cluster-robust standard errors model should also be used, according to [Arellano \(1987\)](#). To verify whether the formulated assumptions were met, regression with Driscoll–Kraay standard errors was employed for fixed-effects estimation. The error structure of this method is robust to heteroscedasticity, correlation, and cross-sectional dependence ([Topcu and Gulal 2020](#)). In situations where the OLS pooled regression model proves more appropriate for panel data analysis, the specification closely resembles that of the fixed-effects model, according to expression (2). To control the correlation of error  $\epsilon_{it}$ , over time, the coefficients are presumed to be constant across all units and periods, with no expected heterogeneity between units ([Bell et al. 2019](#)). Figure 1 summarizes the research methodology employed.

$$Y_{it} = \beta_0 + \beta_1 X_{1it} + \beta_2 X_{2it} + \beta_3 X_{3it} + \epsilon_{it} \tag{2}$$

Dependent Variables (Y)		Independent Variables (Variables to Test)	Construction of Independent Variables	Method of Estimation and Robustness
ROA	←	Bank concentration (in each firm)	Bank concentration constructed with principal component analysis using Hhi_relationship, Max_relationship, Nb_relationship.	Static panel data with fixed, random, or pooled effects selected with Hausman and Breusch-Pagan tests
Interest Rate		Bank-related power	And  Bank –  <i>Related Power</i> = $\frac{Max\_relationship}{Z_m}$ ,  where $Z_m = \frac{1 - Max\_relationship}{N.banks - 1}$	Two estimations for each dependent variable for robustness: panel regression estimation with robust standard errors, and panel regression estimation using Driscoll-Kraay standard errors
Debt-to-Assets Ratio				

**Figure 1.** Diagram of the research design. Note: Max\_relationship, which represents the percentage of the company’s largest loan with the bank; Nb\_relationship—the number of bank relationships, which indicates the number of banks with which the company establishes relationships; and Hhi\_relationship—concentration of bank relationships, which measures the concentration of bank relationships using the HHI index to assess concentration level.

**4. Results**

This section presents the estimation results of the different models, in accordance with the specifications obtained from the tests conducted. Those results are used to assess the impact of bank concentration and bank-related power on the profitability, financing costs, and debt structure of Portuguese companies, from 2006 to 2018.

*4.1. Impact of Bank Concentration and of the Relative Power of Banks on Return on Assets (ROA)*

Table 4 exhibits the results obtained for estimated expressions (1) and (2), sorted by company size. The fixed-effects model and Driscoll-Kraay standard errors were used to assess the impact of the different independent variables on return on assets (ROA). The estimation results obtained from the fixed-effects model (FE) with robust standard errors suggest that profitability, as measured by ROA, cannot be explained by bank concentration. However, the estimation with Driscoll-Kraay standard errors reveals that bank concentration positively influences the performance of micro- and small-sized companies, and SMEs, thereby supporting hypothesis  $H_1$ . The results obtained are in line with Chauvet and Jacolin’s findings (2017). These authors state that in more concentrated markets, banks have more incentives to invest in the acquisition of business information, especially when companies are more informationally opaque, thus supporting the information-based hypothesis. This increased supervision and control of business activity positively impacts firm performance. In markets with greater bank concentration, banking relationships are more likely to intensify, credit institutions expand the services they provide, and information asymmetry and the need for guarantees decrease. In turn, this specific context lowers financing costs and improves firm performance (Pinto 2013).

**Table 4.** Impact of independent variables on return on assets (ROA).

Independent Variable	Business Dimension	FE Model			Driscoll–Kraay Model		
		Coefficients	Robust Standard Error	<i>p</i> -Value	Coefficients	Drisc/Kraay Standard Error	<i>p</i> -Value
Bank Concentration	Micro-Enterprise	10.42115	6.045695	0.085	10.42115	4.663853	0.025 *
	Small Business	0.1762664	0.1141432	0.123	0.1762664	0.0760314	0.020 *
	Medium Company	0.166335	0.1445204	0.250	0.166335	0.1117679	0.137
	Big Company	−0.0010629	0.0054524	0.845	−0.0010629	0.0031834	0.739
	Micro- and Small-Sized Business SMEs	9.393949	5.297796	0.076	9.393949	4.067361	0.021 *
Bank-Related Power	Micro-Enterprise	0.0009442	0.0008369	0.259	0.0009442	0.0006049	0.119
	Small-Sized Business	−0.0002173	0.0000704	0.002 *	−0.0002173	0.000053	0.000 *
	Medium Company	0.0000223	0.0000587	0.703	0.0000223	0.0000544	0.681
	Big Company	0.000111	0.0000869	0.202	0.000111	0.0000631	0.079
	Micro- and Small-Sized Business SMEs	0.0008263	0.0006063	0.173	0.0008263	0.0005249	0.115
		0.0008779	0.0005604	0.117	0.0008779	0.0004961	0.077

(\*) for results that are significant on a 5% basis.

However, these results are quite different from those presented by [Agostino and Triveri \(2010\)](#) and [Delis et al. \(2017\)](#), who state that SMEs that operate in concentrated markets exhibit poorer performance when they have to resort to bank credit, given their highly concentrated ownership structure, which hinders banks from granting better credit conditions, a situation that negatively affects business performance. SMEs are more informationally opaque, subject to financial constraints, and face difficulties in meeting the demands of the banking system. This makes it difficult for them to establish a good relationship with the banks and has a negative impact on business growth and performance ([Beck et al. 2005](#)).

As for the impact of bank-related power on business performance, the results suggest that, irrespective of the estimation method used, only small-sized companies exhibit an improvement in profitability, thereby validating hypothesis  $H_1$ . Smaller companies face great challenges in meeting the demands imposed by banks holding greater market power and this situation often negatively impacts their profitability. Their difficulty in accurately demonstrating their actual financial situation conditions the terms of financing ([Beck et al. 2005](#)). The supremacy of a bank can create an informational monopoly and may lead to a retention problem (hold-up problem), given that the borrowers' information held by the bank makes the company much more dependent on the financing bank.

When banks assume opportunistic behaviors, they are likely to jeopardize valuable investment opportunities. Furthermore, an increase in the number of creditors has been associated with management inefficiencies, as control diminishes with each additional creditor ([Bolton and Scharfstein 1996](#); [Hart 1995](#)). However, part of this managerial discretion can be controlled through bank debt ([Jensen and Meckling 1976](#)). If the firm establishes multiple relationships, the bank's informational monopoly decreases substantially, and the retention problem is mitigated.

However, multiple relationships may condition access to credit and reduce the value of the customer-specific information held by each bank, consequently jeopardizing fund availability and business profitability a posteriori. The asymmetric role played by both parties in the establishment of a bank–borrower relationship implies that, ultimately, the creditor will become the primary beneficiary of the close relationship they have forged. As the former transfers these benefits to the company, these relationships also become valuable for the latter ([Boot et al. 1993](#); [Berger and Udell 1995](#)).

#### 4.2. Impact of Bank Concentration and of the Relative Power of Banks on Corporate Debt Costs

Table 5 presents the result of estimated expressions (1) and (2), sorted by company size, using the fixed-effects model, pooled OLS model, and Driscoll–Kraay standard errors, drawing from data provided in Table 3 regarding interest rate (IR).

**Table 5.** Impact of independent variables on interest rate (IR).

Independent Variable	Business Dimension	FE Model			Pooled OLS			Driscoll–Kraay Model		
		Coefficients	Robust Standard Error	p-Value	Coefficients	Robust Standard Error	p-Value	Coefficients	Drisc/Kraay Standard Error	p-Value
Bank Concentration	Micro-Enterprise	0.5755502	0.25019	0.021 *				0.575550	0.127190	0.000 *
	Small-Sized Business	0.9623591	0.43036	0.025 *				0.962359	0.334465	0.004 *
	Medium Company				0.87328	0.26950	0.001 *			
	Big Company				1.92754	0.69635	0.006 *			
	Micro- and Small-Sized Business	0.8732815	0.26950	0.001 *				0.873281	0.224323	0.000 *
	SMEs	1.927546	0.69635	0.006 *				1.927546	0.612394	0.002 *
Bank-Related Power	Micro-Enterprise	0.0033156	0.00428	0.439				0.003315	0.002410	0.169
	Small-Sized Business	−0.020889	0.31304	0.505				−0.02088	0.016671	0.210
	Medium Company				−0.1253	0.23986	0.601			
	Big Company	−11.76660	13.7938	0.394				−11.7660	10.74242	0.274
	Micro- and Small-Sized Business	0.000272	0.00927	0.977				0.000272	0.004894	0.956
	SMEs				−0.0113	0.01912	0.554			

(\*) for results that are significant on a 5% basis. Note: According to Table 3, the fixed-effects model is only used for estimation in four dimensions, while in the other 2, the estimations are made using the pooled OLS model. The Driscoll–Kraay model and the fixed-effects model are used for businesses with the same sizes.

Bank concentration directly influences interest rates, which supports hypothesis  $H_2$ . This view holds that companies face higher financing costs as bank concentration increases. This conclusion is in line with that advocated by [Agostino and Trivieri \(2010\)](#) and [Bonini et al. \(2016\)](#). [Delis et al. \(2017\)](#) and [Wang et al. \(2020\)](#) present some counterarguments based on the information-based hypothesis. They argue that, in less concentrated markets, banks do not establish solid relationships or invest in obtaining information from smaller companies that are more informationally opaque. Banks will therefore charge higher interest rates to compensate for the perceived risk these companies represent.

Table 5 also suggests that bank-related power does not exert any significant influence on the cost of financing, i.e., the fact that a given bank has greater market power than the others does not affect interest rates. This assumption proves that hypothesis  $H_2$  cannot be validated. The data also suggest that banks with less market power do not necessarily have higher financing costs compared to those with greater control, and vice versa. In concentrated markets, banks can acquire historical information, which will help them reduce information asymmetries ([Hauswald and Marquez 2006](#); [Chauvet and Jacolin 2017](#); [Carbó-Valverde et al. 2009](#)). Conversely, a closer relationship between the banking institution and the company entails a decrease in financing costs. More intense relationships reduce both the markup and financing costs, particularly for smaller companies ([Bonini et al. 2016](#)).

The work of [Farinha and Santos \(2002\)](#) examines the factors that determine the increase in banking relationships among Portuguese companies and the reasons that cause them to switch from bilateral relationships to multilateral relationships, referring that (i) more profitable companies tend to increase the number of bank relationships to minimize hold-up costs, and (ii) companies facing financial difficulties seek to increase the number of bank relationships as a strategy to overcome the credit restrictions imposed by their main bank.

#### 4.3. Impact of Bank Concentration and of the Relative Power of Banks on Debt-to-Assets Ratio (DAR)

Table 6 presents the result of the estimated expressions (1) and (2), sorted by business size, using the fixed-effects model and Driscoll–Kraay standard errors. According to Table 6, bank concentration negatively conditions the debt-to-assets ratio, which suggests



that greater bank concentration leads to lower leverage. Consequently, the companies' financial structure will be stronger, which supports hypothesis  $H_3$ . The results are in line with the perspectives of Degryse et al. (2012) and Bikker and Spierdijk (2017) who advocate that, in bank-concentrated markets, companies primarily turn to self-financing, aligning with the pecking order theory that states that a company should prefer to finance itself internally through retained earnings.

**Table 6.** Impact of independent variables on the debt-to-assets ratio (DAR).

Independent Variable	Business Dimension	FE Model			Driscoll–Kraay Model		
		Coefficients	Robust Standard Error	<i>p</i> -Value	Coefficients	Drisc/Kraay Standard Error	<i>p</i> -Value
Bank Concentration	Micro-Enterprise	−8351.81	4405.732	0.058	−8351.81	3249.551	0.010 *
	Small-Sized Business	−0.2463276	0.2047333	0.229	−0.246327	0.1376364	0.074
	Medium Company	−0.1458864	0.1077418	0.176	−0.145886	0.0812153	0.072
	Big Company	−0.0200299	0.0033929	0.000 *	−0.020029	0.0011794	0.000 *
	Micro- and Small-Sized Business	−10164.31	4415.924	0.021 *	−10164.31	3186.39	0.001 *
	SMEs	−14903.06	5,544,453	0.007 *	−14903.06	4740.575	0.002 *
Bank-Related Power	Micro-Enterprise	−86.62807	65.04397	0.183	−86.62807	50.51778	0.086
	Small-Sized Business	0.0010729	0.0010008	0.284	0.0010729	0.000602	0.075
	Medium Company	−0.0003268	0.0006326	0.605	−0.000326	0.0007463	0.661
	Big Company	0.0001095	0.0000812	0.178	0.0001095	0.000365	0.003 *
	Micro- and Small-Sized Business	−92.54217	65.32136	0.157	−92.54217	50.09726	0.065
	SMEs	−134.3061	70.81504	0.058	−134.3061	67.07209	0.045 *

(\*) for results that are significant on a 5% basis.

Self-financing entails no associated financing costs and does not require the provision of guarantees. In bank-concentrated markets, the leverage ratio decreases as a result of the lower dependency on bank credit, or because small companies cannot face the financial costs of debt, a decision that is more than likely to increase their risk of bankruptcy (Pandey 2002). On the other hand, in the presence of information asymmetry, banks are more likely to invest in gathering business information and intensify banking relationships in order to increase credit availability and reduce restrictions and guarantees (González and González 2008).

When estimated using the fixed-effects model, bank-related power does not seem to have a statistically significant impact on the debt-to-assets ratio. Nevertheless, the estimation carried out using Driscoll–Kraay standard errors suggests that there is an inverse relationship between the structure of SMEs and bank-related power, which supports hypothesis  $H_3$ . However, a positive relationship is observed between bank-related power and the capital structure of large companies (jeopardizes the capital structure).

The results suggest that, in large companies, the relative power of banks contributes to higher levels of indebtedness. Its reduced influence on large companies may be associated with a lower reliance on bank credit, since these companies are capable of generating internal resources or accessing capital markets. The information provided by these companies and the low supervision costs borne by the banks facilitate indebtedness, which is generally induced by the trust-based relationship forged between the bank and the company. Smaller companies, in turn, experience an entirely distinct situation. They are more informationally opaque, and they have to face more significant restrictions and deal with a larger volume of guarantees required by the banks. This is a situation that clearly discourages indebtedness. On the other hand, the need to adapt and the commitment to provide more flexible credit conditions to support the business needs of those companies are challenges that banks have to face. The concentration of credit within a single bank reflects the company's loyalty to the bank and/or, alternatively, a strategy to avoid switching costs that is quite common in

smaller companies. The dominant position held by a bank within the market enables significant gains in information, particularly with larger companies. This will be fundamental to reducing credit risk.

#### 4.4. Impact of Bank Concentration and of Relative Power of Banks on ROA, IR, and DAR, Sorted by Year

Table 7 assesses the impact of bank concentration on return on assets (ROA), financing costs (IR), and debt structure (DAR), within the timeframe spanning the years from 2008 to 2018.

**Table 7.** Impact of bank concentration on dependent variables: annual review using the FE model.

Year	Bank Concentration								
	Return on Assets (ROA)			Interest Rate (IR)			Debt-to-Assets Ratio (DAR)		
	Coefficients	Robust Standard Error	p-Value	Coefficients	Robust Standard Error	p-Value	Coefficients	Robust Standard Error	p-Value
2008	−9.244864	13.90965	0.506	3.838775	3.288102	0.243	1511.738	1727.344	0.381
2009	−8.535076	6.256597	0.173	0.502289	0.5573841	0.368	−3771.982	1893.161	0.046 *
2010	−1.80818	3.929724	0.645	1.383204	0.8332707	0.097	−6275.349	2937.49	0.033 *
2011	1.348194	2.638778	0.609	6.264821	5.11251	0.220	−10,029.05	4504.103	0.026 *
2012	10.10118	6.498106	0.120	4.283053	1.845413	0.020 *	−16,308.43	6465.038	0.012 *
2013	3.628651	3.088965	0.240	3.594374	2.220384	0.105	−18,574.79	7285.686	0.011 *
2014	9.095324	4.350414	0.037 *	3.751572	1.870114	0.045 *	−20,429.37	7892.141	0.010 *
2015	9.431619	4.348199	0.030 *	2.217638	1.536301	0.149	−11,315.86	6000.312	0.059
2016	6.501354	2.920872	0.026 *	6.581209	3.10762	0.034 *	−12,642.01	5724.45	0.027 *
2017	2.988391	1.278761	0.019 *	0.300160	0.5397667	0.578	−8181.452	4165.649	0.050 *

(\*) for results that are significant on a 5% basis; 2007 and 2018 are omitted due to multicollinearity.

According to Table 7, there is no compelling evidence that, between 2008 and 2013, bank concentration influenced business profitability. However, from 2014 onwards, a significant and positive relationship is perceived. The data suggest that there is a direct correlation between bank concentration and profitability that started in 2014 and continued after the 2010–2013 crisis period, driven by a decrease in financial constraints and in the volume of guarantees required (Martins 2016). In bank-concentrated markets, banks have greater access to business information, and thus accessing credit becomes easier for companies, and productive investment increases. This leads to greater profitability.

Evidence also shows that bank concentration had a significant and positive impact on financing costs, in 2012, 2014, and 2016. During the 2008–2009 crisis, there was no evidence of any influence exerted by bank market concentration on the interest rate borne by companies. While the 2008–2009 crisis, which started in the USA, did not significantly affect interest rates, the 2010–2013 crisis showed a negative influence of bank concentration on financing conditions.

In 2014 and 2016, Portugal was still struggling to restore its economic stability. The data suggest that bank concentration during the periods spanning the years from 2009 to 2014, and from 2016 to 2017 led to a decrease in corporate leverage, associated with a greater perception of risk by the banking system and/or an increase in restrictions imposed on credit access (Rua 2017).

Table 8 shows the impact of bank-related power on the operating return on assets (ROA), financing costs (IR), and debt structure (DAR), for the period spanning the years from 2008 to 2018.

**Table 8.** The impact of bank-related power on dependent variables: annual review using the FE model.

Year	Bank-Related Power								
	Return on Assets (ROA)			Interest Rate (IR)			Debt-to-Assets Ratio (DAR)		
	Coefficients	Robust Standard Error	p-Value	Coefficients	Robust Standard Error	p-Value	Coefficients	Robust Standard Error	p-Value
2008	−0.1130145	0.0847292	0.182	6.277107	6.784592	0.355	5066.422	3748.542	0.177
2009	−0.1927135	0.1463825	0.188	0.0242111	0.7866838	0.975	−199.1742	2161.927	0.927
2010	−0.2184637	0.0906998	0.016 *	−0.3367994	1.199415	0.779	−3360.682	3383.588	0.321
2011	−0.0591263	0.0438212	0.177	9.341509	8.582431	0.276	−14,430.36	8511.365	0.090
2012	0.0266162	0.0566628	0.639	4.167491	2.298249	0.070	−30,970.28	15,246.61	0.042 *
2013	0.1981546	0.0640628	0.002 *	6.04311	3.747088	0.107	−37,666.07	18,080.62	0.037 *
2014	−0.1130145	0.0847292	0.182	4.930809	3.007807	0.101	−39,831.11	18,888.79	0.035 *
2015	−0.1927135	0.1463825	0.188	3.102814	2.159887	0.151	−17,652.1	10,615.02	0.096
2016	−0.2184637	0.0906998	0.016 *	4.991077	3.409368	0.143	−25,034.93	11,977.62	0.037 *
2017	−0.0591263	0.0438212	0.177	−1.496164	1.518812	0.325	−12,941.57	7262,841	0.075

(\*) for results that are significant on a 5% basis; 2007 and 2018 are omitted due to multicollinearity.

The estimation results reveal that bank-related power conditioned business performance in 2010, 2013, and 2016. In 2010, the onset of the crisis in Portugal (3rd quarter), the Portuguese economy was still relatively stable. The period spanning from 2013 to 2016 reflects enduring post-crisis impacts (Rua 2017). The positive influence of bank-related power, witnessed in 2013, is associated with the strengthening of banking relationships and the improvement of contractual conditions. The banking system was doing its best to make sure that companies could fulfill their debt service obligations by encouraging the establishment and management of banking relationships. In times of crisis, the banking relationships tend to become increasingly polarized, prompting the most exposed banks to solidify their relationships, and intensify corporate supervision and control to mitigate the risk of corporate insolvency.

The data reveal that, as of now, there is no evidence of a significant influence of bank-related power on financing costs. Regardless of banks' greater or lesser relative power over companies, it became evident that interest rates were not conditioned by this factor. The entire system was subject to more restrictive budgetary policies and higher interest rates (Rua 2017).

Finally, the results show compelling evidence that a greater relative power of banks negatively affects the level of indebtedness, which will result in a positive impact on firms' capital structure. Since smaller companies are more exposed to financial constraints and are required to provide more guarantees, their access to bank financing is more complex. However, these difficulties contribute to a stronger capital structure. During periods of financial distress, one of the primary objectives of the banking system is to make contractual conditions more flexible to allow companies to comply with their debt service obligations.

## 5. Conclusions

This research aims to assess the influence of bank concentration and the relative power of banks on firm performance, financing costs, and capital structure. This study covers an extended time frame (spanning the years from 2006 to 2018) characterized by two periods of crisis, the subprime crisis (2008 and 2009) and the sovereign debt crisis (from 2010 to 2013) that conditioned the activity of Portuguese companies.

The data sample, consisting of 2,669,785 observations, was collected from Banco de Portugal and analyzed using statistical inference techniques, such as static panel data methods (fixed-effects model), the pooled OLS model, with robust standard errors, and regression with Driscoll–Kraay standard errors.

The results suggest a positive impact of bank concentration on the business performance of micro-enterprise and SMEs. Since micro-enterprise and SMEs are more informa-

tionally opaque and entail greater credit risk, banks operating in concentrated markets have more incentives to invest in collecting customer-specific information. This endeavor will ensure greater assistance, supervision, and control, ultimately contributing to the improvement of business performance.

On the other hand, since companies tend to establish privileged relationships with a limited number of banks, bank concentration does not seem to represent a significant constraint on firm performance for the remaining companies. However, during the years of the financial crisis, it was noted that one of the primary objectives of companies and banks wielding greater relative market power was to maintain relationships to minimize potential negative impacts and enhance business performance, which happened in the post-crisis period (after 2014).

The analysis also reveals that bank concentration increases the debt burden borne by companies and that bank-related power has been statistically insignificant during the period under analysis. Irrespective of the relative influence that banks hold in the financing of Portuguese companies, these still have to face high costs. It is widely accepted that, in bank-concentrated markets, companies often depend on one or two banks, which allows banking institutions to charge higher interest rates. This trend extends into the period of the sovereign debt crisis (2010–2013) and the subsequent years.

Finally, Portuguese companies operating in bank-concentrated markets tend to improve their capital structure as indebtedness decreases (bank concentration variable). Micro-enterprise and SMEs subjected to greater funding restrictions are highly informationally opaque and granted limited guarantees. This often forces them to resort to self-financing and only turn to bank debt as a last resort. Consequently, banks with greater banking power find it more difficult to adapt and offer flexible loans to companies, as SMEs rely less on bank financing, thereby conditioning bank-company relationships. In contrast, when considering bank-related power, large companies have access to higher financing capacity. Perhaps, those with high self-financing capacity are free from the constraints faced by SMEs when they resort to the banking system. When a company establishes relationships with a creditor wielding greater relative power, this relationship can influence its capital structure. These companies maintain their loyalty to a bank and may, consequently, have to bear higher costs due to informational monopolies and increased difficulties in switching banks.

This research aims to contribute to the existing literature by providing empirical evidence of the impact of bank concentration and of the relative power of banks—Bank-Related Power, a new variable introduced in this study—on business performance, financing costs, and debt structure. This sort of information is, unequivocally, of utmost relevance to all stakeholders. On the other hand, given the scarcity of studies focusing on the Portuguese reality, our investigation makes an additional contribution: it provides significant results and relevant information about the pivotal role played by bank relationships in shaping business activity.

### *5.1. Theoretical Implications*

This study offers several theoretical contributions to the existing literature. Firstly, we use a wide range of firm characteristics and introduce a new variable, bank-related power, to assess bank relationships. Secondly, the study contributes to a better understanding of the importance of bank relationships in the performance of smaller companies. Finally, we examine how the subprime crises (2008–2009) and the sovereign crises (2010–2013) influenced banking relationships and business activity.

### *5.2. Practical Implications*

This study makes various contributions to different stakeholders. It matters to Portuguese companies, because it analyses the impact of certain characteristics of the banking system (bank concentration and relative power of banks) on business performance (profitability, cost of debt, and capital structure). It enables managers to improve business policies and understand the impact that their decisions have on business performance.

It helps business leaders clarify the importance of the relationship between bank market power and the different dimensions of business activity. It can also be of great significance for both current and potential shareholders, as banking relationships enhance corporate value creation. The financial difficulties faced by certain companies are deeply influenced by the decisions and actions of political decision-makers, business partners, suppliers, customers, and public authorities. Reducing information barriers between SMEs and lenders is another vital area that demands the undivided attention of policymakers, especially if they genuinely want to assist financial institutions in achieving a more effective allocation of their funds. A more complete/deeper understanding of the current context can help improve future circumstances.

Secondly, to the best of our knowledge, this study stands as a pioneer in introducing a novel indicator used for assessing banking relationships in the context of Portuguese companies.

Finally, through this work, scholars, researchers, and professionals will gain a more comprehensive understanding of the current state of the art of a subject that addresses the context of a small economy. Drawing inspiration from this study, they will be capable of introducing new and innovative approaches and contributing to the evolution of an increasingly relevant topic in corporate finance.

### 5.3. Limitations and Avenues for Future Research

The primary limitation of this study stems from the difficulty in accessing corporate information from the Banco de Portugal, due to the General Data Protection Regime and the confidentiality terms in force. These constraints have also limited the development of a more exhaustive analysis of the data collected.

This study focuses on a period marked by financial instability, as it spans some of the biggest financial crises that ever occurred. Future research studies should consider a similar analysis but expand its scope to include other geographic and temporal contexts, and use other indicators and variables, such as credit contract conditions. Furthermore, future studies should use dynamic panel data models to complement the findings presented in this study.

**Author Contributions:** Conceptualization, M.P.G., P.M.N.R. and A.P.P.; methodology, M.P.G., P.M.N.R. and A.P.P.; software, M.P.G., P.M.N.R. and A.P.P.; validation, M.P.G., P.M.N.R. and A.P.P.; formal analysis, M.P.G., P.M.N.R. and A.P.P.; investigation, M.P.G., P.M.N.R. and A.P.P.; resources, M.P.G., P.M.N.R. and A.P.P.; data curation, M.P.G., P.M.N.R. and A.P.P.; writing—original draft preparation, M.P.G., P.M.N.R. and A.P.P.; writing—review and editing, M.P.G., P.M.N.R. and A.P.P.; visualization, M.P.G., P.M.N.R. and A.P.P.; supervision, P.M.N.R. and A.P.P.; project administration, M.P.G., P.M.N.R. and A.P.P.; funding acquisition, P.M.N.R. and A.P.P. All authors have read and agreed to the published version of the manuscript.

**Funding:** This work is funded by National Funds through the FCT—Foundation for Science and Technology, I.P., within the scope of the project Ref. UIDB/05583/2020. Furthermore, we would like to thank the Research Center in Digital Services (CISeD) and the Instituto Politécnico de Viseu for their support. Furthermore, we would like to thank the Banco de Portugal Microdata Research Laboratory—BPLIM: Project ID: SE\_P097.

**Informed Consent Statement:** Not applicable.

**Data Availability Statement:** Restricted access to the Bank of Portugal Microdata Research Laboratory (BPLIM).

**Conflicts of Interest:** The authors declare no conflict of interest.

## References

- Abdullah, Hariem, and Turgut Tursoy. 2021. Capital structure and firm performance: Evidence of Germany under IFRS adoption. *Review of Managerial Science* 15: 379–98. [\[CrossRef\]](#)
- Agoraki, Maria Eleni, Georgios Kouretas, and Anastassios Tsamis. 2021. The determinants of performance in the Eurozone banking sector: Core versus periphery Eurozone economies. *International Journal of Finance & Economics* 26: 416–29.



- Agostino, Mariarosaria, and Francesco Trivieri. 2010. Is banking competition beneficial to SMEs? An empirical study based on Italian data. *Small Business Economics* 35: 335–55. [CrossRef]
- Aguinis, Herman, Ryan Gottfredson, and Harry Joo. 2013. Best-practice recommendations for defining, identifying, and handling outliers. *Organizational Research Methods* 16: 270–301. [CrossRef]
- Álvarez, Roberto, and Mauricio Jara. 2016. Banking competition and firm-level financial constraints in Latin America. *Emerging Markets Review* 28: 89–104. [CrossRef]
- Arellano, Manuel. 1987. PRACTITIONERS' CORNER: Computing Robust Standard Errors for Within-groups Estimators\*. *Oxford Bulletin of Economics and Statistics* 49: 431–34. [CrossRef]
- Banco de Portugal. 2017. Financial Inclusion and Education Initiatives—3rd Meeting of Central Banks of Portuguese Speaking Countries (N. 1; p. 67). Available online: [https://www.bcplp.org/sites/default/files/2018-09/3EncontroBCPLP\\_InclusaoFormacaoFinanceira2017.pdf](https://www.bcplp.org/sites/default/files/2018-09/3EncontroBCPLP_InclusaoFormacaoFinanceira2017.pdf) (accessed on 12 July 2018).
- Banco de Portugal. 2019. Sector Tables and Company and Sector Tables—Central Balance Sheet Studies (N. 36; p. 86). Available online: [https://www.bportugal.pt/sites/default/files/flexpapers/2024100/docs/estudo\\_36\\_cb\\_2019\\_v2.pdf?reload=1578401603794](https://www.bportugal.pt/sites/default/files/flexpapers/2024100/docs/estudo_36_cb_2019_v2.pdf?reload=1578401603794) (accessed on 10 May 2019).
- Banco de Portugal. 2021. Bank Credit Market Survey—Results for Portugal July 2021 (N. 1; p. 38). Available online: [https://www.bportugal.pt/sites/default/files/anexos/pdf-boletim/results\\_jul2021\\_pt.pdf](https://www.bportugal.pt/sites/default/files/anexos/pdf-boletim/results_jul2021_pt.pdf) (accessed on 10 July 2021).
- Banco de Portugal. 2022. Portuguese Banking System: Recent Developments -1st Qtr. 2022 (p. 5). Available online: [https://www.bportugal.pt/sites/default/files/anexos/pdf-boletim/sistemabancario2022t1\\_pt.pdf](https://www.bportugal.pt/sites/default/files/anexos/pdf-boletim/sistemabancario2022t1_pt.pdf) (accessed on 20 March 2022).
- Bank of Portugal Microdata Research Laboratory (BPLIM). 2019. *Central Credit Responsibility—Firm Level Data*. Extraction: June 2019 (Version V1) [Data set]. Lisbon: Bank of Portugal—BPLIM. [CrossRef]
- Beck, Thorsten, Asli Demirgüç-Kunt, and Vojislav Maksimovic. 2005. Financial and Legal Constraints to Growth: Does Firm Size Matter? *The Journal of Finance* 60: 137–77. [CrossRef]
- Bell, Andrew, Malcom Fairbrother, and Kelvyn Jones. 2019. Fixed and random effects models: Making an informed choice. *Quality & Quantity* 53: 1051–74. [CrossRef]
- Berger, Allen, and Gregory Udell. 1995. Relationship lending and lines of credit in small firm finance. *Journal of Business* 68: 351–81. [CrossRef]
- Berger, Allen. 1995. The Profit-Structure Relationship in Banking--Tests of Market-Power and Efficient- Structure Hypotheses Author. *Journal of Money, Credit and Banking* 27: 404–31. [CrossRef]
- Berger, Allen, Asli Demirgüç-Kunt, Ross Levine, and Joseph G. Haubrich. 2004. Bank Concentration and Competition: An Evolution in the Making. *Journal of Money, Credit and Banking* 36: 433–51. Available online: <http://www.jstor.org/stable/3838945> (accessed on 12 April 2021). [CrossRef]
- Bikker, Jacob, and Laura Spierdijk. 2017. *Handbook of Competition in Banking and Finance*. Cheltenham: Edward Elgar Publishing.
- Bolt, Wilco, and David Humphrey. 2015. A frontier measure of US banking competition. *European Journal of Operational Research* 246: 450–61. [CrossRef]
- Bonini, Stefano, Aalberto Dell'Acqua, Matteo Fungo, and Vlado Kysucky. 2016. Credit market concentration, relationship lending and the cost of debt. *International Review of Financial Analysis* 45: 172–79. [CrossRef]
- Bolton, Patrick, and David Scharfstein. 1996. Optimal debt structure and the number of creditors. *Journal of Political Economy* 104: 1–25. [CrossRef]
- Boot, Arnoud. 2000. Relationship Banking: What Do We Know? *Journal of Financial Intermediation* 9: 7–25. [CrossRef]
- Boot, Arnoud, and Anjan Thakor. 2000. Can Relationship Banking Survive Competition? *The Journal of Finance* 55: 679–713. [CrossRef]
- Boot, Arnoud W., Stuart Greenbaum, and Anjan Thakor. 1993. Reputation and discretion in financial contracting. *The American Economic Review* 83: 1165–83.
- Carbó-Valverde, Santiago, Francisco Rodríguez-Fernández, and Gregory F. Udell. 2009. Bank market power and SME financing constraints. *Review of Finance* 13: 309–40. [CrossRef]
- Chauvet, Lisa, and Luc Jacolin. 2017. Financial Inclusion, Bank Concentration, and Firm Performance. *World Development* 97: 1–13. [CrossRef]
- Chu, Yonggian, and Zenguang Li. 2022. Banking relationship, information reusability, and acquisition loans. *Journal of Banking & Finance* 138: 106449. [CrossRef]
- Degryse, Hans, and Steven Ongena. 2001. Bank Relationships and Firm Profitability. *Financial Management* 30: 9–34. [CrossRef]
- Degryse, Hans, Peter de Goeij, and Peter Kappert. 2012. The impact of firm and industry characteristics on small firms' capital structure. *Small Business Economics* 38: 431–47. [CrossRef]
- Delis, Manthos, Sotirios Kokas, and Steven Ongena. 2017. Bank Market Power and Firm Performance. *Review of Finance* 21: 299–326. [CrossRef]
- Dell'Ariccia, Giovanni. 2001. Asymmetric information and the structure of the banking industry. *European Economic Review* 45: 1957–80. [CrossRef]
- Farinha, Luisa, and João Santos. 2002. Switching from single to multiple bank lending relationships: Determinants and implications. *Journal of Financial Intermediation* 11: 124–51. [CrossRef]
- Freixas, Xavier. 2005. Deconstructing relationship banking. *Economic Investigations* 29: 3–31.
- Gallup, John Luke. 2020. Added-variable plots for panel-data estimation. *The Stata Journal* 20: 30–50.

- Giroud, Xavier, and Holger Mueller. 2010. Does corporate governance matter in competitive industries? *Journal of Financial Economics* 95: 312–31. [CrossRef]
- González, Victor, and Francisco González. 2008. Influence of bank concentration and institutions on capital structure: New international evidence. *Journal of Corporate Finance* 14: 363–75. [CrossRef]
- Gun, Musa. 2020. *Financial Service: Banking and Finance*. Lyon: Livre de Lyon. ISBN 978-2-38236-069-9.
- Gupta, Vishal. 2021. *Small Business: Creating Value Through Entrepreneurship*. Hoboken: John Wiley & Sons.
- Han, Liang, Song Zhang, and Francis Greene. 2015. Bank market concentration, relationship banking, and small business liquidity. *International Small Business Journal* 35: 365–84. [CrossRef]
- Hasan, Iftekhhar, Liuling Liu, Haizhi Wang, and Xinting Zhen. 2017. Bank Market Power and Loan Contracts: Empirical Evidence. *Economic Notes* 46: 649–76. [CrossRef]
- Hauswald, Robert, and Robert Marquez. 2006. Competition and Strategic Information Acquisition in Credit Markets. *The Review of Financial Studies* 19: 967–1000. [CrossRef]
- Hedges, Larry, and Jack Vevea. 1998. Fixed- and Random-Effects Models in Meta-Analysis. *Psychological Methods* 3: 486–504. [CrossRef]
- Hart, Oliver. 1995. Corporate governance: Some theory and implications. *The Economic Journal* 105: 678–89. [CrossRef]
- Jensen, Michael, and William Meckling. 1976. Theory of the firm: Managerial behavior, agency costs and ownership structure. *Journal of Financial Economics* 3: 305–60. [CrossRef]
- Kherif, Ferath, and Adelyia Latypova. 2020. Chapter 12—Main component analysis. In *Machine Learning*. Edited by A. Mechelli and S. Vieira. Cambridge: Academic Press, pp. 209–25. [CrossRef]
- Koetter, Michael, James Kolari, and Laura Spierdijk. 2012. Enjoying the quit life under deregulation? Evidence from adjusted Lerner Indices for U.S banks. *The Review of Economics and Statistics* 94: 462–80. [CrossRef]
- Lapteacru, Ion. 2014. Do more competitive banks have less market power? The evidence from Central and Eastern Europe. *Journal of International Money and Finance* 46: 41–60. [CrossRef]
- Martins, Fernando. 2016. The reaction of Portuguese companies to the economic and financial crisis: Main shocks and adjustment channels. *Journal of Economic Studies* 2: 1–25.
- Meslier, Celine, Alain Sauviat, and Dian Yuan. 2020. Comparative advantages of regional versus national banks in alleviating SME's financial constraints. *International Review of Financial Analysis* 71: 18. [CrossRef]
- Nickell, Stephen, and Daphne Nicolitsas. 1999. How does financial pressure affect firms? *European Economic Review* 43: 1435–56. [CrossRef]
- Pandey, I. M. 2002. Capital Structure and Market Power Interaction: Evidence from Malaysia (SSRN Scholarly Paper No. 322700). Available online: [https://papers.ssrn.com/sol3/papers.cfm?abstract\\_id=322700](https://papers.ssrn.com/sol3/papers.cfm?abstract_id=322700) (accessed on 20 March 2022).
- Pesaran, Hashem. 2015. *Time Series and Panel Data Econometrics*. Oxford: Oxford University Press.
- Petersen, Mitchell, and Raghuram Rajan. 1995. The effect of credit market competition on lending relationships. *The Quarterly Journal of Economics* 110: 407–43. [CrossRef]
- Pinto, António. 2013. Banking Relations, Corporate Governance and Performance. Ph.D. dissertation, Faculty of Economics—University of Coimbra, Coimbra, Portugal; p. 301. Available online: <https://estudogeral.uc.pt/handle/10316/23207> (accessed on 20 March 2022).
- PORDATA, I. Lisboa. 2021. Small and Medium-Sized Enterprises as a % of Total Enterprises: Total and by Size. March 29. Available online: <https://www.pordata.pt/Portugal/Small+and+m%C3%A9dias+companies+in+percentage+of+total+of+companies+total+and+by+dimens%C3%A3o-2859> (accessed on 20 July 2021).
- Rabe-Hesketh, Sophia, and Anders Skrondal. 2008. *Multilevel and Longitudinal Modeling Using Stata*, 2nd ed. College Station: STATA Press.
- Rua, António. 2017. Dating the Portuguese business cycle. *Revista de Estudos Económicos do Banco de Portugal*, 60–61.
- Schjelderup, Guttorm. 2016. The tax sensitivity of debt in multinationals: A review. *International Journal of the Economics of Business* 23: 109–21. [CrossRef]
- Serrasqueiro, Zélia, and Paulo Maças Nunes. 2012. Is age a determinant of SMEs' financing decisions? Empirical evidence using panel data models. *Entrepreneurship Theory and Practice* 36: 627–54. [CrossRef]
- Smirlock, Michael. 1985. Evidence on the (Non) Relationship between Concentration and Profitability in Banking. *Journal of Money, Credit and Banking* 17: 69–83. [CrossRef]
- Spierdijk, Laura, and Michalis Zaouras. 2017. The Lerner index and revenue maximization. *Applied Economics Letters* 24: 1075–79. [CrossRef]
- Sulaiman, Abdulwah, Barde Embugus, and Usman Aliyu. 2019. Effect of Herfindahl-Hirschman Index on Capital Structure and Financial Performance of listed Firms in Nigeria. *Dutse International Journal of Social and Economics Research* 3: 1–206.
- Sullivan, Joe Warkentin, and Linda Wallace. 2021. So many ways for assessing outliers: What really works and does it matter? *Journal of Business Research* 132: 530–43. [CrossRef]
- Topcu, Mert, and Omer Serkan Gulal. 2020. The impact of COVID-19 on emerging stock markets. *Finance Research Letters* 36: 101691. [CrossRef]
- Vives, Xavier. 2019. Competition and stability in modern banking: A post-crisis perspective. *International Journal of Industrial Organization* 64: 55–69. [CrossRef]

- Wang, Xiaodong, Liang Han, and Xing Huang. 2020. Bank competition, concentration and EU SME cost of debt. *International Review of Financial Analysis* 71: 20. [CrossRef]
- Wooldridge, Jeffrey. 2003. Cluster-Sample Methods in Applied Econometrics. *The American Economic Review* 93: 133–38. [CrossRef]
- Yoshino, Naoyuki, and Farhad Taghizadeh-Hesary. 2018. The Role of SMEs in Asia and Their Difficulties in Accessing Finance. *ADB Working Paper* 911: 22. Available online: <https://www.adb.org/publications/role-smes-asia-and-their-difficulties-accessing-finance> (accessed on 24 May 2020).
- Zivot, Eric, and Jiahui Wang. 2013. *Modeling Financial Time Series with S-PLUS*. New York: Springer Science & Business Media.

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